

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE SPECIFICATION

ROCK-JACK AND FIGURE-4 FENCE (INCLUDING ROCK CRIB)

(Feet)

CODE 382(f)

I. SCOPE

The work shall consist of furnishing materials and installing barbed wire, smooth wire, or combinations thereof, at the location(s) shown on the plan map and, if needed, on the drawings or as staked in the field.

Fencing includes brace assemblies, gates, cattle guards, and other components required to meet site conditions and achieve objectives for practice application.

II. CONSIDERATIONS

Rock-jack and Figure-4 post and wire fences are highly functional and usually have minimal maintenance requirements. These fences are particularly useful in areas where it is difficult to set regular posts, such as boggy or rocky areas.

Rock-jacks and Figure-4 fence supports should also be considered for use in areas where raw materials are available on the site and when construction and maintenance costs would be less than fences with set posts.

Rock-jacks and/or rock cribs provide the primary fence support. Figure-4 post assemblies can be used in combination with steel posts and wire stays to provide secondary support.

Fence type and the fence design selected will be adequate to control the animal(s) of concern, and must be suited to the landscapes over which it will be installed and shall be adapted to the physical environment of the site.

Fence type and the fence design selected will be adequate to meet the intended life expectancy of the conservation practice.

Boundary fences shall comply with Nevada state laws and fencing codes or standards for construction. Refer to the Nevada Revised Statutes Part 569.431 (1991) for the definition and requirements of a "Legal Fence".

WILDLIFE CONSIDERATIONS

Wildlife considerations will follow the requirements set forth for standard post and barbed wire fencing. See practice specifications for Standard Post and Barbed Wire Fencing, Practice Code 382(a).

III. SPECIFICATIONS

A) MATERIALS

Where appropriate, materials used shall be in accordance with the requirements set forth for standard post and barbed wire fencing. See practice specifications for Standard Post and Barbed Wire Fencing, Practice Code 382(a).

All commercially produced fencing materials will be new, unless an exception is noted.

B) CONSTRUCTION SPECIFICATIONS

Fence height, line wire spacing, and installation spacing of corner, gate, and in-line brace assemblies shall be in accordance with the requirements set forth for standard post and barbed wire fence with the following exceptions or additions to fence construction:

ROCK-JACKS

Rock-jacks are constructed from dimensional lumber, round posts, or split poles.

LINE POST ROCK-JACKS (Exhibit 1)

The wood frame recommended for rock-jacks used as line posts in a fence line (a line-jack) is constructed using at least 3-inch x 6-inch x 5 1/2-foot long legs and base supports. Two of the leg frame members are nailed together at approximately 6-inches from their ends to form an inverted V. A base support is then nailed across the bottom of the inverted V to form an equilateral triangle. This base support member is fastened across the two front legs so it will sit a minimum of six inches above the ground line when in place. A third leg is nailed to the top of the previously constructed triangle to form a tripod. This rear leg is placed onto the X formed by the joint between the two front legs so that all three legs of the frame cross each other at a point at least 40-inches above the ground. The two remaining base supports are then nailed to the bottom of each leg, at least six inches above the ground line, to form the rock platform support joists.

MATERIALS (continued)

Base supports (or joists) for the line-jack floor should have an 8-inch overlap where they join. Two 50d or 60d galvanized nails are used at each joint to connect legs and base supports. Each nailed joint is then wrapped with No. 9-gauge, galvanized, wire.

Each end of the base support joists should rest solidly on a rock base placed to provide additional frame support.

The line-jack legs should be placed in shallow holes dug in the ground to prevent slippage.

The floor of the line-jack should be constructed of 2-inch thick boards. Width of the floor boards can vary. Only the longest floor board need be nailed to the support joists to ensure frame rigidity. Once the line-jack frame is constructed and the floor boards are in place, roughly 300-pounds of rock are placed on the line-jack floor.

Line wires are stapled to the front legs of the line-jack.

ROCK-JACKS AS CORNER, GATE, AND IN-LINE BRACE UNITS (Exhibit 2)

Rock-jacks that are used at fence corners and gates of other locations where extra support is needed, are constructed using at least 3-inch x 6-inch diagonal braces and support joists. Diagonal braces are 8-feet in length and are joined to a 6-inch x 6-inch anchor post. See Exhibit 2.

