

FL600.0505(h) Purpose and objective

The purpose of this supplement is to provide guidance and specification information for use in the design and construction of fences in Florida.

Determining What Kind Of Fence To Use

Fences shall be selected to provide adequate control of the type animals present or planned. Other factors that should be considered include cost, life span and maintenance. Table FL5-1 provides information that can be used to compare various types of fences.

Boundary fences shall meet or exceed the minimum requirements shown in Exhibit FL5-1 for "Legal Fence Requirements" and all local laws and regulations.

Barbed Wire Fences

Standard barbed wire fences are the most common method of fencing for cattle and other large animals due to the cost and relative ease of construction. There are two (2) main types of barbed wire fences: standard (regular) and suspension (high tensile non-energized) fences.

Standard barbed wire fences commonly have five (5) to six (6) line posts per 100 feet of fence and three (3) to six (6) strands of wire. The four (4) strand fence is the most common. This type fence provides good control for cattle and can be used for horses. As general rule barbed wire should not be used for horses due to the high potential for injury. However, this type fence can be used if the pastures are large and there are few places where the horses will congregate next to the fence. Three (3) strand fences provide fair control of cattle when used as interior cross fences. Three (3) wire fences are not acceptable for use as boundary fences. Five (5) and six (6) strand fences can be planned when the cattle are wild and the additional fence strength is needed.

Spacing posts 15 to 20 feet apart with stays inserted between the posts is recommended for most barbed wire fences. Spacing line posts closer than 15 feet will significantly increase the cost of the fence construction, without a corresponding increase in strength. For example material cost for one (1) mile of fence

will be increased 35% if posts are spaced 10 feet apart.

Spacing posts at 30 feet intervals is recommended for very large pastures with low stock densities (generally rangeland). This will decrease the cost of fence construction. Stays shall be placed at no more than 15 foot intervals when this spacing is used. Posts spacing should be decreased near gates and other areas where livestock will congregate.

Posts should be placed at closer intervals (12 to 15 feet) in areas of irregular terrain or where the animals will congregate. These areas generally occur near gates, watering facilities, supplemental feeders or shaded areas.

Suspension fences are a low cost variation of barbed wire fence that can be used on rangelands and large pastures. The completed fence will move (sway) in the wind or when animals strike it. Because of the swaying action of this type of fence the wires need to be attached to the post so they can move freely.

Post spacing for this type of fence may range from 30 to 100 feet. This type of fence should consist of three (3) to six (6) stands of barbed wire.

Distance between stays or stays and posts shall not exceed 15 feet (allowable variance 10 inches). Stays shall be inserted so that the lower ends of the stays do not touch the ground.

Wire tension is very critical in the success of this type of fence. The wires shall be stretched so there is no more than three (3) inches of sag between fence posts when posts are spaced 100 feet apart, or 1 ½ inches when posts are spaced 50 feet apart.

Woven Wire Fences

Woven wire provides good control of most types of animals. These fences are generally 20 to 100% more expensive to construct than a four (4) strand barbed wire fence. Woven wire fences shorter than 38 inches will require one (1) or more strands of barbed wire installed above the woven wire to provide adequate control of large animals. Installing the woven wire two (2) four (4) inches above the ground with a barbed or energized wire installed two (2) inches above the ground is effective in

preventing small animals from burrowing under the fence.

Consideration should be given to the size of openings in woven wire where horned animals, such as goats are to be controlled. Small openings present less opportunity for the animals to entangle themselves.

Line post spacing for woven wire fences shall not exceed 20 feet. Posts should be placed at closer intervals (12 to 15 feet) in areas of irregular terrain or where animals will congregate. These areas generally occur near gates, watering facilities, supplemental feeders or shaded areas.

Woven wire fences can present a significant barrier to wildlife. For this reason woven wire fences are not recommended for use as boundary fences, unless the goal is to control wildlife. To control large wildlife such as deer, the fence should be constructed of a double height of woven wire.

Board fences

Board fences are recommended in areas where the main concerns are safety or aesthetics. Board fences are one of the most expensive types of fence to build and maintain. These fences should be used when fencing is needed for horses. Board fences should also be used when constructing cowpens and other working facilities for livestock. Criteria for selecting materials for board fences is shown in [Table FL5-5](#).

Typically, field fences shall be constructed of three (3) to four (4) boards attached to wooden posts (4" dia. min.). Boards shall be a minimum of one (1) inch by six- (6) inch rough cut lumber. The minimum height of field fences is shown in table FL5-2. Posts are usually spaced eight (8) feet apart for field fences and can be spaced ten (10) feet apart if boards 20 feet in length are used.

Board fences for barn lots, cowpens or corrals shall be constructed of four (4) or more boards with a minimum height of five (5) feet. Taller fences should be planned for animals that are wild or are known to escape over five (5) foot fences. Boards shall be a minimum of two- (2) inch by six- (6) inch rough cut lumber. Posts are usually spaced six (6) to eight (8) feet apart for

corral fences. Posts should be spaced five (5) to six (6) feet apart where crowding will occur.

Boards should be attached to a flat face on the post using three and one half inch (3 ½") long (16d common), galvanized, spiral or ring shanked nails. Joints where boards butt up against each other should be staggered so that each board spans two or more posts.

High tensile, non-energized fences

High tensile, smooth wire fences are becoming increasingly popular for farm fences. These fences are typically constructed with four (4) to ten (10) smooth wires. A six- (6) strand, high tensile fence will provide adequate control of livestock and can be constructed to control large wildlife. A ten- (10) strand, high tensile, non-energized fence will cost approximately $\frac{2}{3}$ of an equivalent woven wire fence.

