

## SECTION 057200 - ORNAMENTAL FENCE AND GATES – GUARD RAILS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Division 3 Section "Concrete" for concrete foundations.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Steel ornamental fence, railing and grills – noted as guardrails
  - 2. Open grill fence panels.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. General: In engineering ornamental fence railing and grills to withstand structural loads indicated, determine allowable design working stresses of materials based on the following:
- B. Structural Performance of Ornamental fence railing and grills: Comply with requirements of ASTM E 985 for structural performance based on testing performed according to ASTM E 894 and ASTM E 935.
- C. Structural Performance of Ornamental fence railing and grills: Provide ornamental fence railing and grills capable of withstanding the following structural loads without exceeding allowable design working stress of materials for handrails, railings, anchors, and connections:
  - 1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:
    - a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
    - b. Uniform load of 50 lbf/ft. (730 N/m) applied horizontally and concurrently with uniform load of 100 lbf/ft. (1460 N/m) applied vertically downward.
    - c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.
  - a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guard.
- D. Thermal Movements: Provide ornamental fence railing and grills that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
  1. Polyester Powder Coating:
    - a. Bonderite 1000 steel panels, in a scored condition, exhibit no undercutting after 500 hours in 5 percent salt spray testing at 95 degrees F and 95 percent relative humidity. No rusting or blistering on panel face. Under the same conditions after 1000 hours, the panels showed less than 3/16 inch undercutting.
    - b. Weatherability: When tested in accordance with ASTM D822, with one year exposure in South Florida, with panels facing south and tilted at a 45 degree angle, a high gloss white polyester coating retains 88 percent of its gloss (gloss reading obtained on washed panels). No film failure.
    - c. Hardness: 2 H (min) when measured in accordance with ASTM D3363.
    - d. Direct Impact: Up to 160 in/lb when measured in accordance with ASTM D2794.
  2. Polyurethane Coating: Tests below conducted on Bonderite 1000 panels at 1.0 mil dry film thickness, cured for 30 minutes at 180 degrees F and aged 14 days at room temperature (25 degrees C). Results of each test: Excellent or no failure.
    - a. 5 percent salt spray: 500 hours
    - b. 100 percent relative humidity: 1000 hours
    - c. Water immersion: 100 hours
    - d. Lacquer thinner, acetone, MEK, gasoline, xylene - 20 double rubs with saturated cloth.
    - e. Lubricating oils, hydraulic fluids, and cutting oils.

- f. Cold Check: 16 cycles, 24 hours at 100 percent humidity; 24 hours at 10 degrees F; 24 hours at 77 degrees F.
- g. Pencil Hardness: H to 2H.
- h. Flexibility: 1/8 inch conical mandrel.
- i. Color: Black.

#### 1.4 SUBMITTALS

- A. Product Data: For manufacturer's product lines of ornamental fence railing and grills assembled from standard components.
  - 1. Include Product Data for grout, anchoring cement, and paint products.
- B. Shop Drawings: Show fabrication and installation of ornamental fence railing and grills. Include plans, elevations, sections, details, and attachments to other Work.
  - 1. For installed ornamental fence railing and grills indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for products with factory-applied color finishes.
- D. Samples for Initial Selection: Short sections of railing or flat sheet metal Samples showing available mechanical finishes.
- E. Samples for Verification: For each type of exposed finish required, prepared on components indicated below and of same thickness and metal indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
  - 1. 6-inch- (150-mm-) long sections of each different linear railing member, including handrails, top rails, posts, and balusters.
  - 2. Fittings and brackets.
  - 3. Welded connections.
  - 4. Brazed connections.
  - 5. Assembled Samples of railings, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- G. Product Test Reports: Indicating products comply with requirements, based on comprehensive testing of current products.

- H. Product Test Reports: Indicating ornamental fence railing and grills comply with ASTM E 985, based on comprehensive testing of current products.

## 1.5 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of ornamental fence railing and grills that are similar to those indicated for this Project in material, design, and extent.
- B. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- C. Source Limitations: Obtain each type of railing through one source from a single manufacturer.

## 1.6 STORAGE

- A. Store materials in a dry, well-ventilated, weathertight place.

