SECTION 051200 – STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:

1. Fabrication and erection of structural steel framing members, support members, bracing members and connections.
2. Base plates, leveling plates, anchor bolts, leveling nuts, shear stud connectors, deformed bars welded to structural steel, and bolts.
3. Grouting under base plates.
4. Shop painting

B. Products furnished but not installed under this section:

1. Steel anchorages cast in concrete.
2. Steel anchorages embedded in masonry.

C. Related Sections:

1. Division 05 Section "Steel Decking".

1.2 REFERENCES

A. General:

1. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the work. Where differences exist between codes and standards, the one affording the greatest protection shall apply.

B. American Welding Society:

1. AWS D1.1 - Structural Welding Code
2. AWS D1.8 -Structural Welding Code -Seismic Supplement

C. American Institute of Steel Construction (AISC):

1. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges
2. AISC 340 - Seismic Provisions for Structural Steel Buildings
3. AISC 360 - Specification for Structural Steel Buildings
4. AISC - Steel Construction Manual
5. RCSC -Research Council on Structural Connections "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts

1.3 DEFINITIONS

A. Unless otherwise specifically approved in writing, furnish exact sections, weights, and kinds of material specified, using details and dimensions shown.

B. Not all connections are detailed; similar details apply to similar conditions, unless otherwise indicated. Contact the engineer promptly to verify design of members or connections in any situation where design requirements are unclear.

1.4 SUBMITTALS

A. Shop drawings for structural steel fabrications shall be submitted for review prior to fabrication, including:

1. Complete fabrication and erection plans and procedures giving full information on aspects of the erection which will affect alignment, plumb and dimensional accuracy of the structure.
2. Connections including size and spacing of bolts and welds.
3. Indicate profiles, sizes, spacing, and locations of structural members, openings, camber and attachments. Indicate welded connections with AWS welding symbols. Indicate net weld lengths. Details of welding materials, equipment, sequence and technique to be used.
4. The contractor shall survey, review and confirm existing conditions prior to developing shop drawings.
5. The fabricator is responsible for the adequacy of any connections designed by the fabricator to performance standards established in the contract documents. Approval of shop drawings does not relieve the fabricator of this responsibility.
6. No portion of the contract drawings shall be reproduced for use as shop drawings.
7. Electronic drawing files of the contract documents will not be provided to the contractor for use in shop drawing preparation for any trade.

B. Manufacturer's Certificate: Submit certification that manufactured products (including bolts, nuts and washers) meet or exceed specified requirements.

C. Product data: Submit certification that manufactured products meet or exceed specified requirements.

1. Weld filler material including filler metal Charpy V-Notch test values, electrodes, fluxes and shield gases.
2. Prime paint.
3. Welded studs.

D. Mill Test Reports: Submit mill test reports indicating structural strength, destructive and nondestructive test analysis and chemical analyses from each heat of steel used in the work.

1.5 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC specifications.

B. Welders shall be qualified in accordance with AWS D1.1 for each process, position and joint configuration.

C. Survey anchor bolts for location and elevation prior to casting concrete.

D. The design of connections not detailed on the Drawings shall be under the direct supervision of a Structural Engineer experienced in design of this work.

1.6 DELIVERY, STORAGE AND HANDLING

A. Shipping: Deliver steel in timely fashion, to permit the most efficient and economical flow or work. Deliver steel members properly marked for field assembly and erection.

1. Deliver anchor bolts, washers, and other anchorage devices to be built into other work in time to avoid delays and permit their proper installation.

B. Storage: Protect steel and other materials of this section from damage and corrosion. If temporary storage at the project site is required, keep steel members off the ground, using platforms or pallets, in a location easily accessible for inspection

PART 2 - PRODUCTS

3.1 MATERIALS

A. Structural Steel Members: ASTM A992

B. Plate, bars and channels: ASTM A36 unless otherwise noted on the drawings.

C. Structural Tubing: ASTM A500, Grade B

D. Pipe: ASTM A53, Grade B

E. Shear Stud Connectors: ASTM A108. Connectors shall be free of defects, cracks or bursts deeper than half the thickness from the periphery of the head to the shaft. After welding, studs will be the length shown on the drawings.

F. Bolts and Nuts: Bolts in structural steel connections shall be ASTM A325 unless designated as A490 on the drawings. Nuts shall be ASTM A563 Grade C or DH. Bolts conforming ASTM A307 and nuts conforming to ASTM A563 may be used in stair, handrail, miscellaneous steel and timber connections.

G. Direct Tension Indicators: ASTM F959

H. Tension Control Structural Bolts: ASTM F1852 or ASTM F2280

I. Washers shall be flat and either circular, square or rectangular conforming to ASTM F436 Type 1. The finish of washers is to match the nut. A325 bolts shall have washers under the head and A490 bolts shall have hardened washers under the head and the nut.

J. Anchor Bolts: ASTM F1554 36 ksi yield strength, unless otherwise designated on the drawings.

K. Welding Materials: Filler metals shall conform to Table 4.1 of AWS D1.1. Electrodes and equipment settings shall be as recommended by the filler metal manufacturer for the position, thickness and conditions of use. electrodes and filler metal shall be low hydrogen types.

L. Grout: ASTM C1107, Grade B non-shrink, non-metallic prepackaged grout requiring only the addition of water.

M. Shop and Touch-Up Primer: Fast-curing, lead and chromate-free, VOC-compliant, universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with performance requirements of FS TT-P-664, or equivalent.

