materials not meeting the above requirements will be rejected, unless written approval is obtained from the State.

SECTION 1050
FENCE MATERIALS

1050-1 GENERAL

All fencing material and accessories shall meet Section 106.

(A) Chain Link Fence

Furnish either galvanized steel fence framework or aluminum alloy fence framework unless otherwise specified. Use the same type of fabric and framework materials throughout the project.

Where galvanized steel framework is used, the fence fabric may be either galvanized steel or aluminum coated steel, except where galvanized steel fabric is specified in the contract. The Contractor may furnish any of the following galvanized steel framework systems:

System G1

Line Posts:	Steel Pipe
Terminal Posts (End, Corner, or Brace Posts):	Steel Pipe
Gate Posts, Double Gate:	Steel Pipe
Gate Posts, Single Gate:	Steel Pipe
Brace Rail and Top Rail [A]	Steel Pipe

System G2

Line Posts:	Steel H Post
Terminal Posts (End, Corner, or Brace Posts):	Steel Pipe
Gate Posts, Double Gate:	Steel Pipe
Gate Posts, Single Gate:	Steel Pipe
Brace Rail and Top Rail [A]	Steel Pipe

System G3

Line Posts:	Roll Formed Steel
Terminal Posts (End, Corner, or Brace Posts):	Steel Pipe
Gate Posts, Double Gate:	Steel Pipe
Gate Posts, Single Gate:	Steel Pipe
Brace Rail and Top Rail [A]:	Steel Pipe or Roll Formed Pipe

A. Top rail to be used instead of tension wire only where called for in the itemized proposal.

Where an aluminum alloy framework is used, the fence fabric may be either aluminum alloy or aluminum coated steel. The Contractor may furnish any of the following aluminum alloy framework systems:

System A1

Line Posts:	Aluminum Post
Terminal Posts (End, Corner, or Brace Posts):	Aluminum Pipe
Gate Posts, Double Gate:	Aluminum Pipe
Gate Posts, Single Gate:	Aluminum Pipe
Brace Rail and Top Rail[A]:	Aluminum Pipe

System A2

Line Posts:	Aluminum H Post
Terminal Posts (End, Corner, or Brace Posts):	Aluminum Pipe
Gate Posts, Double Gate:	Aluminum Pipe
Gate Posts, Single Gate:	Aluminum Pipe
Brace Rail and Top Rail[A]:	Aluminum Pipe

A. Top rail to be used instead of tension wire only where called for in the itemized proposal.

(B) Wire Gauge

TABLE 1050-1
WIRE DIAMETER

Size Coated Wire, gauge	Nominal Diameter of Wire, inch
6	0.192
7	0.177
9	0.148
10 1/2	0.128
11	0.120
11 1/2	0.113
12	0.106
12 1/2	0.099
13	0.092
13 1/2	0.086
14	0.080
15 1/2	0.067
16 1/2	0.058

Whenever the term gauge is used in this section to refer to a size of wire, it will be construed to mean the United States Steel Wire Gauge, SWG (U.S.), regardless of whether or not the base metal of the wire is steel or a nonferrous metal.

1050-2 TIMBER POSTS AND BRACES

(A) General

Use treated southern pine meeting Articles 1082-2 and 1082-3 for all timber posts and braces, except as otherwise specified herein. Posts and braces may be either round or square provided that the same shape is used throughout the project for both the posts and the braces. Post and brace sizes are shown in the plans in inches. The size refers to the diameter for round pieces, or to the edge dimension for square pieces. Square posts and braces shall be fully dressed S4S. An allowable tolerance of 1/2 inch scant for square pieces will be permitted from the dimensions called for in the plans.

Cut round wood posts and braces from sound solid trees, free from short or reverse bends in more than one plane. Do not use log veneer cores for posts and braces unless they contain at least 1 inch of sapwood for their entire circumference on both ends. The post or brace shall not deviate more than 1 inch at any point from a straightedge held longitudinally against the piece.

All posts shall be free from ring shake, season cracks more than 1/4 inch wide, splits in the ends and contain no unsound knots. Sound knots will be permitted provided the width of the knot does not exceed 1/3 the diameter of the post where it occurs. Groups of knots or any combination of defects that will impair the strength of the piece will not be permitted. The pieces shall show not less than 3 annual rings per inch and not less than 30% of summer wood.

