

## Fence

### Barbed Wire

## Conservation Practice Job Sheet

RI-382(a)



#### Definition

A constructed barrier to livestock, wildlife, or people.

#### Purpose

This job sheet is provided as a component of a resource conservation plan. This practice may be applied to contain and control livestock and wildlife movement, facilitate a prescribed grazing system, protect sensitive areas from grazing livestock, and to eliminate access to unsafe areas.

#### Conditions where Practice Applies

This practice may be used on any area where a fence is needed to control access, movement and containment of livestock and wildlife and where people safety and movement is of

concern. Conservation plan maps showing the approximate fence location, complementary conservation practices, grazing schedule, other relevant information, and additional specifications may be included.

Barbed wire fence is not recommended for horses.

#### General Criteria and Specifications

All fence construction shall comply with federal, state, and local fencing codes. Practice Lifespan is 20 years.

#### Fence Line Clearing

Fence lines will be cleared of brush and trees; gullies and steep banks may require grading. Clearing along stream banks will be held to a minimum and no vegetation may be removed within the buffer area, except as required for stream crossings.

Fencing materials shall be of a quality and durability that meets the intended management objectives. Construction shall be performed in a manner that meets the intended management objective. Wire and hardware will be new, galvanized material.

#### Line Post

Maximum spacing between line posts is 16.5 feet. All wooden line posts shall be set at least 30" into the ground.

#### Suitable line posts

3½" in diameter wooden posts of black locust, red cedar (mostly heartwood), redwood, and pressure treated pine or other wood of equal life and strength. Pressure treatment shall meet the requirements for ground contact.

Steel posts must be new, and be painted or galvanized and weigh a minimum of 1.25 pounds per one foot of length. Post will be driven 18" in the ground or as specified by manufacturer. **Every 50 feet or 4<sup>th</sup> post will be wooden.**

The following steel posts are acceptable for line posts:

Style 1 – "T" Section 1-3/8" x 1-3/8" x 1/8" thick

Style 2 – "U" Section 2" x 1-1/4" x 3/32"

Style 3 – "L" Section 2" x 2" x 1/4"

Lightweight stamped-steel posts are not allowed.

#### Brace Posts

Posts shall be set and maintained in a vertical position. All wooden brace posts are to be 5" minimum diameter and set 3 feet into the ground. Horizontal rail brace posts are to be 4" minimum diameter by 8 feet long and be installed 8"-12" below the top of the vertical brace post.

#### Corners and Braces

Refer to drawings on pages 7 through 9 for fence brace configurations and spacing.

#### Single H Braces

Single H Brace corners and end braces may only be installed at the ends of straight fence spans of 165 feet or less.

#### Double H Braces

All corners, fence line ends and gate openings require Double H Brace assemblies, except that Single H Braces may be substituted in straight fence spans of 165 feet or less.

#### Double H Brace Pull Assemblies

Double H Brace pull assemblies are required in straight fence spans at a maximum spacing of 660 feet. Brace wire shall be high tensile, galvanized steel, or 9 gauge soft wire.

#### Adjoining Fences

A fence adjoining an existing fence must terminate in a brace assembly as required above.

#### Corners

A bend in the fence tighter than 20 degrees is considered a corner and not a "straight" pull brace. (In an 8-foot long brace section, 20 degrees is approximately 3 feet off the straight line. Refer to drawings). The above H brace rules apply to corners considering each wire-pull direction from the corner post. Combination single and double H corners are permitted.

If hand set, all backfilled material shall be thoroughly tamped in 4" layers. Post holes shall be at least 6" larger than the diameter or side dimension of the posts. Synthetic posts are to be installed as specified by the manufacturer. If concrete backfill is used, the concrete must be pre-mixed, and worked into place up to the ground surface. No stress shall be applied to posts set in concrete for at least 24 hours after the concrete has set.

#### Wire

All barbed wire shall consist of class 3 galvanized 4-point barbs spaced not more than 5" apart. Galvanized barbed wire shall be fabricated from 12-1/2 gauge class 1 galvanized or better or 15-1/2 gauge class 3 galvanized strand wire and shall meet the requirements of ASTM A121. HT Class 3 barbed 15 1/2 gauge wire meeting the requirement of ASTM A121 may also be used.

