

**NATURAL RESOURCES CONSERVATION SERVICE
SPECIFICATION GUIDELINES
FENCE**

Fence may be installed to meet the manufacturers specifications, or a “standard” fence may be built to meet or exceed the following specifications.

HIGH-TENSILE ELECTRIC FENCE

	Minimum Requirements	Installation
Wire	Smooth high tensile (HT) wire 14 gauge, galvanized (class III)	Attach wire to side of post next to livestock, except on curves and standard corners.
Strength	100,000 psi tensile strength	
Tension	200-250 lb. tension with in-line strainers.	One strainer per wire per: <ul style="list-style-type: none"> • 4000’ of straight line • 2500’ with one 90° corner • 1200’ of uneven terrain Placed near the friction center of line.
Staples	9 gauge slash cut point, 1.5” length, (1” length for very hard wood like locust)	Drive diagonally with wood grain, not tight to post, at an upward angle on depressions, or a downward angle on knolls
Fasteners	Crimping sleeves or approved knots for corner/end posts, Wire-clips on self-insulating line posts and battens; Line-post-insulators for non-self-insulating posts	(see “High Tensile Wire Fencing”, Figure 10, for illustration of approved knots)
Insulators	High density plastic, ultra-violet light resistant or extra heavy duty porcelain, line wire tube, wrap-around tube galvanized steel insert, corner and end double-U, or nail-on insulators. With swing corners, use porcelain type “O” or polypropylene type “W” insulators.	Must allow the wire to slide freely at all contact points, except termination.
Charger	Low impedance, approved by Underwriters Laboratories (UL), U.S. Bureau of Standards, or international standards such as Canadian (CSA), or New Zealand (NZS6203 part IP1983). Other types must meet manufacturer’s specifications, and consider site conditions, length, and type/class of animal constrained.	
Lightning Protection	<ul style="list-style-type: none"> • Surge protector required for all plug-in units. • Arrestor/choke are strongly recommended for systems located in areas prone to thunder storms. 	<ul style="list-style-type: none"> • Locate between power source and charger. • Locate near charger, end of fence line, and highest point in fence.
Ground Return	As specified by manufacturer	

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Warning Signs Post signs at 150' - 200' intervals on fence



Spacing, Height, & Number of Wires

All perimeter fence must meet or exceed the number or wires specified in Table 1 for the kind of livestock constrained. Adjustments may be made to add strength or increase effectiveness.

Perimeter Fence

Table 1. Minimum Number of Strands and Spacing For Permanent HT Electric Fence

Animal Type	Number Strands	Number Electrified	Wire Spacing (from Earth in Inches)
Cows, Heifers, Steers, Cow/Calf	2	2	17-24" and 38"
Sheep & Goats	5	3	7-13-20-28-38"
Horses* & Bulls	7	3	12-18-24-30-42-50"

* Smooth wire high-tensile fence is not recommended for horses due to danger of injury.

Interior Fence

- One, two or three strands;
- Electrified high-tensile, polywire, polytape, flexinet, or steel wire;
- Moveable or permanent posts and spacer combinations;
- Designed to meet the intended objectives.

Posts & Battens

Landowners should consider driving corner and end posts with a mechanical post driver in an auger-drilled pilot hole.

	Dimensions	Acceptable Material	Installation
Corner, End & Gate Posts	5" - 6" diameter or 4" x 4" sq. x 8' long	<ul style="list-style-type: none"> • Wood¹ • Standard fiberglass, 	Set 3.5' - 4' deep w/ 2" lean, except in stony till soils go as deep as possible
Line Posts	3.5" - 4" diameter x 5.5' - 6.5' long	<ul style="list-style-type: none"> • Wood¹ • Fiberglass or steel 	Set 1.5' - 2' deep; set perpendicular to the ground. Maximum spacing: <ul style="list-style-type: none"> • For 2 or 5 strand: 50', or every third 50' interval with battens • For 7-strand: 66'
Battens	40"-48" x 1½" x 1" or 4' - 5'	<ul style="list-style-type: none"> • Self-insulating notched wood or HD fiberglass; • Fiberglass O or T posts 	Install in all depressions; Maximum spacing: <ul style="list-style-type: none"> • 30' for 5 strand; • 50' for 2 or 3 strands;
Batten Anchors	24" x ½" x 1½"	Wood anchor	Use for batten hold downs in dips or uneven terrain

¹ "Wood" acceptable for posts include: black locust, red/white cedar, or other wood of equal life and strength. Live trees may be used, if they are in-line with the fence run, and a protective collar is used to keep tree growth from engulfing the wire and insulator fasteners.

