SECTION 32 31 13

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install complete fence and gates as described in Contract Documents.

B. Related Requirements:
   1. Section 03 30 53: 'Miscellaneous Exterior Cast-In-Place Concrete' for mow strips at fencing and setting sleeves in concrete retaining walls.

1.2 REFERENCES

A. Association Publications: / Organizations:
   1. Chain Link Fence Manufacturers Institute (CLFMI), Columbia, MD www.chainlinkinfo.org.
      a. WLG 2445, *'Chain Link Fence Wind Load Guide for the Selection of Line Post and Line Post Spacing'* (2012).
      b. CLF-SFR0111, *'Chain Link Fence Manufacturers Institute Security Fencing Recommendations'*.
      c. CLF-PM0610, *'Field Inspection Guide'*.
      d. CLF-TP0211, *'Tested and Proven Performance of Security Grade Chain Link Fencing Systems'*.

B. Reference Standards:
   1. ASTM International:
      a. ASTM A123/A123M-17, 'Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products'.
      b. ASTM A153/A153M-16a, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
      c. ASTM A392-11a(2017), 'Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric'.'
      d. ASTM A1011/A1011M-18a, 'Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength'.
      e. ASTM C1107/C1107M-17, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)'.
      f. ASTM F1043-18, 'Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework'.
      g. ASTM F1083-18, 'Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures'.
      h. ASTM F3000/F3000M-13(2018), 'Standard Specification for Polymer Privacy Insert Slats for Chain Link Fabric and Privacy Chain Link Fabric Manufactured Containing Pre-Installed Privacy Slats'.

1.3 SUBMITTALS

A. Action Submittals:
   1. Product Data: Manufacturer literature or cut sheets on fence components.
   2. Samples: Types of vision slats and colors for Architect's selection.

B. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 70 00:
a. Warranty Documentation:
1) Vision Slats:
a) Final, executed copy of Warranty.

1.4 WARRANTY

A. Vision Slats:
1. Manufacturers twenty-five (25) year, pro-rata limited Warranty.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Materials:
1. Fabric:
a. Chain Link Fabric of 9 ga (3.7 mm) wire, galvanized before or after weaving with 1.2 ounce (34 grams) zinc coating conforming to requirements of ASTM A392, Class I.
b. Mesh:
1) With Visual Privacy / Security Slats:
a) 2 inch (50 mm) square mesh required by specified vision slat.
c. Knuckle both selvages.
2. Framework:
a. Posts and Rails shall be roll-formed, self-draining shapes meeting strength requirements of ASTM F1043, Table 3, and with 2 ounce (56.7 grams) zinc coating per 1 sq ft (0.0929 sq meter) of surface area conforming to ASTM A123/A123M.
b. Line Posts:
1) Line Posts 8 feet (2.45 m) and under:
a) 1.875 by 1.625 inch (48 by 41 mm) C-section roll formed from steel conforming to ASTM A1011/A1011M, Grade 45, with minimum theoretical bending strength of 247 lbs (112 kg) under 6 foot (1.80 m) cantilever load.
b) 2.375 inch (60 mm) outside diameter Schedule 40 tubular section weighing 3.65 lbs (1.6 kg) per lineal 1 ft (305 mm) meeting requirements of ASTM F1083.
c) 2.375 inch (60 mm) outside diameter Schedule 40 tubular section weighing 3.12 lbs (1.42 kg) per lineal 1 ft (305 mm) formed from steel meeting requirements of ASTM A1011/A1011M.

c. Top And Brace Rail:
1) 1.625 by 1.25 inch (41 by 32 mm) roll formed section of 45,000 psi (310 MPa) yield strength channel shaped rail with minimum theoretical bending strength of 247 lbs (112 kg) on 10 foot (3.050 m) midpoint load.
2) 1.660 inch 42 mm outside diameter Schedule 40 pipe weighing 2.27 lbs (1.03 kg) per lineal 1 ft (305 mm) meeting requirements of ASTM F1083.
3) 1.660 inch 42 mm outside diameter Schedule 40 tubular section weighing 1.84 lbs (0.83 kg) per lineal 1 ft (305 mm) formed from steel meeting requirements of ASTM A1011/A1011M.
d. Fittings:
1) Pressed steel or malleable iron, hot-dip galvanized conforming to ASTM A153/A153M.
2) Tie wires shall be 12 ga (2.05 mm) minimum galvanized steel or 9 ga (3 mm) minimum aluminum wire.
e. Tension Wire: 7 ga (3.66 mm) minimum galvanized spring steel.

B. Mixes:
1. Post Foundation Concrete:
a. One cu ft cement, 2 cu ft (0.0566 cu m) sand, 4 cu ft (0.1132 cu m) gravel, and 5 gallons (18.93 liters) minimum to 6 gallons (22.71 liters) maximum water.
b. Mix thoroughly before placing.

