SPECIFICATIONS INDEX

GOVERNMENT OF THE VIRGIN ISLANDS, DEPARTMENT OF HEALTH
ELDRA SHULTERBRANDT FACILITY
GRANT NO. D12AP00349 (VI-CIP-2012-3)
St. Thomas, U. S. Virgin Islands

DIVISION 5 – METALS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included in This Section:
1. Provide all labor, materials, equipment, and services, etc. required for the fabrication, shipping, and erection of all structural steel as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
2. In general, structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and may include, but shall not necessarily be limited to, all columns, beams, base plates, leveling plates, relieving angles, angles, channels, braces, stiffeners, separator plates, clips, connections, welding filler metal and electrodes, anchor bolts, connection bolts, erection bolts, and all related materials as required.
3. Rigid masonry anchors welded to steel structure shall be provided as a part of the Work of this Section.

B. Materials Furnished but Installed Elsewhere:
1. Anchor bolts, loose bearing plates, embedded angles, embedded connection plates with studs, etc. shall be furnished under the Work of this Section and placed under the Work of SECTION 03300: CAST-IN-PLACE CONCRETE if set in concrete, or the Work of SECTION 04810: UNIT MASONRY AND MORTAR if set in masonry.

C. Related Work Specified Elsewhere:
1. SECTION 03300: CAST-IN-PLACE CONCRETE
2. SECTION 04810: UNIT MASONRY AND MORTAR
3. SECTION 05400: COLD FORMED METAL FRAMING

1.02 SUBMITTALS

A. Product Data: Submit product data, test reports and installation instructions, steel mill report for each type; structural steel primer paint, high-strength bolts, nuts and washers for each type.

B. Shop Drawings: Submit shop drawings of all Work specified herein:
1. Shop drawings shall indicate all details and schedules for shop fabrication and assembly and erection, including, but not limited to, cuts, copes, camber, connections, and holes. All welds, both shop and field, shall be indicated by AWS "Welding Symbols" and show size, length, and type of each weld. Provide setting drawings, templates, and direction for installation of anchor bolts and other anchorages to be installed as a part of this Work and the Work of other Sections.
2. Note that it shall be the responsibility of the fabricator's detailer to indicate all details required for the proper execution of the Work, regardless of the extent to which details are represented on the Contract Documents.
3. All exposed (exposed to view following project completion), connections shall be clearly identified and detailed on the shop drawings.
4. For structural steel connections indicated to comply with design loads, include structural analysis data prepared by the qualified professional engineer responsible for their preparation.
5. The review of shop drawings will be for size and arrangement of principal and auxiliary members only. Any errors in quantities and/or dimensions shown on shop drawings shall be the responsibility of the Contractor.

C. Certifications: Submit the following certifications:
1. Steel fabricator's in-plant special inspections program including: registration of special inspections program, written procedural and quality control manuals, and evidence of periodic auditing of fabrication practices by an approved inspection agency.
2. Manufacturer's certificate of compliance for structural steel, bolts, nuts, and washers including mechanical properties and chemical analysis, direct-tension indicators, tension-control high strength bolt-nut-washer assemblies and shear stud connectors.
3. Manufacturer's certificate of compliance for weld filler materials.
4. Manufacture's certificate of compliance for shop primers and grout.

5. Welder's certifications.
6. Fabricator's post-fabrication certificate of compliance with the approved construction documents.

D. Qualification Data: Submit qualification data for the fabricator's professional engineer.

1.03 QUALITY ASSURANCE

A. All design, fabrication, and erection of structural steel shall be in accordance with the latest editions of the following American Institute of Steel Construction (AISC) documents:
1. AISC "Specifications for Structural Steel for Buildings" including "Commentary" and Supplements thereto as issued.
2. AISC "Code of Standard Practice for Steel Bridges and Buildings". NOTE: Delete the following sentence from paragraph 4.2.1 of this Code: "This approval constitutes the Owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as a part of his preparation of these shop drawings."
3. AISC "Seismic Provisions for Structural Steel Buildings" and Supplements thereto.
4. AISC "Specification for the Design of Steel Hollow Structural Sections".
5. AISC "Specification for Allowable Stress Design of Single-Angle Members".
6. RCSC-85 "Specifications for Structural Joints Using ASTM A325 or A490 Bolts".
7. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel" and "Code for Welding in Building Construction."
8. ASTM listed Standards by the American Society for Testing and Materials.

B. Fabricator shall be a certified member of AISC who participates in a recognized quality assurance program. Only fabricators that maintain an agreement with an approved independent inspection or quality control agency to conduct periodic in-plant inspections at the fabricator's plant, at a frequency that will assure the fabricator's conformance to the requirements of the inspection agency's approved quality control program will be approved for this project. Shop painting applicator shall be qualified according to AISC Sophisticated Paint Endorsement or SSPC-QP3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

C. Installer shall be a certified member of AISC, who participates in the AISC Quality Certification Program and is designated an AISC Certified Erector, Category CSE.

D. Welders and welding procedures shall be certified in accordance with AWS qualification requirements. Welders shall have been certified or re-certified within the last five (5) years.

E. Exposed steel in finished spaces shall be free from scratches, dents, warps, scaling, and paint runs, etc.

F. All exposed welds shall be ground smooth and prime coated to match original coating. Additional filling and grinding shall be provided as required by the Architect and Engineer, at no additional cost to the Owner.

G. Connections: Provide details of connections required by the D/B Documents to be selected or completed by the structural steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
1. Select and complete connections using schematic details indicated and AISC "Manual of Steel Construction, Load and Resistance Factor Design", Volume 2, Part 9 and AISC "Manual of Steel Construction, Allowable Stress Design", Part 4.
2. Engineering Responsibility: Fabricator's responsibilities shall include using a qualified professional engineer, licensed in the United States Virgin Islands to prepare structural analysis data for structural steel connections.

H. Pre-installation Conference: A meeting shall be held to review the proposed materials, installation coordination and safety. The following personnel shall be present at the meeting:
1. Design/Contractor (Project Manager, Superintendent)
2. Structural Steel Erector / Fabricator (Project Manager, Foreman)
3. Owner's Representative
4. Architect

1.04 TESTING AND INSPECTIONS

A. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified testing agency. Such inspections and tests shall not relieve the Contractor of responsibility for providing his own inspections, quality control and materials and fabrication procedures in compliance with specified requirements. Any non-compliant materials or fabricated components shall be removed and replaced.

B. The fabricator shall submit evidence of in-plant inspections in conformance with IBC "Structural Tests and Inspections – Inspection of Fabricators (Section 1700).

C. Testing and inspection shall be performed as required by the building code, the Contract Documents or as otherwise directed by the Architect and Engineer. The cost of field testing and inspection shall be paid for by the Contractor. If Work is found not to conform to the Contract Documents, the Contractor shall be responsible for the cost of all further testing.

D. The Contractor and testing agency shall examine the Contract Documents and become thoroughly familiar with the Work and related testing and inspection requirements.

E. The Contractor shall cooperate with and facilitate testing and inspection by the testing agency. The Contractor shall, at his own expense, furnish the testing agency, upon request, with the following:
   1. Complete set of reviewed erection drawings, shop drawings, schedules, and corrective work procedures at the fabricating shop or in the field.
   2. Cutting list, order lists, material bills, and shipping lists.
   3. Information as to time and place of all rollings and shipment of material to shops.
   4. Representative sample pieces requested for testing.
   5. Assistance for testing materials and proper facilities for inspection of the Work, in the mill, shop, and field.
   6. Access to the fabrication plant for testing agency inspection and testing.

F. The testing agency shall conduct and interpret tests and inspections, state in each report whether tests and items inspected comply with requirements, and specifically state any deviations.
   1. The testing agency may inspect structural steel at the plant prior to shipment.
   2. The testing agency shall perform an inspection of the steel frame to verify compliance with the details indicated on the Drawings and approved shop drawings, such as bracing, stiffening, member locations, and proper application of joint details at each connection.
   3. Shop and field bolted connection inspection and testing shall be in accordance with Research Council on Structural Connections RCSC-85 "Specification for Structural Joints Using A325 or A490 Bolts", AISC specifications and building code requirements.
   4. Shop and field welding inspection and testing shall be in accordance with AWS D1.1 "Structural Welding Code – Steel" and AISC specifications and building code requirements. Weld inspectors shall be certified in accordance with AWS D1.1.
      a. Welds in the structural seismic resisting system for buildings in Seismic Performance Category C, D or E shall be inspected by ultrasonic testing or other approved methods in accordance with building code requirements.
      b. Column splice welds shall be tested by ultrasonic testing or other approved methods in accordance with the building code requirements.
      c. Base metal having a thickness more than 1.5 inches and subject to through-thickness weld shrinkage strains shall be ultrasonically tested in accordance with building code requirements.