The anchor post is set in the ground to a 1-foot depth (minimum). The anchor post shall have sufficient length that at least 4 ½ -feet of post rises above the ground level when set. All joints are to be notched for a snug fit and to allow one-half of each nail length to be driven into or through each piece. Two 50d or 60d galvanized nails are used at each joint. Each nailed joint is then double wrapped with No. 9-gauge, galvanized wire.

Base support joints may overlap and can be attached on the same side of the anchor post as the diagonal braces. The middle and each end of the support joists should rest solidly on rocks situated to provide additional frame support.

At gates and in-line brace assemblies, the diagonal braces are set perpendicular to each other with one brace parallel to the fence line.

At corners, the diagonal braces are set parallel to the fence line.

Corners wider than 90 degrees may need additional braces and support joists.

The outer end of each diagonal brace should be placed in a shallow hole dug in the ground to help prevent brace movement.

NRCS Nevada
January 2010

The floor of the rock-jack is constructed of 3-inch x 6-inch boards.

Once the rock-jack frame is constructed and the floor boards are in place, rocks are placed on the rock-jack floor. Large, heavy weight, rocks are placed at each joint with lesser weight rock distributed evenly over the rock platform. Weight of rock on the platform is 300 to 500-pounds.

Line wires are stapled to the front legs of the rock-jack.

ROCK CRIBS

Rock cribs are used where it is difficult to dig or drive posts. Should soil conditions prevent setting an anchor post for a rock-jack, rock cribs can be used.

- The ground surface shall be prepared to provide a level bed for setting the rock crib.

Rock cribs may be constructed using wood or steel posts and woven wire of the rock enclosure can be fabricated using wood poles and/or dimensional lumber.

- Wire fences shall have a 40-inch minimum diameter. Woven wire at least 36-inches in height and having No. 12 ½ -gauge intermediate wires shall be used to enclose placed rock (Exhibit 6).
- Square rock cribs shall have a minimum outside dimension of 4 ½ -feet on a side (Exhibit 7).
- Fill constructed crib with rocks less than 20-inches in diameter and ensure that there is no more than a 6-inch void between any placed rocks.

FIGURE-4 IN-LINE FENCE SUPPORTS (Exhibit 3)

Figure-4 fence supports are constructed from either dimensional lumber, round, or split poles.

Figure-4 supports are composed of three frame members (vertical post, diagonal brace, and ground leg) that are each a minimum of 3-inches x 6-inches for dimensional lumber or split poles.

Round poles used as frame members shall have a 3-inch minimum diameter.

The upright post is 4-feet in length and the diagonal brace and ground leg of the support frame are 5 ½ -feet long.

The bottom end of the vertical post rests on the ground surface.

The diagonal brace is fastened to the vertical post at a point approximately 8-inches below the top of the post so that the upper end of the diagonal brace extends 2 to 3-inches past the vertical post. The angled joint between the vertical post and the upper end of the diagonal brace should provide for at least 8-inches of overlap. The end of the diagonal brace pointed away from the fence line rests on the ground surface.

MATERIALS (continued)

The fence line end of the ground leg is attached to the bottom of the vertical post so that about 1 ½ -feet extends past the post. The distance from the end of the ground leg pointed away from the fence, to the midpoint of the vertical post, will then be about 4-feet. Fasten the ground leg to the vertical post above the ground surface and below the bottom line wire.

The outer end of the ground leg is attached to the diagonal brace at a point 10 to 12-inches above the ground line. Two 50d nails are driven into or through Figure-4 frame members at each joint. Each joint is then secured with a double wrap of No. 9-gauge, galvanized wire.

Line wires are stapled to the upright post member of the Figure-4 support frame.

In wet or swampy areas, a pair of 3 to 4-inch diameter poles can replace the single ground leg frame member of the standard Figure-4 design described above. These poles (mudsills) are attached to the bottom of either side of the vertical post and diagonal brace to act as floaters and keep the post from sinking into the wet ground (Exhibit 3).

