

## SECTION 32 31 13

### CHAIN-LINK 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 1 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes:
  - 1. Chain-link fences.
  - 2. Gates included as part of the chain-link fencing system:
    - a. Swing gates.
  - 3. Concrete fence and gate post footings.
- B. Related Sections include:
  - 1. Section 32 31 19 "Decorative Metal Fencing and Gates" for manufactured decorative metal site fencing and gates.

##### 1.3 REFERENCES

- A. ASTM International:
  - 1. ASTM A 123: Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
  - 2. ASTM A 392: Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
  - 3. ASTM A 817: Standard Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcellled Tension Wire.
  - 4. ASTM A 824: Standard Specification for General Requirements for Copper Alloy Castings.
  - 5. ASTM C 33: Standard Specification for Concrete Aggregates.
  - 6. ASTM C 94: Standard Specification for Ready-Mixed Concrete.
  - 7. ASTM C 150: Standard Specification for Portland Cement.
  - 8. ASTM D 2261: Standard Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine).
  - 9. ASTM D 5034: Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test). ).
  - 10. ASTM F 567: Standard Practice for Installation of Chain-Link Fence.
  - 11. ASTM F 626: Standard Specification for Fence Fittings.

12. ASTM A 653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  13. ASTM F 668: Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric.
  14. ASTM F 900: Standard Specification for Industrial and Commercial Swing Gates.
  15. ASTM F 934: Standard Specification for Standard Colors for Polymer-Coated Chain-Link Fence Materials.
  16. ASTM F 1043: Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework.
  17. ASTM F 1083: Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
  18. ASTM F 1184: Standard Specification for Industrial and Commercial Horizontal Slide Gates.
  19. ASTM F 1664: Standard Specification for Poly(Vinyl Chloride) (PVC) and Other Conforming Organic Polymer-Coated Steel Tension Wire Used with Chain-Link Fence.
  20. ASTM F 2200: Standard Specification for Automated Vehicular Gate Construction.
- B. California Building Code (CBC) – California Code of Regulations, Title 24, Part 2.
- C. Chain Link Fence Manufacturers Institute (CLFMI):
1. Product Manual.
  2. WSG 2445: Chain Link Fence Wind Load Guide for the Selection of Line Post and Line Post Spacing.
- D. International Organization for Standardization (ISO):
1. ISO 14021: Environmental Labels and Declarations – Self-Declared Environmental Claims (Type II Environmental Labeling).
- E. National Electrical Manufacturers Association (NEMA):
1. NEMA MG 1: Motors and Generators.
  2. NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum).
- F. National Fire Protection Association (NFPA):
1. NFPA 70: National Electrical Code.
- G. Underwriters Laboratory (UL):
1. UL 325: Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
- H. United States Department of Justice:
1. 2010 ADA Standards for Accessible Design.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site to review pertinent issues related chain-link fencing.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
  - 1. Fence and gate posts, rails, and fittings.
  - 2. Chain-link fabric, reinforcements, and attachments.
  - 3. Gates and hardware.
  - 4. Gate operators, including instructions and motor characteristics.
  - 5. Accessories: N/A
- B. Shop Drawings: For each type of fence and gate assembly.
  - 1. Include plans, elevations, sections, details, post anchorages and attachments to other work. Show locations of fences, gates, posts, rails, tension wires, and gate swings, or stacking areas. Indicate materials, dimensions, sizes, weights, and finishes of components.
  - 2. Include accessories, hardware, gate operation, and operational clearances.
  - 3. Gate Operator: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
  - 4. Wiring Diagrams: For power, signal, and control wiring.
  - 5. Shop Drawings to be sealed and signed by qualified professional engineer responsible for their preparation.
    - a. Include structural analysis data indicating compliance of installed system with specified performance requirements and design criteria, signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of chain-link fence and gate, signed by product manufacturer.
- B. Product Test Report: For framework strength according to ASTM F 1043, for tests performed by a qualified testing agency.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For gate operators to include in emergency, operation, and maintenance manuals.

## 1.8 QUALITY ASSURANCE

- A. Emergency Access Requirements: According to requirements of authorities having jurisdiction for gates with automatic gate operators serving as a required means of access.

## 1.9 FIELD CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

## 1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace privacy slats that fail within specified warranty period.
  - 1. Failures include, but are not limited to
    - a. Deterioration of materials and finishes beyond normal weathering.
  - 2. Warranty Period:
    - a. Structural Failures: 25 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### 2.1 PERFORMANCE REQUIREMENTS

- A. Post size and maximum spacing, footing, post size at gates, and end post size shall be per DSA approved drawings.

### 2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to CLFMI Product Manual and requirements indicated below:
  - 1. Fabric Height: As indicated on Drawings.
  - 2. Steel Wire for Fabric: Wire diameter of 0.148-inch (9 gage).
    - a. Mesh Size: 2 inches.
    - b. Zinc-Coated Fabric: ASTM A 392, Type II, Class 2, 2.0 oz/sq ft with zinc coating applied before weaving.
    - c. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.
  - 3. Selvage: Knuckled at both selvages.

### 2.3 FENCE FRAMEWORK

- A. Posts and Rails: ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 based on the following:
  - 1. Fence Height: As indicated on Drawings.

