SECTION 02825

ORNAMENTAL STEEL FENCING AND GATES

# PART 1 - GENERAL

## 1.1 Work Included

### Materials, testing, and installation of ornamental steel fences and gates.

## 1.2 Related Work

### Section 01300: Submittal Procedures

### Section 03310: Cast-in-Place Concrete

### Section 09800: Painting and Coating

## 1.3 System Description

### Furnish and install complete fencing system where shown, including appurtenant footings, hardware, mountings, or connections required for compliance with manufacturer’s installation requirements and compliance with applicable building codes and standards.

## 1.4 Quality Assurance

### Use adequate numbers of skilled workmen trained and experienced in necessary trades and crafts and completely familiar with specified requirements and methods for proper performance of Work of this section.

## 1.5 References

### ASTM A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

### ASTM A153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware

### ASTM A193 Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service

### ASTM A194 Carbon and Alloy Steel Nuts for High-Pressure and High Temperature Service

### ASTM A325 Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength

### ASTM A490 Heat-Treated Steel Structural Bolts 150ksi Minimum Strength

### ASTM A653 Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated

### (Galvannealed) by the Hot Dip Process

### ASTM A924 Steel Sheet, Metallic-Coated by the Hot Dip Process

### ASTM A1011 Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength and High-Strength Low-Alloy with Improved Formability

### ASTM B6 Zinc

### ASTM B117 Operating Salt Spray (Fog) Apparatus

### ASTM B633 Electrodeposited Coatings of Zinc on Iron and Steel

### ASTM D523 Specular Gloss

### ASTM D822 Tests on Paint and Related Coatings and materials Using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus

### California Building Code (CBC)

### Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact) S. AWS D1.1 Structural Welding Code – Steel

## 1.6 Submittals

### Furnish the following submittals:

| **Submittal** | **Description** |
| --- | --- |
| Shop Drawings | Required for fabricated items such ornamental steel fencing and gates |
| Product Data | Required for all manufactured products per product data requirements. |
| Installation Instructions | Required per installation instruction requirements |
| Certificate of Compliance | For fence work, submit coating system and application certification per certificate of compliance requirements. |
| Foundry or Test Record Transcripts | Submit for factory tests upon request per foundry or test record transcript requirements. |
| Material Samples | Required on request |
| Welder Qualification Certificates | Required for all welders performing work on this project.  Also submit certifications of procedure qualifications for each welding procedure used. |
| Warranty | Furnish one-year warranty from date of final acceptance.  Furnish 10-year (minimum) manufacturer’s warranty for factory finish against cracking, peeling, or blistering. |

## 1.7 Delivery, Storage and Handling

### Strictly follow Manufacturer’s instructions and warranty requirements for delivery, storage, and handling of fencing materials.

## 1.8 Unit Prices

### Payment for Work in this section shall be included as part of lump-sum or unit-price bid amount for which such Work is appurtenant.

# PART 2 - PRODUCTS

## 2.1 Acceptable Manufacturers

### Acceptable Manufacturers include the following:

| **Item** | **Manufacturer** | **Manufacturer Location** |
| --- | --- | --- |
| Concrete Anchors –  Epoxy Adhesive  Anchor Systems | Hilti Corp. “HVA” | Tulsa, OK |
| ITW Ramset / Redhead “Epcon” | Glendale Heights, IL |
| Powers PE1000+ | Brewster, NY |
| Simpson Strong Tie Co. “SET-XP Epoxy-Tie” | Pleasanton, CA |
| Accepted equal |  |
| Ornamental Steel Fences and Gates | All-Cities Fence | Ontario, CA |
| Builder’s Fence Company, Inc. | El Cajon, CA |
| Built Rite Fence Company | Bellflower, CA |
| Econo Fence, Inc. | Riverside, CA |
| Accepted equal |  |

## 2.2 Materials

### Ornamental steel fences and gates shall be manufactured from electrically welded pre-galvanized tubing. Kit type field assembled fence panels are not acceptable. Ornamental steel fences and gates shall be constructed of the materials listed in the table below. Chain link fence with concertina type installed razor wire is acceptable for reservoir stairway and other District approved facility locations.