G. The testing agency shall inspect and test (as required) all welded and bolted work. Weldments and bolted connections that the testing agency determines to be unsatisfactory shall be corrected without delay at the Contractor's expense and to the satisfaction of the testing agency. The testing agency may require drawings showing proposed corrective work to be submitted for approval.

H. The Contractor shall notify the testing agency five (5) days prior to the shipment of any structural steel so that a paint inspection may be made. At these inspections, the dry mill thickness of the paint film may be checked, and steel

containing mill scale that can easily be removed with the blade of a pocketknife will be subject to recleaning and repainting at the expense of the Contractor.

I. Any material or workmanship that is rejected either in the mill, shop, or field shall be replaced promptly by the Contractor to the satisfaction of the Architect and Engineer or testing agency.

J. The fact that steel work has been accepted at the shop shall not prevent its final rejection at the job site, or even after it has been erected, if it is found to be defective in any way.

K. At the completion of fabrication, the fabricator shall submit a certificate of compliance to the Architect, Engineer, Owner and building official stating that the Work was performed in accordance with the approved construction documents.

1.05 PRODUCT HANDLING

A. Delivery of Materials to be Installed Under Other Sections:
1. Anchor bolts, embedment plates, and other anchorage devices that are embedded in concrete or masonry construction shall be delivered to the project site in time to be installed before the start of cast-in-place concrete, or masonry work.
2. Provide setting drawings, templates, and directions for the installation of the anchor bolts and other devices.

B. Storage of Materials:
1. Structural steel members that are stored at the project site shall be above ground on platforms, skids, or other supports.
2. Steel shall be protected from corrosion.
3. Other materials shall be stored in a weathertight and dry place until ready for use in the Work.
4. Packaged materials shall be stored in their original unbroken packages or containers.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Structural Steel Wide Flange Shapes: Shall conform to ASTM A992 Grade 50 unless otherwise indicated on the Structural Drawings.

B. Structural Steel Plates, Bars and Other Shapes: Shall conform to ASTM A 36, Grade 36.

C. Structural Tubes: Shall conform to ASTM A500, Grade B, "Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes," or ASTM A501, "Hot-Formed Welded and Seamless Carbon Steel Structural Tubing" as indicated on the Structural Drawings.

D. Anchor Bolts: Shall conform to ASTM A307 or A325 as indicated on the Structural Drawings.

E. Threaded Fasteners: (Heavy hexagon structural bots, heavy hexagon nuts, and hardened washers) Shall be quenched and tempered medium-carbon steel bolts, nuts and washers conforming to ASTM A 325. Size shall be 3/4" unless otherwise indicated. Where indicated as galvanized, provide units that are hot-dip zinc coated complying with ASTM A153.

F. Direct Tension Indicators: Shall comply with ASTM F959, type as required. TC Bolts may be used in lieu of load indicator washers.

G. Electrodes For Welding: Shall comply with AWS Code.

H. Non-Shrink Grout: See SECTION 03300: CAST-IN-PLACE CONCRETE.

2.02 PAINTING AND PROTECTIVE COATING

A. Structural Steel Shop Primer: Shall be Tnemec 10-1009 Grey at 2.0 - 3.0 mils DFT. Exposed steel shall be coated with Tnemec 37H Chem Prime Universal Phenolic Primer.

B. Galvanizing Repair Paint: Shall be high zinc-dust content paint for re-galvanizing welds in galvanized steel, with dry film containing not less than 94% zinc dust by weight, and complying with SSPC-Paint 20.

C. All ferrous metal herein Specified shall be properly cleaned and shop primed, except at the following locations:
   1. Where hot-dip galvanized steel is specified or shown, it shall not be shop primed.
   2. Where sprayed-on fireproofing is specified or shown, steel shall not be shop primed.
   3. Slip critical connections, surfaces to receive shear connectors (including top flanges of beams and girders) and contact surfaces to be field welded, shall not be shop primed.

D. Surface preparation for exterior steel shall meet requirements of the Steel Structures Painting Council SS PC-SP6 Commercial Blast Cleaning Standard. Surface preparation for interior steel and steel to be fireproofed shall meet requirements of SS PC-SP3 Power Tool Cleaning Standard.

E. Galvanizing: Shall be "hot-dipped" process and shall conform with ASTM A123. Assembled steel products shall be hot-dip galvanized in accordance with ASTM A386, latest edition. The weight of coating shall be as designated in Table 1 "Comparison of Coating Weight Requirements for Hot-Dip Galvanized Products" in accordance with the class and thickness of material.

F. All hot-dip galvanizing shall be done after fabrication. Field cutting of galvanized materials shall be approved by the Architect and Engineer and shall be touched-up with liquid galvanizing as recommended by the fabricator.

G. All hot-dip galvanized materials shall be stamped to indicate ASTM designation and ounces per square foot of zinc coating required by the specifications.

H. A notarized affidavit of compliance to the galvanizing specified shall be submitted from the galvanizer upon request.

PART 3 – EXECUTION

3.01 FABRICATION

A. Structural Steel:
   1. Steel shall be fabricated in strict accordance with the shop drawings and the AISC Standard Specifications. All steel shall be shop fabricated. Field modifications shall not be permitted.
   2. Field verify existing conditions and all dimensions prior to fabrication.
   3. Provide openings in structural members required for other building components. Reinforce openings with steel plates appropriately sized to restore cut members to original strength. Notify the engineer prior to proceeding with proposed cuts or modifications.
   4. Punch and drill steel for attachment of other materials indicated in the Drawings or Specifications to be attached to the steel.

B. Connections:
   1. Connections, unless otherwise indicated, shall be framed beam connections and shall be in accordance with the Standard Specifications for both bolted and welded connections.
      a. All vertical holes shall be 3" on center.
      b. One sided or other types of eccentric connections shall not be permitted unless indicated on the Structural Drawings.
      c. The design of members and connections for any portions of the structure not indicated on the Drawings shall be completed by the fabricator. Connections shall be capable of supporting the maximum uniform load of the member for the span shown and the materials specified. Connections for girders which

support other beams shall be designed for at least 1.5 times the AISC uniform load reaction. All connection design shall be subject to approval of the Structural Engineer.

2. Welded connections shall be used on all shop connections:
   a. All welded construction shall comply with AWS Code for procedures, appearance, quality of welds and methods used to correct welding work. All welds shall develop the full strength of the materials to be welded, unless otherwise indicated.
   b. Welding shall not be done when the ambient temperature is lower than 32 degrees F.; when surfaces are wet or exposed to rain, snow or high wind; or when welders are exposed to inclement conditions.
   c. All connections to be exposed in the finished structure shall be welded in such a manner as to make the finished connection neat and smooth in appearance. Comply with AISC requirements for Architecturally Exposed Structural Steel.

3. Bolted connections shall be used on all field connections, using load indicator washers, or TC Bolts, which shall be installed in accordance with Paragraph 5(e) of the Specifications for Structural Joints.

C. Bearing Plates: Shall be provided under ends of beams and steel joists resting on masonry and concrete.

D. Sloped Joist Seats: Steel fabricator shall coordinate requirements for sloped joist seats with steel joist supplier. Provide all necessary bearing angles and supports.

E. Embedded Steel Plates and Surface Mounted Plates: Shall be provided for beam framing connections to new and existing foundation walls, as indicated on the Drawings.

F. Rigid Masonry Anchors: Provide channel anchors of form and length as indicated. All columns and beams embedded in CMU walls shall have masonry anchors welded at each side in the direction of the wall unless otherwise indicated.

G. Anchor Bolts: Column base plates shall have a minimum of four (4) three-quarter (3/4") inch diameter anchor bolts. Anchor bolt length shall provide eight (8") inch minimum embedment plus three (3") inch minimum hook and sufficient projection above concrete to provide one and one-half (1-1/2") inch minimum extension above top of base plate.

3.02 SHOP PAINTING

A. Steel for General Building:
   1. Thoroughly clean all steel of loose mill scale, rust, dirt, weld spatter, and other foreign matter by power tool cleaning, meeting the requirements of Steel Structures Painting Council SSPC-SP-3. Grind smooth all sharp projections. Oil and grease deposits shall be removed by solvent wiping, meeting the requirements of SSPC-SP-1.
   2. After steel has been properly prepared, apply primer paint to the steel surfaces by spray method, assuring no running or sagging in accordance with manufacturer's directions, so that coverage is not more than 400 square feet per gallon to provide a minimum dry film of 2.0 mils. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

B. No painting shall be done when the temperature is below 40 degrees F., or in damp weather or when the steel is wet or coated with frost.

C. Upon delivery to the job site, steel shall be carefully unloaded and stacked away from extended moisture conditions such as snow or mud.

D. After erection, the erector shall retouch all portions of the shop coat chipped or damaged during erection, and all field welds and connections, with the same paint as used for the shop coat.