A tolerance of 1 inch plus and 1/2 inch minus will be allowed for the diameter of round posts and braces, measured at the small end after peeling. Where they are out of round, this tolerance will apply to the smaller diameter, and the larger diameter shall not exceed the smaller by more than 20%. The maximum rate of increase in diameter at the butt shall be 1 1/2 inches in 10 feet.

A minus tolerance of 1% will be allowed in the length of both round and square posts. Cut the ends square.

(B) Optional Steel Posts and Braces

Steel posts and braces for woven wire fence instead of timber posts and braces are permitted in areas located in or west of Vance, Franklin, Wake, Lee, Moore and Richmond Counties. Use the same type of fence post and brace throughout the project. The optional steel posts and braces shall meet Subarticle 1050-3(B).

1050-3 METAL POSTS AND RAILS

(A) Chain Link Fence

Posts shall meet AASHTO M 181 except as otherwise provided herein.

Steel H posts shall have a minimum yield strength of 45,000 psi and weigh 3.26 lbs/ft. Galvanize steel H posts in accordance with ASTM F1043 with a Type A coating. Aluminum H posts shall weigh 1.25 lbs/ft.

Roll formed steel line posts shall be a 1.625 inch x 1.875 inch section weighing 2.40 lbs/lf after galvanizing and be formed from 0.121 inch thick sheet having a minimum yield strength of 45,000 psi. Roll formed steel brace rails and top rails shall be a 1.250 inch x 1.625 inch section weighing 1.35 lbs/lf after galvanizing and be formed from 0.080 inch thick sheet steel having a minimum yield strength of 45,000 psi. Galvanize all roll formed members after fabrication in accordance with ASTM F1043 with a Type A coating.

Vinyl coated posts shall be pipe posts meeting AASHTO M 181 with a fusion bonded vinyl coating at least 6 mils thick. The vinyl shall meet Section 6 of AASHTO M 181, or if a standard color not listed in AASHTO M 181 is used, the vinyl shall meet the color requirements in ASTM F934, Table 1.

Furnish brace rails with suitable metal connections to fasten them securely to the posts. Provide the top rail not less than 6 inches long with a thickness of at least 0.051 inch if steel, or 0.062 inch if 6063-T6 aluminum alloy and in lengths of at least 15 feet. The complete top rail assembly shall form a continuous rail passing through the top fittings of the line posts and be furnished with suitable metal connections to fasten it to the posts at each end.

For pipe 1.90 inches O.D. and under, the outside diameter at any point shall not vary more than 1/64 inch over no more than 1/32 inch under the standard specified. For pipe 2.375 inches O.D. and over, the outside diameter shall not vary more than ± 1% from the standard specified nor shall the minimum wall thickness at any point be more than 12.5% under the nominal wall thickness specified.

A 10% minimum weight tolerance will be allowed for all steel posts and rails.

(B) Woven Wire Fence

Steel posts used instead of 4 inch timber posts shall be a standard studded T-section 7.5 feet long designed exclusively for use as a fence post and be equipped with a metal anchor plate securely attached to the post. The T-posts shall weigh 1.33 lbs/lf exclusive of the weight of the anchor plate, and have a total weight, including anchor plate, of 10.65 lbs. Nominal dimensions of the T-post shall be 1 3/8 inches wide and 1 3/8 inches deep. A tolerance of ± 3/16 inch will be permitted from these nominal dimensions. The

anchor plate shall be sufficiently sturdy to withstand the strain of driving with no loss of effectiveness, and have a minimum area of 14.0 square inches.

Steel posts used instead of 5 inch timber posts may be either tubular posts or angle posts. They shall be 8 feet long and be embedded in a concrete anchor at least 3.3 feet deep and 10 inches in diameter. Fit tubular posts with ornamental tops that fit over the top of the post to cap against moisture. Fabricate the tubular posts from 2 inch diameter pipe meeting AASHTO M 181 for Grades 1 or 2 metallic coated posts and rails. Fabricate angle posts from angle sections measuring 2 1/2 inches x 2 1/2 inches x 1/4 inch, ± 1/16 inch on the 2 1/2 inch dimensions and ± 0.015 inch on the 1/4 inch dimension and weighing 4.10 lbs/ft.