These fences are constructed of 12 ½ gage, class 3 wire, with a minimum tensile strength of 160,000 pounds per square inch (psi), galvanized steel wire. Wire tension for high tensile fences shall be minimum 150-300 lb. tension per wire.

Wires are held in tension along the posts or posts and stays through the use of in-line strainers. A tension indicator spring may be used to indicate wire tension. Wires must be attached to the posts in such a fashion that the wires may freely move back and forth. This will allow the fence to maintain sufficient elasticity to withstand high pressure (> 1,100 lbs.) from animals and contractions in the wire due to temperatures.

Commercial mechanical fasteners are recommended for joining high tensile wire. Other splices and knots used to attach wires to posts or to join wires may be used if they conform to type of wire being used. Wire splices traditionally used to join barbed or woven wire are not recommended for high tensile wire. These splices usually fail at 60% of the breaking strength of the wire.

Line post spacing may vary from 16 feet without stays to 100 feet if stays are used. Distance between stays or stays and posts shall not exceed 15 feet (allowable variance 10").

Energized (Electric) Fences

Electric fences provide a low cost alternative for pasture permanent and temporary cross fences in pastures. These fences can be constructed to provide adequate control for most classes of animals. Electric fences with less than three (3) wires shall not be used as boundary fences.

Permanent cross fence should be constructed of two (2) to six (6) strands of wire with posts spaced 20 to 30 feet apart.

Temporary cross fences may be constructed of one (1) or more strands of wire. A two- (2) strand temporary fence is recommended for best results. These fences are not eligible for cost share payments.

Animals to be controlled by energized fences should be trained to respect the fence. This can be accomplished by erecting a short span of energized fence in a corral or other relatively small, secure area. Grain or green feed may be placed behind the fence to attract the animals and come in contact with the fence. Moistening the earth below the fence will ensure an effective shock.

Improper earthing (grounding) and damage from lightning strikes are the most common causes of fence failure. Three (3), galvanized ground rods are recommended to ensure a well grounded system. The ground rods should extend at least six (6) feet into the soil. Connect the ground rods to the energizer using one (1) continuous wire. Do not use painted, thinly electroplated or ungalvanized material as ground rods because rust will build up quickly and create resistance. Avoid grounding the system to barns or other buildings.

Lightening arrestors (diverters) are necessary to minimize damage to the energizer during electrical storms. The lightning arrestors must be as good as the ground system to be effective. In areas where lightning presents a major problem it is advisable to place several lightening arrestors in damp areas throughout the farm.

Energized fences should be installed in accordance with the National Electrical Code, State and local regulations, and manufacturer's instructions. The fence energizer and other equipment should carry the label of the

Underwriters Laboratory (UL) or other reputable certifying institutions.

Maintaining the fence lines clear of tall vegetation is necessary to assure proper operation of the fence. Weed burner type energizers are not recommended due to the potential for injury or fires.

Mesh wire fences

Mesh wire (chain link) fences are not recommended for general farm use due to the extremely high cost of materials and labor required. However, mesh wire fences provide excellent control of animals and humans. Mesh wire fences may be necessary to prevent humans or animals access to unsafe areas, such as sinkholes.

Mesh wire fence should be constructed in accordance with the manufacturer's instructions.

Other types of fence

There are several other types of fence materials that can provide good quality control of animals. These types include pipe, vinyl, galvanized panel and cable fences. Generally these fences are used around corrals and homesteads, due to the high cost of construction.

These fences can be used in conservation planning if it is clearly documented that the fence will meet or exceed the criteria specified for traditional fences used to control a specific animal.

Variations

Variations from the materials and installation specification included in this document and conservation practice standard Fence, Code 382 may be approved by the responsible technician only if the following condition is met:

- If sufficient documentation is provided to the State Resource Conservationist to prove that the variations will result in an installation that will meet or exceed one installed in accordance with the standard and specifications.

Minor miscalculation (< 5%) of materials and specifications may be excepted from meeting these specifications.