E. Parts inaccessible after assembly shall be given two coats of shop primer, preferably of different colors.

F. All steel to receive Sprayed-on Fireproofing shall be clean, free of dirt, loose scale, and oil, but shall not receive primer.

G. Surfaces to be field welded or high strength bolted with slip-critical connections shall not be shop primed.

3.03 GALVANIZING

A. All exterior structural steel, including lintels, relieving angles, and other steel that has any portion exposed to the weather, and all other steel so indicated shall be galvanized.

B. Products fabricated from rolled, pressed, and forged steel shapes, plates, bars and strips, shall be hot-dip galvanized in accordance with ASTM A123, latest edition. All hot-dipped galvanized material shall be stamped to indicate ASTM designation and ounces per square foot of zinc coating required by the specifications. Stamp shall be the Duncan stamp as per the Duncan Galvanizing Corp., or equivalent. Such stamps shall not be placed on portions of steel intended to remain exposed to view.

C. The weight of coating shall be as designated in Table 1, "Comparison of Coating Weight Requirements of Hot-Dip Galvanized Products" (ASTM Specifications) in accordance with the class and thickness of material.

D. Only members of the American Hot-Dip Galvanizing Association, Inc. shall perform hot-dip galvanizing.

3.04 ERECTION

A. Structural Steel: Shall be erected in strict accordance with the Standard Specifications and Code of Standard Practice.

3.05 ERECTION BRACING

A. Temporary erection bracing, shoring, and guying shall be provided to hold the structural steel securely and accurately in position in a horizontal/vertical plane. Provide temporary planking and working platforms as necessary to effectively complete the Work.

B. Bracing, shoring, and guying systems shall be designed to resist all construction and wind loads. The systems shall be left in place until all bolting or welding is completed and all building elements that provide lateral support for the structural frame are completed and provide a stable structure.

C. The Contractor shall assume total responsibility for designing, installing, maintaining, and removing all bracing, shoring, and guying required.

3.06 SETTING BASES AND BEARING PLATES

A. Clean concrete bearing surfaces to be free from bond-reducing materials. Roughen to provide suitable bonding surfaces. Clean the bottom surface of base and bearing plates.

B. Set loose and attached base plates and bearing plates for structural members in wedges or other adjusting devices.

C. Tighten anchor bolts after the supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base or bearing plate prior to packing with grout.

D. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's recommendations.

3.07 FIELD ASSEMBLY

A. Structural steel frames shall be accurately assembled to the lines and elevations indicated, and within the erection tolerances specified in the Standard Specifications.

B. Members forming parts of a complete frame or structure shall be aligned and adjusted accurately before being fastened.

C. Structural steel members shall not be field cut or modified. Splice members only where indicated and accepted on the shop drawings.

3.08 ERECTION BOLTS

A. On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment and removal of paint on surfaces adjacent to field welds. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

3.09 FIELD CUTTING

A. Do not use gas cutting torches in the field for correcting fabrication errors in primary structural framing. Cutting shall be permitted only on secondary members that are not under stress, if approved by the Engineer.

3.10 TOUCH-UP PAINTING

A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint by SSPC-SP2 hand tool cleaning or SSPC –SP3 power tool cleaning. Apply paint to exposed areas using the same materials as used for shop painting. Apply by brush or spray to 1.5 mils dry film thickness. For hot-dip galvanized surfaces, clean damaged surfaces, abrade, and apply galvanizing repair paint in accordance with ASTM A780.

END OF SECTION

SECTION 05200 STEEL JOISTS
DEPARTMENT OF HEALTH: ELDRA SHULTERBRANDT FACILITY
GRANT NO. D12AP00349 (VI-CIP-2012-3)
St. Thomas, U. S. Virgin Islands

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included in This Section:
1. Provide all labor, materials, equipment, and services, etc. required for the fabrication, shipping and erection of all steel joists for floor and roof framing as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.

B. Related Work Specified Elsewhere:
1. SECTION 03300: CAST-IN-PLACE CONCRETE
2. SECTION 05100: STRUCTURAL STEEL
3. SECTION 05500: MISCELLANEOUS METAL WORK

1.02 SUBMITTALS

A. Product Data: Submit product data and installation instruction for each type of joist, product and all accessories.

B. Shop Drawings: Submit shop drawings indicating the mark, number, type, size, camber, loading, location, and spacing of all joists; bridging type, mark, method of attachment to the joists; and anchorage and connections. Show type of paint and all accessories and details as may be required for proper installation of joists, including double joists, headers and trimmers as shown or required for framing of floor and roof openings. Show fabrication and dimensions of all joist seats. Provide location drawings for installation of anchor bolts and metal bearing plates.
1. The review of shop drawings will be for size and arrangement of members only. Any errors in quantities and/or dimensions shall be the responsibility of the Contractor.

C. Certifications:
1. Submit manufacturer's certification that joists comply with SJI Specifications.
2. Submit a comprehensive engineering analysis certified by the qualified professional engineer, licensed in the U.S. Virgin Islands, responsible for its preparation.
3. Submit certification that fabricator is a member of the Steel Joist Institute.
4. Submit certificates for welding procedures and personnel.
5. Submit mill certificates signed by manufacturers of bolts certifying that their products comply with specified requirements.
6. Submit certificate of fabricator's in-plant special inspections program including: registration of special inspections program, written procedural and quality control manuals and evidence of periodic auditing of fabrication practices by an approved inspection agency.

1.03 QUALITY ASSURANCE

A. Provide joist fabricated in conformance with American Institute of Steel Construction, Inc. (AISC) and Steel Joist Institute (SJI) "Standard Specifications and Load Tables for Steel Joists and Joist Girders".

B. All welding operators shall be certified and welding processes shall be in accordance with American Welding Society AWS D1.1 "Structural Welding Code – Steel" and AWS D1.3 "Structural Welding Code – Sheet Steel".

C. In case of conflict between referenced Specifications, the more stringent shall govern. In case of conflict between a referenced Specification and the Project Specifications, the Project Specification shall govern.

D. Manufacturer's Qualifications: Only fabricators that maintain an agreement with an approved independent inspection or quality control agency to conduct periodic in-plant inspections at the fabricator's plant, at a frequency that will assure the fabricator's conformance to the requirements of the inspection agency's approved quality control program will be approved for this project.

1.04 TESTING AND INSPECTIONS

A. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified testing agency. Such inspections and tests shall not relieve the Contractor of responsibility for providing his own inspections, quality control and materials and fabrication procedures in compliance with specified requirements. Any non-compliant materials or fabricated components shall be removed and replaced.

B. The fabricator shall submit evidence of in-plant inspections in conformance with IBC "Structural Tests and Inspections – Inspection of Fabricators (1700)".

C. Testing and inspection shall be performed as required by the building code, the Contract Documents or as otherwise directed by the Architect. The cost of field testing and inspection shall be paid for by the Contractor. If Work is found not to conform to the Contract Documents, the Contractor shall be responsible for the cost of all further testing.

D. The Contractor and testing agency shall examine the Contract Documents and become thoroughly familiar with the Work and related testing and inspection requirements.

E. The Contractor shall cooperate with and facilitate testing and inspection by the testing agency. The Contractor shall, at his own expense, furnish the testing agency, upon request, with the following:
   1. Complete set of reviewed erection drawings, shop drawings, schedules, and corrective work procedures at the fabricating shop or in the field.
   2. Cutting list, order lists, material bills, and shipping lists.
   3. Information regarding shipment of materials to shops and access thereto.
   4. Representative sample pieces requested for testing.
   5. Assistance for testing materials and proper facilities for inspection of the Work.

F. The testing agency shall conduct and interpret tests and inspections, state in each report whether tests and items inspected comply with requirements, and specifically state any deviations.
   1. The testing agency may inspect steel joist at the plant prior to shipment.
   2. In-place field bolted and welded joist shall be inspected and tested by the testing agency. Any non-compliant materials or fabricated components shall be removed and replaced at no cost to the Owner. In addition to visual inspection, field welds shall be tested according to AWS D1.1 and the following procedures as applicable: radiographic testing (ASTM E94 and E142), magnetic particle inspection (ASTM E142), ultrasonic testing (ASTM E164), liquid penetrant inspection (ASTM E165).

G. Correct deficiencies in the work that inspections and tests have indicated are not in compliance with specified requirements. Additional testing shall be performed to determine compliance of corrected work.

1.05 PRODUCT HANDLING

A. Deliver, store and handle steel joist as recommended in SJI Specifications. Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses. Protect joists and accessories from harmful elements when stored at the job site. Store above the ground on platforms, pallets or other supports. Keep joists free or dirt and other foreign materials.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Steel: Shall comply with SJI Standard Specifications for chord and web sections. Camber joists to accommodate dead load deflection. Identify each member with its mark.

