SECTION 05 01 02

STRIPPING AND REPAINTING IRON AND STEEL FEATURES

PART 1---GENERAL

1.01 SUMMARY

A. This procedure includes guidance on stripping iron and steel of all paint build-up and repainting.

B. See Division 01 for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
   1. Safety Precautions
   2. Historic Structures Precautions
   3. Submittals
   4. Quality Assurance
   5. Delivery, Storage and Handling
   6. Project/Site Conditions
   7. Sequencing and Scheduling
   8. General Protection (Surface and Surrounding)

C. These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the Director's Representative.

PART 2---PRODUCTS

2.01 MANUFACTURERS

A. Coraflon.

B. Devcon Corporation

C. Or approved equal.

2.02 MATERIALS

A. Metal Filler: Steel filled, two part, epoxy, metal filler, putty grade such as "Plastic Steel" (Devcon Corporation), or approved equal.

B. Finish to be applied to cleaned railings and grates. Follow manufacturer's instructions for surface preparation and application of finish system.
   1. Powder-Coat Finish: thermosetting polyester or acrylic urethane powder coating, AAMA 2603, except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, preparation, conversion coating, and applying and baking finish.
   2. Color and Gloss: As selected by Director's Representative from manufacturer's full range.

2.03 EQUIPMENT

A. Wire Brush: Non-ferrous metal brush such as brass.

B. Dry Grit Blasting: Fine grit at 80-100 psi.

C. Paint brushes

PART 3---EXECUTION

3.01 PREPARATION

A. Remove fence / railings off site and prepare surface for restoration.

B. Surface Preparation:
   1. Determine that surfaces to which paint is to be applied are even, smooth, sound, clean, dry and free from defects affecting proper application. Correct or report defective surfaces to Contracting Officer.
   2. Prepare surface per finish manufacturer's instructions.

3. Execute all painting in a temperature range of 50 - 85 F, at a relative humidity below 60%. Do not apply paint on surface in direct sunlight or in spaces where dust is being generated which would speck the finish.

3.02 ERECTION, INSTALLATION, APPLICATION

A. Remove all paint to bare metal from iron and steel surfaces using mechanical methods such as scraping, sanding or dry grit blasting.

B. Remove dirt and grease and abrade remainder of the surface with wire brushing. Remove residual grit from all surfaces by air blasting.

C. Seal all open joints between metal elements and masonry with backer rods and sealant. Joint shall be concave with smooth finish. Do not allow sealant to extend over the edges of the metal or the face of the stone.

D. Replace or repair any badly deteriorated pieces of metalwork to match the original.

E. Fill small holes, depressions and cracks with metal filler following the manufacturer's written directions. Finish all filled areas by sanding flush, after curing time has elapsed.

F. Prime all metal within two hours of cleaning, down to bare metal using a color obviously different from the finish color.

G. Paint to match color specified by the Director's Representative.
   1. Apply material evenly without runs, sags, or other defects. Work each coat onto the material being coated at an average rate of coverage recommended in manufacturer's printed instructions.
   2. Cover surfaces completely to provide uniform color and appearance with a minimum of dry, film thickness of 2 mils.
   3. Make edges of paint, adjoining other materials or colors, sharp and clean and without overlaps.
   4. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Insure that corners, edges, crevices and exposed fasteners receive a dry film thickness equal to that of flat surfaces.

H. Drying Time: Minimum time, as recommended. Do not apply subsequent coats until the undercoat is thoroughly dry. Sand between coats to produce even and smooth surfaces.

I. Reinstall fence/railing in same location in which it was removed. Use new hardware where applicable.

3.03 ADJUSTING/CLEANING

A. Remove all paint where it has spilled or spattered. Do not drip any paint on stone. Use paint thinner or solvent as necessary to effect complete removal.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall provide all labor, materials and equipment required to furnish, fabricate, deliver and erect Structural Steel as shown on the Plans, as specified, and/or directed.

B. Included are lintels, angles, anchor bolts for column bases, bearing plates, columns, joists, beams, girders, bracing, clips, hangers and other framing.

1.02 REFERENCES

A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. American Association of State Highway and Transportation Officials (AASHTO) Publication:
   a. Standard Specifications for Highway Bridges
2. American Institute of Steel Construction (AISC) Publications:
   a. Manual of Steel Construction
   b. Manual of Steel Construction - Load and Resistance Factor Design
   c. Detailing for Steel Construction
   d. Engineering for Steel Construction
3. American Society for Testing and Materials (ASTM) Publications:
   a. A36/A36M - Structural Steel
   b. A53 - Steel Pipe, Hot-Dipped, Zinc-Coated Welded and Seamless
   c. A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality
   d. A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
   e. A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware
   f. A242/A242M - High-Strength Low-Alloy Structural Steel
   g. A307 - Carbon Steel Externally Threaded Standard Fasteners
   h. A325 - High-Strength Bolts for Structural Steel Joints
   i. A449 - Quenched and Tempered Steel Bolts and Studs
   j. A490 - Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints
   k. A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
   l. A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
   m. A514/A514M - High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
   n. ASTM A529/A529M - Structural Steel with 42 ksi Minimum Yield Point (1/2-Inch Maximum Thickness)