Table FL5-1A Selection Criteria for Permanent Wire Fences

Fence Type	Animal Control Effectiveness ¹							Additional Information		
	Cattle	Goats And Sheep	Horses and Mules	Hogs	Deer/ Other Large Wildlife	Humans	Combination	Cost Index Material only ²	Approx. Life in years	Upkeep ⁴
Barbed wire with 2 point barbs on 4 inch centers or 4-point barbs on 5 inch centers										
3 Strand 12 ½ ga.	Fair	Poor	Poor	Poor	Poor	Poor	Poor	0.92	33	High
4 Strand 12 1/2 ga.	Good	Fair	Fair	Poor	Poor	Fair	Poor	1	33	High
5 Strand 12 ½ ga.	Good	Good	Good	Poor	Poor	Fair	Poor	1.08	33	High
3 Strand 14 gage	Fair	Poor	Poor	Poor	Poor	Poor	Poor	0.85	19	High
Suspension Barbed Wire fence with 4 point barbs on 5 inch centers										
4 Strand 12 1/2 ga.	Good	Poor	Fair	Poor	Poor	Fair	Poor	0.62	33	Medium
6 Strand 12 1/2 ga.	Good	Poor	Fair	Poor	Poor	Fair	Poor	0.77	33	Medium
Woven wire (Light Weight), 11 gage top and bottom wires, 14 1/2 gage filler wires, 6" Stay spacing										
26 Inches	Fair	Good	Poor	Fair	Poor	Fair	Poor	1.08	19	High
32 Inches	Fair	Good	Poor	Fair	Poor	Fair	Poor	1.15	19	High
Woven wire (Medium Weight), 10 gage top and bottom wires, 12 1/2 gage filler wires, 6" Stay spacing										
26 Inches	Fair	Good	Poor	Good	Poor	Fair	Poor	1.23	33	Medium
32 Inches	Fair	Good	Poor	Exel	Poor	Fair	Poor	1.31	33	Medium
39 Inches	Fair	Exel	Good	Good	Poor	Fair	Good	1.38	33	Medium
47 Inches	Good	Exel	Good	Exel	Fair	Good	Good	1.69	33	Medium
Woven wire (Medium Weight), 10 gage top and bottom wires, 12 1/2 gage filler wires, 12" Stay spacing										
26 Inches	Fair	Good	Poor	Good	Poor	Fair	Poor	1.15	33	Medium
32 Inches	Fair	Good	Poor	Good	Poor	Fair	Poor	1.23	33	Medium
39 Inches	Good	Good	Good	Good	Poor	Fair	Good	1.23	33	Medium
47 Inches	Good	Good	Good	Good	Fair	Good	Good	1.31	33	Medium
Woven wire (Heavy Weight), 9 gage top and bottom wires, 11 gage filler wires, 6" Stay spacing										
26 Inches	Fair	Good	Poor	Good	Poor	Fair	Poor	1.46	40	Low
32 Inches	Good	Exel	Poor	Good	Poor	Fair	Poor	1.62	40	Low
39 Inches	Good	Exel	Good	Exel	Poor	Fair	Exel	1.77	40	Low
47 Inches	Exel	Exel	Exel	Exel	Fair	Good	Exel	1.92	40	Low
Woven wire (Heavy Weight), 9 gage top and bottom wires, 11 gage filler wires, 12" Stay spacing										
26 Inches	Fair	Good	Poor	Good	Poor	Fair	Poor	1.31	40	Low
32 Inches	Good	Good	Poor	Good	Poor	Fair	Poor	1.31	40	Low
39 Inches	Good	Excel	Good	Good	Poor	Fair	Good	1.46	40	Low
47 Inches	Excel	Excel	Excel	Good	Fair	Good	Excel	1.54	40	Low
Permanent electric smooth wire, 12 1/2 gage, Number of strands, (wire spacing in inches)										
3 (12", 10", 16")	Good	Poor	Good	Poor	Poor	Fair	Poor	0.31	25	Medium
3 (6", 8", 12")	Poor	Good	Poor	Excel	Poor	Fair	Poor	0.31	25	Medium
4 (6", 6", 6", 12")	Good	Good	Good	Fair	Fair	Good	Fair	0.38	25	Medium
4 (8", 10", 10", 12")	Excel	Poor	Excel	Poor	Fair	Good	Poor	0.38	25	Medium
5 (6", 6", 6", 8", 10")	Exel	Exel	Exel	Exel	Fair	Exel	Exel	0.46	25	Medium
8 (6", 8", 8", 8", 8", 12", 12")	Exel	Exel	Exel	Exel	Good	Exel	Exel	0.77	25	Medium
10 (6", 6", 6", 6", 8", 8", 8", 10", 10")	Exel	Exel	Exel	Exel	Exel	Exel	Exel	0.77	25	Medium

Table FL5-1B Selection Criteria for Temporary Wire Fences

Fence Type	Cattle	Goats And Sheep	Horses and Mules	Hogs	Deer/ Other Large Wildlife	Humans	Combination	Cost Index Material only	Approx. Life in years ³	Upkeep
Temporary electric barbed wire (Not recommended, may pose a safety hazard)										
1 Strand, 12 1/2 gage	Fair	Poor	Good	Poor	Poor	Poor	Poor	0.31	33	High
2 Strand, 12 1/2 gage	Good	Poor	Good	Good	Poor	Fair	Poor	0.38	33	High
Temporary electric smooth, steel wire										
1 Strand, 12 gage	Fair	Poor	Good	Poor	Poor	Poor	Poor	0.23	33	Medium
2 Strand, 12 gage	Good	Poor	Good	Good	Poor	Fair	Poor	0.31	33	Medium
1 Strand, 17 Gage	Fair	Poor	Good	Poor	Poor	Poor	Poor	0.23	17	Medium
2 Strand, 17 Gage	Good	Poor	Good	Good	Poor	Fair	Poor	0.31	17	Medium
Temporary electric smooth, copper covered steel wire										
1 Strand, 18 Gage	Fair	Poor	Good	Poor	Poor	Poor	Poor	0.23	33	Medium
2 Strand, 18 Gage	Good	Poor	Good	Good	Poor	Fair	Poor	0.31	33	Medium
Temporary electric smooth, aluminum wire										
1 Strand, 9 Gage	Fair	Poor	Good	Poor	Poor	Poor	Poor	0.38	33	Medium
2 Strand, 9 Gage	Good	Poor	Good	Good	Poor	Fair	Poor	0.54	33	Medium
1 Strand, 13 Gage	Fair	Poor	Good	Poor	Poor	Poor	Poor	0.31	33	Medium
2 Strand, 13 gage	Good	Poor	Good	Good	Poor	Fair	Poor	0.38	33	Medium

¹ Estimated effectiveness of each fence type to control specific kinds of animals. Exel indicates the fence would provide excellent control of the kind of animal listed.

² A four (4) strand barbed wire fence with posts spaced on 16.5 feet centers was used as the standard in determining the cost index. A fence with a cost index of 1.23 would cost approximately 23% more than theequivalent length of four (4) barbed wire fence with posts spaced on 16.5 feet centers.