3.2 CONNECTIONS

A. Unless otherwise noted on the drawings, shop connections shall be welded and field connections shall be bolted. Weld only in accordance with approved welding procedures.

B. Unless otherwise noted on the drawings, bolted connections shall be 3/4-inch diameter A325-N; connections shall have a minimum of two bolts. Shoulder bolts with hex nut and lock washers shall be used in slotted connections with the washer covering the slot in positions.

C. Unless connections are detailed on the drawings, the contractor is responsible for the design of connections.

D. All elements of a connection shall be designed to resist the loads and moments shown on the drawings; if the reaction or load is not shown on the drawings, connections are to be designed as follows:

1. Beam connections are to be designed to resist one half the allowable load for the appropriate span given in the Tables 3-6 through 3-9 in the AISC Manual of Steel Construction.
2. Composite Beam connections are to be designed to resist three quarters of the allowable load for the appropriate span given in the Tables 3-6 through 3-9 in the AISC Manual of Steel Construction.
3. Beam connections shall be in accordance with the AISC Manual of Steel Construction. The minimum connection angle length will be half the depth of the beam depth.
4. Oversize holes for anchor bolts may be used with field welded washer plates.

3.3 FABRICATION

A. Fabricate structural steel in accordance with the applicable provisions of the AISC Specifications for Structural Steel Buildings. Where practical, fabricate and assemble in the shop.

B. Obtain field measurements necessary for steel fabrication.

C. Perform high strength shop bolting in accordance with the appropriate ASTM specification. Complete high strength shop bolting before welding.

D. Where milling is indicated on the drawings, the contact surfaces shall be machined true to obtain full and complete contact.

E. Shear studs shall not be installed in the shop.

3.4 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP-2

B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, in contact with concrete, within 3 inches of field welds, or on the faying surface of high strength bolted friction connections.

C. Galvanize structural steel members indicated on the drawings as galvanized in accordance with ASTM A123 and A385 after fabrication. Prepare galvanized surfaces to be painted in accordance with ASTM D2092 and shop coat with a compatible primer. Repair damaged galvanizing in accordance with ASTM A780.

3.5 SHOP QUALITY CONTROL

A. Shop bolted connections: Comply with testing and verification procedures in AISC "Specifications for Structural Joints Using ASTM A325 or A490 Bolts."

B. Shop welded connections: Inspect and test shop-fabricated welds as follows:

1. Visually inspect all welds.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Beginning of installation indicates contractor accepts that existing conditions meet the requirements for installation.

3.2 PREPARATION

A. Provide anchor bolts and other items embedded in concrete.

B. Furnish and install temporary supports and internal braces necessary to support structural steel during erection. Temporary supports and braces shall be adequate for anticipated wind, seismic, equipment and erection loads. Remove temporary shoring after the steel erection is complete.

C. After completion of welds, remove weld tabs (spillage dams) in accordance with AWS D1.1 provisions for dynamically loaded structures. After completion of full penetration groove welds, remove backing bars in accordance with AWS D1.1 provisions for dynamically loaded structures, inspect the weld and reinforce the groove weld with a fillet weld.

3.3 ERECTION

A. Erect structural steel in accordance with the AISC Specifications for Structural Steel Buildings.

B. Perform high strength bolting in accordance with the appropriate ASTM specification. Complete high strength bolting before field welding.

C. Do not field cut or alter structural members without approval of the engineer.

D. Column bases and bearing plates:

1. Clean concrete bearing surfaces from bond-reducing materials, and roughen if necessary to improve bond to surfaces.
2. Clean the bottom surface of base plate.
3. Set base plate on wedges or other adjustable devices.
4. After the base plate has been positioned and plumbed, tighten the anchor bolts. Pack grout solidly between the bearing surfaces to ensure that no voids remain.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. High strength field bolts will be subject to inspection.

D. Testing agency will report inspection results promptly and in writing to contractor and Architect

E. Remove and replace work that does not comply with specified requirements.

F. Additional inspecting, at contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5 REPAIRS AND PROTECTION

A. Touch Up Painting: Following installation, promptly clean, prepare, and prime field connections, rust spots, and abraded surfaces.

1. Clean and prepare surfaces by hand tool cleaning, SSPC-SP 2, or power tool cleaning, SSPC-SP 3.
2. Apply a compatible primer of the same type as the shop primer used on adjacent surfaces.

END OF SECTION 051200

SECTION 053100 – STEEL DECKING

PART 1- GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Roof deck.
2. Composite floor deck.
3. Non-Composite form deck.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for concrete fills.
2. Division 5 Section "Structural Steel" for field-welded shear connectors.

1.2 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

C. Product Certificates: For each type of steel deck, signed by product manufacturer.

D. Welding certificates.

E. 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. Screw fasteners.

1.3 QUALITY ASSURANCE

A. Codes and Standards:

1. AISI "North American Specification for the Design of Cold-Formed Steel Structural Members."
2. SDI "Design Manual for Floor and Roof Decks."
3. SDI "Diaphragm Design Manual."

B. Manufacturer Qualifications: Member in good standing of Steel Deck Institute (SDI).

C. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.

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

1.4 DELIVERY, STORAGE, AND HANDLING.

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products manufactured by Nucor Corp.; Vulcraft Division or one of the following:

1. Canam Steel Corporation; The Canam Group.
2. Epic Metals Corporation.
3. New Millennium Building Systems, LLC.
4. Wheeling Corrugating Company; Wheeling-Pittsburgh Steel Corporation.

