SECTION 323119 - DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Decorative steel fences.
2. Swing gates.
3. Horizontal-slide gates.
4. Gate operators, including controls.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for concrete bases for gate operators, drives, and controls and post concrete fill.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For gates. Include plans, elevations, sections, details, and attachments to other work.

1. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Product Test Reports: For decorative metallic-coated-steel tubular picket fences, including finish, indicating compliance with referenced standard and other specified requirements.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For gate operators to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

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. Include 8-foot length of fence complying with requirements.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 DECORATIVE STEEL FENCES

A. Decorative Steel Fences: Fences made from steel tubing bars and shapes, hot-dip galvanized.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Ameristar Fence Products.
b. Ametco Manufacturing Corporation.
c. BarnettBates Corporation

B. Posts: Square steel tubing.

1. Line Posts: 4 inches by 4 inches with 3/16-inch wall thickness.
2. Swing Gate Posts: 4 by 4 inches with 3/16-inch wall thickness.
3. Horizontal-Slide Gate Post, Openings Wider Than 12 Feet: 4 by 4 inches with 3/16-inch wall thickness.
4. Guide Posts for Class 1 Horizontal-Slide Gates: 4 by 4 inches with 3/16-inch wall thickness; installed adjacent to gate post to permit gate to slide in space between.

C. Post Caps: Formed from steel sheet and hot-dip galvanized after forming.

D. Infill: Forge-welded-steel bar grating.

1. Perimeter Bars: Steel flat bars 1 by 1/8 inch.
2. Vertical Main Bars: Steel flat bars 1 by 1/8 inch.
3. Vertical Main Bar Spacing: 2-7/16 inches o.c.

E. Fasteners: Stainless-steel carriage bolts and tamperproof nuts.

F. Fabrication: Assemble fences into sections by welding pickets to rails.
   1. Drill posts and clips for fasteners before finishing to maximum extent possible.

G. Fabrication: Fabricate bar grating infill into sections of size indicated.

   1. Fabricate rails with clips welded to rails for field fastening to posts.
   2. Drill posts, clips, and bar grating for fasteners before finishing to maximum extent possible.

H. Finish exposed welds to comply with NOMMA Guideline 1, Finish #3 - partially dressed weld with splatter removed.

I. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.

   1. Hot-dip galvanize posts and rails.
   2. Hot-dip galvanize rail and picket assemblies after fabrication.
   3. Hot-dip galvanize bar grating infill after fabrication.
   4. Hot-dip galvanize custom-design rail and infill assemblies after fabrication.

J. Finish for Bar Grating Infill: Powder coating.

K. Finish for Metallic-Coated-Steel Items: High-performance coating.

2.2 SWING GATES

A. Gate Configuration: Double leaf.

B. Gate Frame Height: As indicated.

C. Gate Opening Width: As indicated.

D. Automated vehicular gates shall comply with ASTM F 2200, Class III.

E. Galvanized-Steel Frames and Bracing: Fabricate members from square tubes 4 by 4 inches formed from 0.108-inch nominal-thickness, metallic-coated steel sheet or formed from 0.105-inch nominal-thickness steel sheet and hot-dip galvanized after fabrication.

F. Frame Corner Construction: Welded.

G. Additional Rails: Provide as indicated, complying with requirements for fence rails.

H. Infill: Comply with requirements for adjacent fence.

I. Spring Hinges: BHMA A156.17, Grade 1, suitable for exterior use.

   1. Function: 320 - Gate spring pivot hinge. Adjustable tension.
   2. Material: Malleable iron; galvanized.

J. Rim Locks: BHMA A156.5, Grade 1, suitable for exterior use.

1. Function: Interlocking deadbolt operated by key from outside and by turn from inside
2. Material: Cast, forged, or extruded brass or bronze.
3. Mounting Plate: Configuration necessary for mounting locks. Fabricate from 1/8-inch-thick, steel plate; galvanized.