Brace Assembly

- Double brace assembly required for gates, ends, corners with > 5 strands of wire (*see Fig. 2*)
- Single brace assembly required for gates, ends, and corners with 3-5 strands (*see Figure 1*)
- Single post assembly allowed for gates, ends, and corners, with ≤ 2 strands (*see below*).

	Dimensions	Acceptable Material	Installation
Single Post	4" x 4" x 8' long	Wood ¹	a) <u>post must be driven</u> b) <u>3" lean</u> (away from pull)
Brace Posts	4" - 5" diameter x 7.5' - 8' long	Wood ¹	Set 3.5' - 4' deep, except in stony till soils go as deep as possible
Brace Rail	4"- 5" dia. x 8-10' or 2" dia. x 8-10'	Wood ¹ or Galvanized steel tubing	Placed 3' - 4' above ground, between top 2 wires; notched or pinned into brace posts
Brace Pins	$\frac{3}{8}$ " (or .375) x 4" $\frac{3}{8}$ " (or .375) x 9"	Galvanized steel rods	Pin brace rail to posts
Brace Wire	14 gauge	Class III galvanized Double wrapped	Attached 4" from top of brace post to ground level of anchor post, double wrapped, tighten with twitch stick or in-line strainer
Brace Rod	$\frac{1}{2}$ " dia. x 8' - 10'	Galvanized steel	Thread through bottom of end post and brace on top of floating foot (<i>see Figure 3.</i>)
Twist Sticks	1.5" x 2" x 2'	Hardwood	Alternative: In-Line Strainer

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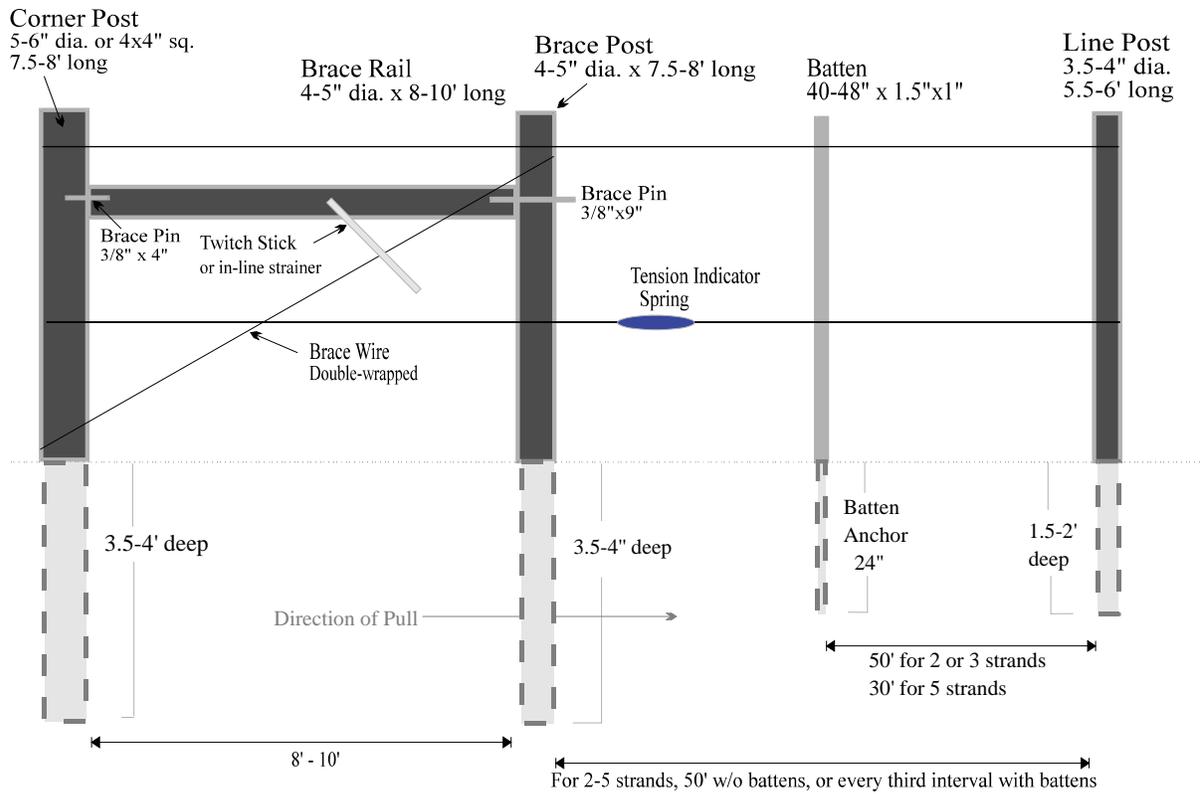


