



# Public Works Standards & Specifications

## DIVISION V - STRUCTURES

### 512 RAILING, FENCING, AND GATES

#### 512.1.00 DESCRIPTION

##### 512.1.01 GENERAL

This work consists of furnishing and installing fences, gates, and gateways of chain link fabric, woven wire fabric, barbed wire, or combinations thereof, in reasonably close conformity to the lines and grades shown or directed by the Engineer. Minimum general standards for fencing shall be as set forth in Section 01050 of the Oregon Standard Specifications for Construction, current edition.

All dimensions shown on the plans are horizontal and vertical measurement. Actual quantities required for the installation may be greater depending on the slope of the terrain. All fenced areas shall have at least one gate.

##### 512.1.02 CERTIFICATION

The Contractor shall furnish material certifications for all fencing materials.

#### 512.2.00 MATERIALS

##### 512.2.01 POSTS, RAILINGS, BRACES, AND APPURTENANCES

Unless otherwise specified, all posts, railings, and similar structural elements shall be standard weight galvanized tubular steel posts conforming to the requirements for AASHTO M 181, having not less than 1.6 oz. galvanizing per SF. Posts and railings shall conform to the following schedule:

Railings and Gates	1.625-inch diameter (1-5/8")
Lind Posts	2.375-inch diameter (2 3/8")
Corner and End Posts	2.875-inch diameter (2 7/8")

##### Gate Posts

Gate swing 2/5' to 6.0'	3.00-inch diameter
Gate swing > 6.0'	4.00-inch diameter

Tubular posts shall be fitted with a snug-fitting, galvanized metal cap.

##### 512.2.01A STEEL

Steel shall be galvanized in accordance with the requirements of ASTM A153, unless otherwise specified. Shapes, plates, and bars shall conform to the requirements of ASTM A36.

Tubing shall conform to the requirements of ASTM A500, Grade B, ASTM 501 or ASTM A53, Grade B, unless otherwise specified.

Posts shall conform to the requirements of ASTM A27, Grade 65-35, unless otherwise specified. Nuts, bolts, and washers shall conform to the requirements of ASTM A307, Grade A.

##### 512.2.02 FENCING

### **512.2.02A CHAIN LINK**

Chain link fabric, ties, and tension wire shall conform to the requirements of AASHTO M181 supplemented and modified as follows:

Fabric may be zinc-coated steel meeting Type 1, Class D coating requirement, aluminum-coated steel, or aluminum alloy. Use only one type on any Project.

Wire fabric ties, wire ties, and hog rings may be zinc-coated steel wire, aluminum coated steel, or aluminum alloy as elected, regardless of the type of wire fabric used.

Use ductile, zinc-coated steel meeting the coating requirements of ASTM A 641/A 641 M, Class 1 for wire fabric ties, wire ties, and hog rings. Aluminum coated steel wire fabric ties, wire ties, and hog rings shall be coated with at least 0.30 ounce per square foot.

#### **512.2.02A(1) VINYL COATED CHAIN LINK**

Vinyl clad chain link fabric shall conform to AASHTO M181, Type IV. The thickness of the coating shall not be included in the gauge rating of the fabric.

#### **512.2.02A(2) SCREENED CHAIN LINK**

In addition to the above requirements for fabric, the screening shall be "View Gard" or an approved equal. Fabric shall be 9-gauge galvanized wire woven in 3-1/2 inch by 5-1/2-inch diamond mesh. Top and bottom selvage shall be knuckle finished. The screening shall be vinyl slats, approximately 5/16" x 2-3/8", in an approved color. The slats shall be inserted vertically and shall be securely fastened to the wire fabric with stainless steel staples and a bottom locking slat.

### **512.2.02B BARBED WIRE**

Barbed wire shall be two-strand and either 12-1/2 gauge or 15-1/2 gauge with 4-point barbs spaced 5-inch intervals conforming to the requirements of AASHTO M 280 (ASTM A 121). Galvanizing shall be Class 3. All barbed wire installed on a Project shall be new or like new, and of the same gauge, unless otherwise approved by the Engineer.

### **512.2.02C BOTTOM TENSION WIRE**

The bottom tensioning wire shall be 7-gauge spring wire with Class 2 coating, unless otherwise specified.