³ The figures in the approximate life in years column was determined based on the wire gage and thickness of wire coating. This information was included to provide guidance in comparing the lifespan of various fences only.

⁴ Upkeep is a relative comparison of the need for maintenance to keep the fence in good working order. Because barbed wire fences rely heavily on wire tension and proper post spacing to perform effectively they require more labor to replace staples, splice broken wire and replace posts than most other fence types.

The information included in Tables FL5-1A and FL5-1B is intended to serve as a guide for selecting the appropriate type of fence to meet the needs of the land owner.

Fence Design and Construction must meet or exceed this minimum criteria

Table FL5-2 Criteria for Selecting Fence Type and Height in Pastures

Animal to Control	Type of Fence	Average Top wire Height	
		Interior Cross Fence	Boundary Fence
Cattle	Barbed wire 4 strand	44 Inches	46 Inches
	Barbed wire 3 strand	38 Inches	Not Acceptable
	Smooth 4 strand (high tensile, non energized)	44 Inches	46 Inches
	Smooth 6 strand (high tensile, non energized)	44 Inches	46 Inches
	Smooth 3 strand (Energized)	38 Inches	Not Acceptable
	Smooth 2 strand (Energized)	38 Inches	Not Acceptable
	Smooth 1 strand (Energized), Temporary only	34 Inches	Not Acceptable
	Woven wire w/ 1 strand barbed wire	38 Inches	46 Inches
Goats and Sheep*	Board	44 Inches	48 Inches
	Woven wire (not recommended for horned goats)	38 Inches	46 Inches
	Barbed wire 4 strand	38 Inches	Not Acceptable
	Barbed wire 5 strand	38 Inches	38 Inches
	Smooth wire 3 strand (Energized)*	26 Inches	Not Acceptable
	Smooth, 5 strand (high tensile, non-energized)	38 Inches	38 Inches
Horses	Board (3 plank)	38 inches	38 Inches
	Woven	48 Inches	48 Inches
	Barbed wire 4 strand Not Recommended	48 inches	46 Inches
	Smooth wire 3 strand (energized)	48 Inches	46 Inches
	Smooth wire 4 strand (energized)	38 Inches	Not Acceptable
	Smooth, 6 Strand (high tensile, non energized)	44 Inches	46 Inches
Hogs	Woven wire w/ 1 or more barbed wires at bottom	44 inches	46 Inches
	Smooth wire 3 strand (energized)	32 Inches	36 Inches
	Smooth wire 4 strand (energized)	26 Inches	Not Acceptable
Deer and/or other large wild animals	Smooth wire 4 strand (energized)	30 Inches	30 Inches
	Woven wire	96 Inches	96 Inches
Humans and Unsafe Animals	Smooth, 6 Strand (high tensile, non-energized) Use only to exclude wildlife.	44 inches	46 Inches
	Chain link (use to control dangerous animals or to exclude humans from very hazardous areas)	Fence height will be based on potential for injury to humans or other animals.	

Variance for top wire height shall not exceed one (1") inch.

For combinations of livestock use the minimum height for the largest animal to be controlled.

Fence type must be compatible with all of the animals to be controlled.

* A 1.5-joule energizer with a 50-mi. capacity is recommended for wool sheep.

Table FL5-3 Criteria for Selecting and Installing Post and Brace Material for Wire Fence

Wood and Synthetic Posts and Brace Members			Steel Posts and Brace Members		
Member	Top Diameter inches	Minimum Length feet *	Member	Pipe Diameter inches	Minimum Length feet
Corner Post	5 ½	8	Corner Post	4	8
End Post	5 ½	8	End Post	4	8
Gate Post	5 ½	8	Gate Post	4	8
Brace Post	5 ½	8	Brace Post	4	8
Line Post	3	6 ½	Line Post	2	6 ½
Horizontal Brace Member	3	6 ½	Horizontal Brace Member	2	6 ½
Diagonal Brace Member	3	10	Diagonal Brace Member	2	10
Fiberglass Line Post (energized fence only)	1	6 ½			
Insultimber Line Post (energized fences only)	1 ½	6 ½			

Post length is shown for a four- (4) strand barbed wire fence. Minimum length for posts shall allow the post to extend two (2) inches (minimum) above the top of the fencing material used.

If Angle Iron is used in place of steel pipe it shall have a minimum dimension of 2 ½" x 2 ½" x ¼".

Table FL5-4 Minimum Post Installation Depth for Various Soil Types

Post	Sandy/Loamy Soil inches	Muck Soil inches	Rocky Soil inches
Corner Post	42	48	42
End Post	42	48	42
Gate Post	42	48	42
Brace Post	42	48	42
Line Post	24	42	18
Line Post (energized fence only)	18	18	18