Figure 1. Single Brace Assembly required for gates, ends and corners with 5 or less strands of wire.

HIGH-TENSILE NON-ELECTRIC FENCE

	Minimum Requirements	Installation
Wire	Smooth and/or woven high tensile 14 gauge, galvanized (class III)	Attach wire to side of post next to livestock, except on curves and standard corners.
Strength	100,000 psi tensile strength	
Tension	200-250 lb. tension with in-line strainers.	One strainer per wire per: <ul style="list-style-type: none"> • 4000 ft of straight line • 2500 ft. with one 90° corner • 1200 ft. of uneven terrain Placed near the friction center of line.
Staples	9 gauge slash cut point, 1.5" length, (1" length for very hard wood like locust)	Drive diagonally with wood grain, not tight to post, at an upward angle on depressions, or a downward angle on knolls
Fasteners	Crimping sleeves or approved knots for corner/end posts, Pre-formed corner hangers or wire-clips on line posts and battens.	

Spacing, Height, & Number of Wires

All perimeter fence must have a minimum of 6 wires with the top wire at least 46" above the ground; it should meet or exceed the number or wires specified in Table 2 for the kind of livestock constrained. Cross fencing will be constructed to the same specifications as the perimeter fence. Adjustments may be made to add strength or increase effectiveness.

Perimeter and Interior Fence

Table 2. Minimum Number of Strands and Spacing for Non-Electric HT Fence

Animal Type	Number Strands	Wire Spacing (from Earth in Inches)
Cattle (not calves)	6	15-20-25-30-35-40
Sheep & Cattle	8	5-10-15-20-25-30-35-40
All Livestock Fence	10	5-10-15-20-25-30-35-40-45-50
Livestock Feedlot	10	10-14-18-22-26-30-35-40-45-50

Posts

Corner, End & Gate Posts

	Dimensions	Acceptable Material	Installation									
	5" - 6" diameter or 4" x 4" sq. x 7.5' - 8' long	<ul style="list-style-type: none"> • Wood¹ • Standard fiberglass, • Steel "T" or "U" posts 	Set 3.5' - 4' deep w/ 2" lean except in stony till soils go as deep as possible									
Line Posts	3.5" - 4" diameter x 5.5' - 6' long	<ul style="list-style-type: none"> • Wood¹ • Fiberglass or steel 	Set 1.5' - 2' deep; See Table below for spacing. Set perpendicular to the ground;									
Line Post Spacing	Number of Strands	Maximum Spacing (ft) <i>w/ Spacers</i> <i>w/o Spacers</i>	Maximum Spacer Distance (ft)									
	<ul style="list-style-type: none"> • 6 strand • 8 strand • 10 strand 	<table> <tr> <td>100</td> <td>33</td> </tr> <tr> <td>66</td> <td>33</td> </tr> <tr> <td>30</td> <td>10-16</td> </tr> </table>	100	33	66	33	30	10-16	<table> <tr> <td>33</td> </tr> <tr> <td>33</td> </tr> <tr> <td>10</td> </tr> </table>	33	33	10
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¹ "Wood" acceptable for posts include: black locust, red/white cedar, or other wood of equal life and strength