## **512.3.00 CONSTRUCTION**

### **512.3.01 GENERAL**

Materials removed under these provisions, including excess excavation, brush, stumps, and debris, shall be disposed of by the Contractor in a manner satisfactory to the Engineer.

### **512.3.02 FENCE**

Fencing shall be 6 feet high, unless otherwise specified or shown on the plans.

The fence lines designated by the design engineer or City Engineer shall be cleared, grubbed, or otherwise prepared by the Contractor such that the grade shall not vary by more than 6 inches in any 15-foot run. All shrubs, brush, logs, down timber, snags, rocks and other obstacles, including trees up to 6-inches in diameter, which interfere with the fence within 36 inches of the line, shall be removed and disposed of as directed by the Engineer. Trees having diameters greater than 6 inches will normally be preserved by varying the fence alignment to pass by them. As much as possible, the fence shall be erected on natural ground, with the bottom of the fence fabric following the ground contours, with no less than one inch nor more than six inches clearance from the ground surface. Fill or excavate ground surface irregularities that interfere with maintaining the specified ground

clearance. Grading shall leave a neat, natural appearance.

All posts shall be set firmly in the ground or in concrete footings as applicable. Excavate for concrete footings to reasonably neat lines, but not less than the specified dimensions and depths in soil, or not less than 18 inches deep in rock. When drilling into solid rock, the Contractor may shorten the post depth such that a minimum of 12 inches of the post is grouted into the rock. Prevent disturbance of original ground at the sides and bottom of the excavation. Footings shall have dimensions not less than dimensions shown on the standard plan and shall fill the excavated areas and contact firm soil at the sides and bottom. Typically, posts will have a minimum 3 feet of set in excavated soil. Reasonable variation in depths will be permitted and posts may be appropriately shortened or left slightly high, as approved by the Engineer, to avoid unnecessary penetration or excavation in rock or to obtain desired grades along the fence. Concrete shall be cast – in-place and tamped around the posts and brace ends with the posts and braces firmly held in proper position. The surface of the concrete shall be struck off and sloped to a smooth surface at the ground level, and the concrete shall be allowed to cure for at least 5 days before the posts and braces are subjected to strain.

Line posts shall be set along the line of the fence, between end, corner, and gate posts, and typically at the spacing called for on the plans. In some cases, line posts may be set at greater spacing not exceeding 25% greater than called out, or at closer spacing if directed or approved by the Engineer. The intent of this provision is for the actual number of line posts installed to be equal to the number required for typical spacing. The height of the posts above the ground shall not exceed the design height of the fence by more than 3 inches.

Intermediate end posts shall be set in the line of new fence at each summit and at each valley in the grade of the fence where the algebraic difference in the grades of adjoining panels of fence exceeds 30%, and at other points located along the fence line to break the fence construction into approximately equal runs not exceeding the applicable length of runs shown. Corner posts shall be set at angle points in fence alignment where the alignment of adjoining panels of fence changes direction by 20 degrees or more.

Metal post braces shall be firmly attached to metal end posts, intermediate end posts, corner posts, and gate posts, and shall be set in concrete footings when indicated on the plans. Corner posts and intermediate end posts shall be provided with two braces, one each way from the post in the main lines of the fence. End posts and gate posts shall be provided with one brace in the line of the fence as called for on the plans.

Tensioning wire shall be attached to end, gate and corner posts by bands and clamps. Top tension wire shall be either threaded through line post loop caps or held in open slots therein in such a manner as to limit vertical movement. Bottom tension wire shall be tied or attached to line posts by ties or clamps to prevent vertical movement.

Expansion sleeves or couplings in longitudinal top and bottom rails shall be provided at spacing not exceeding 200 feet. Tension wires shall be provided with one turnbuckle or one ratchet take-up in each run of fence.

Place fabric and wire on the face of the post designated by the Engineer. On curved alignment, place the fabric and wire on the face of the post against which the normal pull of the fabric and wire will be exerted. Attach fence fabric and barbed wire to each post according to recognized standard practice for fence construction. Use care in stretching woven wire fabric so the pull is evenly distributed over the longitudinal wires and not more than one-half of the original depth of the tension curves is removed.