ROCK-JACK, FIGURE-4, AND LINE POST SPACING

Rock-jacks are placed at all abrupt breaks in topography and definite changes in alignment to the fence line.

In-line rock-jacks (line-jacks) are spaced from 50 to 160 feet, depending on snow conditions and type of intermediate supports.

- On level (rocky or boggy) sites with light snowfall, rock-jacks should be spaced at 100-foot intervals and Figure-4's set every 25-feet with a stay (wood, wire, fiberglass) placed mid-way between each Figure-4 (Exhibit 5).
- For moderately steep topography and/or areas of moderate snowfall, rock-jacks should be spaced at 50-foot intervals with stays (wood or fiberglass) spaced at 12 ½ -foot intervals between rock-jacks (Exhibit 5).
- On steep, rocky slopes, or sites with heavy snow loads, rock-jacks are spaced at 50-foot intervals and Figure-4 assemblies are set 25-feet from each rock-jack with a wooden stay placed mid-way between a Figure-4 and the adjacent rock-jack. (Exhibit 5).
- On sites where steel posts can be driven, rock-jacks are spaced at 160-foot intervals and steel posts are set at 20-foot intervals between rock-jacks. A stay is placed mid-way between steel posts-10-feet from each steel post (Exhibit 4).

IV. INSTALLATION

Unless otherwise specified, installation of the fence shall conform to the specifications and exhibits or other drawings, as provided.

The completed job shall be workmanlike and present a good appearance. The installer and other persons will conduct all work in accordance with proper safety procedures.

V. BASIS OF ACCEPTANCE

After the fence has been installed, a site inspection will be made to determine if fence construction, and the materials used, meet practice specification requirements as specified on the conservation practice documentation worksheet.

VI. MAINTENANCE

This practice will require the performance of periodic maintenance.

Fence maintenance items to be alert to and corrected include:

- tension of wire
- bent steel posts
- broken wires
- post alignment
- wire corrosion
- post stability
- broken frame member
- sagging gates
- bent or broken stays
- wildlife concerns
- pulled staples or clips
- need for additional rock placed in rock-jacks

REFERENCES

The following references provide excellent guidance for fence construction, selection of fencing materials, and the installation of fence components.

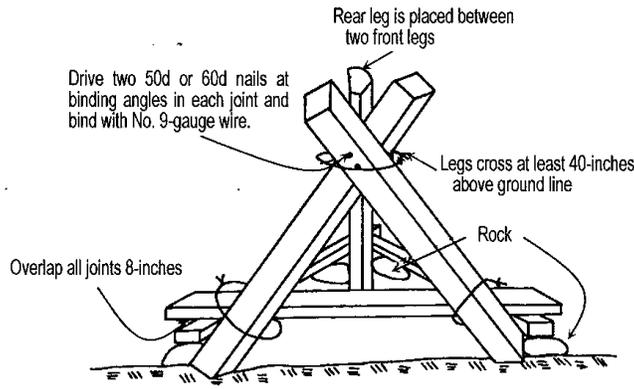
Henderson, G.E. 1966. Planning Farm Fences. American Association for Agricultural Engineering and Vocational Agriculture, Athens, GA. 54pp.

Sanderson, H.R. T.M. Quigley, E.E. Swan, L.R. Spink, 1990. Specifications for Structural Range Improvements. Gen. Tech. Rep. PNW-GTR-250. Portland, OR. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 126p.

USDI Bureau of Land Management and USDA Forest Service. 1988. Fencing. 2400-Range 8824 2803.

Valentine, J.F. 1971. Range Developments and Improvements. Academic Press, San Diego, CA.

EXHIBIT 1

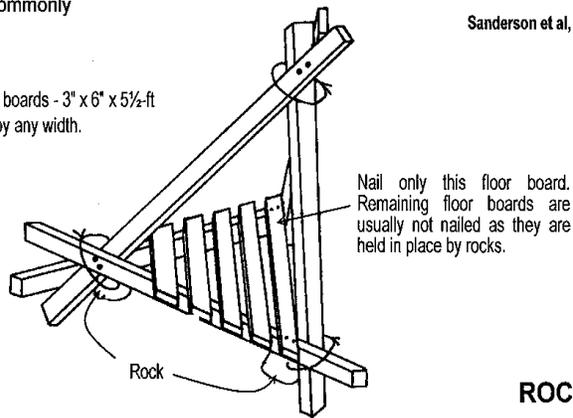


FRONT VIEW

Construction details for rock-jacks used in fence line – commonly called *line-jacks*.