Brace Assembly

Double brace assemblies are required for gates, ends, and corners

	Dimensions	Acceptable Material	Installation
Brace Posts	4" - 5" diameter x 7.5' - 8' long	Wood ¹	Set 3.5' - 4' deep, except in stony till soils where posts should go as deep as possible
Brace Rail	4" - 5" dia. x 8-10' or 2" dia. x 8-10'	Wood ¹ or Galvanized steel tubing	Placed 3' - 4' above ground, between top 2 wires; notched or pinned into brace posts
Brace Pins	$\frac{3}{8}$ " (or .375) x 4" $\frac{3}{8}$ " (or .375) x 9"	Galvanized steel rods	Pin brace rail to posts
Brace Wire	14 gauge	Class III galvanized Double wrapped	Attached 4" from top of brace post to ground level of anchor post, double wrapped, tighten with twitch stick or in-line strainer
Brace Rod	$\frac{1}{2}$ " dia. x 8' - 10'	Galvanized steel	Thread through bottom of end post and brace on top of floating foot (see Figure 3).
Twist Sticks	1.5" x 2" x 2'	Hardwood	Alternative: In-Line Strainer

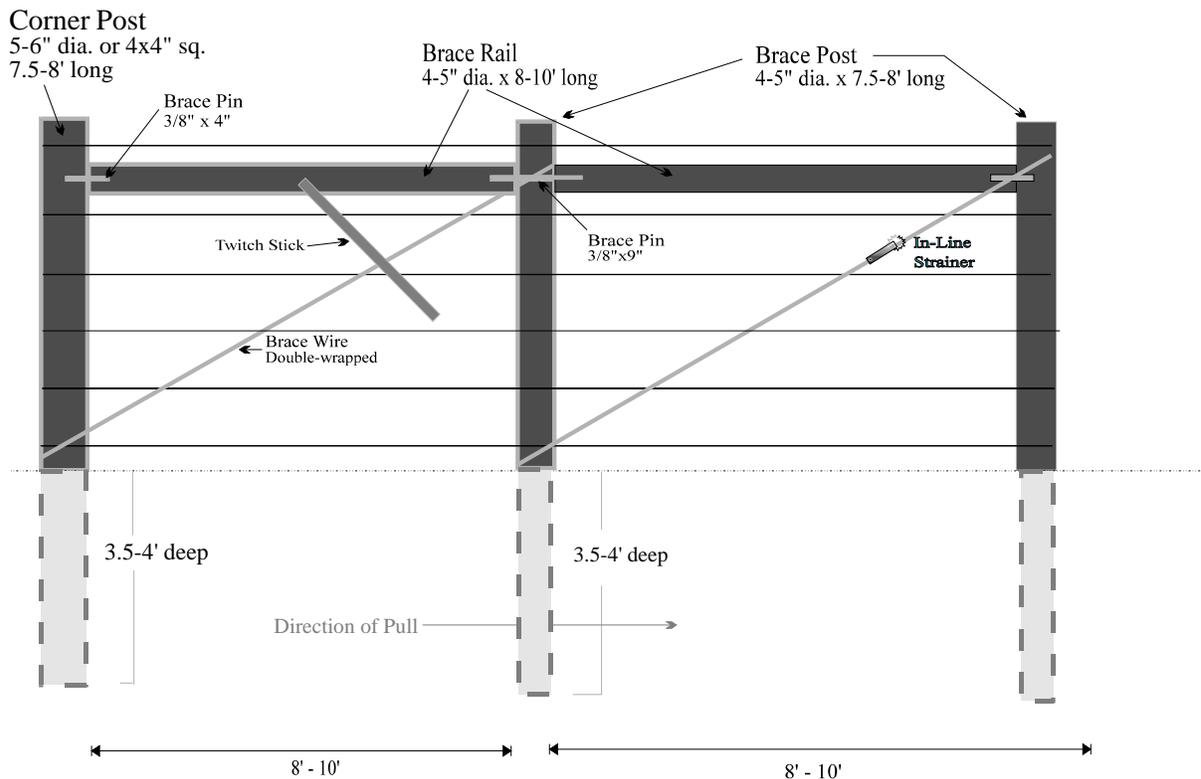


Figure 2. Double Brace Assembly required for gates, ends and corners with more than 5 strands of wire.

