

SECTION 32 31 13
CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):
 - a. A121, Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
 - b. A313/A313M, Standard Specification for Stainless Steel Spring Wire.
 - c. A392, Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 - d. A491, Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric.
 - e. A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
 - f. A615/A615M, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - g. A780, Standard Specification for Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings.
 - h. A824, Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for Use with Chain Link Fence.
 - i. A1011/A1011M, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - j. C94/C94M, Standard Specification for Ready-Mixed Concrete.
 - k. C150, Standard Specification for Portland Cement.
 - l. C387, Standard Specifications for Packaged, Dry, Combined Materials for Mortar and Concrete.
 - m. F552, Standard Terminology Relating to Chain Link Fencing.
 - n. F567, Standard Practice for Installation of Chain-Link Fence.
 - o. F626, Standard Specification for Fence Fittings.
 - p. F668, Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric.
 - q. F900, Standard Specification for Industrial and Commercial Swing Gates.
 - r. F934, Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.
 - s. F1043, Standard Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.

- t. F1083, Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
 - u. F1183, Standard Specifications for Aluminum Alloy Chain Link Fence Fabric.
 - v. F1184, Standard Specifications for Industrial and Commercial Horizontal Slide Gates.
 - w. F1379, Standard Terminology Relating to Barbed Tape.
 - x. F1911, Standard Practice for Installation of Barbed Tape.
 - y. F1916, Standard Specification for Selecting Chain Link Barrier Systems with Coated Chain Link Fence Fabric and Round Posts for Detention Applications.
2. National Electrical Manufacturers Association (NEMA): 250, Enclosures for Electrical Equipment (1,000 volts max.).

1.02 DEFINITIONS

- A. Terms as defined in ASTM F552.

1.03 SUBMITTALS

- A. Action Submittals:

- 1. Shop Drawings:
 - a. Product Data: Include construction details, material descriptions, dimensions of individual components, and finishes for chain link fences and gates.
 - 1) Fence, gate posts, rails, and fittings.
 - 2) Chain link fabric.
 - 3) Gates and hardware.
- 2. Samples:
 - a. Chain Link Fabric: Approximately 6 inches square.
 - b. Posts, Rails, Braces, Wire, and Ties: Approximately 6 inches long.
 - c. Fittings: One each.
- 3. Test Reports: Field test result for compliance of installation of chain link fence, gates, and gate operators.

- B. Informational Submittals:

- 1. Manufacturer's recommended installation instructions.
- 2. Evidence of Supplier and installer qualifications.
- 3. Operation and Maintenance Data as specified in Section 01 78 23, Operation and Maintenance Data.

1.04 QUALITY ASSURANCE

- A. Design, supply of equipment and components, installation, and on-call service shall be product of individual company with record of installations meeting requirements specified.
- B. Preinstallation Conference: Conduct conference at project Site with gate installer to verify layout and operations of automatic gate operating system.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Site in undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

1.06 SCHEDULING AND SEQUENCING

- A. Complete necessary Site preparation and grading before installing chain link fence and gates.
- B. Interruption of Existing Utility Service: Notify owner of utility 72 hours prior to interruption of utility services. Do not proceed with interruption of utility service without written permission from utility owner.

PART 2 PRODUCTS

2.01 GENERAL

- A. Fencing materials and gates shall carry a tag identifying manufacturer.
- B. Legibly mark each roll of fencing material with style, class of zinc coating, and other pertinent identifying information.
- C. Manufacturer Materials: Same kind and color for each type of fence on Project.
- D. Recycled Material: Use recycled drill stem steel pipe materials for fabrication of fences and gates.

2.02 PHYSICAL CHARACTERISTICS

- A. 2-inch Diamond Mesh Pattern: 9-gauge steel woven wire, 20 horizontal wires, 72-inch height, 6-inch spaced vertical wires, knotted joint, Class 3.

B. Barbed Wire:

1. Line Wire: Three strands of No. 12-1/2-gauge.
2. Barbs:
 - a. Number of Points: Four.
 - b. Length: 1 inch.
 - c. Shape: Either round or half round.
 - d. Diameter: No. 14 gauge.
 - e. Spacing: 5 inches.

