SECTION 32 31 13
CHAIN LINK FENCING and GATES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work in this section.

1.2 SECTION INCLUDES

A. Provide complete chain link fencing for exterior locations as follows.
   1. 6'-0" high fence typical perimeter fencing and separation fences
   2. 8'-0" high fence for bicycle parking enclosures.
   3. 8’-0” high fence for propane tank enclosures.
      a. Provide screening slats in the fence when the propane tank is visible from nearby roadways.
   4. Other heights as indicated for specific locations.
   5. Provide black vinyl coated chain link fencing on property perimeters fronting on streets, bicycle racks, and interior courts; galvanized steel fencing elsewhere.
   6. Aluminum coated chain link fence around athletic facilities, bicycle racks, and interior courtyards as authorized in writing by Program Management.

B. Fence locations:
   1. Provide fences around the site, retention ponds, athletic facilities, bike rack, kindergarten play area, dumpsters, lift station, gas tanks, irrigation well, FPL transformer and condensers.
   2. Provide fences around the water meter, potable water backflow preventer, and fire main backflow preventer.
   3. Provide fences around all wet retention/detention ponds, on site with double gates.
   4. At elementary schools, provide fences around wet and dry retention/detention ponds, swales or depressed areas with <u>open access</u> to drainage pipes over 8" in diameter.
   5. Minimum height of all fences is 6', except around the bike rack is 8' high.
   6. Fencing material will be 9-ga galvanized steel or black vinyl coated steel.
      a. Fence fabric shall have knuckled selvage at both top and bottom.
      b. May use aluminum coating in accordance with A.5 above
   7. In projects on existing school campuses, the fence material will match existing fencing that will remain unless otherwise indicated.
   8. Fences for athletic facilities will be in accordance with Facilities Planning for Physical Activity and Sport (Elementary and Middle Schools), and National Federation Court and Field Diagram Guide (High Schools).

C. Fence Design
   1. The Architect or his designated sub-consultant shall be responsible for proper design of all fencing materials, including verification of the minimum material sizes listed herein.
      a. Include proper detailing in the design for installation of intermediate fence rail sections for all fences with particular attention to fences (including backstops) over six feet in height.
      b. Include line, gate, and corner post details for installation of concrete foundations.
   2. Design all fencing to withstand Risk Category I wind speeds, exposure C.

1.3 REFERENCES
- A. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- B. ASTM A392 – Standard Specification for Zinc-Coated Steel Chain Link Fence Fabric
- C. ASTM F567 – Standard Practice for Installation of Chain Link Fence
- D. ASTM F668 – Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain-Link Fence Fabric
- E. ASTM F1043 – Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
- F. ASTM F1083 – Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
- G. CLFMA – Chain Link Fence Wind Load Guide for the Selection of Line Post and Line Post Spacing

1.4 SUBMITTALS
- A. Shop drawings shall indicate details of fabrication, installation, size, layout, post/foundation details, hardware anchorage, and component schedule.
  1. Show locations of different fence fabrics.
- B. Provide manufacturer's product descriptive data on fabric, posts, accessories, fittings, and hardware.
- C. Manufacturer Installation Instructions: Indicate installation requirements and post foundation anchor bolt templates.

1.5 QUALITY ASSURANCE
- A. Perform work in accordance with the manufacturer’s instructions.

1.6 QUALIFICATIONS
- A. Manufacturer: Company specializing in manufacturing the products specified in this section with a minimum of 5-years of experience.

PART 2 PRODUCTS

2.1 MATERIALS
- A. Materials are listed for a six foot tall chain link fence. Taller fences will require other, heavier materials.
- B. Galvanized steel fabric: 9-ga. steel wire, 2" diamond mesh interwoven wire, top selvage knuckle end closed, bottom selvage knuckle end closed, full-height unless otherwise noted.
- C. Vinyl-coated fabric: 9-ga. steel wire, 2" diamond mesh interwoven wire, top selvage knuckle end closed, bottom selvage-knuckle end closed, full-height unless otherwise noted, color: black.
- D. Aluminum-coated fabric: 9-ga. steel wire, 2" diamond mesh interwoven wire, top selvage knuckle end closed, bottom selvage knuckle end closed, full-height unless otherwise noted.
- E. All pipes are hot dip galvanized steel, schedule 40 dimensions, compliant with ASTM A53 or ASTM F1083. ASTM F1043 applies to the galvanized coating.
  1. ASTM A53 applies to 1” and 3” nominal pipe sizes.
  2. Refer to M, below, for an alternate material specification.
- F. Top and Brace Rail: 1-5/8” O.D. (1-1/4” nominal size, 0.140” wall thickness, 2.27 lb./ft.) pipe, plain end, with outside sleeve-type couplings at least 7" long, one coupling in every five shall have a spring for expansion and contraction of rail.
  1. Finish shall match supported fence fabric.
- G. Corner, Terminal (End) and Pull Posts: 3-1/2" O.D. (minimum) (3” nominal size, 0.216” wall thickness, 7.58 lb./ft.) pipe.
  1. Finish shall match supported fence fabric.