K. Mortise Locks: BHMA A156.13, Grade 1, suitable for exterior use.

1. Function: F17 - Deadlock
2. Material: Brass or bronze.
3. Levers: Cast, forged, or extruded brass or bronze.
4. Mounting Box: Configuration necessary to enclose locks. Fabricate from 1/8-inch-thick, steel plate; galvanized.

L. Electric Strikes: BHMA A156.31, Grade 1, of configuration required for use with lock specified, fail-secure, and suitable for exterior use.

1. Mounting Plate: Configuration necessary for mounting electric strikes. Fabricate from 1/8-inch-thick, steel plate; galvanized.
2. Mounting: Mortise into post.

M. Finish exposed welds to comply with NOMMA Guideline 1, Finish #3 - partially dressed weld with splatter removed.

N. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.

O. Metallic-Coated-Steel Finish: High-performance coating.

2.3 HORIZONTAL-SLIDE GATES

A. Gate Configuration: Double leaf.

1. Type: Overhead slide.
2. Type: Cantilever slide, with external roller assemblies.

B. Gate Frame Height: 96 inches.

C. Gate Opening Width: As indicated.

D. Automated vehicular gates shall comply with ASTM F 2200, Class III.

E. Steel Frames and Bracing: Fabricate members from square tubing. Hot-dip galvanize frames after fabrication.

1. Frame Members: Steel tubing 2-1/2 by 2-1/2 inches with 1/8-inch minimum wall thickness.
2. Bracing Members: Steel tubing 1-1/2 by 1-1/2 inches with 1/8-inch minimum wall thickness.

F. Frame Corner Construction:

1. Welded and 5/16-inch-diameter, adjustable truss rods for panels 5 feet wide or wider.

G. Additional Rails: Provide as indicated, complying with requirements for fence rails.

H. Infill: Comply with requirements for adjacent fence.

I. Picket Size, Configuration, and Spacing: Comply with requirements for adjacent fence.

J. Hardware: Latches permitting operation from both sides of gate, locking devicesroller assemblies and stops fabricated from galvanized steel. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate**.**

K. Finish exposed welds to comply with NOMMA Guideline 1, Finish #2 - completely sanded joint, some undercutting and pinholes okay.

L. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.

M. Metallic-Coated-Steel Finish: High-performance coating.

N. Steel Finish: High-performance coating.

2.4 GATE OPERATORS

A. Gate Operators:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. DoorKing, Inc.
    b. FAAC USA.
    c. USAutomatic Inc.
    d. Viking Access Systems.

B. Provide factory-assembled automatic operating system designed for gate size, type, weight, and operation frequency. Provide operation control system with characteristics suitable for Project conditions, with remote-control stations, safety devices, and weatherproof enclosures; coordinate electrical requirements with building electrical system.

1. Provide operator designed so motor may be removed without disturbing limit-switch adjustment and without affecting auxiliary emergency operator.
2. Provide operator with UL-approved components.
3. Provide electronic components with built-in troubleshooting diagnostic feature.
4. Provide unit designed and wired for both right-hand/left-hand opening, permitting universal installation.

C. Comply with NFPA 70.

D. UL Standard: Manufacturer and label gate operators to comply with UL 325.

E. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for automatic gate operators on gates that must provide emergency access.

F. Motor Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, within installed environment, with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1 and the following:

1. Voltage: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected 480 Volt, 3 phase for North Site, 208 Volt, 3 phase for South Site.
2. Horsepower: Not less than ¾.
3. Enclosure: Manufacturer's standard.
4. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.
5. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.

G. Gate Operators: Concrete base or Post mounted and as follows:

1. Mechanical Slide Gate Operators:

a. Duty: Heavy duty, commercial/industrial.
b. Gate Speed: Minimum 60 feet per minute.
c. Maximum Gate Weight: 800 lb.
d. Frequency of Use: Continuous duty.
e. Operating Type: Wheel-and-rail drive with manual release.
f. Drive Type: Enclosed worm gear, reducers, roller-chain drive.