2.2 ACCESSORIES

A. Post Setting Grout at Sleeves:
1. Commercial nonshrink grout conforming to requirements of ASTM C1107/C1107M, Type B or C.
2. Type Two Approved Products:
a. Normal Construction Grout A by W R Bonsal, Charlotte, NC www.bonsal.com.
b. Advantage 1107 Grout by Dayton Superior, Miamisburg, OH www.daytonrichmond.com.
c. NS Grout by Euclid Chemical Co, Cleveland, OH www.euclidchemical.com.
d. 5 Star Special Grout 110 by Five Star Products Inc, Fairfield, CT www.fivestarproducts.com.
e. Duragrout by L&M Construction Chemicals Inc, Omaha, NE www.lmcc.com.
f. Masterflow 713 Pre-mixed Grout by Master Builders, Cleveland, OH www.masterbuilders.com.
g. Tamms Grout 621 by TAMMS Industries, Mentor, OH www.tamms.com.
h. U S Spec MP Grout by U S Mix Products Co www.usspec.com.
i. CG-86 Grout by W R Meadows, Elgin, IL www.wrmeadows.com.
j. Equal as approved by Architect before use. See Section 01 6200.

B. Vision Slats And Fabric:
1. Manufacturer Contact List:
a. *Privacy*Link, Hyde Park, UT www.eprivacylink.com.
2. Description:
a. High-density polyethylene (HDPE), double-walled, self-locking or with locking feature that prevents slats from being removed
b. Slats pre-woven and pre-inserted into chain link fabric.
3. Design Criteria:
a. Meet ASTM F3000/F3000M requirements for pre-installed privacy slats.
b. Provide slats with ultra violet (UV) inhibitors.
4. Visual Privacy / Security:
a. Semi Privacy:
1) Description:
a) When installed, slats will provide 75 percent minimum visual privacy/security.
b) Mesh: 2 inch x 2 inch (50 mm x 50 mm).
2) Pre-inserted slats:
a) Flexible round tubes to lock double-wall slats securely in place at both top and bottom of fence by flexible round tubes.
3) Type Two Acceptable Product:
a) Noodle Link by *Privacy*Link.
b) Equal as approved by Architect before installation. See Section 01 6200.
5. Color:
a. Slats:
1) As selected by Architect from Manufacturer's standard colors.
b. Flexible round tubes:
1) Galvanized Grey.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fence shall be installed by mechanics skilled and experienced in erecting fences of this type and in accordance with Contract Documents.
   1. When general ground contour is to be followed, make changes of grade in gradual, rolling manner.
   2. Evenly space posts in line of fence a maximum of 10 feet (3.050 meter) center to center.

B. Post Foundations:
   1. Except atop retaining walls, set posts with concrete post foundations as specified below:
      a. Line Posts:
         1) Diameter 8 inch (200 mm)
         2) Depth 36 inch (915 mm).
      b. Gate, End, And Corner Posts:
         1) Diameter 12 inch (305 mm)
         2) Depth 42 inch (1 065 mm).
      c. At mow strips, set top of post foundation below grade sufficient to allow for placing of mow strip. Measure post foundation depth from top of mow strip.
      d. Where fences are incorporated into slabs, measure post foundation depth from top of slab. Extend bottom of slab footing sufficient to allow specified amount of concrete around post. At existing slabs, install fence outside perimeter of slab.
      e. For fences on retaining walls, provide 12 inch (305 mm) long sleeves to be cast into retaining wall. Set pipe in sleeve and grout space between sleeve and post full.

C. Fence:
   1. After posts have been permanently positioned and concrete cured for one (1) week minimum, install framework, braces, and top rail. Join top rail with 6 inch (150 mm) minimum couplings at not more than 21 foot (6.40 meter) centers.
   2. Stretch fabric by attaching one end to terminal post and supplying sufficient tension to other end of stretch so slack is removed.
      a. Fasten fabric to line posts with tie wires. Pass ties over one strand of fabric and hook under line post flange.
      b. Place one tie as close to bottom of fabric as is possible with additional ties equally spaced between top and bottom band on approximately equal spacing not to exceed 14 inches (355 mm) on center.
      c. Attach fabric to roll formed terminals by weaving fabric into integral lock loops formed in post. Attach fabric to tubular terminals with tension bars and bands.
      d. Hold fabric approximately 2 inches (50 mm) above finish grade line.
      e. On top rail, space tie wires at no more than 24 inches (610 mm) on center.
      f. Securely attach fittings and firmly tighten nuts.

3.2 CLEANING

A. Spread dirt from foundation excavations evenly around surrounding area unless otherwise directed. Leave area free of excess dribbles of concrete, pieces of wire, and other scrap materials.

END OF SECTION