B. Steel Bearing Plates: Shall be ASTM A36 steel. Seats and anchors shall be appropriately configured by the manufacturer for specific bearing conditions. Where bearing ends of steel joists rest on masonry, they shall be proportioned so that the unit pressure per square inch shall not exceed 250 psi.

C. Bridging: Shall be structural angle and rod, appropriately sized and anchored for spacing and loading conditions, in accordance with the SJI Standard Specifications.

D. Primer Paint: Shall be Tnemec Dipping Tank 10 Series Primer, or approved equal, conforming to FS TT-P-664. Color shall be the standard of the manufacturer. Cleaning of all rust, scale and dirt, and all painting operations, shall be in accordance with the Standard Specifications. All joists shall be shop painted.

2.02 FABRICATION

A. Fabricate steel joists in accordance with SJI and AISC standard specifications. Design and fabricate any non-typical joists for any additional loads or irregular loads indicated on the Drawings.

B. Extensions: Provide extended ends and top chord extensions on joist where indicated, complying with SJI "Specifications" and load tables.
1. Provide extensions in areas with ceilings attached directly to the joist bottom chord. Provide either an extended bottom chord element or a separate unit to suit manufacturer's standards, of sufficient strength to support ceiling construction. Extend ends to within one-half (1/2") inch of the finished wall surface, unless otherwise indicated.
2. Bottom chord extensions in exposed conditions, if applicable, shall be carried and secured to structural steel either parallel to floor plane or in alignment with bottom chords as shown on the Drawings. Provide any clips or angles as required to provide attachment to adjacent structure.

C. Bridging: Provide horizontal or diagonal type bridging for joist, member sizes, end anchorage, and number of rows of bridging shall be in accordance with the Standard Specifications, unless more extensive bridging requirements are indicated on the Drawings. Note: Additional bridging and bracing may be required to brace the bottom chords due to wind uplift as indicated on the Drawings. Use angles for all bridging, unless specifically noted otherwise.

D. End Anchorage: Provide end anchorages, including steel bearing plates, to secure joists and bridging to adjacent construction, complying with SJI "Specifications". Weld bottom chords to clip angles at columns or masonry walls, after all dead loads are in place.

E. Header Units: Provide header units to support tail joists at opening in floor or roof system not framed with steel shapes.

F. Shop Painting Preparation: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint. Surface preparation for exterior steel shall meet requirements of the Steel Structures Painting Council SS PC-SP6 Commercial Blast Cleaning Standard. Surface preparation for interior steel and steel to be fireproofed shall meet requirements of SS PC-SP3 Power Tool Cleaning Standard.

G. Shop Painting: Apply one shop coat of steel primer paint to all joists, bridging, and accessories, except where sprayed-on fireproofing is specified or indicated. Apply paint by spraying, dipping, or other methods to provide a continuous dry paint film thickness of not less than 1.5 mils.
1. Joists intended to remain exposed to view shall be free from scratches, dents, warps, scaling and paint runs, etc. Joists exposed to view shall be painted upside down to prevent paint runs and sags on the bottom chords. All areas lacking a smooth and uniform paint finish shall be sanded smooth and repainted.

PART 3 – EXECUTION

3.01 ERECTION

A. General: It is understood that final joist fabrication details may require modifications to related Work Specified or indicated on the Drawings. For example, the size of seats may change, requiring more or less shimming or perimeter wood blocking. It shall be the Contractor's responsibility to coordinate such modifications and proceed with the Work as approved by the Architect at no additional cost to the Owner.

B. All erection procedures shall be in accordance with the SJI Standard Specifications, shop drawings and as hereinafter specified.

C. Examination: Before placing joists, inspect related bearing conditions and proceed only if they are found to be structurally sound, accurately spaced and suitable braced.

D. Damaged Joist: Repair or replace all damaged joist prior to erection at the direction of the joist fabricator. If repairs are required, a certificate of acceptance by the fabricator shall be submitted to the Architect following the completion of repairs.

E. Anchors: Furnish anchor bolts, steel bearing plates, and other devices to be built into concrete and masonry construction. Provide unfinished threaded fasteners for anchor bolts unless high strength bolts are indicated.

F. Placing Joist: Do not start placement of steel joists until supporting work is in place and secured. Erect joists in true and accurate spacing and alignment. Provide temporary bridging, connections, and anchors to ensure lateral stability during construction.

G. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.
1. All joists parallel or adjacent to masonry walls and steel beams shall have their bridging carried to these walls and beams and securely anchored thereto, unless otherwise indicated on the Drawings.
2. Bridging shall be completely installed before any construction loads are placed upon the joists.
3. Use horizontal bridging attached to the joists by welding, for all H Series joists, unless otherwise indicated on Drawings. Provide horizontal and "X" bridging for LH an DLH series joist as indicated on the Drawings and/or as required by the Standard Specifications, and as required to resist a net uplift pressure of 40 psf on the roof area.

H. Fastening Joists: Joists shall be welded to supporting structural steel or base plates with weld on each side of the seat, each end, as specified by the manufacturer.
1. Set "K" series joists accurately in position with a minimum bearing of 2-1/2" on structural steel, with at least two (2) 3/16" welds, each at least one (2-1/1") inch long.
2. Set long-span joist accurately in position with a minimum bearing of 4" on structural steel, with at least two (2) 1/4" welds, each at least two (2") inches long, or bolted with two (2) 3/4" diameter bolts. Long-span joists at columns shall also be bolted as indicated on the Drawings.

Weld/bolt tie joist bottom chords only after all dead loads have been applied.

I. Touch-up Painting: After joist installation, wire brush welded areas, abraded or rusty surfaces and clean with solvent. Paint field–applied bolt heads and nuts and prepared surfaces on joists and steel supporting members. Use same primer paint as used for shop painting. All finish coat painting shall be provided as a part of the Work of SECTION 09900: PAINTING AND WALLCOVERING.

J. Hanging From Steel Joists: Hanging of all equipment, pipes, etc., shall be done from the top chord of all steel joists, at panel points only.

END OF SECTION

SECTION 05500 – MISCELLANEOUS METAL WORK
DEPARTMENT OF HEALTH: ELDRA SHULTERBRANDT FACILITY
GRANT NO. D12AP00349 (VI-CIP-2012-3)
St. Thomas, U. S. Virgin Islands

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work included in this Section:
   1. Provide all engineering, labor, materials, equipment, and services, etc., required to engineer, furnish, and install all miscellaneous metal work and related accessories as indicated on the Drawings, specified herein, or otherwise required for a complete and proper job.
   2. The Work shall include, but shall not necessarily be limited to:
      a. Miscellaneous structural steel.
      b. Miscellaneous steel plates and angles.
      c. Miscellaneous steel brake metal, pans, closures, trim, and other configurations.
      d. Miscellaneous carpenter's iron as required.
      e. Miscellaneous frames, brackets, and supports for hardware, window systems, and equipment including all mechanical, electrical, medical, athletic, and theatrical equipment. Including seismic bracing for all miscellaneous metal frames, stands, and supports.
      f. Miscellaneous frames and supports for special doors, operable walls, mesh partitions, overhead supported toilet partitions.
      g. Loose lintels and relieving angles not furnished under SECTION 05100: STRUCTURAL STEEL.
      h. Steel handrails and guardrails.
      i. Ladders.
      j. Bollards.
      k. Pit covers and frames.
      l. Expansion joint covers.
      m. Steel corner guards.
      n. Trench drains.
      o. Expanded steel treads and landings.
      p. Abrasive nosings for concrete stairs.
      q. Support frames for benches and counters.
      r. Roof blocking fastening requirements.
      s. Masonry wall top clips.

   3. It shall be a requirement of the Work of this Section to thoroughly review all of the Contract Documents and provide any and all miscellaneous metal work required for a complete and proper job.

B. Related Work Specified Elsewhere:
   1. SECTION 03300: CAST-IN-PLACE CONCRETE
   2. SECTION 05100: STRUCTURAL STEEL
   3. DIVISION 23: MECHANICAL
   4. DIVISION 26 ELECTRICAL

1.2 SUBMITTALS

A. Product Data: Submit product data for manufactured products specified herein.

B. Shop Drawings:
   1. Submit shop drawings for each item or assembly. Shop drawings shall accurately and clearly show in detail the construction, sizes, gauges, dimensions, methods of assembly, supports, finishes, and all other pertinent data and information.
      a. Submit stair, ladder, and railing shop drawings drawn at not less than ¼" scale with components shown in related positions. Provide larger scale custom details, control details and dimensions not governed by job conditions. Show all required field measurements.
      b. Submit lintel fabrication schedule including location, type, size, length, and finish (primed or galvanized coating class.

C. Certifications:
1. Submit manufacturer's certification that the stairs, platforms, railings, and ladders provided are in full compliance with the requirements of the Contract Documents, and are totally suitable for the proposed installations when installed in accordance with the shop drawings.
2. Submit certificates indicating that each welder has satisfactorily passed AWS qualification tests for welding processes involved and if pertinent, has undergone re-certification.
3. Steel fabricator's in-plant special inspections program including: registration of special inspections program, written procedural and quality control manuals and evidence of periodic auditing of fabrication practices by an approved inspection agency.