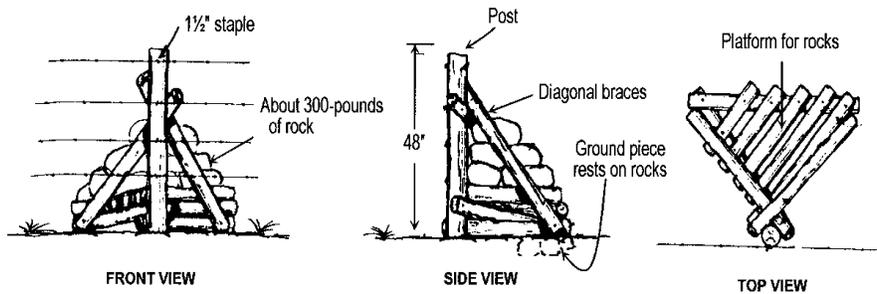
Sanderson et al, 1990

Jack legs and supports: 6 boards - 3" x 6" x 5½-ft
 Floor: Sound wood 2" thick by any width.



SIDE VIEW

ROCK-JACK



FRONT VIEW

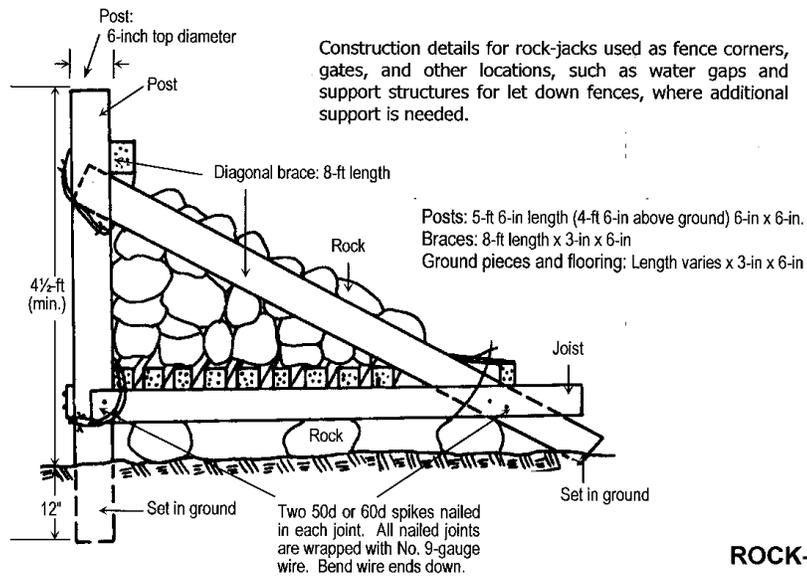
SIDE VIEW

TOP VIEW

Rock-Jack Post

USDI/USFS 2400-Range 8824 2803 (1988)

