

SECTION 02710

FENCES

02710.01 GENERAL

A. Description

This work will include, but not necessarily be limited to, the construction of fence and gates in accordance with, and in reasonably close conformance to, the lines and grades shown on the Contract Documents or as directed by the County Engineer.

B. Related Work Included Elsewhere

1. Clearing and grubbing; Section 02110.
2. Adjusting and replacing fences; Section 02130.

C. Quality Assurance

1. The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.
2. Quality assurance requirements for Portland cement concrete shall be as specified in Section 03310.01.

D. Submittals

1. Shop Drawings

Shop drawings shall be submitted as specified in the "General Provisions" for all fence components. The shop drawings shall include dimensional information, coating details, and such other information as may be required to verify compliance with these Specifications.

2. Certificates of Compliance

Certificates of compliance shall be submitted in accordance with the "General Provisions" for fencing materials stating that the materials furnished meet the requirements specified in Section 02710.02.

02710.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any materials for fence installation.

B. Contractor's Options

None.

C. Detailed Material Requirements

1. Barbed Wire

Barbed wire shall meet the requirements of ASTM A 121. The barbed wire shall be 12 ½ gage with four-point, round barbs at 5-inch spacings and meet Class 3 coating requirements.

2. Chain Link Fabric

Chain link fabric shall be 2-inch mesh woven from coated wire gage No. 6 for 6 foot and 8 foot fence and No. 9 for 5 foot fence. Fence height shall be as noted in the Contract Documents. The ends shall have a knuckled selvage at the bottom and barbed selvage at the top except in yards where fabric shall have knuckled selvage top and bottom. The fabric shall meet the requirements of AASHTO M 181. Type I fabric shall conform to Class D coating. Vinyl coated steel fabric shall conform to F668, Class 2B thermally fused. Vinyl shall be warm grey, green, or black color, or as specified on the Plans. Fabric shall be one piece for the height specified.

3. Portland Cement Concrete

Portland cement concrete for fence post encasement shall be Mix No. 2 as specified in Section 03310.

4. Fence Fittings and Hardware

a. Posts, Rails, Braces, Fittings, and Hardware

All posts, rails, braces, fittings and hardware shall be of the size and shape shown on the Standard Details.

All posts, rails, braces, gate frames and hardware shall conform to the requirements of AASHTO M 181. When these items are specified to be PVC coated, they shall be thermally fused and bonded. The PVC thickness shall be 10 to 15 mil (0.25mm to 0.33mm) except that bolts, nuts, and washers shall be metallic coated steel.

When using round posts, the posts shall conform to industry standards for Class 1 or 2.

b. Tie Wires, Line Post Clips, Tension Wires, and Tension Wire Clips

The wires, lines post clips, tension wires and tension wire clips shall conform to AASHTO M 181. The galvanized coating shall weigh a minimum of 1.2 ounces per square foot. These items, when used with aluminum coated steel fabric, shall be coated with aluminum at a minimum weight of 0.40 ounce per square foot. The tension wire used with PVC coated steel fabric shall have the same coating thickness and color requirements as the fence

fabric.

c. Gates

The fabric used for gates shall be identical to the fencing fabric. When the gate frame is PVC coated, movable fittings, such as hinges and latches, shall be field coated with a PVC coating specifically prepared for this purpose. Gates may be fabricated using welded construction or heavy pressed steel or malleable corner fittings securely riveted. Gates shall be properly braced to eliminate sagging or twisting and shall be equipped with a positive latching type device with means for padlocking. The gate frame and other hardware shall conform to paragraph (a) and (b) as mentioned above.

5. Mowing Strip

Where specified, a mowing strip shall be provided at the base of the fence in accordance with the Contract Documents.

6. Type of Fence

The type of fence shall be the specified height and constructed of one of the seven alternates as herein listed, unless specified as a single type. Replacement fence shall match existing fence as to size, type, coating, and color.

- a. Fence composed of galvanized coated steel fabric and malleable iron posts and fittings.
- b. Fence composed of galvanized coated steel fabric, galvanized steel corner and brace posts, and aluminum line posts.
- c. Fence composed of aluminum coated steel fabric and galvanized steel line posts.
- d. Fence composed of aluminum coated steel fabric; galvanized steel terminal, corner, and brace posts; and aluminum line posts.
- e. Fence composed of bonded vinyl coated steel fabric, galvanized steel or galvanized bonded vinyl coated steel line posts and fittings.
- f. Fence composed of bonded vinyl coated steel fabric; galvanized steel or galvanized bonded vinyl coated steel terminal, corner, and brace posts; and aluminum line posts.

02710.03 EXECUTION

A. General

1. The Contractor's activities and operations shall be confined to the area immediately adjacent to the right-of-way or property lines and within the right-of-way or site except that permission will be granted by the County for normal construction activities through lands owned by or under the control of the County. The

Contractor shall be responsible for satisfactory arrangements for obtaining permission to occupy portions of the lands of adjacent property owners as may be required by the Contractor's plan for completing the required work.