o. A563 - Carbon and Alloy Steel Nuts
p. A568/A568M - General Requirements for Steel, Carbon and High Strength Low-Alloy Hot-Rolled Sheet and Cold-Rolled Sheet
q. A572/A572 - High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality
r. A588/A588M - High-Strength Low-Alloy Structural Steel With 50 ksi (345 MPa) Minimum Yield Point to 4 in. (100 mm) Thick
s. A618 - Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
t. A668 - Steel Forgings, Carbon and Alloy, for General Industrial Use
u. A780 - Repair of Damaged Hot-Dip Galvanized Coatings
v. A992/A992M - High Strength Low-Alloy Structural Steel With 50 ksi (345 MPa) Minimum Yield Point
w. B695 - Coatings of Zinc Mechanically Deposited on Iron and Steel
C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
x. F436 - Hardened Steel Washers
y. F844 - Washers, Steel, Plain (Flat), Unhardened for General Use
z. F959 - Compressible-Washer-Type Direct Tension Indicators for Use With Structural Fasteners

4. American Welding Society, Inc. (AWS) Publication:
   a. D1.1 - Structural Welding Code - Steel
5. Steel Structures Painting Council (SSPC) Publications:
   a. PA 1 - Shop, Field, and Maintenance Painting
   b. Paint 25 - Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer
   c. SP 2 - Hand Tool Cleaning
   d. SP 3 - Power Tool Cleaning
   e. SP 6 - Commercial Blast Cleaning

1.03 SYSTEM DESCRIPTION

A. Provide the structural steel system, including shop primer, galvanizing, complete and ready for use. Structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, and testing shall be provided in accordance with AISC "Manual of Steel Construction", and/or "Manual of Steel Construction - Load and Resistance Factor Design", except as modified in this Section.

1.04 MODIFICATIONS TO REFERENCES

A. The "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings", including Supplement No. 1; the "Code of Standard Practice for Steel Buildings and Bridges", and "Structural Joints Using ASTM A325 or A490 Bolts" except as modified in this Section, shall be considered a part of the AISC "Manual of Steel Construction" and is referred to in this Section as the AISC "Manual of Steel Construction". The "Load and Resistance Factor Design Specification for Structural Steel Buildings", the "Code of Standard Practice for Steel Buildings and Bridges", the "Load and Resistance Factor Design Specifications for Structural Joints Using ASTM A325 or A490 Bolts", and the

"Allowable Stress Design Specification for Structural Joints Using ASTM A325 or A490 Bolts" including Appendix A shall be considered a part of the AISC "Manual of Steel Construction - Load and Resistance Factor Design" and is referred to in this Section as the AISC "Manual of Steel Construction - Load and Resistance Factor Design".

1.05 SUBMITTALS

A. Shop Drawings: Submit for approval prior to fabrication. Prepare in accordance with AISC "Detailing for Steel Construction" and AISC "Engineering for Steel Construction". Shop drawings shall not be reproductions of Contract Drawings. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Use AWS standard welding symbols. Review of shop drawings shall be for size and arrangement of principal and auxiliary members and strength of connections. Dimensions and proper fit shall be the responsibility of the Contractor.

B. Erection Plan: Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing, and a detailed sequence of welding, including each welding procedure required.

C. Manufacturer's Data: Submit for the following:
1. Shop primer, including test report for Class B primer.
2. Load indicator washers.
3. Alternate design bolts.

D. Certificates of Compliance: Submit for the following:
1. Steel
2. Bolts, nuts, and washers
3. Shop primer
4. Welding electrodes and rods
5. Nonshrink grout
6. Galvanizing
7. Pins and rollers

E. Welder's, Welding Operator's, and Tacker's Qualifications: Prior to welding, submit certification for each stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests.

PART 2 - PRODUCTS

2.01 STEEL

A. Structural Steel: ASTM A36.

B. High-Strength Low-Alloy Structural Steel: ASTM A572, Grade 50.

C. Weathering Structural Steel: ASTM A242 Grade; ASTM A588, Grade 50

D. Structural Steel Tubing: ASTM A500, Grade B; High-Strength Low-Alloy ASTM A618.

E. Steel Pipe: ASTM A53, Type E or S, Grade B, weight class; ASTM A501.

F. Sag Rods: ASTM A36.

2.02 BOLTS, NUTS, AND WASHERS: Provide the following unless indicated otherwise.

A. Structural Steel Joints:
1. Bolts: ASTM A325, Type 1; ASTM A490, Type 1 or 2.
2. Nuts: ASTM A563, Grade C and heavy hex style or as specified in the applicable ASTM bolt standard.
3. Washers: ASTM F436, plain carbon steel.

B. Weathering Structural Steel Joints:
1. Bolts: ASTM A325, Type 3; ASTM A490, Type 3.
2. Nuts: ASTM A563, heavy hex style, Grade DH3, except Grade C3 may be furnished for ASTM A325 bolts.
3. Washers: ASTM F436, weathering steel.