Table FL5-5 Post and Wire Spacing

Animal to Control	Type of Fence	Maximum Post Spacing (feet)		Recommended wire placement (inches from ground)
		With Stays	W/o Stays	
Cattle	Barbed wire 4 strand	30 feet	16 feet	16, 26, 36, 46
	Barbed wire 3 strand	30 feet	16 feet	16, 26, 38
	Smooth 4 strand (high tensile, non energized)	100 feet	NA	16, 26, 36, 46
	Smooth 6 strand (high tensile, non energized)	100 feet	NA	6, 14, 22, 30, 38, 46
	Smooth 3 strand (Energized)	150 feet	100 feet	12, 22, 38
	Smooth 2 strand (Energized)	150 feet	100 feet	17-24, 38
	Woven wire w/ 2 strand barbed wire	NA	20 feet	32, 36, 46
Goats and Sheep*	Woven wire (height to top wire)	NA	20 feet	32
	Barbed wire 4 strand	30 feet	16 feet	10, 16, 24, 32
	Barbed wire 5 strand	30 feet	16 feet	6, 14, 22, 30, 38
	Smooth wire 2strand (Energized)*	150 feet	75 feet	8-10, 20-26
	Smooth wire 3 strand (Energized)*	150 feet	75 feet	6, 14, 26
	Smooth, 5 strand (high tensile, non-energized)	150 feet	50 feet	5, 10, 17, 27, 38
Horses	Woven wire w/ 2 strand barbed wire	NA	20 feet	32, 36, 46
	Barbed wire 4 strand	30 feet	16 feet	16, 26, 36, 46
	Smooth wire 3 strand (energized)	150 feet	100 feet	17, 27, 38
	Smooth wire 4 strand (energized)	150 feet	100 feet	17, 27, 37, 46
	Smooth, 6 Strand (high tensile, non energized)	100 feet	NA	6, 14, 22, 30, 38, 46
Hogs	Woven wire w/ 1 barbed wire at bottom	NA	20 feet	4, 30
	Smooth wire 3 strand (energized)	150 feet	75 feet	6, 12, 18 to 20
	Smooth wire 4 strand (energized)	150 feet	75 feet	6, 12, 18, 30
Deer and/or other large wild animals	Woven wire (height to top wire) Use to contain or exclude wildlife.	NA	20 feet	96
	Smooth, 6 Strand (high tensile, non-energized) Use only to exclude wildlife.	60 feet	16 feet	8, 10, 10, 10, 10, 10

Stays shall be used in all permanent, barbed and smooth wire fences when the distance between posts exceeds 16 feet. Stay placement and material shall meet the criteria in Table FL5-6.

Stays shall be installed so they swing free of the ground and allow the fence to sway when touched by animals.

All stays shall be constructed of durable material especially prepared for this purpose. . Wooden stays may be used providing they have a minimum diameter of 1-½ inches. All wire stays shall be constructed of galvanized material.

Table FL5-6 Number of Stays Required and Recommended Placement

Post spacing	Number of Stays	Notes
0 to 16 feet	0	No stays required. 1 stay recommended when post spacing exceeds 15 feet.
0 to 22 feet	1	Evenly spaced between posts
0 to 30 feet	2	Evenly spaced between posts
> 30 feet	As Needed	Maximum distance between stays, or posts and stays shall not exceed 15 feet.

Table FL5-7 Brace Selection and Spacing

Braces are required at all corners, gates, and definite angles or changes in elevation in the fence line (15 degrees or more). Horizontal H brace assemblies are recommended for all permanent fence installations.

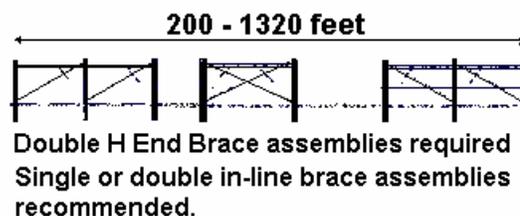
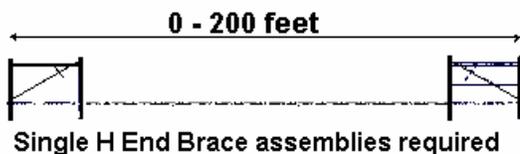
Fence Type	Distance Between End Posts (feet)	End Brace Type	Inline Brace Required (Recommended)	Inline Brace Type
Smooth, Barbed Wire and Suspension Fences	0 – 200	Single H	No	NA
	200 – 1320	Double H	No (Yes)	Single H
	> 1320	Double H	Yes	Double H
Woven Wire Fences	0 – 660	Single H	No (Yes)	Single H

Alternative braces may be used in place of H brace assemblies provided they are designed and constructed to meet or exceed the strength of a single or double H brace. Deadman type braces should not be routinely recommended for installation due to the high cost of installation and the corrosive characteristics of Florida's soils. However, if the cooperatoer elects to use deadman type braces the planner shall:

- Inform the cooperatoer in the design or O & M statement of the potential for brace failure due to corrosion, increased maintenance costs and reduced life-span of the fence.

Design and construction specifications for braces may be found in the following publications:

- Fence Brace Assemblies, Circular 792, Institute of Food and Agricultural Sciences (IFAS), Rev. 1992,
- Fences, USDA – Forest Service Handbook Feb. 1999,
- Planning Fences, American Association of Vocational Instructional Material (AAVIM), 1997.

Figure FL5-1**Brace Type and Placement****Table FL5-8 Criteria for Material Type, Size and Spacing for Board Fence.**

Member	Recom. Min. Fence Height (feet)	Kind of Post	Post Top Diameter (inches)	Post Length (feet)	Post Placement Depth (min.)	Rec. Post Spacing (feet)	Max. Post Spacing (feet.)	Recommended Board Height From Ground (inches.)	
Corral Fence Posts (recommended post spacing is 6 feet)									
Gate Post	5	Wood	6	8 ½	42"	6	8'	18, 32, 46, 60	
Gate Post	5	Pipe	4	8 ½	42"	6	8'	18, 32, 46, 60	
Line Post	5	Wood	5	8 ½	36"	6	8'	18, 32, 46, 60	
Line Post	5	Pipe	4	8 ½	36"	6	8'	18, 32, 46, 60	
Pasture Fence Posts (recommended post spacing is 8 feet)									
Gate Post	4	Wood	6	7 ½	42"	8	10'	12, 24, 36, 48	
Gate Post	4'	Pipe	4	7 ½	42"	8	10'	or	
Line Post	4'	Wood	4	6 ½	30"	8	10'	18, 33, 48	
Line Post	4'	Pipe	4	6 ½	30"	8	10'		
Boards	Material and Dimensions						Max. Space Between Boards		
Corral	Min. 2 inch by 6 inch by 8 foot rough cut, CCA treated plank (2"x6"x8')						12"		
Pasture	Min. 1 inch by 6 inch by 8 foot rough cut CCA treated plank (1"x6"x8')						12"		