## 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating ornamental fence railing and grills without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.8 COORDINATION

- A. Coordinate installation of anchorages for ornamental fence railing and grills. Furnish Setting Drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Products specified herein are components of the 8'-0" 'Aristocrat Style', and produced by Builders Fence Company, Inc. PO Box 125, Sun Valley, CA 913533-0125, 1.800.767.0367.
- B. Additional approved manufactures include the following:
  - 1. Metalco. Fence and Railing Products
  - 2. H.B. Barrington Co.

## MATERIALS AND FABRICATION

- A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
- B. Fabrication: Fence panel components shall be manufactured using the electro-forged welding process for complete penetration of cross members.
- C. Configuration; Fence panels and support components shall be fabricated to the configurations shown on the contract drawings.
- D. Steel Bar Stock: ASTM A36.
- E. Steel Tubing: ASTM A500, Grade B.

## 2.2 FENCE PANELS - OPEN GRILLE CONSTRUCTION

- A. Sterope Design: main bars 31/32 inch by 1/8 inch at 2-7/16 inch centers. Round cross bars 3/16 inch diameter at 5-3/16 inch center.
- B. Picket Type Construction
  - 1. Top and Bottom Pickets: Fabricate sections for top and bottom pickets using tubes welded to back of fencing panels near top and bottom of panels.

## 2.3 FINISHING

- A. Galvanizing: Posts and open grille construction fence panels shall be hot-dip galvanized in accordance with ASTM A123.
- B. Color Coating: After galvanizing, components shall be shop coated with polyester powder coating, or in the case of over-size components, shop coated with Sherwin Williams "Polane" two-part polyurethane shop coating.
- C. Color: to be selected by Architect from Full range of colors

## 2.4 FASTENERS

- A. Fasteners for Anchoring Ornamental fence railing and grills to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring grills and railings to other types of construction indicated and capable of withstanding design loads.
  - 1. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
- B. Fasteners for Interconnecting Fence and Grill Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
  - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other Work, unless exposed fasteners are unavoidable or are standard fastening method for handrail and railing indicated.
- C. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
  - 1. Cast-in-place anchors.
  - 2. Chemical anchors.
  - 3. Expansion anchors.

## 2.5 PAINT

- A. Shop Primers: Provide primers complying with applicable requirements in Division 9 Section "Painting."
- B. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in 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.
- C. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.
- D. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 but containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.6 GROUT AND ANCHORING CEMENT

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

## 2.7 FABRICATION

- A. Welded Connections: Fabricate fence panels by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:
  - 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 flux immediately.
  - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- B. Brackets, Flanges, Fittings, and Anchors: Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.
- C. Provide inserts and other anchorage devices to connect ornamental fence railing and grills to concrete or masonry. Fabricate anchorage devices capable of withstanding loads imposed by ornamental fence railing and grills. Coordinate anchorage devices with supporting structure.
- D. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (12 mm) larger than outside dimensions of post, and steel plate forming bottom closure.
- E. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- F. 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 the Work.
- G. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
- H. Fabricate joints that will be exposed to weather in a watertight manner.
- I. Close exposed ends of railing members with prefabricated end fittings.
- J. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch (6 mm) or less.

- K. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

## 2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. 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.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing ornamental fence railing and grills. Set ornamental fence railing and grills accurately in location, alignment, and elevation, measured from established lines and levels and free from 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. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
  - 3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).
- C. Adjust ornamental fence railing and grills before anchoring to ensure alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing ornamental fence railing and grills and for properly transferring loads to in-place construction.

### 3.2 RAILING CONNECTIONS



- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of ornamental fence railing and grills.
- B. Expansion Joints: Install expansion joints at locations indicated but not further apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches (150 mm) of post.

### 3.3 ANCHORING RAIL ENDS

- A. Anchor rail ends to concrete and masonry with sleeves concealed within rail ends and anchored with postinstalled anchors and bolts.

### 3.4 ATTACHING GATES AND HANDRAILS TO WALLS

- A. Attach gates, fence, railings and grills to wall with wall brackets. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface.
- B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Secure wall brackets to building construction as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- B. Extent and Testing Methodology: Testing agency will randomly select completed handrail and railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Ornamental fence railing and grills will be tested according to ASTM E 894 and ASTM E 935 for compliance with ASTM E 985.
- C. Remove and replace ornamental fence railing and grills where test results indicate that they do not comply with specified requirements, unless they can be repaired in a manner satisfactory to Architect and will comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.6 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.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

### 3.7 PROTECTION

- A. Protect finishes of ornamental fence railing and grills from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the 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 field to shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 057200