2.2 ROOF DECK

A. Steel Roof Deck: Fabricate panels to comply with "SDI Specifications and Commentary for Steel Roof Deck," and with the following:

1. Deck Profile: As noted on drawings.
2. Profile Depth: As noted on drawings.
3. Design Steel Thickness: As noted on drawings.
4. Prime-Painted Steel Sheet: ASTM A1008, Structural Steel (SS), Grade 33 minimum, cleaned, pretreated, and painted in accordance with manufacturer's standard baked-on, rust inhibitive primer.
5. Color: Gray
6. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33 minimum, ASTM A 924 G60 zinc coating.
7. Span Condition: Triple span or more where practical.
8. Side Laps: Lapped.

2.3 COMPOSITE FLOOR DECK

A. Composite Steel 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," with the minimum section properties indicated, and with the following:

1. Deck Profile: As noted on drawings.
2. Profile Depth: As noted on drawings.
3. Design Steel Thickness: As noted on drawings.
4. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33 minimum, ASTM A 924 G60 zinc coating.
5. Span Condition: Triple span or more where practical.

2.4 NON-COMPOSITE FORM DECK

A. Non-Composite Steel Form Deck: Fabricate ribbed-steel sheet non-composite form-deck panels to comply with "SDI Specifications and Commentary for Non-Composite Steel Form Deck," with the minimum section properties indicated, and with the following:

1. Deck Profile: As noted on drawings.
2. Profile Depth: As noted on drawings.
3. Design Steel Thickness: As noted on drawings.
4. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33 minimum, ASTM A 924 G60 zinc coating.
5. Span Condition: Triple span or more where practical.
6. Side Laps: Lapped.

2.5 ACCESSORIES

A. General: Provide manufacturer's standard roof or floor accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0358 inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of thickness and profile as recommended by SDI for overhang and slab depth, 16 GA minimum.

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

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

I. Galvanizing Repair Paint: ASTM A780 with dry film containing a minimum of 94 percent zinc dust by weight.

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

A. Install deck panels and accessories according to applicable specifications and commentary in SDI manual, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.

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

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

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

F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

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

H. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:

1. Weld Diameter: 5/8 inch, nominal.
2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches apart in the field of roof and 6 inches apart in the roof corners and perimeter

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. 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 of 1-1/2 inches with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

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

E. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 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: 3/4 inch, 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.
3. Weld Washers: Provide weld washers when deck metal thickness is less than .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:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. 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 of 1-1/2 inches with end joints as follows:

1. End Joints: Butted.

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.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation and apply repair paint.

END OF SECTION 053100

SECTION 054000 – COLD FORMED STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Load bearing and non-load bearing metal wall framing.
2. Metal floor and ceiling joist framing.
3. Prefabricated metal roof trusses.
4. Formed steel sections, 14 gauge and lighter, for use as bracing, bridging, tracks, furring and fastening.

1.2 REFERENCES

A. AISI "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. AISI "Standard for Cold-Formed Steel Framing General Provisions."

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer, fabricate, and erect cold formed steel framing and connections to withstand design loads within limits and under conditions required.

1. Floor framing members shall withstand design loads without vertical deflections greater than 1/360 of the span.
2. Roof framing members shall withstand design loads without vertical deflections greater than 1/240 of the span.
3. Wall framing members shall withstand design loads without horizontal deflections greater than 1/360 of the span.
4. Wall framing members supporting masonry veneer shall withstand design loads without horizontal deflections greater than 1/600 of the span.

B. Design framing systems to accommodate movement of the structural framing without damage or overstress to members, connections or sheathing.

C. Engineering Responsibility: Engage a cold formed steel framing manufacturer who utilizes a qualified professional engineer to prepare design calculations, shop drawings, and other structural data for steel joists.

1.4 SUBMITTALS

A. Product Data: For each type of member, accessory, and product indicated.

B. Shop Drawings:

1. Detail wall, floor joist, and roof framing layout.
2. Indicate component details including openings, anchorage, welding, fasteners and accessories required to complete installation.
3. Provide structural calculations signed and sealed by a professional engineer including loads and stresses for each component.

C. Welding certificates.

D. 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. Screw fasteners.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

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

1.4 DELIVERY, STORAGE, AND HANDLING.

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Protect materials from corrosion, deformation and other damage during delivery, storage and handling. Protect members from exposure to harmful weather conditions with a ventilated waterproof covering.

PART 2 - PRODUCTS

2.1 COLD FORMED STEEL FRAMING

A. Fabricate metal framing units from sheet steel conforming to ASTM A 1003.

1. Finish: Galvanized, Class G60, minimum.

B. Joists: provide manufacturer's standard shaped sections fabricated from steel.

C. Framing accessories: Fabricate from minimum 16 gauge steel sheet of the type and finish used for framing members. Provide manufacturer's standard configuration for the following accessories:

1. Track channel
2. Bridging
3. Flat strapping
4. Web stiffeners
5. Joist hangers

2.2 FASTENINGS

A. Self-drilling, self-tapping screws, bolts, nuts, and washers, ASTM A 90

B. Anchorage devices: Hot dipped galvanized or stainless steel, including:

1. Powder actuated fasteners
2. Power driven anchor screws
3. Drilled expansion bolts
4. Screws with sleeves

C. Welding: Conform to the requirements of AWS D1.1.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 ERECTION

A. Install cold formed steel framing and accessories according to the requirements of ASTM C 1007 except where exceeded by other requirements.