**Wire Placement - see table 1 at end of job sheet for placement.**

Wires may be equally spaced or spaced according to figure 3.

**Stretching Wire**

Barbed Wire – Should be pulled taut. In warm weather, a stretch of 100 feet (prior to attaching to posts) should sag no more than 4” in the middle and no more than 2” in cold weather.

**Attaching Fencing to Post**

The fencing wire shall be placed on the livestock side of line posts and on the outside of corners and posts in bends and braces in bends.

Each strand of barbed wire shall be attached to each wooden post using 9-gauge galvanized 1½” staples, driven diagonally with the grain of the wood and at a slight downward angle (except in dips). Staples shall not be driven tight to the post.

Wire splices shall be crimped or spliced with 8 wraps around the other (“Western Union Splice”).

The fencing shall be fastened to steel line posts with either 2 turns of 14 gauge galvanized steel wire or the post manufacturer’s special wire clips.

**Stays and Battens**

If used, stays may be made of rot-resistant wood, plastic, fiberglass, or heavy galvanized twisted wire. Stays should be properly fastened to each fence wire. Stay length shall be sufficient for attachment to all fence wires while maintaining correct wire spacing.

**Other Considerations**

Approved alternative fence systems include “Common Sense Fence” or other equivalent fencing systems, approved by an NRCS Resource Conservationist (RC), and installed to manufacturer’s recommendation as approved by RC.

Alternative fencing and bracing systems: Alternative fencing and bracing systems must be pre-approved by an NRCS Resource Conservationist (RC), and must be installed according to manufacturer’s recommendations as approved by the RC.

Fences across gullies or streams require special braces and design. Breakaway fences or swinging water gaps allow debris and water to flow past the fence line without destroying the adjacent fence.

Any permanent fencing for grazing livestock should allow flexibility to facilitate implementation of the grazing plan and permit land management activities such as nutrient application, pest control, forage harvest, and other appropriate practices.

Follow all manufacturers’ safety precautions for handling and installing fencing materials.

Locate fences to facilitate maintenance. Where applicable, clear right of ways should be established and maintained to facilitate fence construction and maintenance.

When possible, install fences across slopes to improve grazing distribution, rainfall infiltration, and reduce soil erosion.

Locate fences to facilitate livestock management, handling, watering, and feeding.

Consider placing permanent riparian stream fencing at the edge of the protected buffer or at least 2 times the active channel width from the top of the stream bank but never less than 10 feet. It is recommended that the stream fence have a maintenance gate installed.

## Specifications Worksheet

Site-specific requirements are listed on the specifications sheet. Additional provisions are entered on the job sketch sheet. Specifications are prepared in accordance with the NRCS Field Office Technical Guide. See Conservation Practice Standard *Fence* (382).

<b>Client:</b>	<b>Farm #:</b>
<b>Field(s):</b>	<b>Tract #:</b>
<b>Planned By:</b>	<b>Location:</b>
<b>Date:</b>	<b>Length of Fence:</b>
<b>Landowner Objectives:</b>	

<b>Purpose</b> (check all that apply)	
<input type="checkbox"/> Reduce erosion and improve water quality by controlling livestock access to streams, springs, wetlands, and ponds.	<input type="checkbox"/> Protect sensitive environmental areas and the flora from vehicular, pedestrian, or animal traffic use.
<input type="checkbox"/> Protect newly planted areas from disturbance until established.	<input type="checkbox"/> Protect the safety of people, livestock, and wildlife by limiting or denying access to hazardous areas.
<input type="checkbox"/> Facilitate handling, movement, and feeding of livestock in the pasture environment.	<input type="checkbox"/> Improve distribution and timing of livestock grazing.
<input type="checkbox"/> Other (specify)	

<b>Type of Fence</b> (Check all that apply)		
<input type="checkbox"/> 3-strand barbed wire	<input type="checkbox"/> 4-strand barbed wire	<input type="checkbox"/> 5-strand barbed wire
<input type="checkbox"/> 6-strand barbed wire	<input type="checkbox"/> 8-strand barbed wire	<input type="checkbox"/>