C. Foundation Anchorage:
1. Bolts: ASTM A307, Grade A, ASTM A325, Type 1, ASTM A490, Type 1.
2. Nuts: ASTM A563, Grade C, heavy hex style, except nuts under 1.5 inches may be provided in hex style.
3. Washers: ASTM F844, F436.

D. Load Indicator Washers: ASTM F959. Provide ASTM B695, Class 50, Type 1 galvanizing.

E. Alternate Design Bolts: ASTM A325, Type 1; ASTM A490, Type 1, with a manufactured notch between the bolt tip and threads. The bolt shall be designed to react to the opposing rotational torques applied by the installation wrench, with the bolt tip automatically shearing off when the proper tension is obtained.

2.03 STRUCTURAL STEEL ACCESSORIES

A. Welding Electrodes and Rods: AWS D1.1. Welding rods for manual shielded metal arc-welding shall conform to E-70 series of ASTM A233.

B. Nonshrink Grout: Grout shall be nonmetallic such as "Embeco" as manufactured by Master Builders, "Introplast" as manufactured by Sika, or equal.

C. Welded Shear Stud Connectors: AWS D1.1 and ASTM A108.

D. Pins and Rollers: ASTM A668, Class C, D, F, or G; ASTM A108, Grades 1016 to 1030. Provide as specified in AASHTO "Standard Specifications for Highway Bridges," Division II, Sections 10.26 and 10.27, except provide pins in lengths to extend a minimum of 0.25 inch beyond the outside faces of the connected parts.

2.04 SHOP PRIMER

A. SSPC Paint 25, except provide a Class B coating in accordance with AISC "Manual of Steel Construction" for slip critical joints.

2.05 GALVANIZING

A. ASTM A123 or A153, as applicable, unless specified otherwise galvanize after fabrication where practicable. Touch up primer for galvanized surfaces SSPC 20, Type I.

2.06 FABRICATION

A. Markings: Prior to erection, members shall be identified by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections shall be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded or on surfaces of weathering steels that will be exposed in the completed structure. Do not locate match markings in areas that will decrease member strength or cause stress concentrations. Manufacturer's symbol and grade markings shall appear on all bolts and nuts.

B. Shop Primer: Shop prime structural steel, except as modified herein, in accordance with SSPC-PA 1. Do not prime steel surfaces embedded in concrete, galvanized surfaces, surfaces to receive epoxy coatings, surfaces designed as part of a composite steel concrete section, or surfaces within 0.5 inch of the toe of the welds prior to welding (except surfaces on which metal decking is to be welded). Slip critical surfaces shall be primed with a Class B coating. Prior to assembly, prime surfaces which will be concealed or inaccessible after assembly. Do not apply primer in foggy or rainy weather; when the ambient temperature is below 45 degrees F or over 95 degrees F; or when the primer may be exposed to temperatures below 40 degrees F within 48 hours after application, unless approved otherwise by the Engineer.
   1. Cleaning: SSPC SP 6, SSPC SP 2 or 3, except that exposed exterior steel surfaces shall be cleaned in accordance with SSPC SP 6. Maintain steel surfaces free from rust, dirt, oil, grease, and other contaminants through final assembly.
   2. Primer: Apply primer to a minimum dry film thickness of 2.0 mil except provide the Class B coating for slip critical joints in accordance with the coating manufacturer's recommendations. After erection, repair damaged primed surfaces with an additional coat of primer.

C. Fireproofing and Epoxy Coated Surfaces: Surfaces to receive epoxy coatings shall be cleaned and prepared in accordance with the manufacturer's recommendations, and as indicated.

D. Surface Finishes: ANSI B46.1 maximum surface roughness of 125 for pin, pinholes, and sliding bearings, unless indicated otherwise.

E. Gas cutting may be used for concealed or minor items of work, i.e.: blocking, etc., but will not be allowed for cutting or enlarging of bolt holes. Bearing ends of

columns shall be accurately milled to a plane surface perpendicular to the axis of the shaft.

F. Provide holes required for use of other trades that can be determined prior to fabrication of structural steel.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Erection
1. Column baseplates and leveling plates shall be set level to correct elevations and temporarily supported on steel wedges or shims until the supported members have been plumbed and grouted.
2. After final positioning of steel members, provide full bearing under baseplates and bearing plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer's instructions. The entire bearing area under the plates shall be grouted solid.
3. Templates shall be furnished as required for the accurate placement of anchor bolts and bearing plates.
4. Structural steel framing shall be carried up true and plumb, and temporary bracing shall be used wherever necessary to withstand all loads to which the structure may be subjected, including erection equipment and its operation. Bracing shall be left in place as long as may be required for safety and then removed by the Contractor. As erection progresses, the work shall be securely connected to take care of all dead load, wind and erection stresses.