1.3 PRODUCT HANDLING

A. Deliver of Materials: Deliver, store and handle components in such a manner as to prevent damage to finished surfaces.

B. Storage of Materials: Store components in a dry, clean location, away from uncured masonry and concrete. Cover with tarpaulin or polyethylene sheeting.

1.4 QUALITY ASSURANCE

A. Welding Standards: Comply with applicable provisions of ASW D1.1 "Structural Welding Code – Steel" and ASW D1.3 "Structural Welding Code – Sheet Steel."

B. Stair and railing fabricator shall be a certified member of AISC who participates in a recognized quality assurance program and who is regularly inspected by an independent testing/inspection agency.
1. In the absence of the above requirements, the fabricator shall be required to hire and pay for an independent testing/inspection agency approved by the Owner, to monitor fabrication and perform random testing of all stairs and railing fabrication procedures.
2. The fabricator shall submit evidence to the Owner indicating satisfactory completion of projects of similar scope and that fabrication facilities are adequate to meet production requirements.

C. Fabricator's Qualifications: Only fabricators that maintain an agreement with an approved independent inspection or quality control agency to conduct periodic in-plant inspections at the fabricator's plant, at a frequency that will assure the fabricator's conformance to the requirements of the inspection agency's approved quality control program will be approved for this project.

1.5 TESTING AND INSPECTIONS

A. General: Stair and railing materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified testing agency. Such inspections and tests shall not relieve the Contractor of responsibility for providing his own inspections, quality control and materials and fabrication procedures in compliance with specified requirements. Any non-compliant materials or fabricated components shall be removed and replaced.

B. The fabricator shall submit evidence of in-plant inspections in conformance with IBC "Structural Tests and Inspections – Inspection of Fabricators (1700).

C. Testing and inspection shall be formed as required by the building code, the Contract Documents or as otherwise directed by the Architect. The cost of field-testing and inspection shall be paid for by the Owner. If Work is found not to conform to the Contract Documents, the Contractor shall be responsible for the cost of all further testing.

D. The Contractor shall cooperate with and facilitate testing and inspection by the testing agency. The Contractor shall, at his own expense, furnish the testing agency stair and railing shop drawings.

E. Shop and field bolted connections and shop and field welded connections shall be inspected.

1.6 STRUCTURAL PERFORMANCE

A. Handrails and Guardrails: Engineer, fabricate, and install handrails and guardrails to comply with requirements of ASTM E985. ASTM E894 and to withstand the following structural loads without exceeding the allowable design working stress of the materials involved including anchors and connections. Apply each load to produce the maximum stress in each of component.
   1. Handrails shall be rigid, free of vibration and able to withstand a concentrated force of 200 pounds applied at any point in any direction and, but not simultaneously, a uniform load of 50 pounds per foot applied in any direction.
   2. Top Guardrails Member shall be rigid and able to withstand a concentrated force of 200 pounds applied at any point and in any direction and, but not simultaneously, a uniform load of 50 pounds per foot applied in any direction, and a simultaneous uniform load of 100 pounds per foot applied vertically downward to the top of the guard.
      a. Infill areas of guardrails shall be rigid and able to withstand a horizontal concentrated force of 200 pounds applied on one square foot at any point in the system including panels, intermediate rails, balusters, or other elements. This loading condition shall not be applied simultaneously with the other loading conditions for guardrails.
      b. Guardrail System shall withstand stresses resulting from railing system loads specified above.

B. Ladders: Engineer, manufacture and install ladders to support in excess of 300 pounds force concentrated live load.

1.7 WARRANTIES

A. Ladders: Provide manufacturer's standard product warranty for ladders against material and manufacturing defects for five (5) years.

B. Color Galvanizing: Provide manufacturer's standard product warrant against excessive corrosion, peeling, chipping, or other failure for a period of twenty (20) years.

PART 2 – PRODUCTS ("Green")

2.1 GENERAL

A. Note: It is the Owner's intent to use energy conserving, environmentally friendly materials to the greatest extent practical. The Contractor is therefore encouraged to use recycled steel products.

B. Miscellaneous metal items shall be standard approved products, fabricated in accordance with best shop practices and, wherever possible, shop assembled, ready for erection.

C. Metals shall be free from defects impairing strength, durability, or appearance and shall be best commercial quality for purposes specified. Metals shall be made with structural properties to safely sustain and withstand strains, stresses, to which they will be normally subjected.

D. Gauges herein specified are minimums and shall refer to U. S. Standard for sheet steel, plate iron, and steel.

2.2 MATERIALS

A. Steel Plates, Shapes and Bars: ASTM A-36.

B. Sheet Steel: Cold-rolled: ASTM A-366; Hot-rolled: ASTM A-569.

C. Steel Tubing: Cold-formed: ASTM A-500, Hot-formed: ASTM A-501.

D. Steel Pipe: ASTM A-53.

E. Fasteners: Provide plated fasteners complying with ASTM B33, Class FE/Zn 25 for electro-plated zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.
1. Bolts and Nuts: ASTM A307, Grade A; ASTM A563.
2. Machine Screws: ANSI B18.6.3.
3. Lag Bolts: ANSI B18.2.1.
4. Plain Washers: Round, carbon steel, ANSI B18.22.1.
5. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.
6. Expansion Anchors: Carbon steel components zinc-plated to comply with ASTM B633.

F. Note: The fabricator shall no stamp, stencil, or otherwise place his identification on any portion of miscellaneous metals intended to remain exposed to view.

2.3 PAINTING AND PROTECTIVE COATING

A. General: All ferrous metal herein Specified shall be properly cleaned and shop primed, except at the following locations:
1. Anchors that are built into masonry shall be coated with bituminous paint, unless specified to be galvanized.
2. Ferrous metal to be encased in concrete shall be left unpainted, unless specified or noted otherwise. Aluminum to be encased in concrete shall be coated with bituminous paint.
3. Where hot-dip galvanized metal is specified or shown, it shall not be shop primed.
4. Where spayed-on fireproofing is specified or shown, metal shall not be shop primed.
5. Where metal is scheduled to receive ceramic tile finish it shall not be shop primed.

B. Surface Preparation:
1. Exterior steel shall meet requirements of the Steel Structures Painting Council, SS PC-SP6 Commercial Blast Cleaning Standard.
2. Interior steel and steel to be fireproofed shall meet requirements of SS PC-SP3 Power Tool Cleaning Standard.

C. Shop Primer for Ferrous Metal shall be Tnemec "37 H Chem Prime Universal Phenolic Primer," at 2.0 – 3.0 mils DFT.

D. Galvanizing Repair Paint shall be high zinc content paint Tnemec 90-97.

E. Bituminous Paint shall be cold-applied mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

2.4 GALVANIZING

A. All exterior steel, including lintels, rails, bollards, grates, frames, and all other steel that has any portion exposed to the weather, shall be hot-dip galvanized. Interior steel shall be hot-dip galvanized where so noted or specified. Hot-dip galvanized products shall not be shop primed.

B. Products fabricated from rolled, pressed and forged steel shapes, plates, bars and strips shall be hot-dip galvanized in accordance with ASTM A-123, latest edition.

C. Iron and steel hardware shall be hot-dip galvanized in accordance with ASTM A-153, latest edition.

D. Assembled steel products shall be hot-dip galvanized in accordance with ASTM A-386, latest edition.

E. The weight of coating shall be as designated in ASTM "Comparison of Coating Weight Requirements for Hot-Dip Galvanized Products" in accordance with the class and thickness of material.

F. Where hot-dip galvanizing prior to completion of fabrication (cutting or welding operations) cannot be avoided, joints and cuts shall be finished with four (4) full coats of touch-up galvanizing repair paint as recommended by the fabricator.

G. Hot-dip galvanizing shall be done by a member of the American Galvanizers Association, Inc.

H. All hot-dipped galvanized material shall be stamped to indicate ASTM designation and ounces per square foot of zinc coating required by the Specifications.

I. A notarized affidavit of compliance to the galvanizing specified shall be submitted from the galvanizer upon request.

J. The galvanizing bath shall contain high grade zinc and other early materials. Immediately before galvanizing the steel shall be immersed in a bath of zinc ammonium chloride. The use of wet kettle process is prohibited.

2.5 SHOP COATING OF GALVANIZED STEEL

A. The following miscellaneous metal components shall receive factory applied architectural finish over hot-dip galvanizing:
   1. All exterior rails.
   2. All exterior bollards.