2. In areas where any privately owned fence or other property is within the County's right-of-way or site, the County Engineer will endeavor to arrange for the relocation of such items. When directed by the County Engineer, the Contractor shall carefully relocate the items where directed. The Contractor shall be responsible for any damage to privately owned items during handling.
3. In the area of large drainage structures and bridges, the fence may be set on a "Fence Line" for the purpose of avoiding the crossing of inlet and outlet ditches by placing the fence behind the headwall of the structure or for the purpose of tying the fence into the existing bridge parapet. These "Fence Lines" as shown on the Plans are only a guide and the exact location of the fence shall be determined in the field by the County Engineer.
4. The fence shall be erected at locations shown on the Plans, or where directed by the County Engineer to grades conforming to existing ground contours with tolerances shown on the Standard Details. The bottom of the fabric shall be placed a normal distance of 1 inch above the ground line, however, over irregular ground, a minimum clearance of 1 inch and a maximum clearance of 6 inches will be permitted for a horizontal distance not to exceed 8 feet.
5. Any excavation or backfill required in order to comply with these provisions shall be made as directed by the County Engineer. The fence shall be true to line, taut, and shall comply with the best practice for chain link fence construction. For roadway and site fencing projects, the fence fabric shall be placed on the road or site side of the posts. For stormwater management ponds the fabric shall be placed on the outside of the posts, or the side furthest from the pond. For site fencing, barb wire strands at the top of the fence should project outward.
6. The type of fence to be supplied shall be as indicated in the Contract Documents.
7. All posts shall be plumbed and placed at the specified spacing shown on the Standard Details with a tolerance of minus 2 feet. Spacing of posts shall be as uniform as practicable under local conditions. The distance between line posts shall not exceed 10 feet.
8. Terminal posts shall be installed at all ends, abrupt changes in grade, and at changes in the horizontal alignment greater than 10 degrees. In no case shall the distance between terminal posts exceed 500 feet.
9. Post lengths must be adequate in all cases to accommodate the fabricated width of the fence fabric without stretching or compressing the fabric and to obtain, as a minimum, the distance required below the bottom of the fabric.
10. Post caps are required for all round line posts, and all terminal and corner posts. Post caps shall be watertight with openings for top rail when required.
11. A tension wire shall be run continuously between terminal posts near the top and bottom of the fabric and attached to the fabric with hog ring fasteners at 18-inch

intervals.

12. Horizontal brace rails shall be installed at all gate, pull, and corner posts. Horizontal brace rails with diagonal truss rods and turn buckle shall be installed at all terminal posts. Sufficient braces shall be supplied to allow complete bracing from each terminal post to all adjacent line posts.
13. Fabric shall be tied to brace rails at 2-foot intervals maximum and to posts at 12-inch maximum spacing. Stretcher bars shall be attached to terminal posts by connectors equally spaced at 16-inch centers maximum. Each connector shall be as close as possible to the ends of the fabric.
14. Gates shall be installed so as to be easily opened and closed by one person and shall be arranged to be swung back parallel with the fence unless otherwise noted.

B. Concrete

1. Concrete footings shall be constructed in accordance with dimensions shown on the Standard Details. Posts shall be centered in cylindrical concrete footings. Aluminum parts, where embedded in concrete, shall be coated with zinc chromate. The concrete shall be thoroughly compacted around the post by tamping or vibrating. The finish top surface shall be a troweled smooth finish, slightly above the ground line, and uniformly sloped to drain away from the post. The post shall not be disturbed in any manner within 72 hours after the individual post footing is completed.
2. Hand mixed concrete shall not be used without written permission of the County Engineer. If permitted, the hand mixed batch shall not exceed $\frac{1}{2}$ cubic yard.
3. Where rock is encountered at a depth less than the specified footing depth, a hole 1-inch larger than the greatest dimension of the post shall be drilled to a depth of 12-inches or to the planned footing depth, whichever is less. After the post has been set, the remainder of the drilled hole shall be filled with grout composed of one part Portland Cement and two parts mortar sand by dry volume. The space above the rock shall be filled with concrete.

C. Anchorage for Line Posts and Terminal Posts (End, Pull, and Corner Posts).

1. The following alternate will be allowed in case of line posts only. After being driven in the ground, the line post shall be held rigidly upright by means of two galvanized steel drive anchor blades. Blades shall be driven diagonally through galvanized steel fittings attached to opposite sides of the post. The approximate spread of the blades at their full depth shall be 39 inches. The top of the device shall be a minimum of 3-inches below the finished grade. The device and procedure shall have prior approval of the County Engineer.
2. The following alternate will be allowed for terminal posts (end, pull, and corner posts). After being driven into the ground the terminal post shall be held rigidly upright by means of two anchor units spaced approximately 6 inches apart along the terminal post, and each anchor unit driven in a direction to offset the stresses caused by the tension of the fence wire. Galvanized steel drive anchor blades which are driven through galvanized steel fittings shall be attached to the opposite

sides of the post. The approximate spread of the blades at their depth shall be 39 inches. The top of the devices shall be a minimum of 3-inches below the finished grade. The device and procedure shall have prior approval of the County Engineer.

02710.04 METHOD OF MEASUREMENT**A. Chain Link Fence**

RESERVED FOR FUTURE USE

B. Terminal Posts

RESERVED FOR FUTURE USE

C. Line Posts

RESERVED FOR FUTURE USE

D. Gates

RESERVED FOR FUTURE USE

02710.05 BASIS OF PAYMENT**A. General**

RESERVED FOR FUTURE USE

B. Chain Link Fence

RESERVED FOR FUTURE USE

C. Terminal Posts

RESERVED FOR FUTURE USE

D. Gates

RESERVED FOR FUTURE USE