2. Heavy-Industrial-Strength Material: Group IA, round steel pipe, Schedule 40.
3. Metallic Coating for Steel Framework:
  - a. Type A: Not less than minimum 2.0 oz/sq ft average zinc coating according to ASTM A 123 or 4.0 oz/sq ft zinc coating according to ASTM A 653.
  - b. Type B: Zinc with organic overcoat, consisting of a minimum of 0.9 oz/sq ft of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.
  - c. External, Type B: Zinc with organic overcoat, consisting of a minimum of 0.9 oz/sq ft of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film. Internal, Type D, consisting of 81 percent, not less than 0.3 mil-thick, zinc-pigmented coating.
  - d. Type C: Zn-5-A1-MM alloy, consisting of not less than 1.8-oz/sq ft coating.
  - e. Coatings: Any coating above.

#### 2.4 TENSION WIRE

- A. General: Provide horizontal tension wire at the following locations.
  1. Location: Extended along bottom of fence fabric.
- B. Metallic-Coated Steel Wire: 0.177-inch diameter, marcelled tension wire complying with ASTM A 817 or ASTM A 824, with the following metallic coating:
  1. Type II: Zinc-coated (galvanized) by hot-dip process, with the following minimum coating weight:
    - a. Matching chain-link fabric coating weight.
- C. Polymer-Coated Steel Wire: 0.177-inch diameter tension wire complying with ASTM F 1664, Class 2b over zinc-coated steel wire.
  1. Color: Match chain-link fabric, according to ASTM F 934.

#### 2.5 SWING GATES

- A. General: Comply with ASTM F 900 for gate posts and single-swing and double-swing gate types.
  1. Gate Leaf Width and Height: As indicated on Drawings.
- B. Pipe and Tubing:
  1. Zinc-Coated Steel: ASTM F 1043 and ASTM F 1083.
  2. Polymer Coating Over Metallic Coating: Matching fence framing.
    - a. Color: Matching polymer-coated chain-link fence fabric, according to ASTM F 934.
- C. Gate Frame Member Sizes and Strength: As required to withstand loads and stresses based on gate size and configuration, and in accordance with ASTM F 900.
  1. Frame Corner Construction: Welded.

- D. Gate Posts and footings shall be per DSA approved drawings.
- E. Hardware:
  - 1. Hinges: 180-degree swing.
    - a. Direction of Swing: As indicated on Drawings.
  - 2. Latch: Permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
    - a. At pedestrian gates, latching mechanism to comply with applicable requirements of the United States Department of Justice's 2010 ADA Standards for Accessible Design and California Building Code, Chapter 11B, for operation.
    - b. At pairs of gates, provide drop-rod latch assembly to secure inactive leaf in closed position.
  - 3. Kickplate: Provide smooth, uninterrupted surface over the lower 10-inch portion of gate on both sides. Extend smooth surface for entire width of gate.
    - a. Fabricate kickplate from 0.0747 inch (14 gage) thick galvanized steel plate.

## 2.6 FITTINGS

- A. Provide fittings according to ASTM F 626.
- B. Post Caps: Provide for each post.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
  - 1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.
  - 2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate rails in the fence line-to-line posts.
- E. Tension and Brace Bands: Pressed steel.
- F. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.
- H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
  - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
    - a. Hot-Dip Galvanized Steel: 0.148 inch (9 gage) diameter wire; galvanized coating thickness matching coating thickness matching coating thickness of chain-link fence fabric.

- I. Finish:
  - 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz/sq ft zinc.

## 2.7 MISCELLANEOUS MATERIALS

- A. Concrete: Normal-weight concrete with not less than 3000-psi compressive strength (28 days), 3-inch slump. Measure, batch, and mix according to ASTM C 94.
  - 1. Portland cement: ASTM C 150, Type I or II.
  - 2. Aggregate: ASTM C 33; 1-inch maximum size.
  - 3. Water: ASTM C 94; potable.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
  - 1. Do not begin installation before final grading is completed, unless otherwise permitted by Architect.
- B. 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.

### 3.3 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.
  - 1. Install fencing on established boundary lines inside property line.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, into firm, undisturbed soil.
- C. 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 to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
    - a. Concealed Concrete: Top 2 inches below grade to allow covering with surface material.

- D. Terminal Posts: Install terminal, end, corner, and gate posts according to ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more. For runs exceeding 500 feet, space pull posts an equal distance between corner or end posts.
- E. Line Posts: Space line posts uniformly at 10 feet on center maximum.
- F. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
  - 1. Locate horizontal braces midheight of fabric 6 feet or higher, on fences with top rail and at 2/3 fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- G. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches on center. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:
  - 1. Extended along bottom of fence fabric. Install bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.
- H. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- I. Intermediate Rails: Secure to posts with fittings.
- J. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch bottom clearance between finish grade or surface and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches on center.
- L. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
  - 1. Maximum Spacing: Tie fabric to line posts at 12 inches on center and to braces at 24 inches on center.
- M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side.



### 3.4 GATE INSTALLATION

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

### 3.5 ADJUSTING

- A. Gate: 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 Operator: Energize circuits to electrical equipment and devices, start units, and verify proper motor rotation and unit operation.
  - 1. Test and adjust operators, controls, and safety devices. Replace damaged and malfunctioning controls and equipment.
  - 2. Lubricate operator and related components.
- C. Lubricate hardware and other moving parts.

### 3.6 DEMONSTRATION

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

END OF SECTION 32 31 13