C. Metal Posts and Assemblies:

1. Strength and Stiffness Requirements: ASTM F1043, heavy industrial fence, except as modified in this section.
2. Round Steel; Pipe, Schedule 40: ASTM F1083.
3. Line Posts:
 - a. 2-3/8 inch (minimum), outside measurement, used steel drill stem pipe with domed, weld-on steel pipe caps with a finish matching that of the pipe.
 - b. Weight: 3.65 pounds per foot.
 - c. Length as indicated.
4. Corner/End/Brace Posts:
 - a. Four-inch (minimum), outside measurement, used steel drill stem pipe with domed, weld-on steel pipe caps with a finish matching that of the pipe.
 - b. Weight: 5.79 pounds per foot.
 - c. Length as indicated.
5. Top and Brace Rails:
 - a. 1.66 inches O.D.
 - b. Weight: 2.27 pounds per foot.
 - c. Length as indicated.
6. Swing Gate Posts (for leaf widths of 4 feet to 10 feet):
 - a. 2.875 inch O.D.
 - b. Weight: 4.64 pounds per foot.
7. Cantilever Sliding Gate Posts:
 - a. Follow ASTM F1184.
 - b. 4 inch O.D.
 - c. Weight: 6.56 pounds per foot.

D. Wire Fasteners for Metal Posts: 12-1/2-gauge galvanized smooth wire for attaching the woven wire to posts.

E. Brace Wire: ASTM A679 12-1/2-gauge tensile strength, Class 3 galvanized Hi-Tensile Wire or 9-gauge tensile strength Class 3 galvanized wire.

F. Metal Gates:

1. Type: Single or double as shown on the Drawings.
2. Design:
 - a. Swing gates shall comply with ASTM F900.
 - b. Cantilever horizontal sliding gates shall comply with ASTM F1184, Type II, Class I.
 - c. Constructed or purchased metal gates, covered with the woven wire the same as or similar to that used on the fence.
 - d. Gates shall be constructed of 2-inch by 12-gauge (minimum) metal tubing with a top, bottom, mid rail, and a diagonal brace. Gate members and braces shall be fastened together by welding before galvanizing.
 - e. Gate latches hardware shall be installed to secure gate(s) in a closed position. Submit data sheet for approval on this item.
 - f. Construct double swing gates with a drop bar at the center as shown.
 - g. Two hinge bolts per gate shall be a minimum of 3/4-inch diameter, with 12 inches of thread for adjustment. Submit data sheet for approval on this Site. Fit opening between gate posts and able to swing through arc of minimum of 90 degrees inward or outward, unless otherwise shown.
3. Height: Match height of fence.
4. Width: As shown on the Drawings.
5. Fittings: Furnish complete with galvanized fittings designed for use with type of gate and gate post provided.

2.03 FUNCTIONAL CHARACTERISTICS

- A. None.

2.04 PERFORMANCE CHARACTERISTICS

- A. Barbed Wire:

1. Zinc-coated Barbed Wire: ASTM A121, Standard Grade.

2.05 CONCRETE

- A. Provide as specified in Section 03 30 00, Cast-in-Place Concrete.

PART 3 EXECUTION

3.01 GENERAL

- A. Install chain link fences and gates in accordance with ASTM F567, except as modified in this section, and in accordance with fence manufacturer's

recommendations, as approved by Contracting Officer. Erect fencing in straight lines between angle points.

- B. Provide necessary hardware for a complete fence and gate installation.
- C. Any damage to galvanized surfaces, including welding, shall be repaired with paint containing zinc dust in accordance with ASTM A780.
- D. Drainage Crossings: Where the chain-link fence must cross drainage ditches or swales, the main fence shall be carried across a ditch or swale with additional fence added below.
 - 1. Frames and Bracing: The fence added below shall be fabricated with galvanized round steel pipe conforming to the requirements for top and brace rails.
 - 2. The construction of the frame shall be welded or assembled with corner fittings. The frame shall be rigid and to the extent necessary to maintain a 2-inch clearance between bottom of the frame and finish grade. If necessary to maintain rigidity, attach to the frame a series of 3/8-inch diameter galvanized steel pipe stakes that are embedded a minimum of 2 feet to the sides and bottom of the ditch.
 - 3. Attach chain link fabric securely to frame at intervals not exceeding 12 inches.