| **Item** | **Material** | **Specification** |
| --- | --- | --- |
| Bolts (Connection Bolts and  Anchor Bolts) - Stainless  Steel | Stainless Steel | ASTM A193 Grade B8M bolts with ASTM A194 Grade 8M nuts  Alternate ASTM F593 Type 316 bolts with ASTM  F594 Type 316 nuts  Washers – same material as nuts |
| Concrete Anchors – Epoxy Adhesive Anchor Systems | Stainless Steel | SAE Type 316 |
| Fencing | Tubular Steel | Galvanized  ASTM A1011 for material galvanized after forming  ASTM A924 for material galvanized prior to forming |
| Minimum yield strength 50 ksi |
| Welding Electrode - Steel | AWS D1.1 E70xx except E7024 rods or electrodes shall not be used. All joints shall be fully welded (seal welded). |
| Picket  Dimensions/Style | 14 gauge  1” square  Smashed point, straight  4” maximum on center |
| Picket Retaining Rods | ⅛” diameter |
| Picket Rail Intersections | Provide PVC Grommets to seal openings |
| Rail Dimensions | 11 gauge  2” x 2” channel  2 rails – 1 on top and 1 on bottom |
| Post Dimensions | 11 gauge  4” square  8 foot nominal maximum span  Zinc plated pressed steel caps |
|  | Fence Height | 8 feet minimum above ground |
|  | Fencepost Depth | 36” minimum  Submit engineering calculations for fences higher than 8’ or where 36” depth cannot be met. |
|  | Applied Design Load | Panels shall support 600-lbf load at mid-span without permanent deformation. |
| Hinged Swinging Gates | Tubular Steel | Fabricate of same material and design as fencing panels. |
|  | Hinge | Welded to gate frame and post, heavy duty barrel type with ball bearing, stainless steel pin, and grease fitting.  Hinges shall allow 90-degree opening of gate. Provide three (3) hinges for each leaf up to 6’ high and one (1) additional hinge for each additional 24” in height, or as determined by the manufacturer. |
|  | Latch | Locking clasp with vandal proof enclosure, unless shown otherwise on Plans. Locking hasp shall allow gate to be unlocked from both sides. |
| V-Wheeled Rolling Gates | Tubular Steel | Fabricate of same material and design as fencing panels. |
|  | Support Posts | Pair of guideposts constructed of minimum 6” square tubing with adjustable guide rollers. Stop post (6” square tubing) |
|  | Rolling Mechanism | 4” minimum diameter solid stainless steel wheels with V-shaped edge groove, grease fittings and needle bearings, mounted to gate frame and riding on inset V-track.  Recessed pocket in gate frame for mounting wheels. 3” clearance between gate frame and finished grade unless otherwise indicated on plans. V-track shall be hot dipped galvanized after fabrication.  Gate assembly shall be braced at top by adjustable guide wheels mounted with brackets to support posts. |
| Automatic Gate Controller |  | Liftmaster Elite Series Controller shall be used, Automatic gate controller shall include photo eye at entrance, bumper / safety edge on gate, inground safety and exit loops, and 2 card readers (1 for entrance and 1 for pedestrian exit). Controller shall be configured to operate a V-groove track and roller style gate. |
| Galvanized Coating after Forming | Zinc | 0.45 oz/ft2 minimum weight  0.3 mil minimum thickness |
| Galvanized Coating prior to Forming | Zinc | ASTM A653  0.90 oz/ft2 minimum weight  Coating designation G90 |
| Powder Epoxy Coating | Preparation | Iron phosphate surface pretreatment, followed by clean water rinse, and non-chromate conversion coating |
|  | Base Coat | Zinc-rich epoxy powder coating  2.0-mil minimum thickness  Gray |
|  | Top Coat | Polyester powder coat  2.0-mil minimum thickness  Black |
|  | Top Coat Performance Requirements | Adhesion > 90% per ASTM D3359 Method B  Corrosion resistance > 3500 hours per ASTM B117  & ASTM D1654  Impact resistance > 60 in-lbf per ASTM D2794  Weathering resistance > 1000 hours per ASTM  D822, D2244, and D523 |
| Hardware – Steel including castings, rolled, pressed and forged articles | Fasteners | 316 stainless steel |
|  | Steel Hardware | ASTM A153 |
|  | Galvanized Coating | ASTM A123 - 3.4 mil thickness - 2.00 ounce/ft2 |

### Zinc coatings shall be applied by hot-dipped or electro-depositing process. Zinc shall comply with ASTM B6.

### Welds made after galvanizing shall be ground smooth and wire-brushed to remove loose or burned zinc coating, after which cleaned areas shall be prepared and neatly coated with 50-50 solder. Repairs to abraded or damaged coating shall be done in similar fashion.