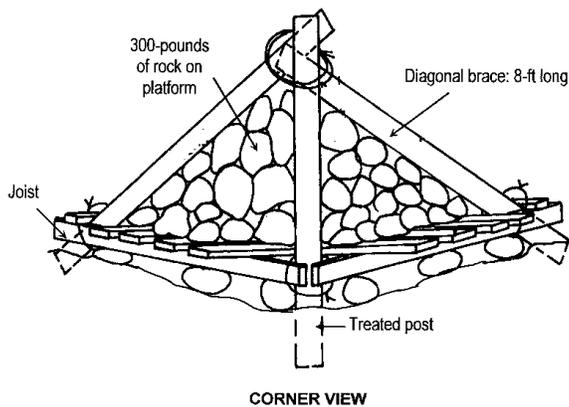
EXHIBIT 2



ROCK-JACK

SIDE VIEW

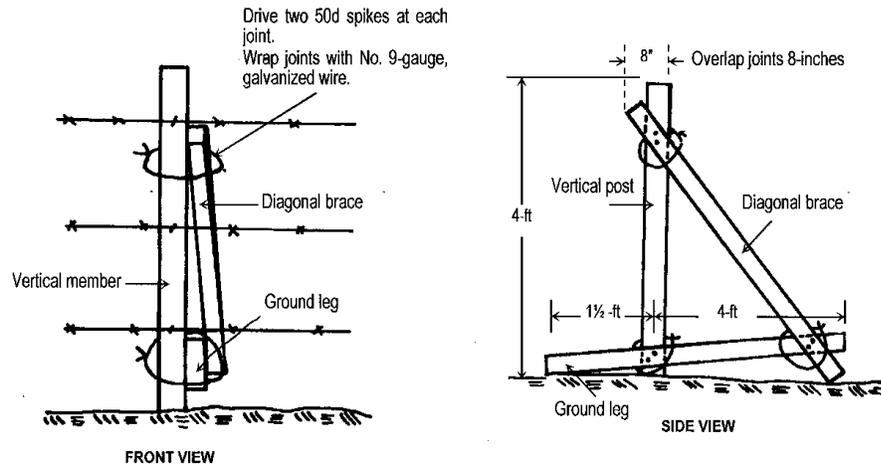
Sanderson et al, 1990



CORNER VIEW

Joints should be notched for snug fit and to allow for half the nail length to be driven into or through each piece. Two 50d or 60d spikes are driven in each joint then double-wrapped with No. 9-gauge, galvanized, wire. Diagonal braces are parallel with fence line. Joists may cross and attach on the same side of post as the diagonal braces. Corners wider than 90° may need additional braces and platform joists.

EXHIBIT 3



Construction details for Figure-4 fence supports.