B. Join components by welding, screws, or bolts as recommended by the framing component manufacturer for the members to be joined.

C. Wall Systems:

1. Erect framing and panels plumb, level and square in strict accordance with approved shop drawings.
2. Handle and lift prefabricated panels in a manner so as not to cause distortion in any member.
3. Anchor runner track securely to the supporting structure as shown on the erection drawings. Install concrete anchors only after full compressive strength has been achieved. Provide a sill sealer or gasket barrier between all concrete and steel connections.
4. Butt all track joints. Securely anchor abutting pieces of track to a common structural element or butt-weld or splice them together.
5. Align and plumb studs, and securely attach to the flanges or webs of both upper and lower tracks except when vertical movement is specified.
6. Install jack studs or cripples below window sills, above window and door heads, at freestanding stair rails and elsewhere to furnish support, securely attached to supporting members.
7. Attach wall stud bridging in a manner to prevent stud rotation. Space bridging rows according to manufacturer's recommendations with a maximum spacing of 4'-0".
8. Frame wall openings to include headers and supporting studs as shown in the drawings.
9. Provide temporary bracing until erection is completed.
10. Provide braced walls at locations indicated on plans as "shear walls" for frame stability and lateral load resistance.
11. As necessary provide for structural vertical movement using a vertical slide clip or other means in accordance with manufacturer's recommendations.

D. FLOOR SYSTEMS:

1. Locate joists directly over bearing studs or provide a suitable load distribution member at the top track.
2. Provide web stiffeners at reaction points as required.
3. Provide joist bridging rows according to manufacturer's recommendations with a maximum spacing of 6'-0".
4. Provide end blocking where joist ends are not otherwise restrained from rotation.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.4 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings with galvanized repair paint according to ASTM A 780 and manufacturer's instructions.

END OF SECTION 054000

SECTION 055013 – MISCELLANEOUS STRUCTURAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Miscellaneous structural fabrications not attached to steel frame.
      a. Loose steel lintels.
      b. Other structural fabrications not attached steel frame and not specified elsewhere.

B. Extent of structural fabrications is indicated on drawings.

1.02 REFERENCES

A. ASTM A 36/A 36M-94 -- Standard Specification for Carbon Structural Steel; 1994.

B. ASTM A 53-93a -- Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless; 1993.

C. ASTM A 123-89a -- Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 1989.

D. ASTM A 167-94 -- Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip; 1994.

E. ASTM A 276-94 -- Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes; 1994.

F. ASTM A 307-94 -- Standard Specification for Carbon Steel

G. ASTM A 312/A 312M-94b -- Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes; 1994.

H. ASTM A 366/A 366M-96 -- Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality; 1996.

I. ASTM A 446/A 446M-93 -- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality; 1993.

J. ASTM A 500-93 -- Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 1993.

K. ASTM A 501-93 -- Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 1993.

L. ASTM A 525-93 -- Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process; 1993.

M. ASTM A 526/A 526M-90 -- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality; 1990.

N. ASTM A 554-90 -- Standard Specification for Welded Stainless Steel Mechanical Tubing; 1990.

O. ASTM A 563-93 -- Standard Specification for Carbon and Alloy Steel Nuts; 1993.

P. ASTM A 569/A 569M-91a -- Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality; 1991.

Q. ASTM A 570/A 570M-92(93) -- Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality; 1992 (Reapproved 1993).

R. ASTM A 611-93 -- Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Structural Quality; 1993.

S. ASTM A 743/A 743M-93a -- Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application; 1993.

T. ASTM A 780-93 -- Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 1993.

U. ASTM B 26/B 26M-92a -- Standard Specification for Aluminum-Alloy Sand Castings; 1992.

V. ASTM B 209-96 -- Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 1996.

W. ASTM B 221-96 -- Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes; 1996.

X. ASTM B 429-92a -- Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube; 1992.

Y. ASTM C 1107-91a -- Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 1991.

Z. AWS D1.1-98 - Structural Welding Code - Steel; American Welding Society; 1998.

AA. AWS D1.3-89 -- Structural Welding Code--Sheet Steel; American Welding Society; 1989.

BB. MIL P-21035B(NAVY) -- Paint, High Zinc Dust Content, Galvanizing Repair (Metric); 1991.

CC. FS FF-S-92B -- Screw, Machine: Slotted, Cross-Recessed or Hexagon Head; 1974 (Amended 1975).

DD. FS FF-W-84A -- Washers, Lock (Spring); 1967 (Amended 1980).

EE. FS FF-W-92B -- Washer, Flat (Plain); 1974.

FF. SSPC-Paint 12 -- Cold-Applied Asphalt Mastic (Extra Thick Film); Steel Structures Painting Council; 1991.

GG. SSPC-Paint 20 -- Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Steel Structures Painting Council; 1991.

1.03 SUBMITTALS

A. Shop Drawings: For each fabricated item show the following:
   1. Plans and elevations.
   2. Jointing and connections.

a. Indicate welded connections using standard AWS symbols; indicate net weld length.
3. Profiles of sections and reinforcing.
4. Fasteners and anchors.
5. Accessories.
6. Location of each finish.

B. Product Data: Manufacturer's specifications and installation instructions. Submit for:
1. All manufactured products used in fabrications.
2. Grouts.

C. Samples of products and materials when requested.

1.04 JOB CONDITIONS

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

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

PART 2 - PRODUCTS

2.01 MATERIALS - METALS

A. Steel Shapes:
1. Angles: ASTM A 36.
a. Galvanizing: Hot-dip galvanizing after fabrication in accordance with ASTM A 123.