3.02 CONNECTIONS

A. Except as modified in this Section, connections not detailed shall be designed in accordance with AISC "Manual of Steel Construction". "Manual of Steel Construction - Load and Resistance Factor Design". Build connections into existing work. Shop connections shall be welded. All connections shall be properly designed for the standard end loads of the members to be connected as tabulated for uniform loads in the AISC Handbook. Provide for unusual end loads where necessary. All welding shall be performed with procedures and by operators recently certified in accordance with the standards of the American Welding Society. Connections shall be types shown on the drawings and/or specified. No burning of holes for connections will be allowed. Field holes shall be drilled. Punch, sub-punch and ream, or drill bolt and pin holes. Bolts, nuts, and washers shall be clean of dirt and rust, and lubricated immediately prior to installation.

B. Tightening of Shear/Bearing Connections: ASTM A307 and ASTM A325N, ASTM A490N bolts, in connections not defined as slip critical or subject to direct tension loads, shall be tightened to a "snug tight" fit. "Snug tight" is the tightness that exists when plies in a joint are in firm contact. If firm contact of joint plies cannot be obtained with a few impacts of an impact wrench, or the full effort of a

worker using a spud wrench, contact the Engineer for further instructions. Bolts which may be tightened only to a snug tight condition shall be clearly identified on the drawing.

C. Tightening of Foundation Bolts: Unless otherwise directed, anchor bolts shall be set prior to concrete pouring. Do not tighten with an impact torque wrench and/or until concrete has cured minimum of 14 days.

3.03 WELDING

A. AWS D1.1, except use only shielded metal arc welding and low hydrogen electrodes for ASTM A514 steel. Do not stress relieve ASTM A514 steel by heat treatment. Grind exposed welds smooth as indicated. Provide AWS D1.1 qualified welders, welding operators, and tackers.

B. Removal of Temporary Welds, Run-Off Plates, and Backing Strips: Removal is not required. Remove only from finished areas.

C. Field welding will not be permitted on primed or painted steel. Contractor is responsible for properly cleaning steel before welding.

3.04 GALVANIZING REPAIR

A. Provide as indicated or specified. Galvanize after fabrication where practicable. Repair damage to galvanized coatings using ASTM A780 zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces to which repair paint has been applied.

3.05 FIELD QUALITY CONTROL

A. Perform field tests, and provide labor, equipment, and incidentals required for testing, except that electric power for field tests will be furnished as set forth in Division 1. The Engineer shall be notified in writing of defective welds within 7 working days of the date of weld inspection.

B. Welds
1. Furnish the services of AWS-certified welding inspectors for fabrication, erection, testing and verification inspections. Welding inspectors shall inspect and mark welds, including fillet weld end returns. All defective welds that have been repaired shall be retested.
2. Shop welds required for structural connections shall be visually inspected and approved by an independent testing laboratory. All questionable welds shall be radiographically or ultrasonically tested. If questionable welds prove defective, Contractor shall test minimum 10% or all other welds at no additional cost.
3. Field welds required for structural connections shall be visually inspected and approved by independent testing laboratory. Where questionable welds are determined, at least 10% of all other welds shall be tested by magnetic particle testing or ultrasonic testing.

END OF SECTION

SECTION 05 31 13 STEEL FLOOR DECKING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall provide all labor, materials and equipment required to furnish and install Steel Floor Decking and accessories, as shown on the Plans, and/or as specified.

1.02 REFERENCES

A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. American Iron and Steel Institute (AISI) Publication:
   a. SG671 Specification for the Design of Cold-Formed Steel Structural Members
2. American Society for Testing and Materials (ASTM) Publications:
   a. A525 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements
   b. A611 Steel, Cold-Rolled Carbon
   c. A653 Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
3. American Welding Society, Inc. (AWS) Publications:
   a. D1.1 Structural Welding Code - Steel
   b. D1.3 Structural Welding Code - Sheet Steel
4. National Fire Protection Association (NFPA) Publication:
   a. 70 National Electric Code
5. Steel Deck Institute (SDEI) Publication:
   a. DMCDFDRD Design Manual for Composite Decks, Form Decks and Roof Decks
6. Underwriters Laboratories, Inc. (UL) Publication:
   a. 209 Cellular Metal Floor Raceway and Fittings

1.03 SUBMITTALS: Submit the following.

A. Manufacturer's Catalog Data: Submit manufacturer's catalog data for floor deck and accessories. Include decking design properties, allowable loadings, and applicable published literature covering the specific type of construction required by this project. Submit and obtain approval before delivery of material to the project site.

B. Drawings: Before starting work, submit completely detailed shop drawings indicating details of decking, accessories, connections, bearing on supports, methods of anchoring, attachment of accessories, adjusting plate details, floor layout, placement directions, structural properties including composite section

properties where required, size and location of holes to be cut and reinforcement provided, type and sequence of welded connections, and other pertinent details.

C. Statements: Welder Certification: Submit qualifications of welders and duration of qualification period in accordance with AWS.

D. Certificates of Compliance:
1. Steel deck materials - Submit manufacturer’s certification attesting that floor decks meet the requirements of SDI and AISI.

1.04 DELIVERY AND STORAGE

A. Do not damage or overload decking and accessories during delivery, storage, or handling. Do not use decking for storage or as working platform until units have been welded into position. Stack decking on platforms or pallets and cover with weathertight ventilated covering. Elevate one end during storage to provide for drainage. Contractor is responsible for replacing damaged material.