Additional Specifications**Wire**

- 1 All wire shall be new galvanized material.
- 2 All barbed wire shall be double strand type.
- 3 All barbed and smooth wire shall meet one of the following criteria:
 - A Domestically manufactured 12 ½ gage or heavier malleable steel wire.
 - B Domestic or foreign manufactured high tensile strength 13 ½ or 15-½-gage wire.
 - C Foreign manufactured 12 ½ gage and heavier malleable steel barbed wire (not high tensile) with a break-strength of 950 pounds-force or more.
If lab tests are needed, three (3) wire samples from the lot under consideration will be tested. The average strength of the samples shall be the basis for acceptance. Any single sample of the three (3) tested having less than 900-lbs. break-strength shall disqualify the lot.
- 4 The average distance between barbs shall not exceed the following criteria:
 - A Two (2) point barbs four (4) inches,
 - B Four point barbs - five (5) inches.
- 5 Woven wire shall, as a minimum, have:
 - A A top and bottom wire diameter of 11 gage with intermediate wire and stay diameter of 14-½ gage intermediate and stay wires. Stay wires shall have a spacing of 12" or less.
 - B When cattle are grazed in addition to sheep and/or goats, use one (1) or more barbed wires may need to be added the woven wire to meet the minimum fence height for cattle. When possible allow a space of 10 inches between the top two (2) wires to reduce the chance that deer will be come entangled in the fence.
 - C All woven wire shall be new and zinc or aluminum coated.
- 6 High Tensile Wire shall meet or exceed the following criteria:
 - A Wire shall have a minimum strength of:
 - B 170,00 P.S.I minimum strength or greater for fences with 3 or wires.
 - C 130,000 P.S.I minimum strength or greater for 1 or 2 wire fences.
 - D Have a minimum of Class III

galvanization (80 ounces of zinc per square inch of wire surface).

- 7 Permanent Energized Fence Wire shall meet or exceed the following criteria:
 - A 12 ½ gage High Tensile wire,
 - B Wire shall have a minimum strength of 170,00 P.S.I minimum tensile strength.
 - C Have a minimum of Class III galvanization (80 ounces of zinc per square inch of wire surface).
- 8 Temporary Energized Fence Wire shall meet or exceed the following criteria:
 - A "Twine-type" woven material with a minimum of eight (8) aluminum or stainless steel filaments, or
 - B "Tape-type" woven material a minimum of ½ inch wide, with at least five (5) aluminum or stainless steel filaments, or
 - C 12-½ gage High Tensile galvanized steel or 12 ½ gage aluminum wire.
 - D Energized net wire that meets or exceeds the strength of permanent or temporary fence wire may be used, in place of permanent or temporary wire.
- 9 Commercial slices or "Western Union" or loop splices with a minimum of eight (8) complete, tightly wound wraps shall be used to join malleable steel wire. A wire-splicing tool is recommended for installing "Western Union" and loop splices.
- 10 Commercial splices recommended by the wire manufacturer shall be used on high tensile and energized fences.

Posts

- 1 Minimum length for posts shall allow the post to extend two (2) inches (minimum) above the top of the fencing material used. An exception to this may be made for board fences. Posts for board fences shall extend to the top of the uppermost board when set to the proper depth. Table FL5-1 shows the recommended wire height for various fences types.
- 2 Line posts shall be set at significant high and low points along the fence to maintain proper wire height. Distance between line posts shall not exceed the "Maximum Post Spacing" shown in Table FL5-4. **Distance between line posts for boundary fence shall not exceed 20 feet.**