H. Remote Controls: Electric controls separated from gate and motor and drive mechanism, with NEMA ICS 6, Type 1 enclosure for pedestal mounting, and with space for additional optional equipment. Provide the following remote-control device(s):

1. Control Station: Keyed, three-position switch with open**,** stop**,** and close function; located remotely from gate. Provide two keys per station.

2. Digital Keypad Entry Unit: Programmable, multiple-code capability of not less than 2500 possible individual codes, consisting of 5-digit codes.

a. Features: Capable of monitoring and auditing gate activity.
b. Face-lighted unit with metal-keyed keypad fully visible at night.

3. Radio Control: Digital system consisting of code-compatible universal receiver for each gate, located where indicated, with remote antenna with coaxial cable and mounting brackets designed to operate gates. Provide two programmable transmitter(s) with multiple-code capability permitting validating or voiding of not less than 1000 codes per channel configured for the following functions:

a. Transmitters: Three button operated, with open and close function.
b. Channel Settings: Three independent channel settings controlling separate receivers for operating more than one gate from each transmitter.

I. Vehicle Loop Detector: System includes automatic closing timer with adjustable time delay and loop detector designed to reverse gate. System includes electronic detector with adjustable

detection patterns, adjustable sensitivity and frequency settings, and panel indicator light designed to detect presence or transit of a vehicle over an embedded loop of wire and to emit a signal activating the gate operator. System includes number of loops consisting of multiple strands of wire, number of turns, loop size, and method of placement, as recommended in writing by detection system manufacturer for function indicated, at location shown on Drawings.

J. Obstruction Detection Devices: Provide each motorized gate with automatic safety sensor(s). Activation of sensor(s) causes operator to immediately function as follows:
   1. Action: Stop gate in opening cycle and reverse gate in closing cycle, and hold until clear of obstruction.
   2. Internal Sensor: Built-in torque or current monitor senses gate is obstructed.
   3. Sensor Edge: Contact-pressure-sensitive safety edge, profile, and sensitivity designed for type of gate and component indicated, in locations as follows. Connect to control circuit using gate edge transmitter and operator receiver system.

      a. Along entire gate leaf leading edge.
      b. Along entire gate leaf trailing edge.
      c. Across entire gate leaf bottom edge.
      d. Along entire length of gate guide posts.
      e. Where indicated on Drawings.

   4. Photoelectric/Infrared Sensor System: Designed to detect an obstruction in gate's path when infrared beam in the zone pattern is interrupted.

K. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop gate at fully retracted and fully extended positions.

L. Emergency Release Mechanism: Quick-disconnect release of operator drive system of the following type, permitting manual operation if operator fails. Design system so control-circuit power is disconnected during manual operation.

   1. Type: Integral fail-safe release, allowing gate to be pushed open without mechanical devices, keys, cranks, or special knowledge.

M. Operating Features:

   1. Digital Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features with capability for monitoring and auditing gate activity. Provide unit that is isolated from voltage spikes and surges.
   2. System Integration: With controlling circuit board capable of accepting any type of input from external devices.
   3. Master/Slave Capability: Control stations designed and wired for gate pair operation.
   4. Automatic Closing Timer: With adjustable time delay before closing and timer cutoff switch.
   5. Open Override Circuit: Designed to override closing commands.
   6. Reversal Time Delay: Designed to protect gate system from shock load on reversal in both directions.
   7. Maximum Run Timer: Designed to prevent damage to gate system by shutting down system if normal time to open gate is exceeded.
   8. Clock Timer: 24-hour Seven-day programmable for regular events.

N. Accessories:
1. Battery Backup System: Battery-powered drive and access-control system, independent of primary drive system:

a. Fail-Safe: Gate opens and remains open until power is restored.
b. Fail-Secure: Gate cycles on battery power, then fail-safe when battery is discharged.