PART 2 - PRODUCTS

2.01 FABRICATION

A. Provide decking in accordance with SDEI DMCDFDRD. Decking shall have the structural properties indicated on drawings. Deck units shall conform to manufacturer's published load tables.

2.02 MATERIALS

A. Provide products of a manufacturer that is regularly engaged in production of steel deck units and accessories.

B. Steel Floor Decks: Thickness of steel used in fabrication of decking shall not be less than 0.0239 inches before galvanizing and shall meet requirements of AISI SG671, except as modified herein.
1. Noncellular Decking: Form decking and accessories from steel sheets conforming to ASTM A653, Grade A (33,000 psi minimum yield strength), galvanized in accordance with ASTM A525, coating designation [G-60

C. Accessories:
1. Adjusting Plates: Use adjusting plates of the same gage and configuration as decking. Use factory-cut plates of predetermined size where possible.
2. End Closures: Factory fabricated of sheet metal.
3. Partition Closures: Factory fabricated of sheet metal. Provide 2.5-pound density blanket insulation at acoustical partitions.
4. Cover Plates: Sheet metal. Polyethylene-coated, self-adhesive, 2-inch wide joint tape may be provided in lieu of cover plates on flat-surfaced decking.

5. Column Flashing: Sheet metal, minimum 0.0358-inch thick or metal rib lath.
6. Access Hole Covers: Sheet metal, minimum 0.0474-inch thick.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to installation of decking units and accessories, inspect the support structure to verify that the as-built structure will permit the indicated field installation of decking system without modification.

3.02 INSTALLATION

A. Install steel deck units in accordance with approved shop drawings. Place units on structural supports, properly adjusted, leveled, and aligned at right angles to supports. Report inaccuracies in alignment or leveling to the Engineer and make necessary corrections before deck units are permanently anchored. Locate end laps over supports only, with minimum lap of 2 inches and as indicated. Do not use unanchored deck units as a work or storage platform. Permanently anchor all units placed by the end of each working day.

B. Anchorage Methods: After placement and alignment, and after inaccuracies have been corrected, permanently fasten steel deck units in place as indicated. Use methods as recommended by the Steel Deck Institute, subject to the Engineer's approval. Length of side and end laps of deck and intervals of fastening shall be as recommended by the steel deck manufacturer, but not less than 2 inches. Clamp or weight deck units to provide firm contact between deck units and structural supports while welding or fastening is being performed.
   1. Welding: Perform welding in accordance with AWS using methods and electrodes recommended by the manufacturers of the base metal alloys being used. Welds shall be made only by operators previously qualified by test prescribed in AWS to perform the type of work required. Location, size and spacing of welds shall be in accordance with the Steel Deck Institute recommendations and as shown on the shop drawings. Clean welds immediately by chipping and wire brushing. Heavily coat welds, weld scars, cut edges, drill holes, rust spots, and damaged portions of shop finish with zinc-rich primer provided by the deck supplier and approved by the Engineer. Those welders producing unsatisfactory welding, even though they have passed qualification tests, shall be immediately recertified or replaced with qualified welders.
   2. Fasteners: Provide powder actuated or screwed fasteners for anchoring the deck to structural supports and adjoining units. Provide positive locking-type fasteners standard with the Steel Deck Institute and the manufacturer, as approved by the Engineer.

C. Openings:

1. Openings required in deck larger than five square feet, or greater than 24 inches in either direction or 30 inches in diameter, shall be predetermined and provided as a part of fabrication herein.
2. Punching, drilling or cutting deck openings smaller than above stated for passage of pipes, ducts, or attachment of other items shall be performed in field by Contractor requiring such. Obtain approval of the Engineer for such holes or other openings larger than 6 inches in diameter.
3. Steel reinforcing members indicated or required around openings through decks for roof hatches, fans, and similar projections will be provided by others when shown in drawings. If not shown, but required, this Contractor shall provide such.
4. Steel reinforcing members required for auxiliary openings smaller than stated above and not indicated on drawings shall be provided by Contractor requiring opening.

D. Accessories:
1. Adjusting Plates: Provide in locations too narrow to accommodate full-size deck units and install as shown on shop drawings.
2. End Closures: Provide end closure to close open ends of cells at columns, walls, and openings in deck.
3. Closures Above Partitions: Provide for closing voids between cells over partitions that are perpendicular to direction of cells. Provide a one-piece closure strip for partitions 4 inches nominal or less in width and two-piece closure strips for wider partitions. Provide sheet metal closures above fire-rated partitions at both sides of partition with space between filled with fiberglass insulation. Provide flexible rubber closures above acoustic-rated partitions at both sides of partition with space between filled with blanket insulation.
4. Column Flashing: Provide for spaces between floor decking and columns which penetrate the deck. Field cut flashing to fit column in the field and tack weld to decking and columns.
5. Access Hole Covers: Provide to seal holes cut in decking to facilitate welding of decking to structural supports.
6. Hangers: Provide as indicated to support suspended ceilings. Space devices so as to provide one device per 6.25 square feet.