Use steel braces with steel posts and either tubular braces or angle braces to match the posts. Furnish the braces with suitable metal connections to fasten them securely to the posts. Fabricate tubular braces from 1 1/4 inch diameter pipe meeting AASHTO M 181 for Grades 1 or 2 metallic coated posts and rails. Fabricate angle braces from angle sections measuring 2 inches x 2 inches x 1/4 inch ± 3/64 inch on the 2 inch dimensions and ± 0.010 inch on the 1/4 inch dimension and weighing 3.19 lbs/ft.

A 10% minimum weight tolerance will be allowed for all steel posts and braces.

For pipe 1.90 inches O.D. and under, the outside diameter at any point shall not vary more than 1/64 inch over nor more than 1/32 inch under the standard specified. For pipe 2.375 inch O.D. and over, the outside diameter shall not vary more than ± 1% from the standard specified nor shall the minimum wall thickness at any point be more than 12.5% under the nominal wall thickness specified.

Galvanize all steel posts and braces other than tubular members in accordance with ASTM A123.

1050-4 BARBED WIRE

Barbed wire shall meet ASTM A121 except as otherwise provided in this subarticle.

The barbed wire may be either galvanized steel or aluminum coated steel except that where aluminum chain-link fabric is used, galvanized steel barbed wire shall not be used. Use the same type of material throughout the project. All barbed wire shall have 4 point barbs spaced not more than 5 inches apart. Single strand barbed wire will not be acceptable.

Two strand galvanized steel barbed wire shall be fabricated from either 12 1/2 gauge or 15 1/2 gauge strand wire with 4 point galvanized steel 14 gauge barbs. The 12 1/2 gauge shall be Standard Grade with a Class 3 coating on the wire and a Class 1 coating on the barbs. The 15 1/2 gauge shall be Chain Link Fence Grade with a Class 3 coating on both the wire and barbs.

Two strand aluminum coated steel barbed wire shall be fabricated from two strands of 12 1/2 gauge aluminum coated steel wire with the 4-point barbs being either 14 gauge aluminum coated steel or aluminum alloy wire.

1050-5 WOVEN WIRE

Woven wire fencing shall conform to ASTM A116 or AASHTO M 279. The fence fabric shall be 47 inches high, with 10 horizontal strands. Space the strands 3 inches apart at the bottom and 8 inches apart at the top with progressive spacing between. Space vertical strands at 6 inch intervals. Any of the following styles and coating classes may be used.

(A) Style 1047-6-9, Grade 60 (all horizontal and vertical strands of wire shall be 9 gauge) with a Class 3 zinc coating.

(B) Style 1047-6-11, Grade 60 (top and bottom horizontal strands to be 9 gauge wire, all other strands to be 11 gauge) with a Class 3 zinc coating.

(C) Style 1047-6-12 1/2, Grade 125 (top and bottom horizontal strands of wire to be no smaller than 10 1/2 gauge with a minimum breaking strength of 1610 lbs., all other strands to be no smaller than 12 1/2 gauge with a minimum breaking strength requirement for horizontal strands of 960 lbs. with a Class 3 coating.

Brace wire shall be a 9 gauge steel in accordance with ASTM A641, except that the minimum zinc coating shall be 0.80 ounces per sf.

1050-6 CHAIN LINK FABRIC

Chain link fence fabrics shall meet AASHTO M 181. Galvanized steel fabric shall have a Class D coating. Polyvinyl coated fabric shall be Type IV, Class A or B and the vinyl coating shall be a standard color meeting AASHTO M 181 or ASTM F934 Table 1. Glare screen fabric with a 0.5 inch mesh shall have a Class 1 zinc coating in accordance with ASTM A392. The height of the chain link fence fabrics shall be as shown in the pay item description. Weave the fabric from 11 gauge wire, unless otherwise required by the contract. Glare screen fabric shall be 11 1/2 gauge unless otherwise required by the contract.