CONVENTIONAL ELECTRIC FENCE

PERMANENT FENCE	Minimum Requirements	Installation
Wire	12 gauge smooth wire	
Insulators	Manufactured insulators for electric strands (see p.1)	Use 12 gauge galvanized wire to fasten wire to insulators
Energizers	Solar, 120 volt, or battery powered; Approved by Underwriters Laboratories (UL) or the U.S. Bureau of Standards, printed on name plate.	Installed as per manufacturer's recommendations
Ground	Ground rods as specified by manufacturer	
<u>Spacing, Height & Number of Wires</u>	Permanent fence shall have at least <i>two (2) strands</i> , with at least <i>one (1) wire electrified</i>	
<u>Posts, Spacing & Brace Assembly</u>	Same as for non-electric fences (see <i>Barbed and Woven Wire Fence</i> , pp. 6-7)	
MOVEABLE FENCE	<ul style="list-style-type: none"> • Smooth wire; or, polywire, polytape, flexinet used with low impedance charger; • One, two or three wires as needed to control animals; • Charger approved by recognized testing lab (see p.1) • Moveable or permanent posts and spacer combinations, per manufacturer's recommendations; • Designed to meet the intended objectives 	

BARBED WIRE OR WOVEN WIRE FENCE

	Minimum Requirements	Installation
Wire	Barbed wire: two twisted strands of 12 ½ gauge with 14½ gauge; two-point barbs on approximately 5" centers; galvanized wire and barbs. Woven wire: 12 ½ gauge top/bottom wires with 14½ gauge line and stay wires; galvanized.	Attach wire to side of post next to livestock, except on inside curves and standard corners in which case wire is tied-off.
Staples	9 gauge galvanized wire staple; 1.5" length, (1" length for very hard wood like locust). On steel posts, use wire clips that come with posts	Drive diagonally with wood grain, not tight to post, at an upward angle on depressions, or a downward angle on knolls
<u>Spacing, Height, & Number of Wires</u>	<ul style="list-style-type: none"> • All-barbed-wire fence must have a minimum of four barbed strands, spaced approx. an equal distance apart, with the bottom wire being 14-18" above the ground level. • Woven wire fence ≤ 32" high must have at least two barbed wires, or two smooth wires, above the woven wire (if smooth wire is used, the bottom one must be electrified). • Woven wire fence > 32" high requires one barbed or one smooth wire above the woven wire (smooth wire must be electrified); • Woven wire fence for hogs, requires one barbed wire below the woven wire. 	

Perimeter and Interior Fence

Table 3. Minimum Number of Strands, Height and Stay Spacing for Barbed or Woven Fence

Animal Type	Height (inches)	Barbed Wire Strands	Woven Wire	
			Stay Spacing	Gauge (fill wire)
Cattle or Mixed Livestock	44	4 or 5	6 or 12	11
Hogs	32	N/A	6	9
Sheep or Goats	39	5	6	9
Horses	48	N/A	6	11
Deer	94	N/A	6 bottom 12 top	9

Posts**Corner, End & Gate Posts**

	Dimensions	Acceptable Material	Installation
Corner, End & Gate Posts	5" diameter or 4" x 4" sq., and sufficient length to support height plus depth requirements	<ul style="list-style-type: none"> Wood¹ Standard fiberglass, 	Set 2.5' - 3' deep
Line Posts	3" diameter, and sufficient length to support height plus depth requirements	<ul style="list-style-type: none"> Wood¹ Live trees in line with fence may be used as posts, if sound wood and ≥ 4" diameter 	Set 1.5' - 2' deep; Set perpendicular to the ground; Spaced a maximum of 16 feet.
	Lengths same as for wooden posts	Steel "T" or "U" posts, Weighing > 1.1 lb./ft. of length; Studded, embossed or punched	Set 1.5' - 2' deep; Set perpendicular to the ground; Spaced a maximum of 16 feet.

Brace Assemblies

Single brace assemblies are required for gates, ends, corners, and all definite angles $\geq 15^\circ$

	Dimensions	Acceptable Material	Installation
Brace Posts	4" diameter x 7.5' - 8' long	Wood ¹	Set 3' deep
Brace Rail	4" dia. x 7.5' - 8' or 1½" dia. x 7.5' - 8'	Wood ¹ , or Galvanized steel pipe	Placed horizontally at center of the top 1/3 re of brace post and post being anchored; notched or pinned into two posts
Brace Pins	3/8" (or .375) x 4" or 3/8" (or .375) x 9"	Galvanized steel rods	Pin brace rail to posts
Brace Wire	9 gauge	Smooth wire, Class III galvanized Double wrapped	Wire attached 4" from top of brace post to ground level of anchor post, double wrapped, tighten with twitch stick or in-line strainer.
Twist Sticks	1.5" x 2" x 2'	Hardwood	Alternative: In-Line Strainer