3.03 CONCRETE WORK

A. Prior to placement of concrete, inspect the installed decking to ensure that there has been no permanent deflection or other damage to the decking. Decking which has been damaged or permanently deflected shall be replaced as approved by the Engineer. Concrete fill over metal deck is specified in Section 03 30 00, "Cast-In-Place Concrete".

END OF SECTION

SECTION 05 31 23
STEEL ROOF
DECKING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall provide all labor, materials and equipment required to furnish and install Steel Roof Decking and accessories, as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
   1. American Iron and Steel Institute (AISI) Publication:
      a. SG671- Specification for the Design of Cold-Formed Steel Structural Members
   2. American Society for Testing and Materials (ASTM) Publications:
      a. A525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
      b. A611 - Steel, Cold Rolled, Carbon
      c. A653 - Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
   3. American Welding Society, Inc. (AWS) Publications:
      a. D1.1 - Structural Welding Code, Steel
      b. D1.3 - Structural Welding Code - Sheet Steel
   4. Factory Mutual Engineering and Research Corporation (FM) Publications:
      a. P7825 - Approval Guide
      b. D/S1-28 - Insulated Steel Deck, Loss Prevention Data Sheet 1-28
   5. Steel Deck Institute (SDEI) Publication:
      a. DMCDFDRD - Design Manual for Composite Decks, Form Decks and Roof Decks
   6. Underwriters Laboratories, Inc. (UL) Publications:
      a. BMD - Building Materials Directory
      b. 580 - Tests for Uplift Resistance of Roof Assemblies

1.03 SUBMITTALS: Submit the following.

A. Manufacturer's Catalog Data: Submit manufacturer's catalog data for roof deck and accessories. Include decking design properties, allowable loadings and applicable published literature covering the specific type of construction required by this project. Submit and obtain approval before delivery of material to the project site.

B. Drawings: Before starting work, submit completely detailed shop drawings indicating the decking, connections, bearing on supports, methods of anchoring, accessories, attachment of accessories, roof layouts, placement directions, size

and location of holes to be cut and reinforcement to be provided, type and sequence of welded connections, and other pertinent details.

C. Statements:
1. Welder Certification: Submit qualifications of welders and duration of qualification period in accordance with AWS.

D. Certificates of Compliance:
1. Steel Deck Materials: Submit manufacturer's certification attesting that roof decks meet the requirements of SDI and AISI.

1.04 QUALITY ASSURANCE

A. Steel Deck: Deck and accessories shall be the products of a manufacturer regularly engaged in the manufacture of steel roof decking.

B. Welder Certification: Provide qualification of welders and duration of qualification period in accordance with AWS.

C. Regulatory Requirements:
1. Wind Storm Resistance: The roof construction assembly shall be capable of withstanding an uplift pressure in accordance with ASCE 7 -16.

1.05 DELIVERY AND STORAGE

A. Do not damage or overload decking and accessories during delivery, storage, or handling. Do not use decking for storage or as working platform until units have been welded into position. Stack decking on platforms or pallets, and cover with weathertight ventilated covering. Elevate one end during storage to provide for drainage. Contractor is responsible for replacing damaged material.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel: Deck units shall be manufactured from steel conforming to ASTM A611, Grade CASTM A653, Grade A having a minimum yield of strength of 33,000 psi. Quality and properties shall conform to AISI SG671.

B. Zinc-Coated Steel: Provide zinc-coated steel deck and accessories conforming to ASTM A525 G60. Zinc-coated steel will not require shop painting.

C. Accessories: Provide accessories of the same material as the deck and not lighter than 20-gauge, unless specified otherwise herein. Provide manufacturer's standard type accessories, as specified herein.
1. Adjusting Plates: Provide plates of the same gauge and configuration as the roof units. Use factory cut plates of predetermined sizes where possible.
2. End Closures: Factory fabricate of minimum 22 gauge sheet metal.

3. Closures Above Partitions: Provide flexible rubber or sheet steel closures above typical partitions.
4. Cover Plates: Provide butt cover plates, underlapping sleeves; or 2-inch wide noncombustible, pressure sensitive tape.
5. Miscellaneous Accessories: Provide cant strips, fasteners, sump pans, ridge and valley plates, and various types of plates and closures as indicated or as necessary to complete the work. Provide accessories required for a finished installation.

2.02 FABRICATION: Provide decking in accordance with SDEI DMCDFDRD.

A. Decking shall be 1.5 – 20 gage Type B galvanized roof deck and as indicated on drawings. Deck units shall conform to manufacturer's published load tables. Deck shall safely support uniformly distributed live loads as indicated on drawings, plus dead loads of construction indicated and/or specified. Deflection shall not exceed 1/240 of maximum span for live loads specified.

PART 3 - EXECUTION

3.01 INSPECTION OF SUPPORT STRUCTURE

A. Prior to installation of steel roof deck and accessories, inspect the support structure to verify that the as-built structure will permit the indicated field installation of the decking system without modification.