2.02 MATERIALS - MISCELLANEOUS

A. Grout: Nonshrink, factory blended and packaged; complying with ASTM C 1107.

B. Concrete: Normal weight ready-mix concrete as specified in Division 3.
1. Compressive strength: 2500 pounds per square inch, minimum, at 28 days, unless otherwise indicated.

C. Concrete Inserts: Style as required for application.

D. Fasteners: Use fasteners suitable for the material being fastened and for the type of connection required.
1. For exterior use or built into exterior walls: Nonferrous stainless steel, zinc coated or cadmium plated.
2. Use fasteners of same material as items being fastened unless otherwise indicated.
3. Bolts and studs: ASTM A 307.
4. Nuts: ASTM A 563.
5. Machine screws: FS FF-S-92.
6. Plain washers: FS FF-W-92.
7. Lock washers: FS FF-W-84.

E. Bituminous Mastic: SSPC-Paint 12.

F. Galvanizing Repair Paint: Zinc dust paint complying with SSPC-Paint 20 or MIL P-21035B, Type I or II.

G. Shop Primer: Fabricator's standard primer.

2.03 FABRICATION - GENERAL

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

B. Mechanical Finishes: Complete finishing prior to fabrication wherever possible.
1. After fabrication, finish all joints, bends, abrasions, and other surface blemishes to match finish.
2. Protect finish on exposed surfaces by using temporary protective covering.

C. Anchors: Fabricate to suit substrate indicated; use anchors of same material and finish as item except where specifically indicated otherwise.

D. Welding:
1. Welding of steel: Comply with AWS D1.1 recommendations.
2. Provide continuous welds at welded corners and seams.
3. Exposed welds: Grind flush and smooth.

E. Joints Exposed to Weather: Fabricate to keep water out, or provide adequate drainage of water that penetrates.

F. Items in Contact with Masonry or Concrete: Hot-dip galvanize all steel items which will be in permanent contact with masonry or concrete.

2.04 FABRICATION - SHEET METAL

A. Comply with general fabrication requirements.

B. Bend sheet metal corners to smallest possible radius.

C. Welding Steel Sheet: Comply with AWS D1.3 recommendations.

2.05 FABRICATION - MISCELLANEOUS STRUCTURAL FABRICATIONS

A. Loose Lintels: As indicated.
1. Weld double lintels together when indicated.
2. Where bearing dimension is not indicated, provide minimum of 8 inches bearing on each side of opening.
3. Hot-dip galvanize all lintels set in exterior walls.

B. Shop prime all steel members, except:
1. Galvanized steel members.
2. Steel members embedded in concrete or mortar.
3. Steel members to receive sprayed-on fireproofing.
4. Steel members which are not to receive a finish paint system.
5. Steel members for which an entirely field-applied coating is required.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

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

B. Perform all field fabrication required for installation.
   1. Fit joints tightly.
   2. Weld joints as indicated.
      a. Weld in accordance with AWS code.
      b. Exposed welds: Grind flush and smooth.

C. Do not cut or weld items galvanized after fabrication that are indicated for bolted or screwed field connections.

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

E. Provide temporary supports and bracing as required.

F. Coat aluminum surfaces in contact with concrete and masonry with bituminous mastic.

3.02 CLEANING AND TOUCH-UP

A. Touch up damage to galvanized surfaces using galvanizing repair paint in accordance with ASTM A 780.

END OF SECTION 055013

SECTION 055100 - METAL STAIRS AND RAILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Metal stairs
   2. Wall-mounted railings.
   2. Railings not associated with metal stairs.
   3. Shop coatings.

B. Related Sections:
   1. Other metal fabrications: Elsewhere in Division 5.

1.02 REFERENCES

A. 29 CFR 1910.23 -- Occupational Safety and Health Standards; Guarding Floor and Wall Openings and Holes; Code of Federal Regulations; 1974 (with Amendments through 1984).

B. ASTM A 36/A 36M-94 -- Standard Specification for Carbon Structural Steel; 1993.

C. ASTM A 53-93a -- Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless; 1993.

D. ASTM A 123-89a -- Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 1989.

E. ASTM A 167-94 -- Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip; 1994.

F. ASTM A 276-94 -- Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes; 1994.

G. ASTM A 307-94 -- Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength; 1994.

H. ASTM A 312/A 312M-94b -- Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes; 1994.

I. ASTM A 366/A 366M-96 -- Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality; 1996.

J. ASTM A 446/A 446M-93 -- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality; 1993.

K. ASTM A 500-93 -- Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 1993.

L. ASTM A 501-93 -- Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 1993.

M. ASTM A 525-93 -- Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process; 1993.

N. ASTM A 526/A 526M-90 -- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality; 1990.

O. ASTM A 527/A 527M-90 -- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality; 1990.

P. ASTM A 554-90 -- Standard Specification for Welded Stainless Steel Mechanical Tubing; 1990.

Q. ASTM A 563-93 -- Standard Specification for Carbon and Alloy Steel Nuts; 1993.

R. ASTM A 569/A 569M-91a -- Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality; 1991.

S. ASTM A 570/A 570M-92(93) -- Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality; 1992 (Reapproved 1993).

T. ASTM A 611-93 -- Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Structural Quality; 1993.

U. ASTM A 743/A 743M-93a -- Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application; 1993.

V. ASTM A 780-93 -- Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 1993.

W. ASTM C 1107-91a -- Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 1991.

X. AWS D1.1-98 - Structural Welding Code - Steel; American Welding Society; 1998.

Y. AWS D1.3-89 -- Structural Welding Code--Sheet Steel; American Welding Society; 1989.

Z. MIL P-21035B(NAVY) -- Paint, High Zinc Dust Content, Galvanizing Repair (Metric); 1991.

AA. FS FF-W-84A -- Washers, Lock (Spring); 1967 (Amended 1980).