B. Finish shall be "Primergalv" by Duncan Galvanizing, or approved equal. Colors shall be selected by the Architect from the manufacturer's full range of available colors. Coating shall maintain a pull-off strength of 500 psi when tested in accordance with ASTM D4541.
   1. Factory-Applied Universal Primer: Where galvanized steel is specified to receive a factory primer for field applied topcoat, provide factory-applied polyamide epoxy primer over specially prepared galvanized steel, 2.0 mils dry film thickness minimum. Apply primer within 12 hours after galvanizing at the galvanizer's plant in a controlled environment meeting applicable environmental regulations, and as recommended by the coating manufacturer.
   2. Factory-Applied High-Performance Architectural Finish: Where galvanized steel is specified to receive a factory applied architectural finish, provide factory-applied polyurethane color coating, 2.5 mils dry film thickness minimum, over primed galvanized steel as previously referenced. Apply coating at the galvanizer's plant, immediately after the application of the prime coat, in a controlled environment meeting applicable environmental regulations, and as recommended by coating manufacturer.

2.6 ROOF BLOCKING FASTENING REQUIREMENTS

A. Perimeter roof blocking shall be secured to decking, structural steel, spaced steel angles, or plates, as indicated on the Drawings.

B. The Contractor shall provide additional steel angles and plates to suit specific job conditions.

C. Where joist or beams do not extend out of roof edge, provide single or back-to-back steel angles or steel plates welded to perimeter steel beams in configurations indicated on the Drawings or otherwise required for support of blocking at 2'-0" o.c. intervals. Provide pre-drilled holes in steel for bolting of blocking at 24" o.c. with ½" bolts.

2.7 MASONRY WALL TOP CLIPS

A. Provide steel clip angles at both sides of the tops of masonry walls secured to building structure, coordinate with the Work of Section 05100: Structural Steel. In general, size, spacing, and attachment of wall clips shall

be determined by whether the wall in non-structural (architectural) or is a structural element (fire wall, load-bearing wall or shear wall for example) and shall be as indicated on the Drawings. Wall clips specified herein or partition top anchors specified in Section 04200: Unit Masonry and Mortar shall be provided for all masonry walls unless specifically indicated otherwise.

2.8 MISCELLANEOUS FRAMING AND SUPPORTS

A. Provide steel framing and supports for applications indicated that are not a part of structural steel scope as required to complete the Work. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent construction. Fabricate from steel shapes, plates, and steel bars of welded construction using mitered joints for field connections. Cut, drill, and tap units to receive hardware, hangers, and similar items. Equip units with integrally welded anchors for casting into concrete or building into masonry.

2.9 LADDERS

A. Ladders shall be standard, 6063-T6 aluminum alloy, fixed ladders as manufactured by O'Keefe's Inc., or approved equal. Ladders shall have channel rails and 1-1/4" serrated square rungs spaced no more than twelve (12") inches on centers. Ladder shall be at least eighteen (18") inches clear between rails. Inclined ladders (ship's ladders) shall have 4-1/8" deep treads and handrails. All aluminum shall be mill finish. Provide floor and wall mounting brackets as required. All ladders shall be in strict compliance with OSHA/ANSI A14.3 standards. Ladders twenty (20') feet or more in height shall be equipped with platforms. Provide the following ladder models:
1. Interior pit and roof access: Series 500.
2. Exterior roof access: Series 502.
3. Exterior roof access with parapet: Series 503.

2.10 BOLLARDS

A. Unless otherwise indicated on the Drawings, bollards shall be six (6") inches diameter galvanized steel pipe (to be filled with concrete). Bollards shall be not less than 6'-6" in length with 3'-6" exposed above finish grade.

2.11 PIT COVERS AND FRAMES

A. Unless otherwise indicated on the Drawings, steel pit covers shall be ¼" thick galvanized steel checkerplate. Frames shall be appropriately sized galvanized steel angles with suitable stops and anchoring devices.

2.12 EXPANSION JOINT COVERS

A. Metal expansion joint covers shall be manufactured by Balco Inc., C/S Construction Specialties, MM Systems Corp., or approved equal.

2.13 TRENCH DRAINS

A. Trench drain grates, covers, pans, and frames shall be heavy-duty, H20 wheel loading, cast iron grates and frames with an integral galvanized steel-formed pan. Units shall be 12-1/2" wide, Model No. TCMB-10/TGMB-10, as manufactured by McKinley, or approved equal.

2.14 METAL CHANNEL FRAMING SYSTEMS (UNISTRUT)

A. Various building materials and equipment such as suspended lights and service columns shall be provided with concealed metal channel framing systems as required to permanently and safely anchor such items to suitable building primary structural components.

B. Metal channel framing systems shall be Unistrut Metal Framing as manufactured by UNISTRUT Corporation, or approved equal. Framing shall be electrogalvanized steel. Systems shall be complete and shall be properly

engineered, fabricated, and installed by the manufacturer or its authorized representative/installer. Installer shall have not less than five (5) years experience.

C. The Work of Channel Framing systems shall include, but shall not necessarily be limited to:
   1. Field inspection to verify job conditions, dimensions, and suitability of primary structure to receive channel framing.
   2. Engineering of all channel framing, attachments between framing members, attachments between framing systems and building structure, and anchor points to receive attachments by the manufacturer of the building material or equivalent to be supported by the channel framing systems.
   3. Coordination of framing load capacity and anchor point types and locations with the requirements of the related material or equipment manufacturer.
   4. Submission of structural calculations including, but not limited to design criteria, stress and deflection analysis and selected framing, fittings and anchors prepared by a professional structural engineer licensed.
   5. Submission of shop drawings.

2.15 LOOSE STEEL LINTELS

A. Loose lintels shall be fabricated from A-36 steel from angles, shapes and masonry anchors of size and type scheduled for openings in masonry walls, unless otherwise indicated on the Drawings.

B. All dimensions for locations of rails shall be field measured. Drawing dimensions shall be considered approximate and actual field conditions shall be ascertained before fabrication of rails.

C. In general, heights of handrails shall be 2'-10" above nosings. Heights of guardrails shall be 3'-6" above finish floor, unless otherwise noted on the Drawings. Handrails shall be mounted to provide 2-1/4" minimum clear space to walls or other surfaces at stairs and 1-1/2" minimum clear space at all other locations.

D. Space intermediate balusters as indicated on the Drawings or as otherwise required providing maximum clear space between all members of less than four (4") inches. Guardrails shall not have an ornamental pattern that would provide a ladder effect. Space railing posts as indicated on the Drawings, and in accordance with railing engineering requirements.

E. In general, handrails at stairs shall extend a minimum of 12" beyond the top riser and at least 12" plus the width of one tread beyond the bottom riser. At the top, the handrail extension shall be parallel to the working surface. At the bottom, the handrail shall continue to slope for a distance of the width of one tread from the bottom riser, with the remainder parallel to the walking surface.

F. In general, handrails at ramps shall be parallel to the walking surface at all locations and shall extend a minimum of 12" beyond the top of the ramp and at least 12" beyond the bottom of the ramp.

G. Steel Railing Fittings shall be as per Julius Blum and Co., or approved equal. All fittings for exterior use shall be galvanized. Fittings shall be:
   1. Weld on caps: No. 938
   2. Round slip flanges: No. 611 and No. 1611
   3. Wall returns: No. 665 and No. 1665
   4. Brackets: No. 386 and No. 1386

PART 3 – EXECUTION

3.1 VERIFYING CONDITIONS

A. Coordinate all work with the work of other trades. Verify all field dimensions and that the work fits the work of other trades. Perform all cutting, fitting, and drilling required. Furnish all necessary templates and patterns required to build items into work of other trades. Provide holes and connections for the attachment of work of other trades.

3.2 GENERAL FABRICATION AND INSTALLATION

A. Metal surfaces shall be clean and free from mill scale, flake rust, and rust pitting, well formed and finished to shape and size, with sharp lines and angles and smooth surfaces. Shearing and punching shall leave clean true lines and surfaces. Weld or rivet permanent connections. Welds and flush rivets shall be finished flush and smooth on surfaces that will be exposed after installation. Welds shall be continuous unless otherwise noted. Welds shall not have voids or pockets and shall be ground to provide smooth transitions between metal surfaces. Do not use screws or bolts where they can be avoided; where used, heads shall be countersunk, screwed up tight and threads nicked to prevent loosening.

B. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water. Provide holes and connections for the work of other trades.

C. Castings shall be size determined by work type for which they form parts. Each member if possible shall be in one piece, make joints at moldings or fillets. Casting thickness shall be uniform, sufficient to ensure perfect workmanship, required strength for design use. Make castings clean, smooth, true to pattern, free from defects. Moldings, ornaments shall be rather more deeply cut than indicated to counteract flattening effects of casting, finishing; exactly reproduce form, feeling of models. Edges shall be sharp, come from molds clean, smooth, perfect.

D. Non-slip surfaces shall be made safe for foot traffic with non-slip abrasive embedded uniformly in wearing surface at casting time.