1050-7 FENCE FITTINGS, HARDWARE AND ACCESSORIES

All fittings, hardware and accessories shall meet AASHTO M 181, AASHTO M 232, ASTM F626 OR ASTM A641 or ASTM A809 except for the size, type and coating requirement as shown below in Table 1050-2 and elsewhere in this article.

Galvanize bolts, nuts, washers and other threaded items in accordance with AASHTO M 232.

Where shown in the plans, fit the posts with ornamental tops. The base of tops to be used with pipe posts shall fit over the top of the post to guard against moisture.

Tension wire for use with galvanized steel chain link fabric shall meet AASHTO M 181 for zinc coated tension wire. Tension wire for use with aluminum or aluminum coated chain link fabric may be either aluminum coated tension wire meeting AASHTO M 181, or solid aluminum wire with a minimum diameter of 0.192 inch. The aluminum for solid aluminum wire shall meet ASTM B211 for Alloy 5056 or 6061, and have a minimum breaking strength of 1,216 lbs. force and a minimum elongation of 10%. Tension wire for use with guardrail mounted glare screen fabric shall be 6 gauge and for barrier mounted glare screen the wire shall be 9 gauge unless otherwise required by the contract.

Vinyl coated fittings and accessories shall be galvanized steel or aluminum coated steel meeting this article and have a bonded vinyl coating. The vinyl shall meet Section 6 of AASHTO M 181 and be a standard color meeting AASHTO M 181 or ASTM F934 Table 1. The vinyl coating shall be at least 6 mils thick, except that the coating on tension wire, hog rings and tie wires shall be 6 to 10 mils thick.

1050-8 REPAIR OF GALVANIZING

Repair of galvanizing shall be in accordance with Article 1076-7. Do not use aerosol can products for repairs

TABLE 1050-2 PROPERTIES OF FENCING MATERIALS				
Item	**Gauge or Diameter, inch**	**Coating, oz/sf**	**Coating, oz/sf, Aluminum**	**Remarks**
Tie wires, steel	9	0.90	0.40	For fastening chain link fabric and tension wire to tubular sections or to roll formed steel line posts.
Tie wires, Aluminum	6	-	-	Alloy 1350-H19 or approved equal.
Clips, steel wire	7	0.90	-	For fastening chain link fabric and tension wire to H- posts.
Clips, steel wire	11	0.85	-	For fastening woven wire fabric to steel posts.
Hog rings, steel	12	0.80	0.40	For fastening chain link fabric to tension wire.
Hog rings, aluminum	9	-	-	Alloy 1350-H19 or approved equal.
Truss rod, steel	5/16	2.00	-	-
Tension (stretcher) bars, steel	3/16 x 3/4	1.50	-	For connection of 1 3/4" or 2" fabric to end, gate and corner posts for fabric heights over 5 ft.
Tension (stretcher) bars, steel	3/16 x 5/8	1.50	-	For connection of 1 3/4" or 2" fabric to end, gate and corner posts for fabric heights up to 5 ft.
Tension (stretcher) bars, steel	1/4 x 3/8	1.50	-	For connection of 1" fabric to end, gate, and corner posts.
Staples, Nails or	9	0.35	-	For fastening woven wire to timber posts. Shall be the size and shape shown in the plans.
Tension wire braces	9	0.90	0.40	For woven wire fence.
Post and line caps	-	1.30	-	For installation on top of posts to guard against moisture.
Rail and brace ends (pressed steel or cast iron)	-	1.30	-	-
Top rail steel sleeves	0.051	1.30	-	For rail connections. shall be fabricated to prevent movement along the rail.
Tension band	14	1.30	-	For fastening tension bar to posts.
Brace band	12	1.30	-	For fastening rail to posts.
Barbed wire extension arms (pressed steel or cast iron)	14	1.30	-	Shall be fitted with clips or slots for attaching the barbed wire to the arms.
Hinges, latches	-	2.00	-	-

SECTION 1052
SALT AND LIME STABILIZERS

1052-1 SODIUM CHLORIDE

Sodium chloride shall meet AASHTO M 143.

1052-2 CALCIUM CHLORIDE

Calcium chloride shall be Class S or L meeting AASHTO M 144.