BB. FS FF-W-92B -- Washer, Flat (Plain); 1974.

CC. MIL-M-17194D -- Metal, Expanded, Steel; 1986.

DD. SSPC-PA 1 -- Shop, Field, and Maintenance Painting; Steel Structures Painting Council; 1991.

EE. SSPC-Paint 20 -- Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Steel Structures Painting Council; 1991.

FF. SSPC-SP 1 -- Solvent Cleaning; Steel Structures Painting Council; 1982.

GG. SSPC-SP 3 -- Power Tool Cleaning; Steel Structures Painting Council; 1989.

HH. SSPC-SP 7 -- Brush-Off Blast Cleaning; Steel Structures Painting Council; 1985 (with editorial changes 1991).

II. SSPC-SP 8 -- Pickling; Steel Structures Painting Council; 1985 (with editorial changes 1991).

1.03 DEFINITIONS

A. Quality: Unless otherwise indicated, all requirements of this section apply to all fabricated items. Where "standard quality" is indicated, items identified as "utility quality" need not comply. Where "utility quality" is indicated, the requirement is applicable only to items identified as "utility quality".

1.04 PERFORMANCE REQUIREMENTS

A. Member sizes indicated are minimum; provide sizes required.

B. Design to resist the loads indicated.

C. Stair Treads: Design to resist specified uniform load or specified concentrated load applied to 4 square inches in the center of the tread, whichever condition results in the greater stress, unless otherwise indicated.

D. Handrails: Design to resist the loads specified by applicable building code(s).

E. Guardrails: Design to resist loads specified by applicable building code(s).

F. Toeboards: Where toeboards are indicated as required, but are not detailed, design toeboards to conform to the requirements of 29 CFR 1910.23.

1.05 SUBMITTALS

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

B. Product Data: Manufacturer's specifications and installation instructions. Submit for:
   1. All manufactured products used in fabrications.
   2. Grouts.

C. Samples of products and materials when requested.

1.06 QUALITY ASSURANCE

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

1.07 JOB CONDITIONS

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

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Pre-Engineered, Pre-Fabricated Steel Stairs: Products of the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:
   1. American Metal Works, Inc.
   2. American Stair Corporation.
   3. Sharon Companies, Ltd.

2.02 METAL STAIRS

A. Stair between first and second floors:
   1. Design is based on custom-designed stairs; at contractor's option, pre-engineered, pre-fabricated stairs having minor deviations from design may be used, provided essential dimensions are maintained, applicable codes are complied with, and performance requirements are met.
   2. Design live loads:
      a. Uniform load: 100 pounds per square foot of horizontal projection.
      b. Concentrated tread load: 300 pounds.
   3. Stringers: Steel channels.
   4. Treads: Steel pan, filled with concrete.
   5. Risers: Sheet steel.
   6. Landings: Steel pan, filled with concrete.
   7. Steel finish: Factory primed for painting.
   8. Quality: Standard.

B. Railings:
   1. Round steel pipe or tube.
   2. Steel finish: Hot-dipped galvanized.
   3. Mounting: Wall.
   4. Quality: Standard.

2.03 MATERIALS - METALS

A. Steel Shapes:
   1. Plates, bars, angles, channels, and H-sections: ASTM A 36.
   2. Galvanizing: Hot-dip galvanizing after fabrication in accordance with ASTM A 123.
   3. Tube:
      a. Hot-rolled: ASTM A 501.
      b. Cold-formed: ASTM A 500.
         1. Galvanizing: Hot-dip galvanizing after fabrication in accordance with ASTM A 123.
   4. Pipe: ASTM A 53 (black steel and hot-dip galvanized).
      a. Galvanizing: ASTM A 53, (G185 nominal).

B. Steel Sheet:
   1. For structural uses: Hot-rolled, ASTM A 570; cold-rolled, ASTM A 611.
   2. For nonstructural uses: Cold-rolled, ASTM A 366; hot-rolled, ASTM A 569.

C. Galvanized Steel Sheet:
   1. For structural uses: ASTM A 446.
   2. For nonstructural uses: ASTM A 526.
   3. For lock forming: ASTM A 527.
   4. Galvanizing: In accordance with ASTM A 525, G90, unless otherwise indicated.

D. Stainless Steel Shapes: Type 304 or 316, unless otherwise indicated.
   1. Angles, channels, and bars: ASTM A 276.
   2. Strip and plate: ASTM A 167.
   3. Tube: ASTM A 554.
   4. Pipe: ASTM A 312.
   5. Castings: ASTM A 743.

2.04 MANUFACTURED COMPONENTS

A. Expanded Metal Mesh Treads and Platforms:
   1. Galvanized steel: MIL-M-17194, Class 2, Grade A.
   2. Standard mesh, unless otherwise indicated.
   3. Mesh weight: 1/4 inch No. 18.

2.05 MATERIALS - MISCELLANEOUS

A. Grout: Nonshrink, factory blended and packaged; complying with ASTM C 1107.

B. Concrete: As specified in Division 3.

C. Concrete: Normal weight ready-mix; compressive strength of 2500 pounds per square inch, minimum, at 28 days, unless otherwise indicated.