2. Corner, terminal and pull post foundations shall be minimum 12“-diameter by 36“-deep. Post shall extend to within 6” of the foundation bottom.
3. Equip posts with ¼" x ¾" tension bar 11-ga by 1" wide tension bands and ⅜" dia. carriage bolts and nuts, bands at 14" o.c.

H. Line Posts shall be 2-7/8” O.D. (2-1/2” nominal size, 0.203” wall thickness, 5.79 lb./ft.) pipe.
1. Equip posts with pressed steel top of manufacturer's design; finish shall match supported fence fabric.
2. Line post foundations shall be minimum 10“-diameter by 30“-deep. Post shall extend to within 6” of the foundation bottom.

I. Gate Posts:
1. Refer to Table 1, included in the Appendix at the end of this section for required minimum gate post and post foundation sizes.
2. Finish of gates shall match adjacent fence fabric.

J. Gates:
1. 1-5/8” O.D. SCH 40 (1-1/4” nominal size, 0.140” wall thickness, 2.27 lb./ft.) galvanized steel pipe frames with all welded construction. Provide internal bracing with ⅜" adjustable steel truss rods.
    a. Gates wider than four feet may require heavier frames using larger diameter pipe.
    b. Wide gates must be free of gravity-induced sag when first installed.
2. Heavy-duty type pressed steel hinges, constructed to allow gate to swing 90° to 180°.
    a. Provide min. 2 hinges per leaf, 3 hinges per leaf for all gates over eight feet wide, total width.
    b. Cast iron hinges are not acceptable.
    c. Drill and screw hinges to gateposts on all gates over six feet wide, total width.
        i) Tighten hinges on gateposts before installing screws.
        ii) Use minimum two, ¼” diameter screws per individual hinge.
        iii) Drill through hinge and the gatepost wall, then set the screws.
        iv) The screws are to keep the hinge from rotating on the gate support post.
3. Use pressed steel padlocking device, center rest, and semi-automatic catch to secure all driveway gates in the open position.
    a. Cast iron hardware is not acceptable.
4. Pedestrian gates not located along a means of egress shall be equipped with locking hardware that will allow use of padlocks to secure the gate.
    a. Manufacture locking hardware from pressed steel, not cast iron.
5. Pedestrian gates that are located along a means of egress shall be equipped with panic hardware that allows immediate egress from the school site.
    a. Refer to DMS Section 08 71 00 for acceptable products and manufacturers.
    b. The panic hardware operating mechanism shall be equipped with guards that prevent unauthorized operation by individuals outside the school site.
    c. Manufacture all locking hardware from pressed steel or equivalent materials.
    d. Cast iron hardware is not acceptable.

K. Caps: Vinyl or galvanized steel, depending on location, sized to post diameter, set screw retainer.
L. Accessories: Same finish as framing and fabric.

M. Alternate Pipe Material
1. It will be acceptable to use pipe material that complies with the SS40 High Strength Fence Framework as noted below:
   a. Material specification conforms to ASTM F1043, Group IC.
   b. 50,000 psi steel yield strength.
   c. High strength steel conforming to ASTM A1011.
   d. O.D. coating Type B and I.D. coating Type D.
   e. As manufactured in the United States by Allied Tube and Conduit, or equal.
   f. Dimensional standards as shown in the following table:

OUTSIDE DIAMETER	NOMINAL PIPE SIZE	DECIMAL OUTSIDE DIAMETER	WALL THICKNESS	MATERIAL WEIGHT (LB./LIN.FT.)	USE
1-5/8”	1-1/4”	1.660	0.111	1.84	Top and Brace Rails Gate Frames
2-7/8”	2-1/2”	2.875	0.160	4.64	Line Posts
3-1/2”	3”	3.500	0.160	5.71	Corner, Terminal (End) and Pull Posts
4”	3-1/2”	4.000	0.160	6.56	Gate Posts *

*See Table 1 in the Appendix

PART 3 EXECUTION

3.1 EXAMINATION
A. Verify that preparations in fence locations are complete, without irregularities that would interfere with fence installation, correct unsatisfactory conditions before starting work.