<b>Posts</b>		
<b>Type</b> Black Locust, Eastern red cedar OR pressure treated pine or other preservative treated wood OR standard steel line posts every 50 feet or 4 <sup>th</sup> post will be wooden	<b>Size</b> Line posts are wood 8 feet or longer 3½" minimum diameter OR Standard steel line post 1 <sup>3</sup> / <sub>8</sub> " x 1 <sup>3</sup> / <sub>8</sub> " x 1 <sup>1</sup> / <sub>8</sub> " , with anchor plate	<b>Spacing</b> Wood line posts spaced a maximum of 16½ feet apart set 2.5 feet deep minimum OR Steel line posts spaced a maximum of 16½ feet apart set to top of anchor plate or 18" w/wooden post every 50 feet on 4 <sup>th</sup> post.

<b>Braces</b>	
<b>Wooden Braces</b> (8 feet minimum length)  4" diameter at small end	<b>Brace Wire</b> High Tensile, Galvanized Steel, 9 Gauge OR  12½ Gauge High Tensile, Galvanized, Double Wrapped

<b>Operation and Maintenance</b>
<p>Inspections and maintenance are required to achieve the intended function, benefits, and life of the practice. The landowner/operator is responsible to establish and implement an inspection and maintenance program. Regular inspection of fences should be part of an ongoing maintenance program. Items to inspect and maintain during the 20-year design life of the practice include, but are not limited to, the following:</p> <ol style="list-style-type: none"> <li>1. Inspection of fences after storm events is necessary to ensure the continued proper function of the fence. Promptly repair or replace damaged or broken fencing.</li> <li>2. Retain and properly discard all broken fencing material and hardware to prevent ingestion by animals or injury to equipment, people, or animals.</li> <li>3. Remove debris collected in the fencing.</li> <li>4. Clear the brush from fence lines to reduce voltage loss. Vegetative control can be achieved by herbicides applied per the manufacturer's label.</li> <li>5. Remove fallen limbs and maintain proper tension on the fence wires. Overhanging trees and limbs should be trimmed or removed as needed.</li> <li>6. Maintain proper tension on the fence wires.</li> <li>7. Follow your grazing plan, where appropriate.</li> <li>8. All necessary precautions should be taken to ensure the safety of construction and maintenance crews.</li> </ol> <p><b>Other:</b></p>

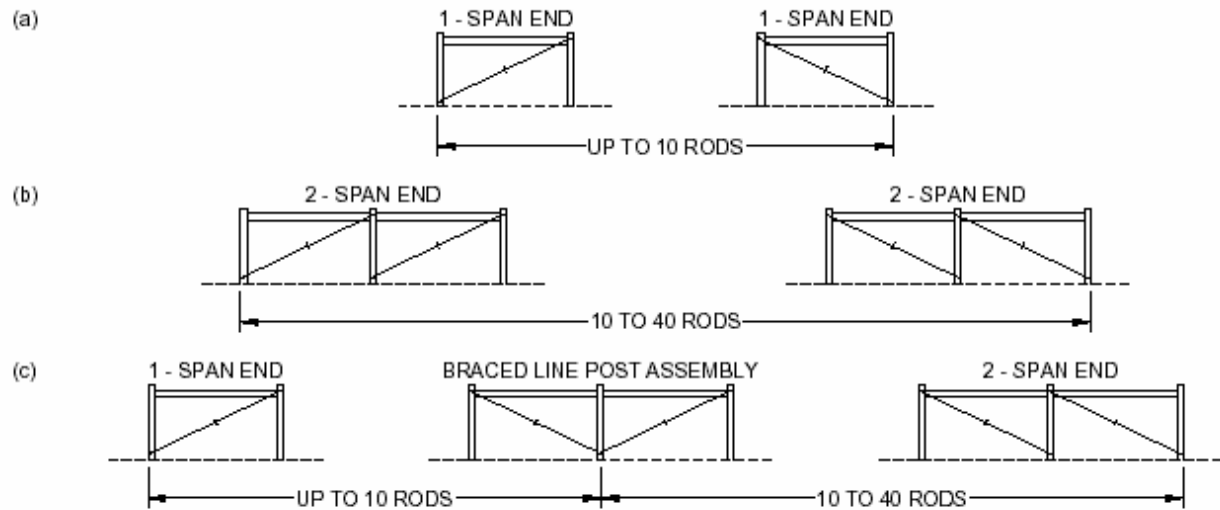
For information regarding this practice contact:

\_\_\_\_\_ at \_\_\_\_\_.