- 3 All wooden posts, plank and brace materials shall be preservative pressure treated (PPT) with chromated copper arsenate (CCA-Type A, B or C) at the following rates:
 - A Materials 5 inch in diameter or larger 0.6 Pounds (min.) per cubic foot.
 - B Materials less than 5 inches in diameter 0.4 Pounds (min.) per cubic foot.
- 4 Steel pipe posts shall be fitted with water tight end caps and meet the following weight requirements:
 - A Four (4) inch steel pipe shall weigh 10.79 lbs. per linear foot (min.) and,
 - B Two (2) inch steel pipe shall weigh 3.65 lbs. per linear foot (min.).
- 5 All steel material shall be hot dip galvanized, or painted in accordance with Commercial Standard 184, with one or more coats of high grade weather resistant steel paint or enamel.
- 6 Steel corner and brace posts shall be set in a concrete anchor block. The anchor block shall have a minimum surface area of 48 square inches and should extend at least one (1) inch below the bottom of the post. All galvanized steel material set in concrete shall have protective coating (paint, etc.) that will not react with the concrete. The concrete anchor block shall be mounded above the soil surface to prevent water from ponding around the base of the post.
- 7 Steel posts shall be constructed of high carbon steel.
- 8 Steel "T" or "U" posts used shall weigh a minimum of 1.33 lbs. per linear foot exclusive of anchor plate. Posts shall be studded, notched or punched for wire attachment.
- 9 Steel posts shall be installed so the anchor plate is completely below ground level.
- 10 Fiberglass, Insultimber and other self insulating synthetic posts shall be used for construction of energized fences **only** and shall meet or exceed the requirements provided by the energizer manufacturer.
- 11 Line posts for energized fences shall be installed to the depth recommended by manufacturer or 18 inches, whichever is deeper.
- 12 Line posts for temporary electric fences shall be installed to a depth recommended by the manufacturer.
- 13 Concrete, plastic and other material may be used as fence posts when it can be documented that they meet or exceed the strength, durability and longevity of the posts specified in the above sections.
- 14 Live trees may be used as posts in barbed wire fences, **only** in areas that are generally inaccessible by livestock, where clearing a fence line is not feasible or will create a significant disturbance in wetlands, and other types of fence posts cannot be used.
- 15 Trees **shall not** be used as part of a permanent end, corner or gate brace assembly.
- 16 Fences constructed using trees as fence posts **shall** meet the following criteria:
 - A Trees will be used for shortest distance possible; a permanent end brace assembly shall be constructed as close as possible to the trees to be used as fence posts.
 - B Trees must be properly aligned and spaced.
 - C Trees are of low value.
 - D Trees are of sufficient size to prevent swaying other movement (> 6" Diameter at Breast Height).
 - E Wire or insulators will not be fastened directly to trees. When using live trees a batten shall be installed between the tree and the wire. The batten shall be equivalent or exceed the strength and durability of a CCA treated 2x4 and shall be securely attached to the tree. Fence wires shall be attached directly to the batten. Where wires will be wrapped completely around the tree a batten shall be placed on each side of the tree.
- 17 Wire shall be attached to the posts in a manner appropriate for the type of wire and fence post used. For non-energized fences us the following guidelines:
 - A Soft wood posts (pine, cypress, etc.) use 1 ½ inch long, galvanized staples.
 - B Hardwood posts (oak, cedar, etc.) use 1 inch long, galvanized staples.

- C Steel posts use wire clips designed for the purpose or 16 gage (minimum) galvanized wire.

Note-The following information may be used to estimate the quantity of 1 ½” staples need to construct 1 mile of fence.

Number of wires	Pounds
Five	23
Four	18
Three	13
Woven wire	23

- 18 Fence materials should be attached to the post on the side receiving the greatest pressure from livestock or humans. Wires used for cross fences may be installed on alternate sides of adjacent posts, creating a zigzag type fence.

Gates

- 1 Gates shall be designed to accommodate the land owners objectives. A 10 or 12 foot gate is usually adequate for the movement of livestock. If the gate will be regularly used for truck or farm machinery consider installing 14 to 16-foot gates.
- 2 Gates shall be constructed of durable material that equals or exceeds the quality of the adjoining fence. Aluminum gates resist deterioration from weather better than wood or steel. Steel or wood gates will withstand pressure from livestock and machinery much better than aluminum.
- 3 Wooden gates shall be constructed of two (2) inch or larger treated lumber. Material shall be new and defect free.
- 4 Gate hinges shall be attached directly to a braced end post.
- 5 Gates for energized fences shall be installed in accordance with the manufacturer's instructions.
- 6 Wire gates shall conform to the kinds, grades and sizes specified for new fence and shall include the necessary fittings and stays

Cattle Guards

- 1 A cattle guard is a structure consisting typically of parallel bars (pipes) over a shallow ditch to prevent cattle from straying.
- 2 All cattle guards shall meet the following minimum criteria or any applicable standard

drawings, the designs and specifications included in “Fences” USDA-Forest Service handbook:

- A Width of guard five (5) foot (minimum), eight (8) foot recommended,
- B Length of guard ten (10) foot,
- C Six (6) to eight (8) inch spacing between bars,
- D Installed on a solid concrete or treated timber foundation, with perpendicular support stringer spaced no more than 18 inches apart.
- E Equipped with wings to prevent animals from escaping around the ends of the cattle guard.

Specific Criteria and Specifications for Energized Fence

- 1 All insulators and other hardware shall meet or exceed the energizer and wire manufacturers specifications.
- 2 Wire for high-tension power fences shall be (200-300 lb. tension per wire) minimum 12.5 gauge, 170,000 psi break strength, Type III galvanized steel wire.
- 3 All permanent, energized fences shall have a minimum of 2 strands of wire.
- 4 When wire is used for temporary fencing, line post, insulator, and corner criteria shall be the same as the permanent energized fence criteria.
- 5 The minimum allowable variance for wire height shall not exceed two (2) inches on all wires).
- 6 Top wire should be about two-thirds of the shoulder height of the animal to be controlled. Other wires should be spaced so the animal receives a facial shock.
- 7 Energized fences for horses should be constructed of highly visible materials to prevent injury. One-half inch or wider poly-tape is recommended.
- 8 Fence Energizers shall meet the following minimum criteria:
 - A High power, low impedance with a 5,000 to 6,000 volt peak output with a pulse that is finished within 300 millionths of a second (0.0003 seconds) with all fences charged (on) and under maximum anticipated load.