3.02 INSTALLATION

A. Install steel roof deck units in accordance with approved shop drawings. Place units on structural supports, properly adjusted, leveled, and aligned at right angles to supports. Extend deck units over three or more supports unless absolutely impractical. Report inaccuracies in alignment or leveling to the Engineer and make necessary corrections before deck units are anchored permanently in place. Locate end laps over supports only, with minimum lap of 2 inches and as indicated on drawings. Do not use unanchored deck units as a work or storage platform. Permanently anchor units placed by the end of each working day. Suspended ceilings, light fixtures, ducts, utilities, or other loads shall not be supported by the steel deck.

B. Anchorage Methods: After placement and alignment, and after inaccuracies have been corrected, permanently fasten steel roof deck units in place by welding and with self-drilling screws. Use methods as indicated on drawings and as recommended by the Steel Deck Institute, subject to the Engineer's approval. Length of side and end laps of deck and intervals of fastening shall be as recommended by the steel deck manufacturer, but not less than 2 inches. Clamp or weight deck units to provide firm contact between deck units and structural supports while welding or fastening is being performed.
1. Welding: Perform welding in accordance with AWS D1.3 using methods and electrodes as recommended by the manufacturers of the base metal alloys being used. Welds shall be made only by operators previously

qualified by test prescribed in AWS to perform the type of work required. Location, size and spacing of welds shall be as indicated and as shown on the approved shop drawings. Clean welds immediately by chipping and wire brushing. Heavily coat welds, weld scars, cut edges, drill holes, rust spots and damaged portions of shop finish and zinc-rich primer provided by the deck supplier and approved by the Engineer.

2. Fasteners, Screwed: Provide fasteners for anchoring the deck to adjoining units that are designed to withstand the design loads indicated and that are standard with the Steel Deck Institute and the manufacturer. Provide fasteners of a positive locking type; approved prior to installation.

C. Accessories: Install cover plates, adjusting plates, finish strips, closures and closure sheets as necessary to complete the work. Install finish strips and closure sheets so as to lap one support a minimum of 2 inches.
   1. Adjusting Plates: Provide in locations too narrow to accommodate full-size deck units and install as shown on shop drawings.
   2. End Closures: Provide end closure to close open ends of cells at end walls eaves and openings in roof deck.
   3. Closures Above Partitions: Provide for closing voids between cells above interior walls and over partitions that are perpendicular to direction of cells.
   4. Cover Plates: Provide at end joints between adjoining non-lapping units.

D. Openings:
   1. Punching, drilling or cutting deck openings smaller than above stated for passage of pipes, ducts, or attachment of other items shall be performed in field by Contractor requiring such. Obtain approval of the Engineer for such holes or other openings larger than 6 inches in diameter.
   2. Steel reinforcing members indicated or require around openings through decks for roof hatches, fans, and similar projections, will be provided by others when shown on drawings. If not shown, but required, this Contractor shall provide such.
   3. Steel reinforcing members required for auxiliary openings smaller than stated above and not indicated on drawings shall be provided by Contractor requiring opening.

3.03 FIELD QUALITY CONTROL

A. Inspect the decking top surface for flatness after installation. The top flanges of each sheet shall be flat with concavity or convexity not to exceed 1/16-inch (1.58-mm). A straight edge placed across any three contact surfaces shall leave a gap of not more than 1/16-inch between the straight edge and any point of the contact surface; when gap is more than 1/16-inch, provide corrective measures or replacement. Reinspect the decking after performing corrective measures or replacement.

B. Complete installation of deck and accessories shall be subject to approval by roofing Contractor and Engineer.

END OF SECTION

SECTION 05 40 01
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Cold-Formed Metal Framing, as shown on the Plans, as specified, and/or directed.

1.02 APPLICABLE PUBLICATIONS

A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. American Institute of Steel Construction (AISC) Publication:
   a. SG671 Specification for the Design of Cold-Formed Steel Structural Members
2. American Society for Testing and Materials (ASTM) Publications:
   a. A570 Structural Steel, Sheet and Strip, Carbon, Hot-Rolled, Quality
   b. A611 Steel, Sheet, Carbon, Cold-Rolled, Structural Quality
   c. A653 Steel Sheet, Zinc Coated (Galvanized) OR Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
3. American Welding Society, Inc. (AWS) Publication:
   a. D1.3 Structural Welding Code Sheet Steel

1.03 SUBMITTALS: Submit the following.

A. Design Data:

1. Metal framing detailing

Verify sizes, gauges, and spacing of members and connections. Show methods and practices used in installation.

B. Manufacturer's Catalog Data:

1. Cold-formed metal framing members

C. Drawings:

1. Cold-formed metal framing
   a. Bearing wall and roof framing

Show sizes, thicknesses, layout, material designations, connections, methods of installation, and accessories.

2. Detailed HDS framing system for exterior wall and window opening framing.

D. Certificates of Compliance:

1. Cold-formed metal framing members

1.04 DELIVERY AND STORAGE

A. Deliver materials to job site and store in adequately ventilated, dry locations. Storage area shall permit easy access for inspection and handling. If necessary to store materials outside, stack off the ground, properly support on a level platform, and fully protect from the weather as approved. Handle materials carefully to prevent damage. Replace damaged items with new, as directed by the Engineer.

