

## **PART 1 - GENERAL**

### **1.01 RELATED DOCUMENTS**

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.01A, entitled "Related Documents."

### **1.02 SUMMARY**

- A. Section Includes:
  - 1. Stainless steel decorative metal railings with infill panels.
- B. Related Sections:
  - 1. Division 01 Section "Sustainable Design Requirements."
  - 2. Division 05 Section "Metal Stairs" for mounting decorative metal railings to metal pan stairs.

### **1.03 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

### **1.04 COORDINATION AND SCHEDULING**

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not meet structural performance requirements.

### **1.05 ACTION SUBMITTALS**

- A. Product Data: For the following:
  - 1. Manufacturer's product lines of stainless steel decorative metal railings assembled from standard components.
  - 2. Perforated metal infill panels.
  - 3. Finishes.

- B. CTHPB Documentation Submittals: Comply with Division 01 Section "Sustainable Design Requirements" and provide the following in addition to other action submittals:
  - 1. Product Data for Credit 5d: For adhesives and sealants, documentation including printed statement of VOC content.
  - 2. Product Data for Credit 5d: For paints and coatings, including printed statement of VOC content.
  - 3. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Include plans, elevations, sections, and attachment details.
- D. Samples for Initial Selection: For products involving selection of color, texture, or design.
- E. Samples for Verification: For each type of exposed finish required.
  - 1. Sections of each distinctly different linear railing member.
  - 2. Fittings, end caps, and brackets.
- F. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### **1.06 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For professional engineer licensed in the State of Connecticut.
- B. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.
- D. Preconstruction test reports.
- E. Evaluation Reports: For post-installed anchors, from ICC-ES.

#### **1.07 QUALITY ASSURANCE**

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
  - 1. Build mockups as directed by Construction Manager.
  - 2. Build mockups for each form and finish of railing consisting of railing and anchorage system components that are not less than 24 inches in length.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.08 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Stainless-Steel Decorative Railings:
  1. Basis of Design Product: Subject to compliance with requirements, provide **VIVA Railings, LLC; FRAME Metal Panel Railing System** or comparable product by one of the following:
    - a. AGS Stainless, Inc.
    - b. HDI Railing Systems.
- B. Source Limitations: Obtain decorative metal railing systems from single source from single manufacturer. Systems must be designed, engineered, and fabricated by manufacturer of railing system.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods, including structural analysis, preconstruction testing, field testing, and in-service performance.
  1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

### 2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ft. applied in any direction.

- b. Concentrated load of 200 lbf applied in any direction.
  - c. Uniform and concentrated loads need not be assumed to act concurrently.
2. Infill of Guards:
- a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
  - b. Infill load and other loads need not be assumed to act concurrently.

### 2.03 RAILING SYSTEM

- A. Component based, factory welded components. Shop fabricate such that no jobsite welding, grinding or cutting is required.
- 1. Mill joints to a tight, hairline fit.
  - 2. Miter corner joints.
  - 3. Height: 42 inches.
  - 4. Configuration: Commercial.
- B. Posts: Solid bar post, stainless steel with powder coat finish.
- C. Perforated Metal Infill Panels: Aluminum sheet with perforations, manufacturer's standard thickness, within nominal 2-inch- wide aluminum angle frame, ground smooth without visible seams.
- 1. Pattern: As selected by Architect from manufacturer's full range.
  - 2. Finish: Powder Coat.
    - a. Color: As selected by Architect from manufacturer's full range.
- D. Handrails: Stainless steel tube, 1-1/2 inch outside diameter, #6 dull satin finish.
- E. Hardware: Stainless steel construction; separate dissimilar materials with bushings, grommets or washers to prevent electrolytic corrosion.
- F. Mounting:
- 1. Egress Stairs: Top Steel Channel Weld.
  - 2. Social Stair: Fascia Steel Tube Weld.

### 2.04 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.
- C. Stainless Steel Sheet, Strip, Plate, and Flat Bar: ASTM A666, Type 304.
- D. Stainless Steel Bars and Shapes: ASTM A276, Type 304.

- E. Aluminum Plate and Sheet Infill Panels: ASTM B209.

## 2.05 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
  - 1. Stainless-Steel Components: Type 304 stainless-steel fasteners.
  - 2. Dissimilar Metals: Type 304 stainless-steel fasteners.
- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless exposed fasteners are unavoidable.
  - 1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

## 2.06 MISCELLANEOUS MATERIALS

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

## 2.07 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.

- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate handrails with welded connections unless otherwise indicated.
- H. Form changes in direction of handrails as follows:
  - 1. As detailed.
  - 2. By radius bends of radius indicated.
  - 3. By bending to smallest radius that will not result in distortion of railing member.
- I. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- J. Close exposed ends of hollow railing members with prefabricated end fittings.
- K. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.
- L. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
- M. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- N. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.
  - 1. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
  - 2. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- O. Perforated-Metal Infill Panels: Fabricate infill panels from perforated metal made from aluminum.
  - 1. Frame panels with C-shaped channels made from stainless steel sheet, not less than 0.043 inch thick.
  - 2. Orient perforated metal with pattern parallel to ground.

## **2.08 GENERAL FINISH REQUIREMENTS**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

## **2.09 STAINLESS-STEEL FINISHES**

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Manufacturer's standard powder coat finish in color as selected by Architect from manufacturer's full range.
- C. Stainless Steel Finishes:
  - 1. Dull Satin Finish: ASTM A480/A480M, No. 6.

## **2.10 ALUMINUM FINISHES**

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Color: As selected by Architect from manufacturer's full range.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION, GENERAL**

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

**3.02 RAILING CONNECTIONS**

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

**3.03 CLEANING**

- A. Clean stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

**3.04 PROTECTION**

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 73 00