### Before leaving shop, all steel not shown or specified to be galvanized, powder epoxy coated or stainless shall receive one coat of pigmented primer recommended by Manufacturer of final paint system. Parts inaccessible after assembly shall be given second coat of same primer. Final painting shall be as specified in Section 09800.

# PART 3 - EXECUTION

## 3.1 Preparation

### Make field measurements needed to fabricate and install metal fabrications before submitting shop drawings or ordering. Make minor changes in dimensions and alignments as needed to avoid utilities or structural conflicts.

### Clean surfaces of metalwork to contact concrete, removing all rust, dirt, grease and other foreign substances before concrete is placed.

### Secure all embedded metalwork accurately in position when concrete is placed to prevent displacement or undue vibration during or after placement of concrete.

### Where metalwork is to be installed in recesses in formed concrete, said recesses shall be made, metalwork installed, and recesses filled with dry-pack grout in conformance with Section 03740.

## 3.2 Installation

### Furnish and install fencing and gate materials at locations shown on Plans and Submittals.

### The following installation standards shall be followed:

#### Applicable OSHA and Cal OSHA regulations

#### Applicable building and fire code requirements

#### Manufacturer’s installation and warranty requirements

### Refer variances between above documents and Contract Documents to District Representative.

### Install fencing and gates according to Manufacturer’s installation and warranty requirements.

### Fencing and gate materials shall be furnished and installed by Contractor at locations shown on Plans and Submittals.

### Install fencing and gate materials to tolerances recommended by Manufacturer. Unless otherwise shown, install fencing true, plumb, and level using precision gauges and levels.

### Construct footings using Class C 2500-lb concrete, crowned at top to shed water. Line post footings shall be 36-inches deep and 8-inches diameter. All other footings shall be 36 inches deep and 12-inches diameter.

### Where fence installation is specified in existing concrete slabs or structures, core drill existing concrete for embedment of fence and gate posts. Core drill hole shall be 2" (minimum) greater than post width.

### Where fence and gate post installation is specified in precast sleeves, provide grout to fill post and sleeve. Grout shall be non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, and water reducing and plasticizing additives.

### Where surface mounting of posts is specified, provide flange type base plates with 4 holes. Anchor bolts shall be 316 stainless steel epoxy anchors with size and embedment as required for design loads. Provide leveling nuts beneath base plate for post adjustment and fill space beneath plate with non-shrink grout, 3/4" minimum thickness.

### Joints in fencing and gates shall have a close fit with corner joints coped or mitered and in true alignment.

### Built-up parts shall be free of warp.

### Exposed ends and edges of metal shall be slightly rounded.

### For electronic gates and in ground loop will be required on both sides of the gate to facilitate exist and ensure gate does not close on entering or existing vehicles. Safety beams shall be provided to prevent closure of electronic gates on vehicles or pedestrians.

### Automatic gate controllers are required on all new gate installation. Automated gate operators shall be approved by District staff during design and prior to construction. Controllers shall be configured to operate v-groove track style roller gates.

### All automated vehicle gate shall also be installed with an adjacent man gate which can be operated independently and at the same time as the vehicle gate.

### Each gate shall be provided with bumper/safety edges, a photo eye, and a minimum of 2 card readers (one per vehicle gate and one per pedestrian access gate).

## 3.3 Field Quality Control

### Field testing shall include the following:

| **Item** | **Test For** | **Test Standard**  **(Astm Or Other**  **Test Standard)** | **Frequency** | **First Test**  **Paid For By** | **Retests**  **Paid For By** |
| --- | --- | --- | --- | --- | --- |
| Ornamental Steel Fences and Gates | No bends, twists or open joints No projecting edges or corners at intersections | Visual inspection | All fence work and gates | Contractor | Contractor |
| Field Performance | Demonstrate compliance to  Contract Documents and  Manufacturer’s printed literature | 1 test | Contractor | Contractor |
| 11-month  Warranty  Inspection | Demonstrate compliance to Contract Documents and Manufacturer’s printed literature | 1 test | Contractor | Contractor |

END OF SECTION