SECTION 0214

FENCE

0214.0100 GENERAL

0214.0101 Description of Work. The work under this Section shall consist of furnishing all labor, materials, and equipment required for constructing chain link fence and gates—including polyethylene inserts and security barbed wire—at the locations and in accordance with the details shown on the plans, TW Standard Details 1610 and 1615, and the requirements of these specifications.

The chain link fabric shall be 72 inches high unless otherwise noted on the plans or in the special specifications.

Chain link fence shall be constructed of zinc-coated steel fabric, posts, hardware, and fittings.

0214.0104 Delivery, Storage, and Handling. Chain link fence fabric, posts, rails, gates, redwood pickets, and barbed wire shall be delivered to the site, stored, and handled in a manner to avoid any damage to the materials or galvanized coating. Fence materials shall be stored and protected from damage, as well as dirt, mud, oil, paint, grease, and all other deleterious materials.

0214.0200 PRODUCTS

0214.0201 Materials.

(A) General. All fencing material may be sampled and tested in accordance with the applicable material standards specified herein.

(B) Concrete. Portland cement concrete for post footings shall conform to the requirements of Section 0301 and be Class C.

(C) Posts.

(1) Round Pipe. Posts shall be zinc-coated (galvanized) round steel pipe conforming to the requirements of ASTM A53, Type E or S, Grade A Standard Weight, Schedule 40, or shall be round pipe conforming to all of the requirements of AASHTO M 181 for Grade 2 pipe.

In addition, posts shall be finished with an acrylic top coat having a nominal thickness of 0.0005 inch. A chromate chemical treatment of 30 micrograms per square inch shall be applied to the zinc coating prior to applying the acrylic top coat.

All posts for plain chain link fence, including posts with polyethylene inserts, shall have an outside diameter of 2-1/2 inches as shown in TW Standard Detail 1610. End, corner,

and intermediate posts shall have an outside diameter of 3 inches, as shown in TW Standard Detail 1610.

Posts supporting gates shall be as indicated in Tables 0214-1 and 0214-2 below. If plans call for square posts, sizes shall be submitted to the Engineer for review and approval.

Table 0214-1
Single-Leaf Gates

Opening (face to face)	Gate Posts (round, OD)	Hinge Space (post to upright)
3’-0” to 6’-0” (914 – 1829 mm)	2.875 in (73 mm)	2.25 in (57 mm)
7’-0” to 10’-0” (2134 – 3048 mm)	4 in (102mm)	2.25 in (57 mm)
11’-0” to 12’-0” (3353 – 3658 mm)	4 in (102 mm)	2.25 in (57 mm)
13’-0” to 18’-0” (3962 – 5486 mm)	6.625 in (168 mm)	3.5 in (89 mm)
19’-0” to 20’-0” (5971 – 6096 mm)	8.625 in (219 mm)	3.5 in (89 mm)

Table 0214-2
Double-Leaf Gates

Opening (face to face)	Gate Posts (round, OD)	Hinge Space (post to upright)
8’-0” to 12’-0” (2438 – 3658 mm)	2.875 in (73 mm)	2.25 in (57 mm)
14’-0” to 24’-0” (4267 – 7315 mm)	4 in (102 mm)	2.25 in (57 mm)
26’-0” to 36’-0” (7925 – 10973 mm)	6.625 in (168 mm)	3.5 in (89 mm)
38’-0” to 40’-0” (11582 – 12192 mm)	8.625 in (219 mm)	3.5 in (89 mm)

(2) Roll-Formed Posts. Roll-formed posts shall be manufactured from steel sheet and strip conforming to the minimum requirements of ASTM A570/A570M Grade 45, and shall meet the strength and dimensional requirements of AASHTO M 181 for Type I roll-formed posts. The required coating shall be a hot-dip zinc coating in accordance with the requirements of AASHTO M 181 for Grade 1 steel posts, or a coating system

meeting the exterior coating requirements of AASHTO M 181 for Grade 2 round steel posts, consisting of a hot-dip zinc coating, chromate chemical treatment, and organic top coat.

(D) Rails. Rails are located midway between the top and bottom of the fence fabric between end and corner posts and the first line post. When specified on the plans or the special specifications, rails may be used to connect the top of posts. Rails shall be zinc-coated (galvanized), round steel pipe conforming to the requirements of ASTM A53, Type E or S, Grade A Standard Weight, Schedule 40. Rails shall be finished with a chromate treatment and acrylic coating identical to that required on posts. Rails shall have a nominal outside diameter of 1-5/8 inch. Rail ends shall be fitted with malleable steel caps.