2. External electric-powered solenoid lock with delay timer allowing time for lock to release before gate operates.
3. Instructional, Safety, and Warning Labels and Signs: According to UL 325
4. Equipment Bases/Pads: Precast concrete, depth not less than 12 inches dimensioned and reinforced according to gate operator component manufacturer's written instructions and as indicated on Drawings.

2.5 STEEL AND IRON

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

B. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

C. Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

D. Bar Grating: NAAMM MBG 531.

1. Bars: Hot-rolled steel strip, ASTM A 1011/A 1011M, Commercial Steel, Type B.
2. Wire Rods: ASTM A 510.

E. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 50, with G90 coating.

F. Castings: Either gray or malleable iron unless otherwise indicated.

1. Gray Iron: ASTM A 48/A 48M, Class 30.
2. Malleable Iron: ASTM A 47/A 47M.

2.6 MISCELLANEOUS MATERIALS

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

1. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for strength and compatibility in fabricated items.

B. Concrete: Normal-weight, air-entrained, ready-mix concrete complying with requirements in Section 033000 "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch maximum aggregate size.

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

2.7 METALLIC-COATED-STEEL FINISHES

A. Galvanized Finish: Clean welds, mechanical connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

B. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

C. Powder Coating: Immediately after cleaning and pretreating, apply TGIC polyester powder-coat finish, with a minimum dry film thickness of 2 mils.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

D. Powder Coating: Immediately after cleaning and pretreating, apply two-coat finish consisting of zinc-rich epoxy prime coat and TGIC polyester topcoat, with a minimum dry film thickness of 2 mils for topcoat. Comply with coating manufacturer's written instructions to achieve a minimum total dry film thickness of 4 mils.

1. Color and Gloss: As selected by Architect from manufacturer's full range.
2. Comply with surface finish testing requirements in ASTM F 2408.

E. High-Performance Coating: Apply epoxy primer, polyurethane intermediate coat, and polyurethane topcoat to prepared surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.

B. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

1. Construction layout and field engineering are specified in Section 017300 "Execution."

3.3 DECORATIVE FENCE INSTALLATION

A. Install fences according to manufacturer's written instructions.

B. Install fences by setting posts as indicated and fastening rails and infill panels to posts. Peen threads of bolts after assembly to prevent removal.

C. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 24 inches plus 3 inches for each foot or fraction of a foot that fence height exceeds 4 feet.

D. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Exposed Concrete: Extend 2 inches above grade. Finish and slope top surface to drain water away from post.

3. Posts Set in Concrete: Extend post to within 6 inches of specified excavation depth, but not closer than 3 inches to bottom of concrete.
4. Space posts uniformly as shown on Drawings.

3.4 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.5 GATE OPERATOR INSTALLATION

A. General: Install gate operators according to manufacturer's written instructions, aligned and true to fence line and grade.

B. Excavation for Support Posts, Pedestals, and Concrete Bases: Hand-excavate holes for bases in firm, undisturbed soil to dimensions and depths and at locations as required by gate operator component manufacturer's written instructions and as indicated.

C. Concrete Bases: Cast-in-place concrete, depth not less than 12 inches, dimensioned and reinforced according to gate operator component manufacturer's written instructions and as indicated on Drawings.

D. Vehicle Loop Detector System: Cut grooves in pavement and bury and seal wire loop according to manufacturer's written instructions. Connect to equipment operated by detector.

E. Comply with NFPA 70 and manufacturer's written instructions for grounding of electric-powered motors, controls, and other devices.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

3.7 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Automatic Gate Operators: Energize circuits to electrical equipment and devices. Adjust operators, controls, safety devices, and limit switches.

1. Hydraulic Operators: Purge operating system, adjust pressure and fluid levels, and check for leaks.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Lubricate hardware, gate operators, and other moving parts.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain gates.

END OF SECTION 323119