

Section 2519. Fence Construction

2519.01 DESCRIPTION.

Furnish all material, set posts, and erect the fence according to the contract documents.

2519.02 MATERIALS.

Meet requirements of [Section 4154](#) for the type of fence specified.

2519.03 CONSTRUCTION.

Furnish and erect field fence or chain link fences of the type and dimensions shown in the contract documents and according to the following provisions:

A. Field Fence

1. General.

- a. Erect the fence along the right of way line, parallel to and 1 foot (300 mm) inside the right of way line, unless shown otherwise in the contract documents. Unless required otherwise by the contract documents, install the wire on the roadway side of the posts.
- b. Prior to placement, provide a smooth ground profile free of all tall grass and debris in the area the fence is to be placed.
- c. When rock is encountered, employ the appropriate means of excavation to the bottom of post elevation. Place backfill using suitable material placed and thoroughly compacted by tamping until the post is firmly embedded, plumb, and true to alignment.

2. Brace Post Assembly.

- a. Locate brace posts so the horizontal brace will make contact with both posts while posts are in the vertical position. Set all posts as shown in the contract documents.
 - 1) Angle posts will be required where vertical alignment of fence changes 30 degrees or more.
 - 2) Corner posts will be required where horizontal alignment of fence changes by 10 degrees or more.
 - 3) When required in the contract documents, install pull post assemblies at right-of-way breaks of less than 10 degrees, horizontal alignment changes less than 30 degrees, and property corners.
 - 4) An end post assembly will be required where a fence begins or ends.
- b. Place and tamp backfill material, consisting of a well graded crushed stone meeting requirements of [Section 4120](#) or a PCC mix approved by the Engineer, around angle, corner, end, gate, and brace posts. Ensure backfill material contains sufficient moisture to be readily and thoroughly compacted by tamping at the time backfill material is placed.
- c. Posts may be driven if demonstrated that driving can be done in a manner that will not damage the post. Drive the post plumb and true to alignment. Place backfill material in voids around driven posts that require straightening. Thoroughly compact backfill material by tamping.
- d. Install metal braces as shown in the contract documents. Place them so they will not hold water on top of the brace. At installations with two brace wires, maintain tension in both directions.

3. Pull Post Assemblies.

- a. Pull post assemblies are required when the distance between pull posts is greater than 960 feet (300 m) in straight lines of fence. Pull post assemblies are for the purpose of tightening fence wire by mechanical means. Use mechanical means to tighten fence fabric from both directions to the middle post. Use a staple to secure each line wire of the fence fabric and barbed wire at pull posts. Drive the staples so they are not parallel with the wood grain and are tight.
- b. Set posts to comply with the provisions in [Article 2519.03, A, 1](#), above.

4. Line Posts.

- a. In each run of fence between brace posts, set line posts at the interval designated in the contract documents. Use wood posts no smaller than 4 inch (100 mm) top diameter.
- b. In runs of fence 1,000 feet (300 m) or less, use steel line posts that are all of the same type. Set steel line posts by driving. Do not damage posts while driving.