D. Concrete Inserts: Style as required for application.

E. Fasteners: Use fasteners suitable for the material being fastened and for the type of connection required.
   1. For exterior use: Nonferrous stainless steel, zinc coated or cadmium plated.
   2. In exterior walls: Nonferrous stainless steel, zinc coated or cadmium plated.
   3. Use fasteners of same material as items being fastened unless otherwise indicated.
   4. Bolts and studs: ASTM A 307.
   5. Nuts: ASTM A 563.
   6. Plain washers: FS FF-W-92.
   7. Lock washers: FS FF-W-84.

F. Galvanizing Repair Paint: Zinc dust paint complying with SSPC-Paint 20 or MIL P-21035B, Type I or II.

G. Shop Primer: Fabricator's standard primer.

2.06 FABRICATION - GENERAL

A. Fabricate and shop-assemble in largest practical sections for delivery to site.

B. Prepare and reinforce fabrications as required to receive applied items.

C. Smooth off exposed edges and projections that are within reach and would otherwise be uncomfortable to touch.

D. Joints and Connections:

1. Standard quality fabrications: Make tight and flush joints.
2. All joints and connections: Welded, except where otherwise indicated.
3. Exposed fasteners may be used only for joints and connections specifically indicated as requiring exposed fasteners.

E. Welding: Provide continuous welds at corners and seams.
1. Structural shapes: Comply with AWS D1.1 recommendations.
2. Sheet metal: Comply with AWS D1.3 recommendations.
3. Welds exposed to view: Grind flush and smooth.
a. Utility quality: Welds need not be ground smooth, but sharp edges and corners must be removed.

F. Joints Exposed to Weather: Fabricate to keep water out or provide adequate drainage of water that penetrates.

G. Sheet Metal: Bend corners to smallest possible radius.

H. Anchors: Fabricate to suit anchors indicated; use anchors of same material and finish as item except where specifically indicated otherwise.

2.07 FABRICATION - STAIRS

A. Construct stairs as indicated; provide all components necessary for support and anchorage, and to provide a complete installation.

B. Channel-Shaped Members: Provide welded closures for exposed ends.

C. Provide toe boards at open sides of platforms where stringer does not extend above floor level.

D. Steel Sheet Treads, Tread Pans and Platforms:
1. Steel sheet: Cold-rolled.
a. Minimum thickness: 14 gage
2. Pan treads and platforms:
3. Prefabricated pan treads, complete with concrete fill, may be used; attach to stringers by manufacturer's standard method.
4. Aggregate for nonslip finish on concrete: Aluminum oxide grit or crushed emery abrasive aggregate.
5. Pan tread nosing: Integral with pans, with not more than 1/2 inch return.

E. Grating Treads and Platforms:
1. Nosing: Integral, nonslip.
2. Attach treads to stringers using brackets bolted or welded to treads and bolted or welded to stringers.

2.08 FABRICATION - RAILINGS

A. General: Construct as indicated.
1. Round pipe/tube: Minimum inside diameter of 1 ¼" inches.
2. Pipe/tube: Nominal wall thickness of 0.125 inch.
3. Connections: Welded and ground.
4. Welding: Fill joints completely and grind off flush.
5. Elbows: Mitered, only.
6. Tee and cross intersections: Coped and fitted.
7. Exposed ends of hollow members: Close with prefabricated fittings or with 3/16-inch-thick plate fully welded.

8. Bending of members: Use jigs to make each similar configuration the same; make neat bends without other deformation.
9. Close exposed open ends of members using same material as used in member.

B. Provide all components necessary for assembly of railings and for attachment to other work.

C. Wall-Mounted Handrails: Return railing to wall at ends except where otherwise indicated.

2.09 FINISHING

A. Galvanizing for Members Other than Sheet: Hot-dip galvanize after fabrication.

B. Preparation of Steel for Finishing: Prepare by removing loose mill scale, loose corrosion products, dirt, oil, and grease.
1. Use pickling, blast cleaning, or power tool cleaning, as required.
a. Pickling: Perform in accordance with SSPC SP-8.
b. Blast cleaning: Perform in accordance with SSPC SP-7, minimum.
c. Power tool cleaning: Perform in accordance with SSPC SP-3.
d. For exterior fabrications, use blast cleaning in accordance with SSPC SP-6, minimum.
2. Standard quality: Grind off projections on exposed surfaces and fill holes and depressions.
3. Solvent clean in accordance with SSPC-SP 1.

C. Priming: Apply primer in shop immediately after preparation; comply with SSPC-PA 1.
1. Apply extra coat to corners, welds, edges, and fasteners.
2. Shop prime all steel members of fabrications indicated to be factory-primed for painting.
a. Exceptions:
1. Surfaces to be field welded.
2. Surfaces in direct contact bond with concrete.
3. Fire Stair at North side of building.

D. Protect finishes on exposed surfaces from damage by using temporary protective coverings.
1. Where corrosion occurs prior to application of finish coating, clean corroded areas and re-apply shop coatings.
2. Touch up damaged factory finishes as recommended by fabricator.

PART 3 - EXECUTION

3.01 INSTALLATION

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

B. Provide temporary supports and bracing as required.

C. Anchor to substrates indicated; provide all fasteners required.

D. Perform all field fabrication required for installation.
1. Fit joints tightly.
2. Weld joints as indicated.
a. Weld in accordance with AWS code.

b. Exposed welds: Grind flush and smooth.