¹ "Wood" acceptable for posts include: black locust, red/white cedar, or other wood of equal life and strength

WOODEN BOARD FENCE

		Minimum Requirements	Installation
<u>Boards</u>			
	Kind	Douglas fir, western larch, southern yellow pine, white oak, or other wood of equal life and strength	
	Treatment	Painted lumber, treated with anti-fungal agent in a light oil or waterborne preservative (i.e. copper chromate or chromate zinc chloride) Creosote, or comparable preservative	
	Size	Rails shall be a minimum of 1" by 6" (nominal) by at least 8' long	
	Spacing	Minimum of three (3) boards, spaced on 16" centers Upper edge of top board approx. 48" above ground for 3 board fence and 64" above ground for 4 board fences. Bottom board approx. 16" above ground level.	
	Nails	16d galvanized, or cadmium nails;	Drive two nails per board to each post
	<u>Posts</u>	Same requirements as for <i>Barbed or Woven Wire Fences</i> . If in barnyard/feedlot, use 6" x 6" corner and line posts.	Spaced appropriately to the board length to a max. of 16'.

Corner or End Post
5-6" dia. x 7.5-8' long

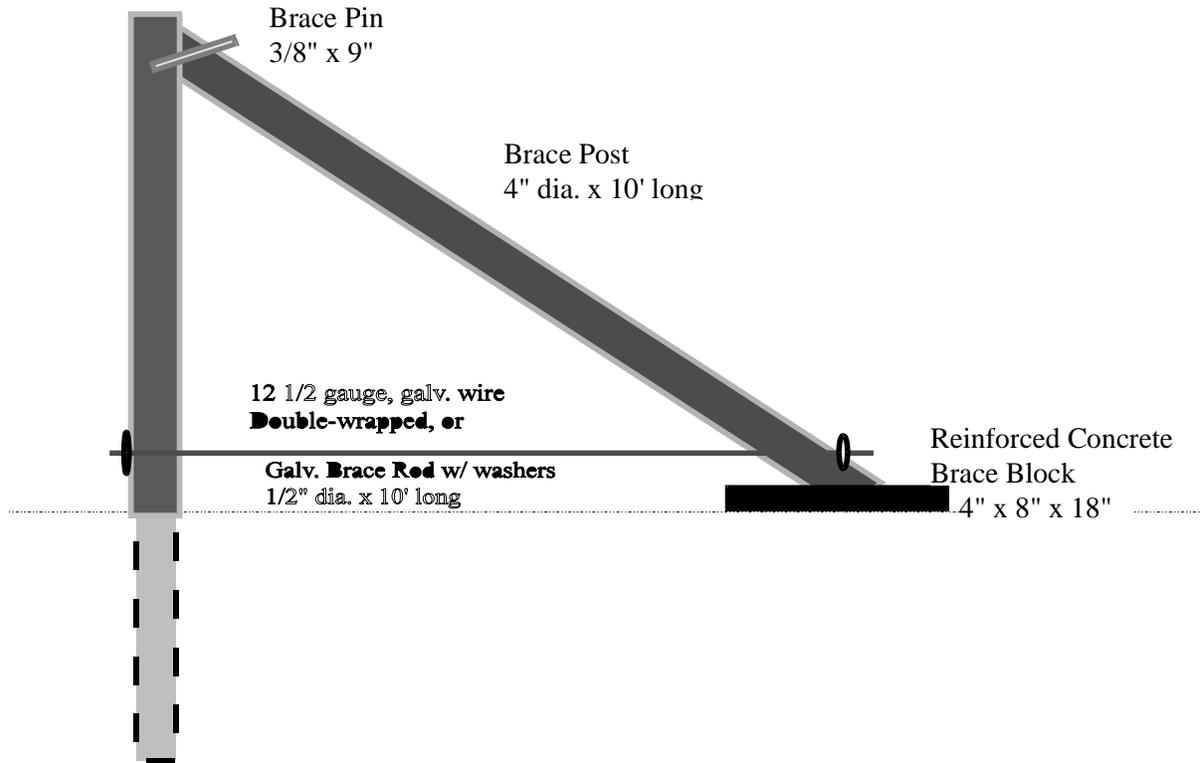


Figure 3. Diagonal Brace Assembly for ends and corners of fence in stoney till soils.