- B Have safety fuse(s).
 - C Be 110 volt, 220 volt, or 12-volt battery powered systems.
- 9 All insulators and other hardware shall meet or exceed the energizer manufacturer's specifications.
 - 10 Insulated Cable used shall be galvanized wire with two layers of insulation for underground burial or overhead transmission (do not use copper wire due to corrosion).
 - 11 Grounded energized fence systems shall meet or exceed the following specifications:
 - A Ground all fence wires with a minimum of six (6) feet of galvanized ground rod.
 - B Energizer ground wire must be connected to a galvanized pipe or rod (three quarters (0.75) inch or larger diameter) and driven into the ground a minimum of six (6) feet.
 - C If soil depth prohibits installing the ground to a six- (6) foot depth, then two (2) or more galvanized pipes or rods shall be installed.
 - D Ground rods shall be no closer than ten (10) feet to any other electrical ground, water pipes, milk barns, or metal items leading into working areas.
 - E Lightning arrestors shall be installed on all energized fence systems and ground all wires at least every 3,000 feet of fence. Place lightning arrestors, no closer than ten (10) feet from the energizer.
 5. Household, barn or other building wiring or plumbing shall not be used as an earth (ground) for energized electric fences.
 6. All earth (ground) stakes shall be a minimum of 33 feet away from any other electrical earth (ground) peg or system to reduce the possibility of mains (110V/230V) power flowing continuously through any electric fence system.
 7. Where possible, avoid installing any fences under or running parallel to power lines. If this is unavoidable, the crossing should be made underneath the power and at right angles to it.
 8. Where fences are in the vicinity of overhead power lines, no fence wires should be higher than 6 feet above the ground.
 9. Electric fences bordering public thoroughfares should have a warning sign at least 8 inches x 4 inches in size every 300 feet. These signs should display the words "ELECTRIC FENCE" or the recognized symbol. Any lettering should be at least 1 inch high

Specific Criteria and Specifications for Board Fence

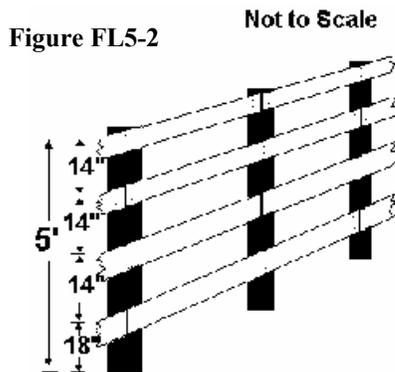
- 1 Board (plank) fence may be used to subdivide areas where there is a concern for damage to animals, humans or in instances that other types of fence will degrade property values.
- 2 All material used in the construction of board fences shall be new, with no observable defects.
- 3 Corrals, cowpens and other high pressure areas where large animals will congregate and place pressure on the fence two (2) inch by six (6) inch rough cut lumber shall be used.
- 4 Pasture, and other low pressure areas where light to moderate pressure will be placed on the fence, one (1) inch x six (6) inch rough cut lumber shall be used (minimum).
- 5 Boards shall be Preservative Pressure treated (PPT) with 0.4 pounds of (min.) per cubic foot of Chromated Copper Arsenate (CCA-type A, B, or C).
- 6 Fence Height in corrals shall be five (5) feet in height (minimum). A fence height of six

Safety and Warning Criteria

1. All Electric fence installations shall be installed in such a manner that it meets or exceeds the safety and warning recommendations of the manufacturer.
2. Barbed wire should not be electrified.
3. Never use electric fencing where contact with children or infants is likely.
4. Install energizers (if possible) inside a building in a position free from the risk of mechanical damage. If mounted outdoors, energizers should be mounted on a substantial structure in a position free the risk of mechanical damage.

(6) feet is recommended for Brahman-cross and exotic breeds of cattle. The minimum fence height for controlling sheep and goats the minimum fence height shall be 36".

- 7 Fence Height in pastures and other low Intensity areas shall be four (4) feet for controlling cattle, horses, and humans. The minimum fence height for controlling sheep and goats shall be 36".
- 8 Unions (joints) shall be staggered so that they do not all occur on the same post (see figure FL5-2).



- 9 Planks shall be attached to the post with attached to the posts using new galvanized spiral or ring shanked nails, not less than three and one half (3 1/2) inches long.
- 10 Nail or screw holes should be pre-drilled to prevent splitting the planks. Nails shall be offset to prevent splitting the post. All posts should have flat face four (4) inch wide where the planks are attached.

H Brace Construction Specifications (Refer to Figure FL5-4)

1. The horizontal brace member shall be:
 - 6 1/2 feet in length (minimum)
 - 10 feet in length (maximum)
 - 3" diameter treated wood (minimum)
 - 2" diameter pipe (minimum)
2. Horizontal Brace members shall be attached to the upper 1/3 of the anchor post and the

post to be braced. The ideal placement of the horizontal brace is .75 times H, with H equal to the recommended height of the post. All standard H brace assemblies should, as a minimum, maintain a two (2) to one (1) ratio of brace length to height of the top wire.

3. Wooden brace material shall be preservative pressure treated according to the criteria applicable to wooden posts.
4. Brace Members shall be secured to the posts using screws, nails, or pins.
5. Screws, nails or pins shall be a minimum of 3/8 inch in diameter and extend two (2) inches (min) into both the post and brace member.
6. Round wood posts shall be notched to provide a flat surface to meet the brace member. The notch shall be 1/2 to 1 inch deep.
7. A tension member consisting of 2 complete loops of 9 gage smooth single strand or 12 1/2 double strand wire. The loops shall extend from a point approximately 4 to 6 inches above the top of the brace member to a point approx. 2 to 4 inches above ground level of the post being braced. The loops of wire shall be twisted to secure the brace and provide rigidity to the brace assembly.
8. Steel corner and brace posts shall be set in a concrete anchor block. The anchor block shall have a minimum surface area of 48 square inches and should extend at least one (1) inch below the bottom of the post. All galvanized steel material set in concrete shall have protective coating (paint, etc.) that will not react with the concrete. The concrete anchor block shall be mounded above the soil surface to prevent water from ponding around the base of the post. The concrete shall be allowed to cure for a minimum of 24 hours prior to stretching the wire.

Figure FL5-4