(E) Fence Fabric. Chain link fabric shall be zinc coated (galvanized), conforming to the requirements of ASTM A392, Class 1 coating. The minimum weight of coating shall be 1.2 ounces per square foot of wire surface area. Fence fabric shall be 72 inches in height and shall be manufactured of 9-gauge wire.

Fabric for plain chain link fence shall be woven throughout in the form of approximately 2-inch square mesh.

Fabric for chain link fence with redwood inserts shall be woven throughout in the form of a 3-1/2-inch by 5-1/2-inch mesh.

Fabric shall be furnished with twisting and barbing on both selvages, top and bottom.

(F) Tension Wire and Fabric Fasteners. Tension wire shall be 7-gauge coil spring steel wire with a minimum tensile strength of 75,000 pounds per square inch, and a minimum zinc coating of 0.8 ounce per square foot of uncoated wire surface.

Tie wires, hog rings, and post clips shall be zinc coated and of the same gauge as the fence fabric being fastened. The minimum weight of zinc coating shall conform to the requirements of ASTM 392, Class 1.

(G) Truss Rods and Tighteners. Truss rods and tighteners shall be zinc coated and fabricated from quality steel. Truss rods shall be 3/8-inch adjustable rods. Truss tighteners shall have a strap thickness no less than 1/4 inch.

(H) Miscellaneous Fittings and Hardware. Structural bars, stretcher bars, stretcher bar bands, post caps, and miscellaneous hardware shall be fabricated from quality steel and shall be zinc coated. Stretcher bar bands shall be 1/8 inch by 1 inch preformed steel bands.

(I) Barbed Wire and Barbed Wire Support Arm. Barbed wire shall be 12-1/2-gauge steel wire with 4-point, 14-gauge barbs spaced 5 inches apart. Barbed wire shall be zinc-coated steel wire conforming to the requirements of ASTM A121, Class 1 coating.

Stays shall be 9-1/2-gauge twisted wire designed for screw-on type installation. Stays shall be zinc coated and of good quality. The minimum weight of zinc coating shall be 0.3 ounce per square foot of uncoated surface.

Barbed wire and support arms shall be of the type shown on the standard details or plans. Support arms shall be zinc-coated and fabricated from commercial-quality steel.

(J) Pickets. Vertical fence slatting shall be tan polyethylene as manufactured by PDS Fencing or approved equal.

(K) Gates. Gates shall be of the sizes shown on the plans. Gates greater than 8 feet in width shall have a vertical member (i.e. intermediate rail) installed at the midway point of the gate.

Gate frames shall be constructed of steel pipe at least 2 inches in diameter or larger; interior vertical members shall be constructed of not pipe at least 1-1/2 inch in diameter or larger. Pipe shall be zinc-coated steel pipe conforming to the requirements of ASTM A120, Standard Weight, Schedule 40.

Truss rods and tighteners for gate frames shall conform to the requirements specified herein under Subsection 0214.0201(H).

Fabric for the gates shall be of the same kind used for the adjoining chain link fence and shall be attached to the gate frame by the use of stretch bars, stretcher bands, and tie wires as specified under Subsection 0214.0300.

Gates shall be provided with a combination steel or malleable iron catch and locking attachment that will not rotate around the latch post. Stops to hold gates open shall be provided where required. Malleable iron mushroom-type center stops will be used on the double gate.

0214.0300 EXECUTION

0214.0301 General. Unless otherwise directed by the Engineer, the Contractor shall clear fence lines of all earth, trees, brush, and other obstructions interfering with the proper construction of the fence. Disposal of removed material shall be in accordance with the requirements of Section 0203. Clearing for the fence line shall be kept within right-of-way, easement, or property boundary.

0214.0302 Setting Posts. Line posts shall be spaced at not more than 10-foot intervals for plain chain link fence and 8-foot intervals for chain link fence with inserts, measured from center to center of posts. Such measurement shall be made parallel to the slope of the natural ground.

End-, intermediate-, and corner-post assemblies shall be as shown on the plans. Intermediate-post assemblies shall be spaced at 500-foot intervals or midway between pull posts when the distance between such posts is less than 1,000 feet and more than 500 feet.