- c. Set wood line posts in bored holes no smaller than 9 inches (225 mm) in diameter or by driving in a manner which will not damage the post. Thoroughly tamp soil removed from bored holes back into the hole.
 - d. Set all posts plumb and true to line. Reset all posts that are:
 - Out-of-plumb more than 1 inch (25 mm).
 - Out-of-line more than 2 inches (50 mm).
 - e. At each steel post, secure each line wire of the fence fabric and barbed wire to the post by a wire tie or clip. Wrap the clip around the wire on each side of the post, holding the wire tightly to the post to preventing slipping up or down the post.
- 5. Stretching Fence Fabric.**
 - a. Cut and tie off fabric at all pull posts. Pass each line wire to the pull post. Secure the wire with no less than four wraps tight around itself. Stretch the wire until:
 - All slack is taken up,
 - All longitudinal wires are taut, and
 - Approximately 50% of the factory fabricated fence crimp is removed.
 - b. Apply tension in the fabric by mechanical means using equipment designed for such use. Hold the fabric until the end of each line wire has been tightened around the pull post and securely wrapped on itself. From the pull post around the angle or corner post to the other pull post, hand tension the fabric at the angle or corner post assembly.
 - c. For pull post assemblies, extend the fence fabric past the brace post and attach to the pull post. Cut and wrap each line wire of the fabric around the pull post. Secure line wire by no less than four wraps tight around itself.
- 6. Stretching Barbed Wire.**
 - a. Secure each strand of barbed wire at pull posts by wrapping around the post with no less than four wraps tight around itself.
 - b. Apply tension to each individual strand of barbed wire by mechanical means using equipment designed for such use.
 - c. Hold the wire until the end of each wire has been tightened around the pull post and the end is secured on itself before the tension is released.
- 7. Splices.**
 - a. Fabricate splices in fence fabric, as detailed in the contract documents by one of the following methods:
 - Attaching the fabric to pull posts according to [Article 2519.03, A, 3](#), or by wire splice,
 - Approved fence splice,
 - Crimp connector, or
 - Rod method.
 - b. Fabricate splices in barbed wire, as detailed in the contract documents, by either:
 - Attaching the wire to pull posts according to [Article 2519.03, A, 6](#), or
 - Approved fence splice or crimped connector recommended for barbed wire which develops a strength of at least 85% of the wire strength.
 - c. Fabricate splices in brace wire by approved splice or crimped connector recommended for brace wire which develops a strength of at least 85% of the wire strength, as detailed in the contract documents.
- 8. Gates.**
 - a. Mount gates so that they swing fully and do not sag or drag on the ground. Provide them with a galvanized, welded chain:
 - Long enough to completely encircle the post and the end frame of the gate.
 - With chain links large enough to use with a padlock.
 - b. Drive a 4 inch (100 m) diameter wood post in the ground to provide an adequate stop to prevent the gate from opening to a point that would damage the gate.
- 9. Electrical Grounds.**

Field fence will not be required to be grounded except as required in the contract documents.
- 10. Channel Crossing Fence.**
 - a. Construct channel crossing fence complying with, and at locations indicated in, the contract documents.

- b. Channel crossing fence, of the type specified in the contract documents, will be required when:
 - A stream or ravine is to be crossed and it is impractical to fit the line fence to the existing ground line, and
 - More than two additional barbed wires are required below the normal line fence to adequately close the opening.
- c. Set the posts and stretch the barbed wire and secure as specified for field fence.
- d. Use barbed wire with a spacing of no more than 6 inches (150 mm).
- e. For Type A channel crossing fence, use extra length wood posts and additional field fence materials to close the opening satisfactorily. For Type B channel crossing fence, construct a floodgate as shown in the contract documents, in addition to extra length wood posts and additional field fence materials needed to close the opening satisfactorily.

11. Flood Plain Fence.

Use materials specified for field fence. Use wood line posts only, spaced as shown in the contract documents, and with the fence fabric on the downstream side of the posts. Otherwise, construct flood plain fence to meet requirements for field fence.

B. Chain Link Fence.

1. General.

Unless indicated otherwise in the contract documents, use chain link fence that is a nominal 72 inches (1.8 m) in height with steel posts connected with pipe rails at the top and tensioned stretcher wire at the bottom.