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## Specification Guidesheet for fencing 382 (a)

### STRAIGHT FENCES ON FLAT LAND



### STRAIGHT FENCES ON ROLLING LAND

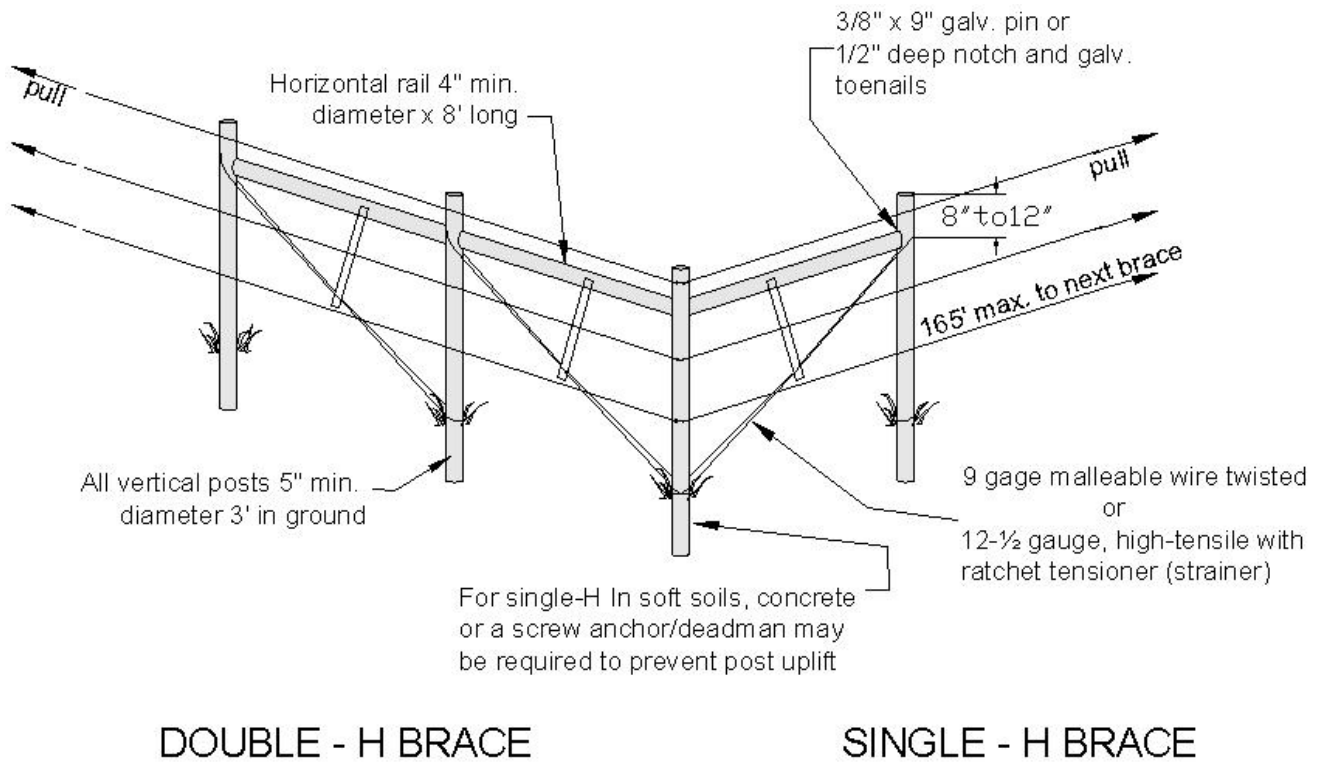


### CURVED FENCES



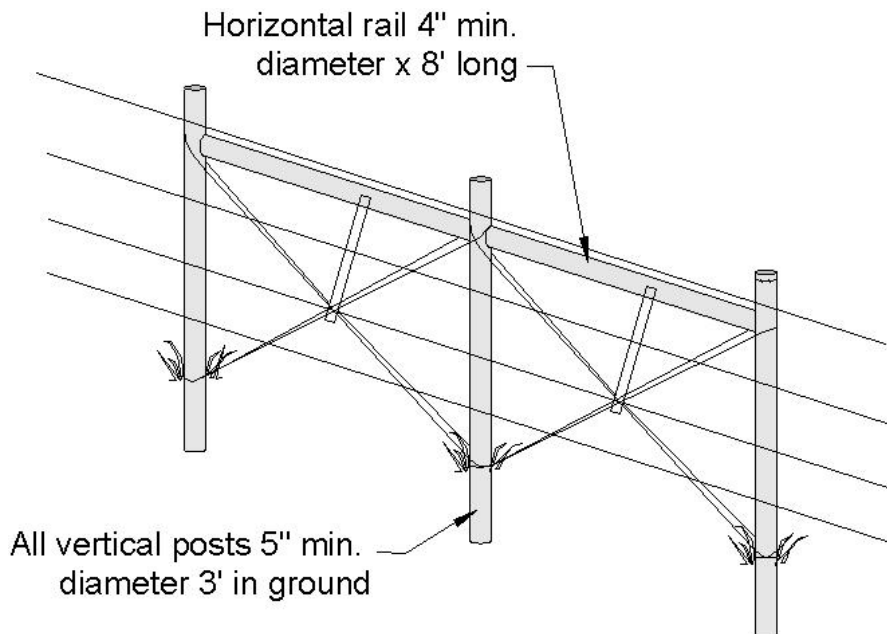
**Types of anchor-and brace assemblies and where to locate them:** (a) For fence lengths of 10 rods (165 feet) or less, use single-span end construction. (b) For fence lengths of 10 to 40 rods (165 to 660 feet), use double span end construction. (c) For fences more than 40 rods (660 feet) long use a braced-line-post assembly to divide the fence lengths. (d) On rolling land, fence stretching is easier if braced line-post assemblies are located at the foot and top of each hill. (e) Contour fences, more than 20 rods (330 feet) long, should have a braced-line-post assembly installed to keep the stretches to 20 rods (330 feet) or less. Install in straight section at least one post span away from a curve. Do not install on a curve.