E. Connections and accessories shall be adequate to safely sustain, withstand stresses, strains, to which they will be normally subjected.
   1. Connections to steel unless otherwise specified shall be steel.
   2. Connections to genuine wrought iron work shall be wrought iron or steel.
   3. Connections to cast iron, unless otherwise specified shall be steel.
   4. Bolts, nuts, screws for exterior work shall be electrogalvanized, unless otherwise noted.

F. Furnish all standard screws, bolts, washers, and other such fastening devices as are necessary for attaching this work to other materials. Anchors and other connecting devices required in concrete or masonry shall be built-in as the work progresses. NOTE: Special attention shall be given to the firm and secure anchoring of overhead mounted materials and equipment.

G. Do cutting, punching, drilling, tapping required for attachment of other work coming in contact with miscellaneous metal where indicated or where directions for same are given prior to or with review of shop drawings.

H. Unless otherwise indicated, bolt, and screw heads shall be flat countersunk in exposed faces of ornamental or finished character; elsewhere as required. Cut off bolts, screws, etc., where exposed, flush with nuts, or other adjacent metal. Except as otherwise required, weld shop-assembled connections; welds, bolts, or machine screws may be used for field connections. Exposed fastenings shall be the same materials, color, and finish as metal to which they apply, unless otherwise required.

I. Make up threaded connections tightly so that threads will be entirely concealed by fittings.

J. Work to be built in with masonry shall be of form required for anchorage, or be provided with suitable anchors, expansion shields, toggle bolts, etc. as required for proper anchorage. Fastening to wood plugs in masonry shall not be permitted.

K. Install all supporting members, fastening, framing, hangers, bracing, brackets, straps, bolts, angles, and the like required to set, connect work rigidly and properly to structural steel, masonry, other construction.

L. All items shall be installed plumb, straight, square, level and in proper elevation, plane, location and alignment with other work.

3.3 STEEL RAILING FABRICATION AND INSTALLATION

A. Fabricate handrails and railing systems to comply with the requirements indicated for design, dimensions, details, finish, member sizes and anchorage but not less than that required to support structural loads.

B. Interconnect railing and handrail members by butt-welding or welding with internal connectors, unless otherwise indicated. At tee and cross intersections, cope ends of intersecting members to fit contour of pipe to joined end and weld all around. Form changes in direction of railings by welding fabricated flush elbow fittings, by radius bends as indicated, or by flush radius bends. Remove burrs and splatter.

C. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each configuration required. Maintain cylindrical cross section of pipe throughout the entire bend without buckling, twisting, cracking or otherwise deforming.

D. For components exposed to exterior or moist environments, provide weepholes or other means of evacuating entrapped water. All exterior rails, fittings and brackets shall be hot-dipped galvanized after fabrication.

E. Provide wall returns at all ends to adjacent surfaces and secure as required. Close exposed ends by welding 3/16" thick steel plate in place, except where clearance of end of pipe and adjoining wall surface is less than ¼", or unless otherwise detailed.

F. Welds shall be continuous and thoroughly fused without undercutting or overlap. Grind exposed welds smooth to form a uniformly smooth surface.

G. Provide miscellaneous steel for connection of rail supports as detailed on the Drawings. Do not support railing temporarily by any means that does not satisfy structural performance requirements.

H. Set rails plumb and aligned. Set rails horizontal or parallel to rake of stairs. Support wall handrails on brackets, in accordance with railing engineering requirements. Space closer together if so indicated on the Drawings. Connect railing posts to stair framing to stair framing by direct welding, unless otherwise indicated.

I. Install handrail brackets away from handrail ends and finish ends with return fittings. Use drill-in expansion anchors at concrete or masonry walls. Mount handrails only on gypsum board assemblies that have been reinforced to receive railing anchors.

J. Provide expansion joints in railings at intervals not to exceed forty (40') feet. Provide slip joints with internal sleeves extending two (2") inches beyond the joint on either side. Fasten the internal sleeve securely on one side only. Locate expansion joints within six (6") inches of posts.

K. Where railings are to be set in concrete, railing posts shall be set in 6" matching sleeves as follows: Clean dust and foreign matter from sleeves. Moisten interior of hole and surrounding surface with clean water. Mix fast setting cement with water and stir until a smooth, creamy consistency is produced. Pour mixture into annular space until it overflows the hole. Taper cement away from rails to promote proper drainage. Wipe off excess, leaving a build-up of approximately 1/8".

3.4 LADDERS

A. All ladders shall be installed in strict accordance with the manufacturer's instructions, the American Standard Safety Code for Fixed Ladders and all applicable OSHA regulations.

B. Completed ladder installations shall be rigid and free from vibration.

C. Ladders in elevator pits shall extend not less than 3'-6" above outside finish floor level as required by OSHA and shall be located as recommended by the elevator manufacturer.

D. Exterior roof ladders shall extend no less than 3'-6" above parapet walls or upper roof surfaces as applicable, and shall have looped returns as required by OSHA. Rungs shall be held off a minimum of 9" off adjacent wall.

E. Interior roof hatch ladders shall extend from the floor to the roof surface. Rails shall extend to just below the underside of the roof hatch.

F. Ladders twenty (20') feet or more in height shall be provided with cage closures as required by OSHA.

3.5 EXPANSION JOINT COVERS

A. Covers shall extend full width of openings.

B. Covers shall be installed level, plumb, and flush with finish surfaces, and shall be fastened with anchor shields and bolts in strict confidence with the manufacturer's instructions and recommendations.

C. Provide all corners, tees, transitions, etc., as required for a complete and proper job.

D. Provide fire rated expansion joint covers with all required safing insulation and fire stopping at fire rated locations. Entire assembly shall be installed in strict accordance with the manufacturer's instructions and tested assemblies.

END OF SECTION

SECTION 05510 METAL STAIRS
DEPARTMENT OF HEALTH: ELDRA SHULTERBRANDT FACILITY
GRANT NO. D12AP00349 (VI-CIP-2012-3)
St. Thomas, U. S. Virgin Islands

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   (1) Straight run, steel-framed stairs.

B. Related Sections: The following Sections contain requirements that relate to this Section.
   (1) Division 5 Section "Pipe and Tube Railings" for pipe and tube handrails and railing systems.
   (2) Division 5 Section "Pipe and Tube Railings" for pipe handrails and railing systems, not attached to metal stairs or to walls adjacent to metal stairs.
   (3) Division 5 Section "Ornamental Handrails and Railings" for ornamental metal handrails and railing systems fabricated from stock components.

1.03 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer, fabricate, and install steel stairs to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of steel stairs.
   (1) Treads of Steel Stairs: Capable of withstanding a uniform load of 100 lbf per sq. ft. (4.8 kN/sq. m) or a concentrated load of 300 lbf (1.35 kN) on a area of 4 sq. inches (26 sq. cm) located in the center of the tread, whichever produces the greater stress.
   (2) Platforms of Steel Stairs: Capable of withstanding a uniform load of 100 lbf per sq. ft. (4.8 kN/sq. m).
   (3) Stair Framing: Capable of withstanding stresses resulting from loads specified above as well as stresses resulting from railing system loads.

B. Structural Performance of Handrails and Railing Systems: Engineer, fabricate, and install handrails and railing systems to comply with requirements of ASTM E 985 for structural performance based on the following:
   (1) Testing performed according to ASTM E 894 and E 935.
   Structural computations.

1.04 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for metal stairs, prefilled metal pan stair treads, nonslip aggregates and nonslip aggregate surface finishes, cast nosings, extruded nosings, steel floor plate, paint products, and grout.

C. Shop drawings detailing fabrication and installation of steel stairs. Include plans, elevations, sections, and details of steel stairs and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.
   (1) For installed steel stairs indicated to comply with certain design loadings, include structural analysis data sealed and signed by the qualified professional engineer who was responsible for their preparation.

D. Samples for initial selection of the following products, in the form of manufacturer's color charts or sections of units showing the full range of colors and patterns.
   (1) Precast stair treads.
   (2) Epoxy-filled stair treads.
   (3) Extruded abrasive nosings.

E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

F. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of architects and owners, and other information specified.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in producing steel stairs similar to those indicated for this Project with a record of successful in-service performance and with sufficient production capacity to produce required units without delaying the Work

B. Installer Qualifications: Arrange for steel stair installation specified in this Section by the same firm that fabricated them.

C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code-Sheet Steel."
   (1) Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering pre-assembled stair units that may be incorporated in the Work include, but are not limited to, the following:
   (1) Alfab, Inc.
   (2) American Metal Works, Inc.
   (3) American Stair Corp., Inc.
   (4) The Sharon Companies, Ltd.

2.02 FERROUS METALS

A. Metal Surfaces, General: For surfaces exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, roughness, or, for steel sheet, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.