3.2 INSTALLATION
A. Measure and lay out complete fence line, parallel to surface of ground.
   1. Locate line posts 10' o.c. maximum spacing.
   2. Locate corner posts where fence changes directions more than 10°.
B. Provide minimum posthole diameter 3 times outside post diameter.
   1. Set posts minimum of 24" into concrete base, plumb to ¼" in 10'; fill hole with concrete to 2" above grade.
   2. Crown the surface of concrete to slope away from posts.
C. Fence Fabrics:
   1. Stretch fabric tight between terminal posts or at intervals of 100' maximum.
      a. Do not stretch fabric until concrete foundation has cured 28 days min.
   2. Position the bottom of the fabric approximately 2" above ground level at each post.
   3. Cut or splice fabric to form one continuous piece between terminal posts.
   4. Attach fabric to terminal, corner or pull posts using tension bars and tension bands at 14" o.c.
   5. Attach fabric to line posts using wire ties or clips, spacing not to exceed 15" o.c.
   6. Attach top edge of fabric to top rails using wire ties or clips, spacing not to exceed 24" o.c.
   7. Attach bottom edge of fabric to bottom rails using wire ties or clips, spacing not to exceed 24" o.c.
   8. Place fabric on outside of posts and rails.
   9. Install fabric so its bottom edge is two inches above finished grade (+/- ½ inch).
D. Gates:

1. Use swing gates.
2. When used in emergency egress situations, limit-swinging gate leaves to 4'-0" wide.
3. Provide 2" ground clearance for gate leaves 5'-0" or less and 4" for over 5'-0" wide.
4. Set gate posts at least 1'-8" back from face of curbs.
5. Install gates plumb and level ¼" in 10'.
6. Adjust hardware to provide smooth operation.

E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods.
   1. Install brace rail one bay from end and gateposts.
F. Brace tops of all posts installed adjacent to buildings and/or columns with steel brackets substantially secured to building wall and/or columns.
G. Fasten fabric to top rail, posts, braces, and bottom tension wire with tie wire, maximum 15" o.c.
H. Attach fabric to end, corner, and gateposts with tension bars and tension bar clips.
I. Install bottom tension wire stretched taut between terminal posts.
J. Do not attach the hinged side of gate to building walls; provide gateposts.
K. Install gate with fabric to match fence.
   1. Install three hinges per leaf, latch, catches, and drop bolt.
L. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.
   1. Do not install drop rod retainers (cane bolts) on gates that that are part of emergency egress routes - provide alternate approved hardware.

3.3 ADJUST AND CLEAN

A. Adjust brace rails and tension rods for rigid installation.
B. Tighten hardware, fasteners, and accessories.
C. Remove excess and waste materials from project site.
D. Adjust gates to alignment, operate freely, and latch properly.

END OF SECTION

APPENDIX

TABLE 1 – REQUIRED MINIMUM SWING GATE POST AND FOUNDATION SIZES

Size of a Single Gate Section (1)			Nominal Pipe Size (2, 4)	Minimum Foundation Dimensions(3)	
				Diameter	Depth
3’	to	11’	3-1/2”	14”	30”
11’-1”	to	18’	6”	20”	36”
18’-1”	to	21’	6”	24”	36”
21’-1”	to	25’	6”	24”	42”
25’-1”	to	30’	6”	30”	42”

FOOTNOTES:
(1) A gate with a 22 foot total width would have two, single sections, each 11’ wide.
(2) The gate post extends to within 3” of the foundation bottom.
(3) Unless otherwise noted on the plans for a specific gate.
(4) All gateposts shall be hot dip galvanized, SCH 40, having the listed nominal pipe size, unless the design engineer specifies larger pipes. See body of specification for ASTM requirements.