E. Do not cut or weld items galvanized after fabrication that are indicated for bolted or screwed connections.

F. Fill steel pans with concrete, as indicated; make surface level.
1. Embed aggregate for non-slip finish uniformly into concrete surface.

3.02 CLEANING AND TOUCH-UP

A. Touch up damage to galvanized surfaces using galvanizing repair paint in accordance with ASTM A 780.

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

END OF SECTION 055100

SECTION 055133 – METAL LADDERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Aluminum wall ladders, including parapets, cages and handrails.
   1. Types: Types of aluminum wall ladders include:
      a. Fixed Wall Ladder – Elevator Pit Access

B. Related Sections: Section(s) related to this section include:
   1. Section 061000 - Rough Carpentry for required wood blocking.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements: Provide aluminum wall ladders which have been manufactured, fabricated and installed to withstand loads from Building Code of New York State and to maintain performance criteria stated by manufacturer without defects, damage or failure.

B. Ladder Performance Requirements:
   1. Aluminum Fixed Wall Ladders: Certified to meet ANSI A14.3 as an OSHA Type I industrial metal ladder.
   2. Solid Rivets: 4 per rung with combined shear strength in excess of 3600 lb (16,020 N).

1.03 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit product data, including manufacturer’s product sheet, for specified products.

C. Shop Drawings: Submit shop drawings showing layout, profiles, product components, accessories and finishes.

D. Samples: Submit selection and verification samples for finishes.

E. Quality Assurance Submittals: Submit the following:
   1. Manufacturer’s Instructions: Manufacturer’s installation instructions.

F. Closeout Submittals: Submit the following:
   1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
   2. Warranty: Warranty documents specified herein.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

B. Regulatory Requirements: OSHA and ANSI A14.3.

C. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

1.05 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

1.06 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

1. Warranty Period: 1 year commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

BASIS OF DESIGN:

A. Manufacturer: ALACO Ladder Company.

1. Contact: 5167 "G" Street, Chino, CA 91710-5143;

Telephone: (888) 310-7040; Fax: (909) 591-7565.

C. Architect Approved Equal.

2.02 FIXED WALL LADDERS - ELEVATOR PIT ACCESS

BASIS OF DESIGN:

A. Fixed Wall Ladders- Model 561-E- Elevator Pit Access

B. Basic Use:

1. Model 561-E fixed wall, side exit ladders provide permanent elevator pit maintenance access. They are ideal for tanks, water treatment plants, refineries and other industrial or marine applications. This ladder has a narrower wall offset to allow for elevator clearance in the elevator pit.

C. Construction Materials:

1. Components are fabricated from 6061-T6 aluminum alloy for added safety, strength and long-lasting durability, with no painting required.
2. Model 561-E fixed wall elevator pit ladders include side rails with 1-1/8" (29 mm) round rungs that are serrated and secured with cast aluminum connectors, 4 solid rivets and 3/8" (9.5 mm) thick brackets mounted to the walls.

D. Size:

1. Climb Height: Maximum 20' (6.1 m) pit floor to floor level.
2. Width: 20-1/4"

E. Finishes and Coatings:

1. Mill finish is standard on aluminum ladders.
2. Factory applied paint coatings and chem-film treatment for field applied primers are available upon request.
3. Custom coatings and surface treatments are also offered.

2.03 FABRICATION

A. Aluminum Ladder Fabrications:

1. General: Fabricate tread aluminum stairs to conform with performance and construction requirements, and in accordance with approved shop drawings and/or dimensional prints. Fabricate and shop-assemble to greatest extent possible.

B. Handrail, Cage:

1. General: Fabricate handrails and cages to conform with dimensions, performance, and construction requirements, and in accordance with approved shop drawings or dimensional prints.
2. Aluminum: Cut, formed, and punched parapets, handrails, cages, rest platforms and security doors with mounting brackets and kickplates possibly gas tungsten arc welded or gas metal arc welded with bolt-on handrails.

2.04 SOURCE QUALITY

A. Source Quality: Obtain aluminum wall ladders from a single manufacturer.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.02 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
   1. Verification: Verify that dimensions and angle are correct and that substrate is in proper condition for ladder installation. Do not proceed to install until all necessary corrections have been made.

3.03 PREPARATION

A. Coordination: Coordinate start and installation of tread stairs with other related and adjacent work. Installation shall not start until construction has progressed to point that weather conditions and remaining construction operations will not damage ladder installation.

3.04 INSTALLATION

A. Aluminum Ladders Installation:
   1. Series 560 Fixed Aluminum Ladders.
      a. Detail top rung at or slightly above stepping-off surface and space rungs 12" (305 mm) oc to bottom rung, which is installed 12" (305 mm) from the floor.
      b. Space wall mounting brackets 6' (1.8 m) oc, with floor brackets recommended at bottom end.
      c. Install parapet railing 42" (1067 mm) above top rung, then extend 24" (610 mm) horizontally and return to roof or the rear of parapet. Rungs can be shown returning to the roof if the parapet is high enough to require them.
      d. Touch up with matching paint any chipped or abraded damage to factory finish or coating.
      e. Apply primer or paint to pretreated surface.

B. Handrails and Cages:
   1. Install ALACO flared cage between 7' - 8' (2 - 2.4 m) above the floor if installation exceeds 20' (6 m) in height.

2. Touch up with matching paint any chipped or abraded damage to factory finish or coating.

3. Apply primer or paint to pretreated surface.

3.05 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.

3.06 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

END OF SECTION 055133