**Note: One rod equals 16 ½ feet.**



## Typical Combination Corner Brace Assembly

Figure 1



## Double - H Brace Pull Assembly

Figure 2



SUGGESTED SPACING FOR BARBED WIRE

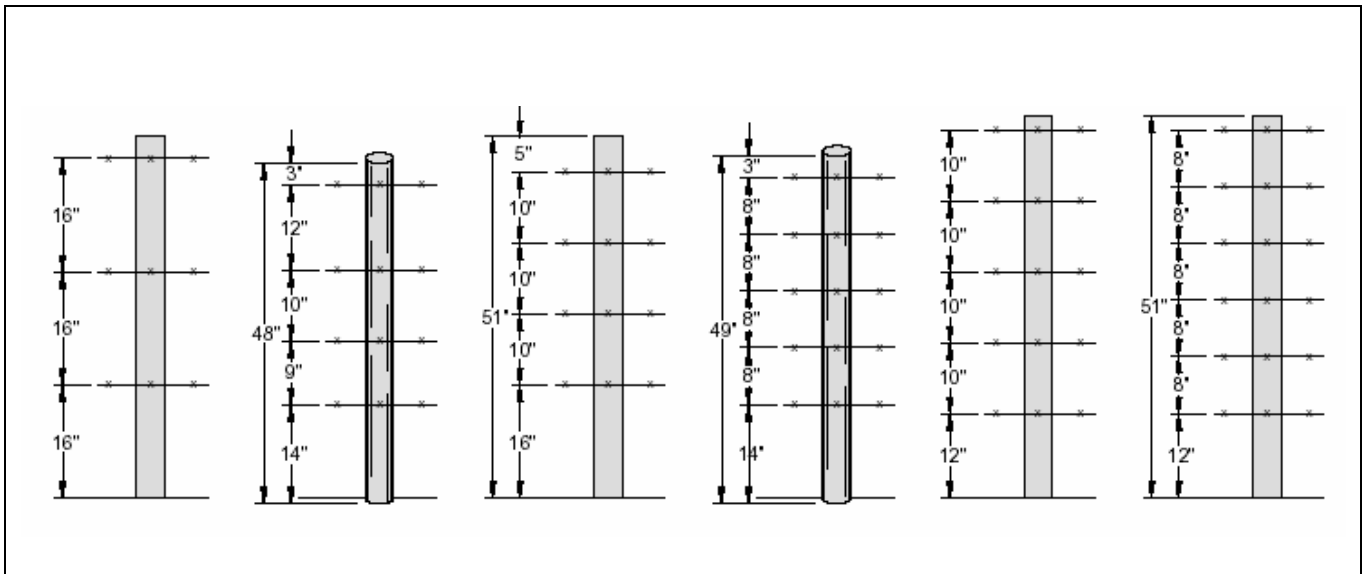
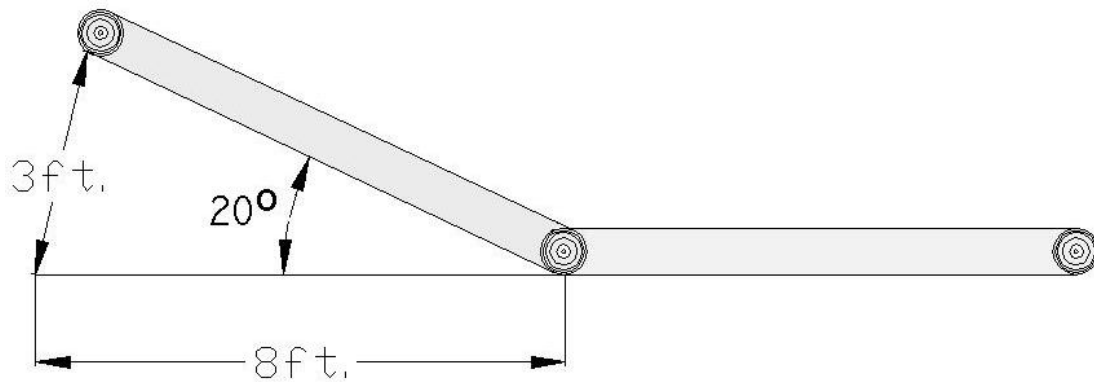


Figure 3



**Top View of Fence Brace Showing Minimum Angle to be Considered a Corner**

Figure 4

**RI NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD FENCE (382)**

**Table 1. Fence Selection Criteria**

Fence design and construction must meet the minimum requirements for controlling specific animal types.

