

SECTION 32 31 54
ORNAMENTAL METAL FENCES AND GATES

PART 1 - GENERAL

1.1 DESCRIPTION

This work consists of all labor, materials, and equipment necessary for furnishing and installing ornamental metal fences, gates and accessories in conformance with the lines, grades, and details as shown.

1.2 RELATED WORK

- A. Temporary Construction Fence: Section 01 00 00, GENERAL REQUIREMENTS.
- B. Finish Grading: Sections 31 20 00, EARTH MOVING and 32 90 00, PLANTING.
- C. Card readers and biometric devices: Section 28 13 11, PHYSICAL ACCESS CONTROL SYSTEMS.
- D. Intrusion alarm: Section 28 16 11 INTRUSION DETECTION SYSTEM
- E. Chain link enclosures and barbed wire barriers: Section 32 31 13, CHAIN LINK FENCES AND GATES.
- F. Door Hardware: Section 08 71 00, DOOR HARDWARE

1.3 MANUFACTURER'S QUALIFICATIONS

- A. Fence, gates, and accessories shall be products of manufacturers regularly engaged in manufacturing items of type specified and will be supplied by the same manufacturer.

1.4 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES, furnish Manufacturer's Literature and Data for all Fencing, gates and accessories.
- B. Certification that fence alignment meets requirements of contract documents.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - A853-04.....Steel Wire, Carbon, for General Use
 - C94/C94M-07.....Ready-Mixed Concrete
 - F626-96a(2003).....Fence Fittings
 - F1083-06.....Pipe, Steel, Hot-Dipped Zinc-Coated
(Galvanized) Welded, for Fence Structures.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials shall conform to ASTM F1083 ferrous metals, zinc-coated; and detailed specifications forming the various parts thereto; and other requirements specified herein. Zinc-coat metal members (including fabric, gates, posts, rails, hardware and other ferrous metal items) after fabrication shall be reasonably free of excessive roughness, blisters and sal-ammoniac spots.

2.2 ORNAMENTAL METAL FENCE

- A. The ornamental metal fence shall include all components such as pickets, pales, rails, posts, gates and hardware required.
- B. Material:
1. Steel material for fence framework (i.e. tubular pickets, rails and posts), shall be galvanized prior to forming in accordance with the requirements of ASTM A653/A653M, with minimum yield strength of 50,000 psi (344 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft² (276 g/m²), Coating Designation G-90.
 2. The manufactured galvanized framework shall be subjected to the thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pretreatment/wash (with zinc phosphate), an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a zinc-rich thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508mm). The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be Black. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 1.
 3. Material for fence pickets shall be 1" square x 14 Ga. tubing. The cross-sectional shape of the rails shall conform to the manufacturer's design with outside cross-section dimensions of 1.75" square and a minimum thickness of 14 Ga. Picket holes in the rail shall be spaced 4.715" o.c. Picket retaining rods shall be 0.125" diameter galvanized steel. Posts shall be a minimum of 2-1/2" square x 12 Ga. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections.

C. FABRICATION

1. Pickets, rails and posts shall be precut to specified lengths. Rails shall be prepunched to accept pickets. Pickets shall be predrilled to accept retaining rods.
2. Grommets shall be inserted into the prepunched holes in the rails and pickets shall be inserted through the grommets so that predrilled picket holes align with the internal upper raceway of the rails (Note: This can best be accomplished by making an alignment jig). Retaining rods shall be inserted into each rail so that they pass through the predrilled holes in each picket.
3. Completed sections (i.e., panels) shall be capable of supporting a 600 lb. load applied at midspan without permanent deformation. Panels shall be biasable to a 25% change in grade.
4. GATES: Gates shall be fabricated using panel material and gate ends having the same outside cross-section dimensions as the rail. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined either by welding or by the same retaining rod process used for panel assembly.

D. Gates:

1. Gates shall be designed to meet the same forced entry and anti-climb characteristics as the other portions of the fence.
2. Provide motorized sliding gates for vehicle access where indicated on the Drawings.
3. Provide hinged gates with access by weatherproof card reader and weatherproof electric strike for vehicle access where indicated on the Drawings.