Gate posts shall be set in a steel sleeve 8 inches in diameter and 22 inches deep. The gate post shall be grouted solid within the steel sleeve using "coarse grout" (3/8 inch) per ASTM C476, of fluid consistency and with a mix ratio by volume of 1 part Portland cement, 2 parts minimum to 3 parts maximum damp loose sand, and 1 part minimum to 2 parts maximum coarse aggregate. Fluid consistency shall mean that consistency is as fluid as possible for pouring without segregating the constituent parts. Minimum strength is 2000 pounds per square inch.

All other posts shall be placed in a vertical position, except in unusual locations where the Engineer may direct the posts be set perpendicular to the ground surface. All other posts shall be set in concrete footings. Footings for line posts shall be 6 inches in diameter and extend 24 inches below finished grade. Footings for end, intermediate, corner, and gate posts shall be 12 inches in diameter and extend 30 inches below finished grade. The surface of concrete footings shall be a minimum 1 inch above finished grade and crowned at the top to shed water. All exposed concrete shall be finished to a smooth surface.

Mushroom-type stops shall be set in concrete 12 inches in diameter and 12 inches deep. Concrete shall be flush with finish grade per TW Standard Detail 1610.

Fence fabric or wire shall not be attached to the posts until the concrete has cured a minimum of 72 hours.

At locations where a change in the vertical alignment of the fence line forms an angle of deflection of 10 degrees or more, a corner-post assembly shall be provided. A change in the horizontal alignment of the fence line where the angle of deflection is 30 degrees or more shall be considered a corner, and a corner-post assembly shall be installed.

0214.0303 Connections. Fence rails shall be connected to posts by means of suitable pressed-steel connections. Intermediate rails shall be trussed with 3/8-inch adjustable rods between line post and end, gate, or corner post.

0214.0304 Installing Fence Fabric. Chain link fence fabric shall be fastened on the outward facing side of the posts, unless otherwise specified by the Engineer. The fabric shall be stretched taut and fastened to the posts. Between posts, the top and bottom edges of the fabric shall be fastened to the tension wires. When top rails are indicated on the plans or special specifications, the fabric shall be fastened to the top rail at 24-inch intervals maximum. The fabric shall be installed such that the top edge projects over the top rail. The tension wires shall be stretched tight and installed on a straight grade between posts.

The fabric shall be fastened to end, corner, latch, gate and pull posts with stretcher bars and stretcher-bar bands. Stretcher-bar bands shall be spaced at intervals not exceeding 14 inches. The fabric shall be fastened to the line posts with the wires or post clips spaced at intervals not exceeding 14 inches, and to the tension wire with the wires or hog rings spaced at intervals of 18 inches, center to center.

Selvage at the top and bottom of chain link fence fabric shall be twisted and barbed, unless otherwise specified. The space between the bottom of the fence fabric and the finished grade shall not exceed 3 inches.

0214.0305 Barbed Wire. Barbed wire for chain link fence installations shall be pulled taut before being permanently attached to the barbed-wire extension arms and the posts. Barbed wire across the top of a gate frame shall be made taut by means of eye bolts or ratchet bands at each end.

Barbed-wire extension arms shall angle outward at line, intermediate, and corner posts. Each arm shall accommodate 3 barbed-wire strands and be securely fastened at each arm. The topmost strand of barbed wire shall be 12 inches above the fabric and extend 12 inches out from the face of the fabric.

A maximum of 2 splices on barbed wire will be allowed between post assemblies but not on the same wire. No splicing will be allowed within 100 feet of a pull post.

0214.0306 Gates. Gate frames shall be fastened together at the corners by welding. Welding shall be performed in accordance with the requirements of AWS D1.1.

Gates shall be hung by at least 2 steel or malleable iron hinges at least 3 inches in width, so designed as to securely clamp to the gate post and permit the gate to be swung back against the fence.

Gates shall be installed and adjusted such that the operation will be smooth and free with no binding. Gates shall be plumb, square, and level at the proper elevation, and shall operate freely and smoothly from fully open to completely closed. The distance between the bottom of the gate and finished grade shall not exceed 3 inches when the gate is in the closed position.

Industrial drop rods shall be zinc-coated steel pipe conforming to the requirements of ASTM A120, Standard Weight, Schedule 40.