Fabric shall be fastened to end, gate, and corner posts, and to gate frames as indicated on the plans. Fabric shall be attached to line posts with wire ties at top and bottom and at intermediate spacing not exceeding 18 inches. Fabric shall be attached to top and bottom rails and to longitudinal tension wire

with metal bands or tie wires spaced as detailed, but in no case greater than 24 inches apart.

Splices of fabric and splices of separate lines of wire between posts will be permitted provided that not more than two fabric or separate wire splices, spaced at least 50 feet apart, occur in any one run of fence. Fabric splices shall be with spiral pickets of specified chain link fabric material. Splices of tension wire and barbed wire shall be of the wrap or telephone type with each end wrapped around the other for not less than six complete turns.

In final position, the fabric and barbed wire shall be free from warp and sag, and appearance shall reflect first class workmanship in every detail.

### **512.3.03 GATES**

Gate openings shall be cleared and graded to permit the swing gate to open in a horizontal plane for a minimum of 90 degrees in each direction. Roll gates shall be graded for smooth level operation.

Gates shall be constructed to reflect high quality workmanship. Wire splices shall develop the full strength of the wire, and the finished work shall provide a taught and well-aligned closure of the opening capable of being readily opened and closed by hand.

#### **512.3.03A SWING GATES**

Swing gates shall be hinged in a manner to prevent removal of the gate without proper tools. Firmly attach the fittings to the gates and posts. Set each single gate to swing freely inward and outward in a plane so it can be fastened securely in its latch holder, or in the case of double gates, in its latch holder and gate stops. Set double gates on their respective hinge pintles to provide a common horizontal plane in which each single gate swings.

#### **512.3.03B ROLL GATES**

Roll gates shall be installed in accordance with the plans and manufacturers details and recommendations.

### **512.3.04 REMOVING AND REBUILDING FENCE**

Remove and rebuild existing fences as shown or directed. Construct fences to approximately the same condition as the original fence. Salvage the materials in existing fences to be removed and rebuilt and incorporate in the rebuilt fences. Replace fence materials damaged beyond reuse at no additional cost to the Owner. Firmly reset posts to the staked alignment. Post spacing and the number of wires to be strung shall be the same as the original fence. Furnish new staples or clips to fasten the wires to the posts.

### **512.4.00 MEASUREMENT AND PAYMENT**

Payment for fencing, barbed wire, and gates shall be as listed in the Bid Schedule. The price bid shall include full compensation for furnishing all materials, equipment, tools, labor and incidentals necessary to construct fencing and gates complete and in-place.

#### **512.4.01 FENCING**

Measurement and payment for fencing shall be on a lineal foot basis, less gate openings, to the nearest foot, for the type and height of fence specified and constructed.

#### **512.4.02 BARBED WIRE**

Measurement and payment for barbed wire shall be on a lineal foot basis to the nearest foot measured along the fence line for the type of fence specified and constructed.

#### **512.4.03 GATES**

Measurement and payment for gates shall be on a per each basis for the type and length of gate

specified and constructed. Barbed wire on gates shall be paid for under the Barbed Wire pay item.

**512.4.04 REMOVING AND REBUILDING FENCE**

When listed in the schedule of Bid Items, measurement and payment for rebuilding fence shall be on a lineal foot basis at the unit bid price. Payment shall be full compensation for all work, including any new materials necessary to complete the rebuilding of the fence.

**512.4.04 LUMP SUM BASIS**

When listed in the schedule of Bid Items as a Lump Sum Amount, payment for fencing, gates, and barbed wire shall be paid as a lump sum for the type and length of fence specified and installed. Payment shall be compensation for all materials, equipment, tools, labor, and incidentals required to construct fences.

**512.4.05 CLEARING AND GRUBBING**

No separate payment shall be made for clearing and grubbing fence lines, gate openings, or areas necessary to install fencing. This work shall be considered incidental to fence construction.

**512.4.06 INCIDENTAL BASIS**

When not listed in the Schedule of Bid Items as a separate pay item, construction, removal, or replacement of fences, wire, gates, and related work shall be considered incidental to the completion of other work specified in the Contract.