2. Posts.

- a. The Engineer will designate the location of each end, angle, corner, and gate post.
- b. Set posts with the required brace post assembly at each end, angle, corner, and gate. Set all posts vertically as shown in the contract documents.
- c. Fill the hole around each post with PCC meeting the requirements of [Section 2403](#).
- d. Ensure dirt or other foreign material is not mixed with concrete as it is placed. Forms will not be required if, in the opinion of the Engineer, the earth around the hole is dry and firm enough to permit satisfactory placement. Fill the hole around the post completely with concrete. Neatly finish the concrete to slope up to the post approximately 1 1/2 inches (38 mm) above the ground surface. Protect the concrete from drying by covering with soil or burlap kept wet for 24 hours or by applying white curing compound.
- e. Set posts a minimum of 24 hours before fence is stretched.
- f. Instead of drilling holes for posts and filling with concrete, other equivalent means of securely anchoring the posts into the ground may be used if the Engineer approves.
- g. So that no section of fence longer than 500 feet (150 m) is constructed with line posts only, place pull posts, constructed according to the contract documents, between end, angle, corner, and gate posts, as necessary.
- h. Install the top rail according to the contract documents.

3. Chain Link Fabric.

- a. Unless required otherwise, place the fabric on the side of the posts closest to the roadway to be protected. For non-roadway installations, attach the fabric on the side designated in the contract documents.
- b. Construct as follows:
 - 1) Secure each end of each run of chain link fabric by a stretcher bar inserted in the final link of the fabric. Use a stretcher bar that is as long as the fabric is wide.
 - 2) Secure this bar and the tight fabric to the end post by tension bands equally spaced no more than 15 inches (380 mm) apart.
 - 3) Place a tension wire tightened by mechanical means approximately 4 inches (100 mm) from the lower edge of the fence.
 - 4) Securely attach the chain link fabric to the braces, top rail, tension wire, and all intermediate posts at intervals of no more than 1 foot (300 mm) by wire ties or clips.
 - 5) Uniformly smooth the ground surface along the line of the fence for a width of 2 feet (600 mm) so that the fabric will conform to the ground surface.

4. Gates.

Erect gates as shown in the contract documents.

5. Electrical Grounds.

- a. Properly ground chain link fence that crosses beneath any primary electrical power transmission line, other than a secondary feeder line for individual customer service. Ground the fence at the point of transmission line crossing and at a distance of 25 to 50 feet (7.5 m to 15 m) in each direction from the crossing. Construct the grounding installation as detailed in the contract documents.
- b. Ground chain link fence erected adjacent to and within 50 feet (15 m) of a primary power line by placing ground rods at no more than 500 foot (150 m) intervals.
- c. Include at least one ground in each applicable straight section of fence. The Engineer may require the installation of an additional ground at the terminus of a section of fence or at other locations near areas of pedestrian traffic. Connect the ground rod to the fence as shown in the contract documents.

2519.04 METHOD OF MEASUREMENT.

Measurement for the items associated with fence construction will be measured as follows:

- A. Field Fence or Chain Link Fence: linear feet (meters) constructed, of the height and type specified, measured along the fence at the bottom of the fabric, excluding the length of gates or fence otherwise measured for payment.
- B. Field Fence Brace Panels: by count of the metal braces properly installed for the various units.
- C. Channel Crossing Fence: linear feet (meters) of the type specified and constructed according to the contract documents, measured along the fence at the bottom of the fabric between end posts for the channel crossing fence.
- D. Flood Plain Fence: linear feet (meters) constructed, measured along the fence at the bottom of the fabric between end posts for the flood plain fence.
- E. Gates: by count of each type and size installed.

2519.05 BASIS OF PAYMENT.

- A. Payment will be the contract unit price as follows:
 1. For the various types of fence: Per linear foot (meter).
 2. Field Fence Brace Panels: each. Payment is compensation for brace wires and metal braces.
 3. Gates: each.
- B. Payment is full compensation for furnishing all material and for construction of fence as provided herein, including clean up after the work is complete. Excavation will not be paid for separately, but excavation in unexpected rock will be paid for as extra work. Unexpected rock will be considered as rock encountered during post installation, but not visible from the roadway nor indicated in the contract documents.
- C. Electrical grounds required in the contract documents will not be paid for separately. Payment for additional electrical grounds required by the Engineer will be according to [Article 1109.03, B.](#)