Animal type to control	Fence type	Purpose of Fence				Spacing Inches above ground level <small>ww fences start 2-3 " above the ground</small>
		Perimeter (boundary prohibited areas)	Access lanes & stream crossings	Interior subdivision	Stream exclusion	
		Minimum Criteria				Inches
Cattle	Barbed 3-wire	NO	NO	Meets	Meets	18, 30, 42
Cattle	Barbed 4-wire	NO	Meets	Exceeds	Exceeds	16 to 48 evenly spaced
Cattle	Barbed 5-wire	Meets	Exceeds	Exceeds	Exceeds	14 to 48 evenly spaced
Cattle	Non-Electric 4-wire high tensile smooth			Exceeds	Meets	12 to 42 evenly spaced
Cattle	Non-Electric 6-wire high tensile smooth	No	Meets	Exceeds	Exceeds	12 to 44 evenly spaced
Cattle	Non-Electric 8-wire high tensile smooth	Meets	Exceeds	Exceeds	Exceeds	12 to 44 evenly spaced
Cattle	Electric 1-wire high tensile smooth	NO	NO	Meets	NO	32
Cattle	Electric 2-wire high tensile smooth	NO	Meets	Exceeds	Meets	20, 32
Cattle	Electric 3-wire high tensile smooth	NO	Exceeds	Exceeds	Exceeds	18, 30, 42
Cattle	Electric 4-wire high tensile smooth	Meets	Exceeds	Exceeds	Exceeds	12 to 42 evenly spaced
Cattle	Electric 5-wire high tensile smooth	Exceeds	Exceeds	Exceeds	Exceeds	12 to 44 evenly spaced
Cattle	Electric 1-wire Polywire or Polytape (1hot wire)	NO	NO	Meets	NO	32
Cattle	Electric 2-wire Polywire or Polytape (2 hot wires)	NO	Meets	Exceeds	Meets	20, 32
Cattle	Woven wire plus one or more top wire	Exceeds	Exceeds	Exceeds	Exceeds	47 min, 6 max between top wires
Cattle	Wood or Composition boards (6" wide)	Exceeds	Exceeds	Exceeds	Exceeds	6, 6, 8, 10 between boards
Cattle	HT Woven wire plus one or more top wires	Exceeds	Exceeds	Exceeds	Exceeds	47 min, 6 max between top wires
Goats & sheep	Barbed 5-wire	NO	NO	Meets	Meets	6 to 32 evenly spaced
Goats & sheep	Barbed 6-wire	NO	Meets	Exceeds	Exceeds	6 to 36 evenly spaced
Goats & sheep	Barbed 8-wire	Meets	Exceeds	Exceeds	Exceeds	6 to 48 evenly spaced
Goats & sheep	Non-Electric 5-wire high tensile smooth	NO	NO	Meets	Meets	6 to 32 evenly spaced
Goats & sheep	Non-Electric 6-wire high tensile smooth	NO	Meets	Exceeds	Exceeds	6 to 36 evenly spaced
Goats & sheep	Non-Electric 7-wire high tensile smooth	Meets	Exceeds	Exceeds	Exceeds	6 to 42 evenly spaced
Goats & sheep	Electric 3-wire high tensile smooth	NO	NO	Meets	Meets	8, 18, 30
Goats & sheep	Electric 4-wire high tensile smooth	NO	Meets	Exceeds	Exceeds	6 to 36 evenly spaced
Goats & sheep	Electric 5-wire high tensile smooth	Meets	Exceeds	Exceeds	Exceeds	6 to 38 evenly spaced
Goats & sheep	Woven wire plus one or more top wire	Exceeds	Exceeds	Exceeds	Exceeds	32 min, 6" max between top wires
Goats & sheep	Wood or Composition boards (6" wide)	Exceeds	Exceeds	Exceeds	Exceeds	6, 6, 8, 10 between boards
Goats & sheep	HT Woven wire plus one or more top wires	Exceeds	Exceeds	Exceeds	Exceeds	35 min, 6" max between top wires