3.02 PREPARATION

- A. Clear area on either side of fence to the extent specified in Section 01 35 00, Environmental Protection and Special Controls. Eliminate ground surface irregularities along fence line to the extent necessary to maintain a 2-inch clearance between bottom of fabric and finish grade.
- B. 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.
- C. Embedment Coating: Coat portion of galvanized or aluminum-coated steel posts that will be embedded in concrete as specified in Section 09 90 00, Painting and Coating. Extend coating 1 inch above top of concrete.

3.03 POST SETTING

- A. Drill or hand-excavate holes for posts to diameters and spacing indicated, in firm, undisturbed soil. Driven posts are not acceptable. Postholes shall be clear of loose materials. Waste materials from postholes shall be removed from Site or regraded into slopes on Site.

- B. Posthole Depth:
 - 1. Minimum 3 feet below finished grade.
 - 2. 2 inches deeper than post embedment depth below finish grade.
- C. Set posts with minimum embedment below finished grade of 34 inches and with top rail at proper height above finished grade. Verify posts are set plumb, aligned, and at correct height and spacing. Brace posts, as necessary, to maintain correct position and plumbness until concrete sets.
- D. Backfill postholes with concrete to 2 inches above finished grade. Vibrate or tamp concrete for consolidation. Protect above ground portion of posts from concrete splatter.
- E. Before concrete sets, crown and finish top of concrete to readily shed water.
- F. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.
- G. Line Posts: Space line posts uniformly at 10 feet on centers between terminal end, corner, and gate posts.

3.04 POST BRACING

- A. Install according to ASTM F567, maintaining plumb position, and alignment of fencing. Install braces at gate, end, pull, and corner posts diagonally to adjacent line posts to ensure stability. Install braces on both sides of corner and pull posts.
 - 1. Locate horizontal braces at mid-height of fabric or higher, on fences with top rail, and 2/3-fabric height on fences without top rail. Install so posts are plumb when diagonal truss rod assembly is under proper tension.

3.05 TOP RAILS

- A. Install according to ASTM F567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps and terminating into rail end attached to posts or posts caps fabricated to receive rail at terminal posts. Install top rail sleeves with springs at 105 feet maximum spacing to permit expansion in rail.

3.06 BARBED WIRE SUPPORTING ARMS

- A. Barbed wire supporting arms shall be installed as indicated and as recommended by manufacturer. Bolt or rivet supporting arm to top of post in a

manner to prevent easy removal with hand tools. Angle single arms to outside of fence.

3.07 TENSION WIRE

- A. Install according to ASTM F567 and ASTM F1916, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with tie wires at a maximum spacing of 24 inches on center.
- B. Install tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.

3.08 CHAIN LINK FABRIC

- A. Do not install fabric until concrete has cured minimum 7 days.
- B. Apply fabric to outside of enclosing framework. Pull fabric taut to provide a smooth and uniform appearance free from sag, without permanently distorting fabric diamond or reducing fabric height. Tie fabric to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- C. Splicing shall be accomplished according to ASTM F1916 by weaving a single picket into the ends of the rolls to be joined.
- D. Leave 2 inches between finish grade or surface and bottom selvage, unless otherwise indicated.
- E. 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.
- F. Tie Wires: Fasten ties to wrap a full 360 degrees around rail or post and a minimum of one complete diamond of fabric. Twist ends of tie wire three full twists, and cut off protruding ends to preclude untwisting by hand.
 - 1. Maximum Spacing: Tie fabric to line posts at 12 inches on center and to brace and top rails at 24 inches on center.

3.09 GATES

- A. Install gates according to manufacturer's written instructions, level, plumb and secure for full opening without interference. Attach fabric and hardware to gate using tamper-resistant or concealed means. Adjust hardware for smooth operation and lubricate where necessary so gates operate satisfactorily from OPEN or CLOSED position.

3.10 FIELD QUALITY CONTROL

- A. Post and Fabric Testing: Test fabric tension and line post rigidity according to ASTM F1916.
- B. Gate Tests:
 - 1. Prior to acceptance of installed gates, demonstrate proper operation of gates under each possible OPEN and CLOSE condition specified.
 - 2. Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range.
 - 3. Confirm that latches and locks engage accurately and securely without forcing and binding.

3.11 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, to train Agency's personnel to adjust, operate, and maintain gates.

3.12 CLEANUP

- A. Remove excess fencing materials and other debris from Site.

END OF SECTION

