# Sediment Retention Fiber Rolls (SRFRs)
# General Usage and Installation Guidelines

Erosion Control Technology Council

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July 2018
Version 2.0

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## Introduction

Sediment Retention Fiber Rolls (SRFRs) are a manufactured three-dimensional device of a specified filler matrix encapsulated within a flexible containment material utilized in sediment and flow control applications. SRFRs are also known as wattles, logs, socks, tubes or fiber rolls. SRFRs are available as prefabricated units; constructed into tubular configurations comprised of rice straw, wheat straw, excelsior fiber, wood fiber, coconut fiber, compost, flax or a similar matrix material. The matrix material is encapsulated within biodegradable or photodegradable netting, yielding an approximate functional life of 1 - 3 years. Functional life will vary depending on factors such as material composition and site-specific climatic conditions. SRFRs provide economical performance and utility for numerous applications such as perimeter control, inlet protection, velocity control and slope length reduction. Finally, as with any erosion control or sediment control measure, proper installation and maintenance is critical to the success of these products.

SRFRs offer many advantages when used in slope and channel applications. Once installed, SRFRs reduce flow velocity, intercept runoff and remove sediment from polluted waters. Sediment collects upstream of the unit and within the fibrous matrices of SRFRs. Plant material may also take hold upstream and within the SRFR matrix. When plant material is established, a vegetated buffer is formed providing permanent erosion control. In an unvegetated condition, SRFRs serve to shorten the effective slope length of the waterway or slope.

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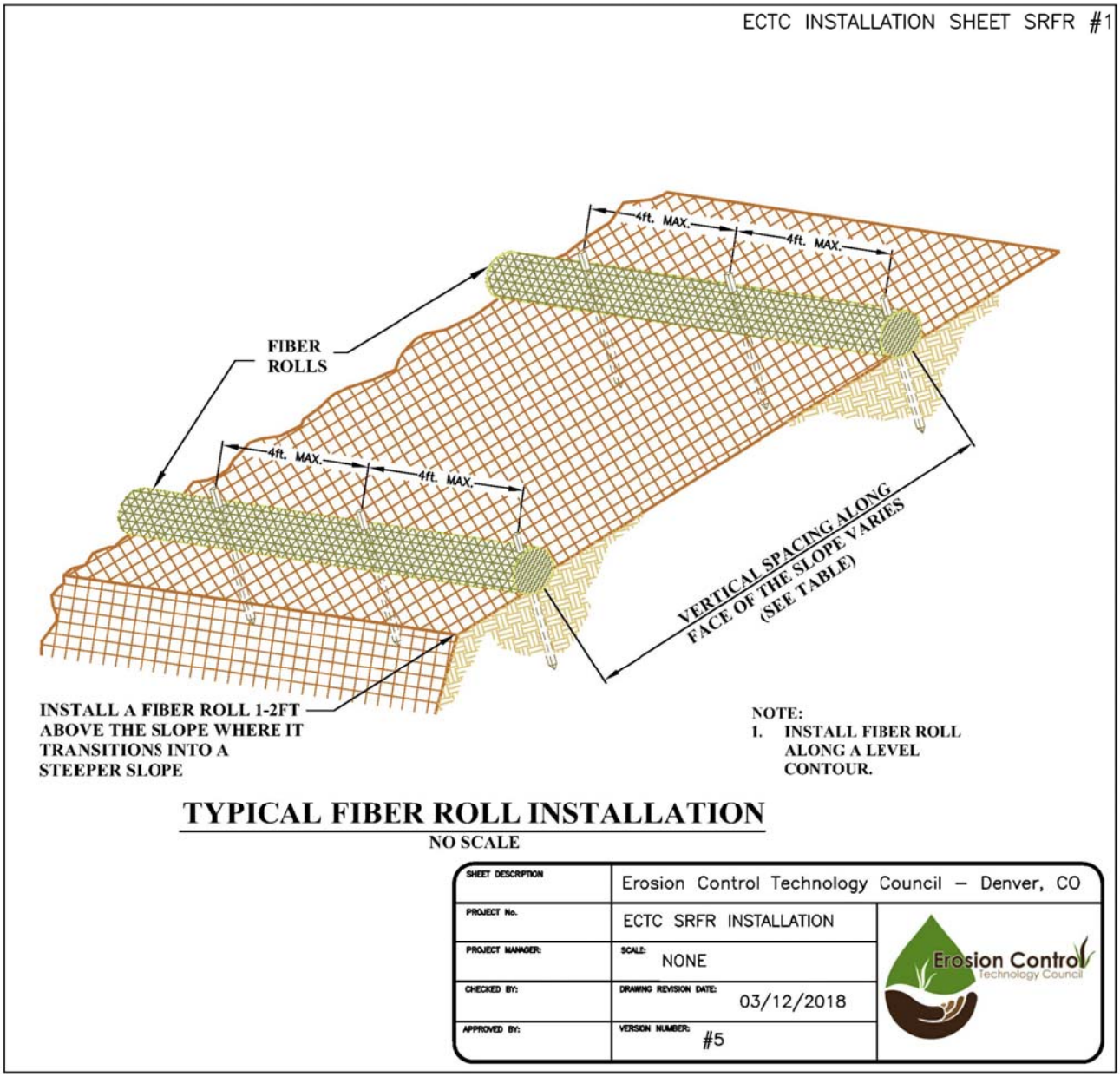
## Appropriate Applications