E. Sequence of Operation for Gates:

1. Personnel Gates: Provide weatherproof card reader access and exiting control of weatherproof magnetic locks for all personnel swing gates. All gates shall be tied to the Fire Alarm and shall "Fail Safe Open" upon fire alarm activation or loss of power to allow egress. During normal usage, gates should open upon card reader activation to release magnetic lock. Gate should be provided with closer and reclose within 30 seconds of activation. Gates should also provide notification to the Security Control Center that they are being opened and closed.
2. Sliding Vehicle Gates: Provide weatherproof card reader access ties to an automatic gate controller to open gates. Provide loop

detectors in pavement on both sides of gates to allow opening and delayed closing of gates until vehicle clears gate. Exiting from yards will be achieved by initiating loop detector on inside of gate to open it. Gate operators shall be tied to emergency power to allow opening in the event of loss of power.

2.3 ACCESSORIES

Accessories as necessary caps, rail and brace ends, wire ties or clips, braces and tension bands, tension bars, truss rods, and miscellaneous accessories conforming to ASTM F626

2.4 CONCRETE

ASTM C94/C94M, using 3/4 inch (19 mm) maximum-size aggregate, and having minimum compressive strength of 3000 psig (25 mPa) at 28 days. Non-shrinking grout shall consist of one part Portland cement to three parts clean, well-graded sand, non-shrinking grout additive and the minimum amount of water to produce a workable mix.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fence by properly trained crew, on previously prepared surfaces, to line and grade as shown. Install fence in accordance with the manufacturers printed installation instructions, except as modified herein or as shown. Maintain all equipment, tools, and machinery while on the project in sufficient quantities and capacities for proper installation of posts, pickets,, rails, pales, and accessories.
- B. Engage the services of a Registered Professional Land Surveyor or Registered Civil Engineer specified in Section 01 00 00, GENERAL REQUIREMENTS, to stake out and certify that the fence alignment meets the requirements as shown.

3.2 EXCAVATION

Excavation for concrete-embedded items shall be of the dimensions shown, except in bedrock. If bedrock is encountered before reaching the required depth, continue the excavation to the depth shown or 18 inches (450 mm) into the bedrock, whichever is less, and provide a minimum of 2 inches (50 mm) larger diameter than the outside diameter of the post. Clear loose material from post holes. Grade area around finished concrete footings as shown and dispose of excess earth as directed by the Resident Engineer.

3.3 POST SETTING

Install posts plumb and in alignment. Set post in concrete footings of dimensions as shown, except in bedrock. Thoroughly compact concrete so as it to be free of voids and finished in a slope or dome to divert water running down the post away from the footing. Cure concrete and grout a minimum of 72 hours before any further work is done on the posts.

3.4 POST CAPS

Fit all exposed ends of post with caps. Provide caps that fit snugly and are weathertight. Where top rail is used, provide caps to accommodate the top rail. Install post caps as recommended by the manufacturer and as shown.

3.5 SUPPORTING ARMS

Design supporting arms, when required, to be weathertight. Where top rail is used, provide arms to accommodate the top rail. Install supporting arms as recommended by the manufacturer and as shown.

3.6 TOP RAILS AND BOTTOM RAILS

Install rails before installing pickets. Provide suitable means for securing rail ends to terminal and intermediate post. Top rails shall pass through intermediate post supporting arms or caps as shown. The rails shall have expansion couplings (rail sleeves) spaced as recommended by the manufacturer. Where fence is located on top of a wall, install expansion couplings over expansion joints in wall.

3.7 ACCESSORIES

Supply accessories (post braces, truss rods, and miscellaneous accessories), as required and recommended by the manufacturer, to ensure complete installation.

3.8 GATES

Install gates plumb, level, and secure for full opening without interference. Set keepers, stops and other accessories into concrete as required by the manufacturer and as shown. Test gates, hardware, locking mechanisms and releases for proper operation. Adjust and lubricate as necessary.

3.9 REPAIR OF GALVANIZED SURFACES

Use galvanized repair compound, stick form, or other method, where galvanized surfaces need field or shop repair. Repair surfaces in accordance with the manufacturer's printed directions.

3.10 FINAL CLEAN-UP

Remove all debris, rubbish and excess material from the station.

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