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

C. Steel Tubing: Product type (manufacturing method) and as follows:
   (1) Cold-Formed Steel Tubing: ASTM A 500.

D. Steel Pipe: ASTM A 53, standard weight (schedule 40), unless otherwise indicated, or another weight required by structural loads.
   (1) Painted finish, unless otherwise indicated.
   Galvanized finish for exterior installations and where indicated.

E. Rolled Steel Floor Plate: ASTM A 786/A 786M.

F. Steel Bars for Gratings: ASTM A 569/A 569M or ASTM A 36/A 36M.

G. Wire Rod for Grating Cross Bars: ASTM A 510 (ASTM A 510M).

H. Uncoated Structural Steel Sheet: Product type (manufacturing method), quality, and grade as follows:
   (1) Cold-Rolled Structural Steel Sheet: ASTM A 611, grade as follows:
      (a) Grade A, unless otherwise indicated or required by design loading.

I. Uncoated Steel Sheet: Commercial quality, product type (method of manufacture) as follows:
   (1) Cold-Rolled Steel Sheet: ASTM A 366/A 366M.

J. Galvanized Steel Sheet: Quality as follows:
   (1) Structural Quality: ASTM A 446/A 446M; Grade A, G 90 (Z 275) coating, unless otherwise indicated, or unless another grade is required for design loading.

K. Welding Rods and Bare Electrodes: Select according to AWS specifications for the metal alloy to be welded.

2.03 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head type, ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), with hex nuts, ASTM A 563 (ASTM A 563M), and, where indicated, flat washers.

C. Machine Screws: ANSI B18.6.3 (ANSI B18.6.7M).

D. Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M).

E. Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).

F. Lock Washers: Helical, spring type, carbon steel, ANSI B 18.21.1.

G. Expansion Anchors: Anchor bolt and sleeve assemblies of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
   (1) Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2.04 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements of FS TT-P-664, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

2.05 CAST ABRASIVE NOSINGS (05510.A)

A. Fabricate units of material, sizes, and configurations indicated. If not indicated, provide cast-iron units with integral abrasive finish. Furnish in lengths required to accurately fit each opening or conditions.
   (1) Cast units with an integral abrasive grit consisting of aluminum oxide, silicon carbide, or a combination of both.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   (1) American Safety Tread Co., Inc.
   (2) Amstep Products.
   (3) Armstrong Products, Inc.
   (4) Balco/Metalines, Inc.
   (5) Safe-T-Metal Co.
   (6) Wooster Products Inc.

C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with the manufacturer.

D. Drill for mechanical anchors with countersunk holes located not more than 4 inches (100 mm) from ends and not more than 12 inches (300 mm) o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by the manufacturer.

E. Apply black asphaltic coating to concealed bottoms, sides, and edges of cast-iron units set into concrete.

F. Provide a plain surface texture, except where fluted or cross-hatched surfaces are indicated.

2.06 GROUT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
   1) Nonshrink, Nonmetallic Grouts:
      a) B-6 Construction Grout; W. R. Bonsal Co.
      b) Diamond-Crete Grout; Concrete Service Materials Co.
      c) Supreme; Cormix Construction Chemicals.
      d) Sure-grip High Performance Grout; Dayton Superior Corp.
      e) Euco N-S Grout; Euclid Chemical Co.
      f) Five Star Grout; Five Star Products.
      g) Vibropruf #11; Lambert Corp.
      h) Crystex; L&M Construction Chemicals, Inc.
      i) Masterflow 928 and 713; Master Builders Technologies, Inc.
      j) Sealtight 588 Grout; W. R. Meadows, Inc.
      k) Sonogrout 14; Sonneborn Building Products – ChemRex, Inc.
      l) Kemset; The Spray-Cure Company.

2.07 CONCRETE FILL AND REINFORCING MATERIALS (05510.B)

A. Concrete Materials and Properties: Comply with requirements of Division 3 Section "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 2,500 psi (17 MPa), unless higher strengths indicated.

B. Nonslip Aggregate Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rust-proof and nonglazing; unaffected by freezing, moisture, or cleaning materials.

C. Reinforcing Bars: ASTM A615 (ASTM A615M), Grade 60 (Grade 400), unless otherwise indicated.

2.08 FABRICATION, GENERAL

A. Form steel stairs from materials of size, thickness, and shapes indicated, but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C. Shear and punch metals cleanly and accurately.

D. Remove sharp or rough areas on exposed surfaces.

E. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
   1) Weld corners and seams continuously to comply with the following:
      a) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
      b) Obtain fusion without undercut or overlap.
      c) Remove welding flux immediately.
      d) At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and welded surface matches contours of adjoining surfaces.

   2) Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
   3) Shop Assembly: Preassemble in shop to greatest extent possible to minimize field splicing and assembly. Use connections that maintain structural value of joined pieces. Clearly mark units for field assembly and coordinated installation.
   4) Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.09 STEEL-FRAMED STAIRS (05510.C)

A. General: Construct stairs to conform to sizes and arrangements indicated. Join pieces together by welding, unless otherwise indicated. Provide complete stair assemblies, including metal framing, hangers, columns, handrails, railing systems, newels, balusters, struts, clips, brackets, bearing plates, or other components necessary for the support of stairs and platforms, and as required to anchor and contain the stairs on the supporting structure.
   1) NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM "Metal Stair Manual" for class of stair designated, except where more stringent requirements are indicated.
      a) Commercial class, unless otherwise indicated.
         1. Fabricate treads and platforms of exterior stairs to accommodate slopes to drain in finished traffic surfaces.

B. Stair Framing: Fabricate stringers of structural steel channels, plates, or a combination thereof, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers; and bolt or weld newels and framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finish surfaces.Where masonry walls support steel stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal Pan Risers, Subtreads, and Subplatforms: Shape metal pans for risers and subtreads to conform to configuration shown. Provide thicknesses of structural steel sheet for metal pans indicated, but not less than that required, to support total design loading.
   1) Form metal pans of uncoated cold-rolled steel sheet, unless otherwise indicated.
   2) Form metal pans of galvanized-steel sheet, where indicated.

3) Directly weld risers and subtreads to stringers; locate welds on side of metal pans to be concealed by concrete fill. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting. Shape metal pans to include nosing integral with riser. Attach cast abrasive nosings to pan risers. Make nosings full width of tread with noses flush with riser faces and tread surfaces. At Contractor's option, provide prefabricated stair assemblies with prefilled treads consisting of prepoured reinforced concrete fill, with nonslip aggregate finish, in welded sheet metal pan, attached to installed stringers using manufacturer's standard connection detail.
   a) Provide subplatforms of configuration and construction indicated; if not indicated, of same metal as risers and subtreads, in thickness required to support design loading. Attach subplatform to platform framing members with welds.

2.10 FINISHES

A. General: Finish metal stairs after assembly.
   1) Comply with NAAMM "Metal Finishes Manual" for recommendations on application and designations of finishes.

B. Galvanizing: Hot-dip galvanize items indicated to be galvanized to comply with applicable standard listed below:
   1) ASTM A 153 for galvanizing iron and steel hardware.
   2) ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch (0.76 mm) thick and heavier. Fill vent and drain holes that will be exposed in the finished work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

C. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed units:
   1) Exteriors (SSPC Zone 1B): SSPC SP 6 "Commercial Blast Cleaning."
   2) Interiors (SSPC Zone 1A): SSPC SP 3 "Power Tool Cleaning."

D. Apply shop primer to uncoated surfaces, except those with galvanized finish or those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.
   1) Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, weld plates, and anchor bolts. Coordinate delivery of such items to Project site.

3.02 INSTALLATION, GENERAL

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

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing steel stairs. Set units accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Install steel stairs by welding stair framing to steel structure or to weld plates cast into concrete, except where otherwise indicated.

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

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

F. Field Welding: Comply with the following requirements:
   1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2) Obtain fusion without undercut or overlap.
   3) Remove welding flux immediately.
   4) At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

3.03 INSTALLING STEEL STAIRS WITH GROUTED BASE PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base plates.

B. Set steel stair base plates on wedges or other adjustable devices. After the stairs have been positioned and aligned, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
   1) Use nonmetallic, nonshrink grout, unless otherwise indicated.
   2) Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.04 INSTALLING STEEL PIPE RAILINGS AND HANDRAILS

A. Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:
   1) Anchor posts to steel by welding directly to steel supporting members.
   2) Anchor handrail ends into concrete and masonry with steel round flanges welded to rail ends and anchored into wall construction with drilled-in expansion anchors.

B. Secure handrails to wall with wall brackets and end fittings. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets and wall return fittings to building construction as follows:
   1) Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt. Use type of bracket with predrilled hole for exposed bolt anchorage. For concrete and solid masonry anchorage, use drilled-in expansion anchor.
   2) For hollow masonry anchorage, use toggle bolts having square heads.
   3) For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with stud installations for accurate location of backing members.
   4) For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.

3.05 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1) Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. For galvanized surfaces, clean welds, bolted connections, and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION