

**KANSAS DEPARTMENT OF TRANSPORTATION
 SPECIAL PROVISION TO THE
 STANDARD SPECIFICATIONS, EDITION 2007**

Delete SECTION 828 and replace with the following:

SECTION 828

FENCING

828.1 DESCRIPTION

Construct the designated type of fence and gates as shown in the Contract Documents.

The bid item Fence (Chain Link) (Special) is typically used for Pedestrian Fences for structures. Construct according to the Bridge Standard Drawings and the Contract Documents. All parts, posts, hardware, etc. are subsidiary to the bid item Fence (Chain Link) (Special). When Fence (Chain Link) (Special) (Duplex/PVC) is specified in the Contract Documents, use Duplex/PVC protection materials to coat all parts, posts, hardware, etc and woven chain link according to **SECTION 1620** (07-16005-R01).

BID ITEMS

UNITS

| | |
|---|-------------|
| Fence (*) (**) | Linear Foot |
| Fence (*) (Temporary) | Linear Foot |
| Fence (*) (Removal and Resetting) | Linear Foot |
| Fence (Removal of Existing) | Linear Foot |
| Gate (*) (**) | Each |
| Posts (Corner) (*) | Each |
| Posts (End) (*) | Each |
| Posts (Pull) (*) | Each |
| Floodgates | Each |
| Fence (Chain Link) (**) (Special) (***) | Linear Foot |

*Barbed Wire, Chain Link, Single Wire Cable, Woven Wire (Type A, Type B or Type A or B). Temporary fence may be Barbed Wire, Chain Link, Single Wire Cable, Woven Wire or the type shown on the Plans.

** Size, when necessary.

*** Duplex/PVC

828.2 MATERIALS

Provide materials that comply with the applicable requirements.

| | |
|---|---|
| Woven Wire Fence Fabric | DIVISION 1600 |
| Chain Link Fence Fabric | DIVISION 1600 |
| Barbed Wire | DIVISION 1600 |
| Steel Posts and Braces | DIVISION 1600 |
| Wood Posts | DIVISION 2300 |
| Preservative Treatment for Timber | DIVISION 2300 |
| Gates | DIVISION 1600 |
| Tension Wire | DIVISION 1600 |
| Fittings | DIVISION 1600 |
| Wire Cable and Fittings for Highway Fence | DIVISION 1600 |
| Floodgates | DIVISION 1600 |
| Concrete and Grout | DIVISION 400 |
| Duplex/PVC Protection | DIVISION 1600 (07-16005, latest version) |

a. General. When designated in the Contract Documents, use metal "T" section commercial grade posts for barbed wire fence weighing a minimum of 1 ½ pounds per foot after galvanizing.

Use material for temporary fence meeting recognized industry standards. Temporary fence material may have been previously used. The Engineer will approve the temporary fencing materials on the basis of condition and compliance with dimensional requirements.

b. Fence (Chain Link) () (Special) (Duplex/PVC).** When the Contract Documents specify Duplex/PVC, in addition to providing Fence (Chain Link) (Special) according to **SECTION 1620** (07-16005, latest version), coat all posts, hardware, etc. according to **SECTION 1620** (07-16005, latest version).

828.3 CONSTRUCTION REQUIREMENTS

a. General. Confine activities and operations to the area immediately adjacent to the right-of-way lines and within the highway right-of-way or as shown in the Contract Documents. The Contractor is responsible for satisfactory arrangements for permits, as required, from adjacent property owners.

When the Contractor's operations create the need for temporary fencing, provide and install temporary fencing and appurtenances until such time that the permanent fence is in place (or until the temporary fence is no longer required). At the discretion of the Engineer, temporary fencing may be erected without concrete footings, pull posts, corner posts, etc. Remove the temporary fencing and appurtenances from the project site, when directed by the Engineer. Temporary fencing materials will remain the property of the Contractor.

(1) Clearing. When necessary, clear the path of the fence line.

(2) Trench Excavation. When necessary, excavate a trench to line and grade in areas of irregular ground to secure clearance between the ground line and the bottom of the fence fabric, or to permit placing steel fence wire below the bottom of the fence fabric at stream crossings. In areas where rock is encountered, excavate the rock as necessary to the required line and grade. Backfill any excavation of rock below the required grade with suitable materials as directed by the Engineer. Construct trenches to provide proper drainage. In general, the bottom of the fence will follow the contour of the ground according to standard industry practice in constructing fence of the types specified.

b. Concrete Footings. When required, construct footings of commercial grade concrete according to the Contract Documents.

Volumetric proportioning and hand mixing of concrete is permitted for concrete footings where small quantities are required.

Extend the top of the footing slightly above the ground line and steel trowel to a smooth finish with a slope to drain away from the post. Center posts, braces and other units in their footings. Set the posts and braces in advance of placing the fence to allow the concrete time to obtain its strength.

c. Posts Set in Rock. Where rock occurs within the required depth to which fence posts are to be erected, drill a hole of a diameter slightly larger than the largest dimension of the post in the rock and grout in the posts. When shown in the Contract Documents, cast in place the concrete footing as specified in **subsection 828.3b.**, between the top of rock and the required grade. At line posts, where top of rock is 8 inches or less below the required grade, remove the anchor plate. At all line posts, backfill the excavation above the top of rock with excavation materials placed in 4 to 6 inch layers. Thoroughly tamp each layer in place.

d. Structure Terminals. Place structure terminal assemblies at all stock passes, crossroad underpasses or overpasses and major drainage structures as shown in the Contract Documents.

e. Floodgates and Channel Crossings. Construct floodgates and channel crossings as shown in the Contract Documents.

f. Intermediate or Line Posts. Erect each post plumb, and horizontally line up all posts between horizontal angle points with no perceptible variation. Erect with line post spacing as uniform as practicable under local conditions, with maximum spacing as shown in the Contract Documents and a tolerance of minus 2 feet.

g. Pull Posts. Construct pull post assemblies (to the approximate spacing shown) in straight runs and at each vertical angle point as described in the Contract Documents.

h. Corner Posts. Place corner post assemblies at all horizontal angle points, and erect to comply with the measurement shown in the Contract Documents.

i. End Posts. Construct end post assemblies in the line of the fence at all terminal points. When gates and flood gates are required, use end posts to attach the gate or flood gate.

j. Identification Signs. Provide and place identification signs as shown in the Contract Documents.

k. Erection of Gates. Provide all materials necessary to complete the installation of pedestrian and vehicular gates as shown in the Contract Documents.

Carefully align all gates with posts vertical. Tightly assemble clamps used for attaching hardware. Construct the bottom of each gate 3 to 5 inches above the ground when closed, and to clear the ground by a minimum of 3 inches at all points in its swing. Modify the existing grade within the area of swing to meet this requirement, as directed by the Engineer. Direction of swing of gates will be shown in the Contract Documents. Install all gate stops as shown in the Contract Documents. For all gates, provide stops with latches, or other approved means for holding gates open, and place to prevent damage to the gate or fence by over-swing. Provide stops to arrest the swing of a closed gate at the centerline of the fence.

l. Removal of Existing Fence. Remove the existing fence and store at locations as directed by the Engineer. Reset existing fence to be removed and reset, as shown in the Contract Documents.

Provide all new materials necessary for resetting fence.

m. Erection of Woven Fence. Unless shown otherwise in the Contract Documents, either type of woven wire fence shown may be provided, but only one type may be used on a project.

Place the bottom of the fabric of woven wire fence a nominal distance of 3 inches above the ground line. However, over irregular ground, a clearance of 1 to 6 inches for a distance less than 8 feet is permitted. Perform any necessary excavation and backfilling required to comply as specified in **subsection 828.3a.(2)**.

Set all metal end, corner, pull and brace posts and all braces in concrete footings as shown in the Contract Documents. The dimensions of the footings may be varied as permitted by the Engineer, but shall provide an equal volume of concrete. Except where rock is encountered, set or drive intermediate or line posts into the ground. Provide metal posts with an approved plate or other anchor device to hold the post plumb and in proper alignment. The plate or anchor shall be satisfactorily welded or riveted (not less than 2 rivets) to the post. Wood posts may be driven or set in pre-bored holds. Remove any posts damaged by driving.

After posts are permanently positioned and concrete footings are fully set, place fabric by securing or fastening one end and applying sufficient tension to remove all slack before making permanent attachments. Fasten the lateral wires to end, corner and pull posts by wrapping the wires around the posts and tying the wire back on itself with a minimum of 5 twists wrapped tightly. Perform tying by using tools designed for the purpose according to the fence manufacturer's recommendation.

Apply the tension for stretching the fence by use of mechanical fence stretchers and with single wire stretchers, according to the fence manufacturer's recommendations. Securely make all splices in the fabric according to the fence manufacturer's recommendations, and using tools designed for that purpose.

Fasten fence fabric to steel intermediate or line posts with ties or clamps, and to wood posts with staples at the bottom and top 2 wires and other alternate intermediate lateral wires. Where the design of the line post incorporates satisfactory provision for supporting and securing the fabric wire to the post, the Engineer may eliminate tie wires or clamps.

n. Erection of Chain Link Fence. Set the posts sufficiently in advance of the placing of the fabric to allow the concrete time to obtain its design strength. Set the bottom of the fabric 3 inches above the finished ground line. Fasten the fabric to the tension wires as shown in the Contract Documents.

(1) Post Spacing and Setting. Set posts with a maximum spacing of 10 feet and set a minimum of 2 ½ feet below the finished surface of the ground in concrete footings as shown in the Contract Documents. Construct the concrete footings of a size and shape shown in the Contract Documents.

(2) Fabric bands with fasteners. Fasten fabric to line posts with aluminum or galvanized fabric bands spaced approximately 14 inches apart. Securely fasten the fabric to the end posts by approved type metal fasteners.

o. Erection of Barbed Wire Fence. Erect the fence as shown in the Contract Documents.

For intermediate or line posts, use either wood or metal posts of the type shown in the Contract Documents, but only one type may be used on the project,

Excavate holes for wooden posts on line and to the depth shown in the Contract Documents, and of sufficient size to permit adequate compaction of the backfill around the post.

Set corner posts and support posts, and securely brace and wire before setting the intermediate posts. Space the intermediate posts equal distances apart, 13 ½ feet maximum. Set the posts plumb, firm and true to designated line and grade. If not set in concrete, place the backfill around the posts in thin layers and thoroughly compact.

If metal posts are used for the intermediate posts, drive with an approved mechanical device to the depth shown in the Contract Documents.

Use brace wire consisting of 2 complete loops of No. 9 smooth, galvanized wire. Twist the loops both above and below the brace post until tight.

Draw barbed wire taut with an approved mechanical device and securely fasten to each post with a minimum of 1 fence staple or approved wire clip. Loop the wire around the end and corner posts, and fasten with sufficient staples to anchor the wire securely.

p. Erection of Single Wire Cable Fence. Construct single wire cable fence as shown in the Contract Documents. Set all required posts as shown in the Contract Documents by driving or drilling and backfilling. Use either metal or wood posts, but only one type may be used on the project.

q. Electrical Grounds. Immediately below where a power line crosses a fence, ground the fence with a galvanized or copper coated rod, 8 feet long and a minimum of 5/8 inch in diameter, driven vertically until the top is approximately 6 inches below the top of ground. Braze or attach a No. 6 solid copper conductor with an approved clamp to the rod and to the fence so each element of the fence is grounded. Install the ground rod immediately below the point of crossing.

r. Erection of Fence (Chain Link) (Special). Erect the Fence (Chain Link) (Special) as shown in the Contract Documents.

828.4 MEASUREMENT AND PAYMENT

The Engineer will measure various sections of fence, fence to be removed and fence to be removed and reset by the linear foot from center to center of terminal posts, excluding gate length.

The Engineer will measure single wire cable fence by the linear foot, except no measurement will be made for corner posts and end posts for this type of fence.

The Engineer will measure each Post (Corner), Post (Pull) and Post (End). Gate and floodgate posts required will be measured as Post (End).

The Engineer will measure temporary fencing including appurtenances by the linear foot when shown in the Contract Documents or directed by the Engineer. The Engineer will not measure temporary fencing and appurtenances necessitated by the Contractor's operations.

The Engineer will measure Fence (Chain Link) (Special) by the linear foot. All posts, hardware, etc. are subsidiary to the bid item Fence (Chain Link) (Special).

The Engineer will not measure clearing, excavation, backfill, drilling of rock, electrical grounds, structure terminals, channel crossing and line posts for payment. These items are subsidiary to the various fencing items in the Contract Documents.

Payment for various types of "Fence", "Fence (Temporary)", "Fence (Removal and Resetting)", "Fence (Removal of Existing)", "Gates", "Posts (Corner)", "Posts (End)", "Posts (Pull)", "Floodgates" and "Fence (Chain Link) (Special)" at the contract unit prices is full compensation for the specified work.

Quantities shown in the Contract Documents for temporary fencing are for estimating purposes only. No adjustment in the contract unit price will be made regardless of the amount of underruns or overruns.

Delete SECTION 1620, and replace with the following:

SECTION 1620

MATERIALS FOR FENCING

1620.1 DESCRIPTION

This specification governs the ferrous and nonferrous materials and components utilized in the construction of fences of various types.

1620.2 REQUIREMENTS

a. General. Fencing materials and components governed through this specification must comply with **subsection 1620.2b** unless specified otherwise in the Contract Documents. The height and design of any fence is to be as specified in the Contract Documents. This also applies to, but is not restricted to, wire diameters, mesh size, tension bar dimensions, selvage type, brace and tension bands, post caps, sleeves, rail ends, and other miscellaneous and accessory components associated with the type of fence specified.

b. Material Specifications.

(1) Fence (Chain Link). Provide chain link fence that complies with AASHTO M 181. Provide framework (post and rail) components that comply with ASTM F 1043 for heavy industrial fence with only pipe Group IA or IC permitted.

When polymer-coating is specified in the Contract Documents, provide chain link fence that complies with AASHTO M 181, Type IV, Class A, extruded and bonded; or Type IV, Class B. Use the color specified in the Contract Documents that complies with AASHTO M 181 or ASTM F 934.

Provide accessory and miscellaneous components that comply with ASTM F 626. Components not specifically addressed in this or the other specifications must comply with the Chain Link Fence Manufacturer's Institute (CLFMI) Product Manual, CLF 2445. Tension bars are to have nominal dimensions of not less than 3/16 inch by 3/4 inch and may not be more than 2 inches shorter than the height of the chain link fabric they are applied to. Brace and tension bands are to have nominal dimensions of not less than 3/32 inch by 7/8 inch and comply with the cross section profile of the posts they are to be applied to. Truss rods are to have a minimum nominal diameter of 3/8 inch.

The terminology applied to chain link fencing is to be consistent with ASTM F 552.

The corrosion protection coating requirements of AASHTO M 181 apply to all components and supersede less stringent requirements that may occur in other specifications.

(2) Fence (Chain Link) (Special). Provide Fence (Chain Link) (Special) that complies with **subsection 1620.2b.(1)**, except provide pipe or tubing for framework that complies with the following:

- Nominal Pipe Size (NPS) as shown on the Contract Documents.
- Outside diameter and wall thickness corresponding to Extra Strong Pipe (Schedule 80).
- ASTM A 53, Grade B; ASTM A 500, Grade B, C or D; ASTM A 501, Grade A; or ASTM F 1083 Intermediate Strength Grade (use only for size NPS 5 or larger). ASTM F 1083 High Strength 83,000 Grade may be used for framework that is not welded to a base plate or other component.
- Other pipe or tubing will be approved provided it meets the dimensional requirements and the tensile and chemical requirements of one of the materials listed above.

Do not use continuous, furnace butt-welded (Type F) pipe.

(3) Barbed Wire. Provide zinc-coated and aluminum-coated steel barbed wire that complies with AASHTO M 280.

All barbed wire is to have dual line wires, each of 0.1 inch minimum nominal diameter, with four point round wire barbs, 0.08 inch minimum nominal diameter wire, at a nominal spacing of 5 inches. The dual line wires must have a unidirectional twist and have the barbs applied to one line wire only unless they are interwoven through the line wires. A Class 3 coating level is required for zinc coated barbed wire.

(4) Woven Wire Fabric (horizontal line wires, vertical stay wires). Provide zinc-coated and aluminum-coated steel woven wire fence fabric that complies with AASHTO M 279. A Class 3 coating level is required for zinc-coated woven wire fence fabric, and the minimum permissible line wire breaking strength is 960 pounds.

(5) Steel Fence Posts and Assemblies. Except as addressed previously in **subsection 1620.2b.(1)** and **(2)**, provide posts and assemblies that comply with AASHTO M 281.

(6) Zinc-Coated Steel Wire Strand. Provide strand for use in conjunction with fences that complies with ASTM A 475.

(7) Swing or Slide Type Gates. Provide gates that comply with ASTM F 900 for swing type and ASTM F 1184 for slide type. The wire or fabric utilized in the fence construction is to be applied to the gate frame unless specified otherwise through **subsection 1620.2a**. It will be an option to require hot dip galvanizing of the frame after weld construction.

(8) Accessory and miscellaneous components not referenced previously in a specification or this subsection must be zinc coated in compliance with ASTM A 153 for hot dip galvanizing or ASTM B 633 for electrodeposited zinc on threaded fastener components of nominal size of less than 1/2 inch diameter. Mechanically deposited zinc coatings on larger fastener components is permitted, however, other than the zinc coating application method, all requirements of ASTM F 2329 must be complied with. Fastener components must comply with **SECTION 1616**. Aluminum coating is acceptable when permitted and regulated by the specification that governs the component.

c. Fence (Chain Link) (Special) (Duplex/PVC).

(1) All posts, hardware, etc. Perform the following duplex protection requirements in order listed:

- Use Fence (Chain Link) (Special) as specified in this specification, and galvanize according to **subsection 1620.2b**.
- smooth out any drips, dross or ash inclusions;
- Do not quench bath galvanized surfaces that are to be duplex coated. Clean using alkaline cleaners, ammonia cleaners or solvent. Passivating film is prohibited;
- Rinse with clean water;
- Dry completely;
- Prepare the surface according to ASTM D 6386 and the following:
 - Blast clean with SSPC-SP-7 using abrasives softer than zinc;
 - Aluminum-Magnesium Silicates;
 - Walnut shells;
 - Sand with a Mohs hardness equal to or less than 5, and between 200-500 grit;
 - Temperature must be > 70° and less than 50% humidity;
- After blasting, leave a minimum of 3.3 mils of galvanizing with a + tolerance of 2 mils;
- Powder coat;
 - Use polyester powder with degassing agents;
 - Preheat materials to be powder coated;
 - Powder coat a thickness of 3.5 to 4 mils;
 - Measure and report galvanizing thickness before and after blasting and report powder coat thickness;
 - Perform Methyl Ethyl Ketone (MEK) test, and report results; and
 - Perform Cross Hatch test ASTM D 3359, and report results.

(2) Woven Chain Link.

- Use the same specified color that was used for the posts, hardware, etc. When no color is specified, use black.
- The PVC coating shall conform to AASHTO M 181 Type IV Class A.

1620.3 TEST METHODS

Conduct all tests required by the applicable AASHTO, ASTM, or other material specifications of **subsections 1620.2b** and **c**. Coating thickness may be measured by any one of the methods specified in ASTM B 633 and by eddy current methods, ASTM E 376 (B 244 may also be useful as a technique guideline), provided that

appropriate calibration procedures and standards have been applied. The magnetic induction and eddy current methods are nondestructive in nature and are preferred. Destructive techniques, i.e., coating removal, may be utilized as referee methods.

1620.4 PREQUALIFICATION

Not applicable.

1620.5 BASIS OF ACCEPTANCE

a. Submit for approval to the project Engineer and MRC a Type A certification (certified mill test report), as specified in **DIVISION 2600**, that governs the analysis of all heats delivered to the project for all wire utilized in the construction of the fence or fence components, regardless of application.

b. Submit for approval to the project Engineer and MRC a Type A certification (certified mill test report), as specified in **DIVISION 2600**, that governs the analysis of all heats delivered to the project for post and rail utilized in the construction of Fence (Chain Link) (Special). Provide certifications that show all information necessary to verify compliance with the dimensional, tensile and chemical requirements of this specification.

c. Submit for approval to the project Engineer and MRC a Type A certification as specified in **DIVISION 2600**, that governs the analysis of the Duplex/PVC Protection utilized in the construction of Fence (Chain Link) (Special). Provide certifications that show all information necessary to verify compliance with the requirements of this specification.

d. Receipt and approval of a Type D certification as specified in **DIVISION 2600** for all other fencing components.

e. Inspection and testing by field personnel of all fencing components for compliance with corrosion protection coating thickness, dimensional requirements, quality of workmanship and the delivery condition.

05-01-13 BD(BS) (JPJ)
Aug-13 Letting