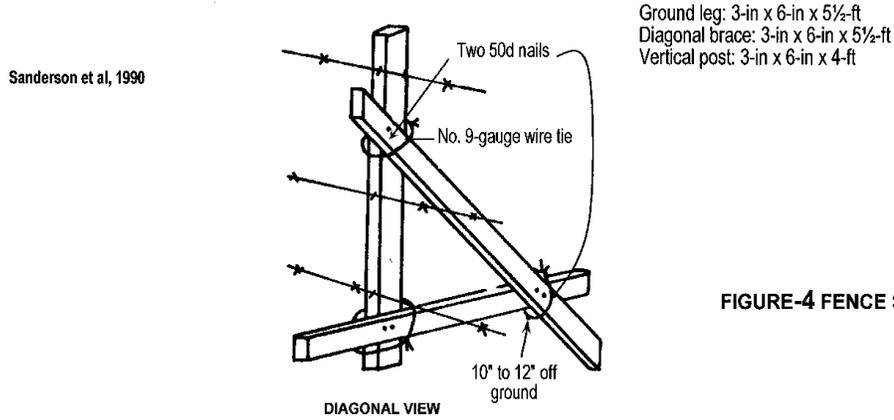


FIGURE-4 FENCE SUPPORTS

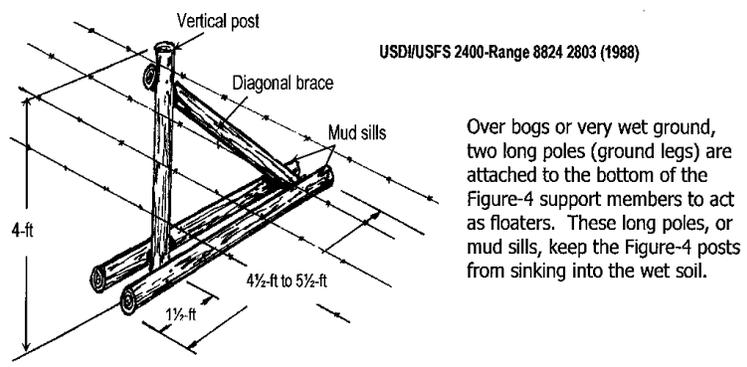
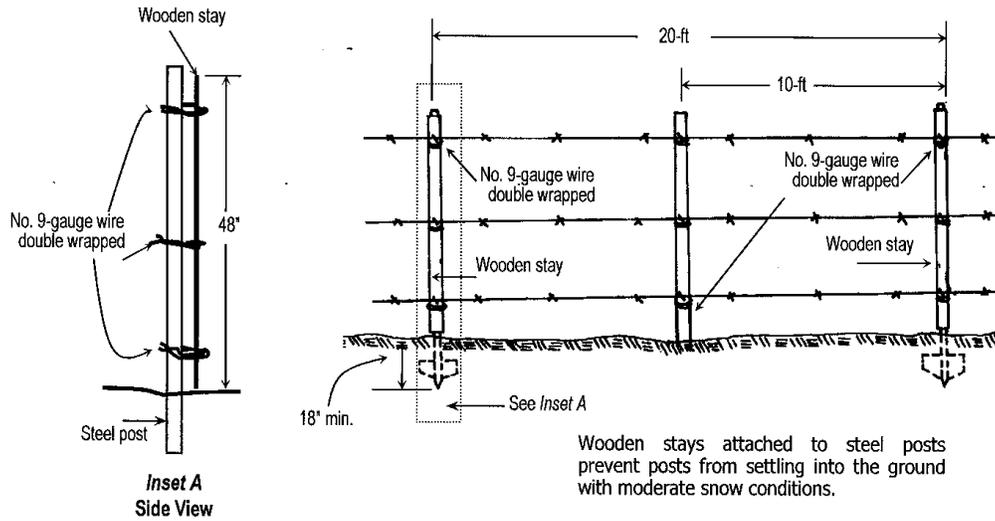
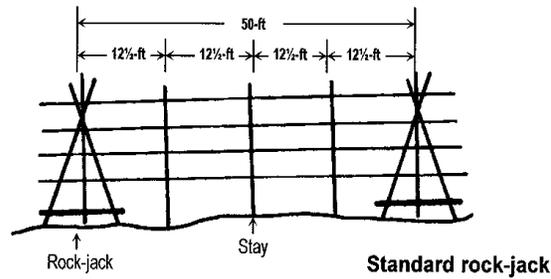


EXHIBIT 4



ROCK-JACKS WITH STEEL POSTS



Sanderson et al, 1990

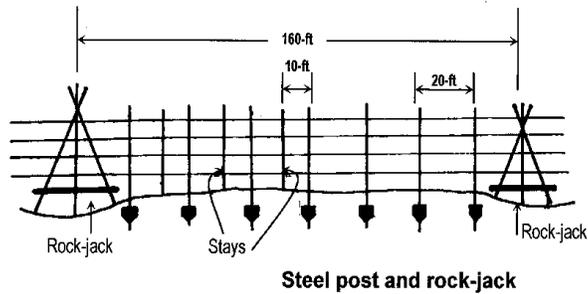
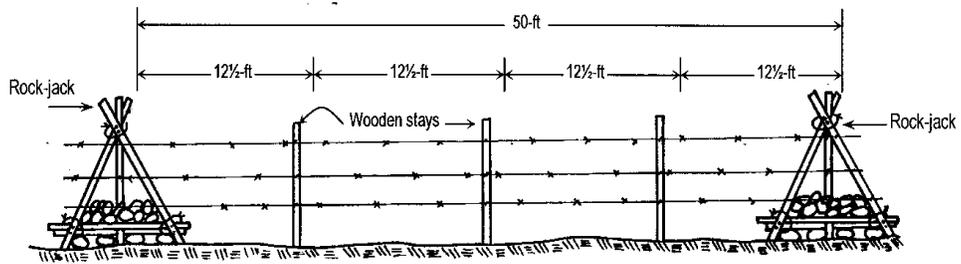