1.05 LOAD-BEARING COLD-FORMED METAL FRAMING:

A. Include top and bottom tracks, bracing, fastenings, and other accessories necessary for complete installation. Framing members shall have the structural properties indicated. Where physical size or structural properties are not indicated, they shall be as necessary to withstand all imposed loads.

1.06 MAXIMUM DEFLECTION

A. Exterior Studs:

Deflection Criteria	Exterior Finish
L/240 or L/360	Synthetic Plaster, Metal Panels
L/360	Cement Plaster, Wood Veneer
L/600	, Stone Veneer

PART 2 - PRODUCTS

2.01 STUDS AND JOISTS

A. Studs, jamb studs, headers and tracks of 16 Gauge (0.0598 inch) and Heavier Galvanized steel, ASTM A653, Grade D, Grade 50 G60

B. Studs and Joists of 18 Gauge (0.0478 inch) and Lighter Studs and Joists of 18 Gauge (0.0478 inch) and Lighter, Track, and Accessories (All Gauges): Galvanized steel, ASTM A653, Grade A (33,000 psi minimum) G60

C. Sizes, Gauges, and Structural Properties: Shall be as indicated.

PART 3 - EXECUTION

3.01 FASTENING

A. Fasten framing members together by welding or by using self-drilling or self-tapping screws. Welding shall conform to AWS D1.3 welding procedure.

Electrodes and screw connections shall be as required and indicated in the design calculations. Do not field weld materials lighter than 18 gauge.

3.02 TRACKS

A. Provide accurately aligned runners at top and bottom of partitions. Anchor tracks as indicated on documents and in approved submittals. . Butt weld joints in tracks or splice with stud inserts. Fasteners shall be at least 3 inches from the edge of concrete slabs.

3.03 STUDS

A. Cut studs square and set with firm bearing against webs of top and bottom tracks. Position studs vertically in tracks and space as indicated in design. Do not splice studs. Provide at least two studs at jambs of doors and other openings 2 feet wide or larger. Provide Clark Detrich HDS framing system for exterior window opening framing. Refer to structural documents for additional information. Provide cripple studs over openings to maintain indicated stud spacing. Provide tripled studs at corners, positioned to receive interior and exterior finishes. Fasten studs to top and bottom tracks by welding or screwing both flanges to the tracks. In curtain wall construction, provide for vertical movement where studs connect to the structural frame. Provide horizontal bracing in accordance with AISI SG671, consisting of, as a minimum, runner channel cut to fit between and welded to the studs or hot- or cold-rolled steel channels inserted through cutouts in web of each stud and secured to studs with welded clip angles. Bracing shall be not less than the following:

LOAD	WEIGHT	BRACING
Wind load only	Up to 10 feet	One row at mid-height
	Over 10 feet	Rows 5'-0" o.c. maximum
Axial load	Up to 10 feet	Two rows at 1/3 points
	Over 10 feet	Rows 3'-4" o.c. maximum

3.04 JOISTS

A. Locate each joist directly above a stud. Joists shall have at least 2.50 inches of bearing on steel, 4 inches on masonry, and shall be reinforced over bearings where required to prevent web crippling. Splice joists over bearings only. Lap and weld splices as indicated. Provide manufacturer's standard bridging which shall not be less than the following:

CLEAR SPAN	BRIDGING
Up to 14 feet	One row near center
14 to 20 feet	Two rows at 1/3 points
20 to 26 feet	Three rows at 1/4 points
26 to 32 feet	Four rows at 1/5 points

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel items.

1.02 RELATED REQUIREMENTS

A. Section 09 91 13 - Exterior Painting: Paint finish.

B. Section 14 20 00 - Hydraulic Elevators

1.03 REFERENCE STANDARDS

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

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

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.

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

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A 36/A 36M.

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

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. 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.

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

2.03 FABRICATED ITEMS

A. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.

B. Elevator Support for Entrances and Rails

2.04 FINISHES - STEEL

A. Prime Painting: One coat.

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

END OF SECTION

SECTION 05 51 33
METAL LADDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prefabricated ladders.

1.02 RELATED REQUIREMENTS

A. Section 08 31 10 - Floor Access Doors.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

B. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.

C. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.

D. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2008.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.

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

PART 2 PRODUCTS

2.01 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B211/B211M, 6063 alloy, T6 temper.

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

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

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. 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.

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

2.03 PREFABRICATED LADDERS

A. Prefabricated Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
   1. Components: Manufacturer's standard rails, rungs, treads, handrails. returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
   2. Materials: Aluminum; ASTM B211/B211M, 6063 alloy, T52 temper.
   3. Finish: Mill finish aluminum.
   4. Manufacturers:

a. Industrial Ladder & Scaffolding, Inc.; _____: www.anyladder.com/#sle.
b. Precision Ladders, LLC; Fixed Alumnium Wall Ladder: www.precisionladders.com/#sle.

2.04 FINISHES - ALUMINUM

A. Exterior Aluminum Surfaces: Class I natural anodized.

B. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.05 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

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

3.04 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.

END OF SECTION