Animal type to control	Fence type	Purpose of Fence				Spacing Inches above ground level ww fences start 2-3 " above the ground
		Perimeter (boundary prohibited areas)	Access lanes & stream crossings	Interior subdivision	Stream exclusion	
		<b>Minimum Criteria</b>				<b>Inches</b>
Horses	Electric 2-wire high tensile smooth	NO	Meets	Meets	Meets	28, 38
Horses	Electric 3-wire high tensile smooth	NO	Exceeds	Exceeds	Exceeds	28, 38, 48
Horses	Electric 4-wire high tensile smooth	Meets	Exceeds	Exceeds	Exceeds	18 to 54 evenly spaced
Horses	Electric 5-wire high tensile smooth	Exceeds	Exceeds	Exceeds	Exceeds	18 to 54 evenly spaced
Horses	Electric 1-wire Polywire or Polytape	NO	NO	Meets	NO	34
Horses	Electric 2-wire Polywire or Polytape	NO	Meets	Meets	Meets	28, 48
Horses	Woven wire w/1 wire HT on top	Exceeds	Exceeds	Exceeds	Exceeds	48 + HT at 54
Horses	Mesh "No climb" 2"x4" spacing	Exceeds	Exceeds	Exceeds	Exceeds	48 + HT at 54"
Horses	Wood or Composition boards (6" wide)	Exceeds	Exceeds	Exceeds	Exceeds	18 min. 12 max. between boards
Hogs	Electric 2-wire high tensile smooth	NO	NO	Meets	Meets	8, 16
Hogs	Electric 3-wire high tensile smooth	NO	Meets	Exceeds	Exceeds	8, 16, 24
Hogs	Woven wire 32" w/ 1 wire barb or HT	Exceeds	Exceeds	Exceeds	Exceeds	32 + barb or HT at 38
Hogs	Woven wire 32" w/ 1 Ht electric inside	Meets	Meets	Meets	Meets	32 + 1 electric wire 8 off ground, 8 inside of fence.
Deer	Woven wire 96" tall w/2 strands of smooth wire	Meets	Meets	Meets	Meets	96" w/smooth wire at 9' and 10'
Buffalo	Electric 4-wire high tensile smooth	NO	NO	Meets	Meets	16 to 42 evenly spaced
Buffalo	Electric 5-wire high tensile smooth	NO	Meets	Exceeds	Exceeds	16 to 48 evenly spaced
Buffalo	Electric 6-wire high tensile smooth	Meets	Exceeds	Exceeds	Exceeds	12 to 52 evenly spaced
Chickens/turkey	Woven wire 2"x4" 1 wire HT or barb above	Exceeds	Exceeds	Exceeds	Exceeds	72
Emu and ostrich	Woven wire 6"x6" 1 wire HT or barb above	Exceeds	Exceeds	Exceeds	Exceeds	72
Chickens/turkey	HT Woven wire 2"x4" 1 wire HT or barb above	Exceeds	Exceeds	Exceeds	Exceeds	72
Emu and ostrich	HT Woven wire 6"x6" 1 wire HT or barb above	Exceeds	Exceeds	Exceeds	Exceeds	72
People	Chain link	Meets	Preferred option			60 with 1 barb above
People	Electric 5-wire	Meets				12 to 60 evenly spaced
People	Woven wire 47 inch plus 1 or 2 barbed wires or HT elec	Meets				47 min. HT or barb at 6 spacing to 48. HT may be electrified

Alternative fencing and bracing systems may be approved by the Resource Conservationist, i.e. *common sense fence, horseguard or equivalent.*

**Fencing – Job sheet** **RI - JS 382**

<b>Practice Installation Guidelines</b>
It shall be the responsibility of the landowner to obtain all necessary permits and/or rights, and to comply with all ordinances and laws pertaining to this installation.
Practice designs and specifications shall be reviewed by NRCS planner with the landowner prior to start of work for practice installation.
Contact the NRCS planner _____ at 401- _____ prior to installation. Keep NRCS planner updated throughout the installation process.
Contact the NRCS planner _____ at 401- _____ upon completion of practice.

<b>Practice specifications and special requirements</b>
Installation shall be in accordance with the following specifications and special requirements. <b>NO CHANGES ARE TO BE MADE IN THE DRAWINGS OR SPECIFICATIONS WITHOUT PRIOR APPROVAL OF THE NRCS.</b>
1. Use Practice Specifications: <b>Fencing specifications worksheet Specification Guide Sheet for Fencing (382)</b>
The landowner/operator acknowledges that:
<b>A)</b> He/she has received a copy of the practice specifications, and Operation and Maintenance plan, and that he/she has an understanding of the contents and the requirements.
<b>B)</b> He/she has or will obtain all of the necessary permits prior to construction.
<b>C)</b> No changes will be made in the installation of the job without prior concurrence of the NRCS technician.
<b>D)</b> This practice has a lifespan of 20 years.
<b>E)</b> Adherence to the Operation and Maintenance plan of the installed work is necessary for proper performance during the practice lifespan.
<b>F)</b> NRCS planner shall be contacted prior to installation for a review of the practice installation and at completion for practice certification.
<b>Accepted by :</b> _____ <b>Date:</b> _____
<b>Address :</b> _____

<b>Practice design approval</b>
Lead Discipline for this practice: <b>Biological Conservation Sciences Division</b>
Job Classification:
_____ No design changes were made. _____ Design changes were approved and are included
<b>Design approved by:</b> _____ <b>Date:</b> _____

<b>Practice certification</b>
I have made an on-site inspection and have determined that the practice has been installed according to practice standard and specifications.
<b>Certified by:</b> _____ <b>Date:</b> _____