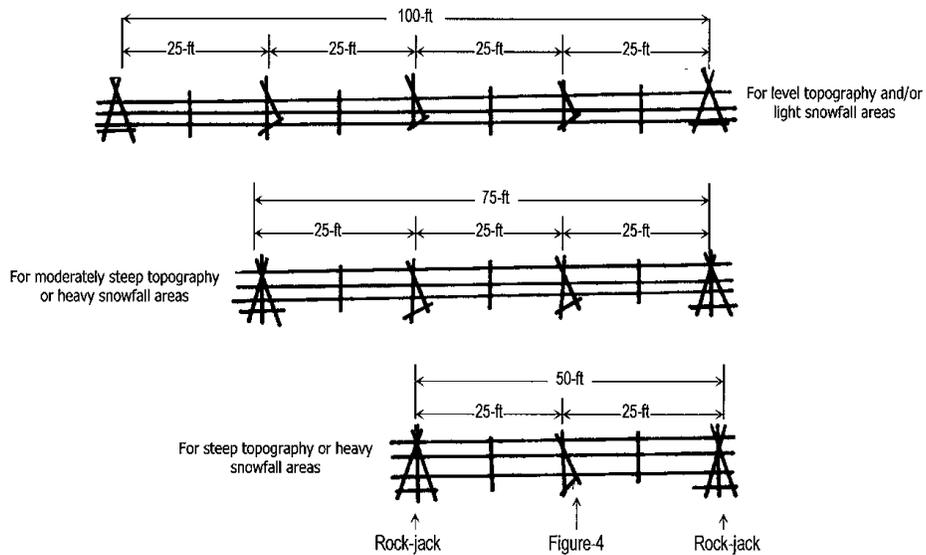
EXHIBIT 5



Spacing recommendations for fences that use rock-jacks and Figure-4s. Additional rock-jacks are placed at abrupt breaks in topography.

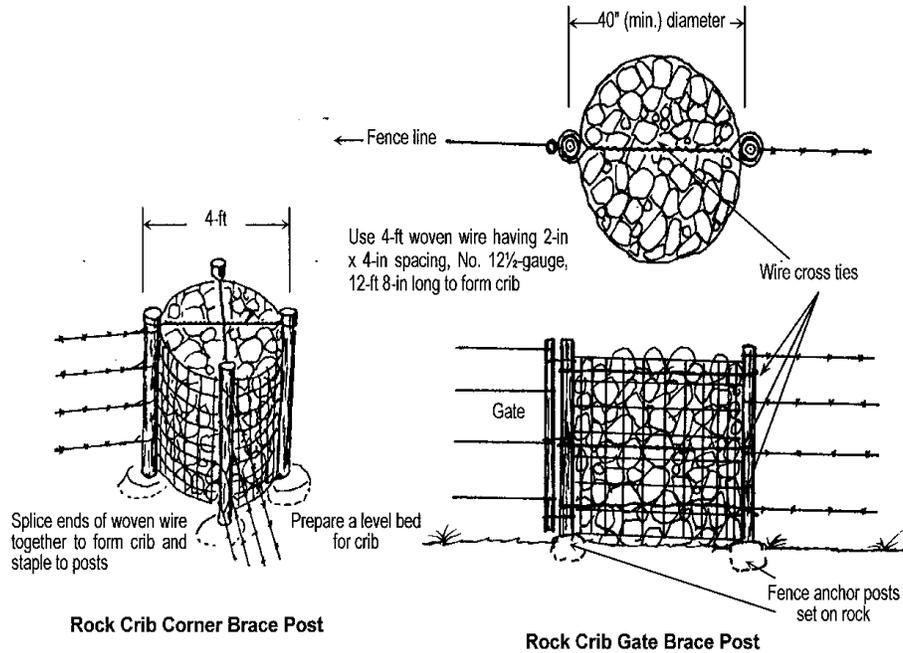
SPACING RECOMMENDATION FOR ROCK-JACKS AND FIGURE-4 FENCE COMPONENTS.

Sanderson et al, 1990



ROCK-JACK AND FIGURE-4 FENCE

EXHIBIT 6



ROCK CRIB

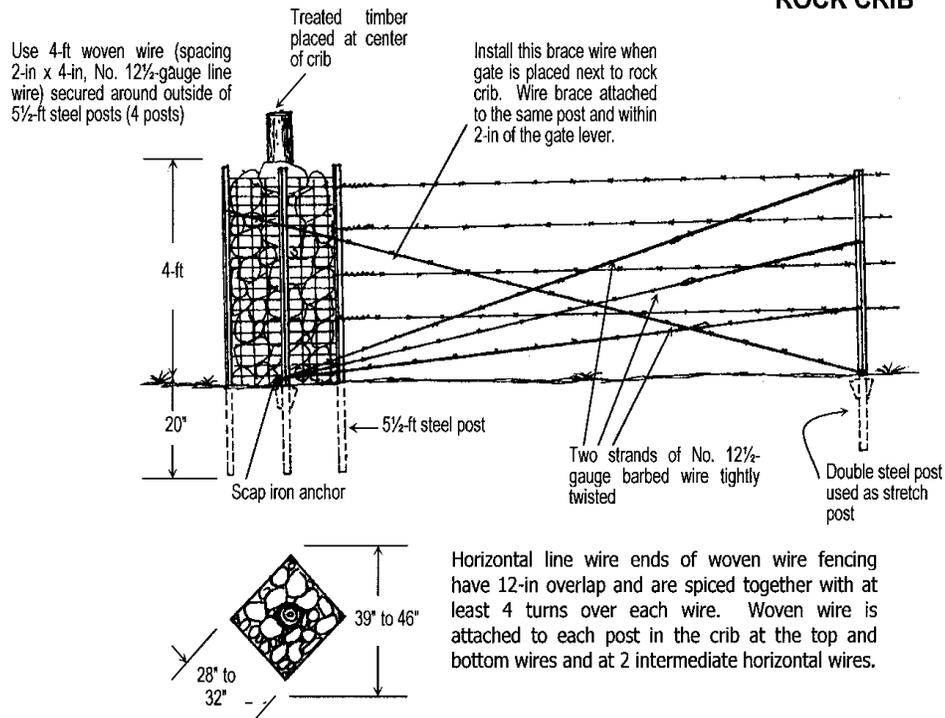
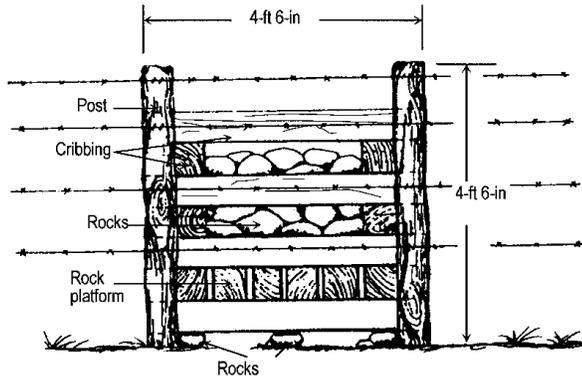
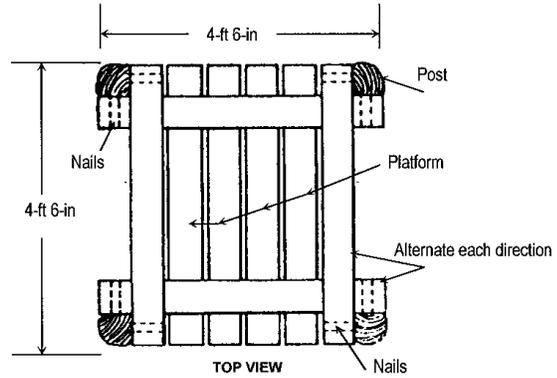


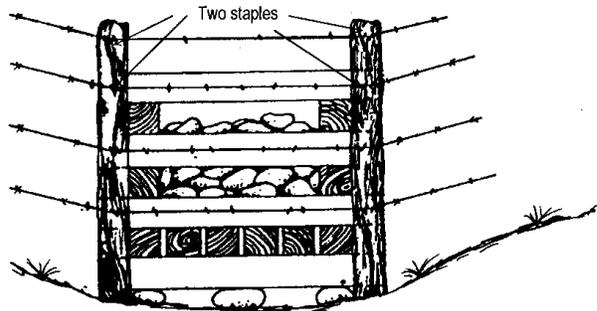
EXHIBIT 7

USDI/USFS 2400-Range 8824 2803 (1988)



SQUARE ROCK CRIBS

Square rock cribs are used as in-line brace unit, fence corners, or at gates where rock-jack and Figure-4 fence is constructed. Square rock cribs are stable and are useful where it is difficult to dig or drive posts.



Square rock crib for crossing dry draws