SRFRs are typically placed along the toe, top, face and at grade breaks of exposed and erodible slopes to shorten the slope length and spread runoff as sheet flow. SRFRs are also frequently used for inlet protection, around temporary stockpiles and even around the perimeter of a job




NOTES:

1. Install fiber roll along a level contour.
2. Some SRFRs are anchored on the down gradient side through the netting only as compared to through the center of the SRFR as shown on this detail. (See netting only stake detail – ECTC SRFR installation sheet 5)

**Figure 1. Spacing of SRFRs.**

## Appropriate Applications (cont.)

site for sediment containment and/or filtration. SRFRs are also used in channel applications as checks to reduce flow velocity and filter sediment laden flow. SRFRs may be used in conjunction with Rolled Erosion Control Products (RECPs) and Hydraulically Applied Erosion Control Products (HECPs). If used with HECPs, SRFRs are installed prior to application of the HECP. Once SRFRs are installed, apply the HECP per the manufacturer's application rates and instructions. When used with RECPs, SRFRs are typically placed and secured after installation of the RECP. Proper installation is necessary for successful SRFR implementation. Excessive runoff and erosion may occur if SRFRs are not adequately spaced, trenched in and/or anchored. The following provides a general guide to determination of spacing and installation.

### Table 1. Nominal Spacing for SRFR Slope Installations.

| | | Nominal Diameter Spacing (ft) | | | |
|---|---|---|---|---|---|
| | | 6" dia. | 9" dia. | 12" dia. | 20" dia. |
| **Slope Gradient** | ≤4H:1V | 20 | 40 | 60 | 80 |
| | 3H:1V | 15 | 30 | 45 | 60 |
| | 2H:1V | 10 | 20 | 30 | 40 |
| | 1H:1V | 5 | 10 | 15 | 20 |

## Reducing Slope Length for Erosion Control

Slope length and gradient are two factors that directly affect the erodibility of a slope and introduce sediment into stormwater runoff. As many road right-of-ways are space limited, slopes along roadsides tend to be steep, leading to accelerated erosion. SRFRs provide a reliable and economical means to reduce the effective length of slopes, thus reducing erosion and sediment discharge to receiving waters.

## Suggested Spacing

Primarily, the gradient of the slope will determine the distance between SRFRs on a slope, however, the soil type and overall project risk may affect the final spacing plan of the installation. See Figure 1 for illustration of typical SRFR spacing.

Typical spacing between SRFRs for slope applications is recommended in Table 1. Contact the manufacturer of the SRFR for specific recommendations.

Typical spacing between SRFRs can be calculated as follows for channel applications:

$$\text{Spacing} = \frac{\text{(Unit Nominal Diameter - Trench Depth)}}{\text{Channel Gradient}}$$

Example: Unit Nominal Diameter = 9”
Trench Depth = 2.0” (See step 3)
Channel Gradient = 0.005 ft/ft

**Spacing = [(9” - 2.0”) / (12” per ft)] / 0.005 = 116.7 ft**

## Key Elements for Successful Product Installation

Always consult with the manufacturer for specific product installation requirements and site specific recommendations.

It is critical that the SRFRs are installed perpendicular to the expected water flow (parallel to the slope contour or across the width of the channel/ swale).

Lay the SRFRs onto an RECP, the prepared subgrade, or into the trenches in the soil; ensuring no gaps exist between the roll and the subgrade or RECP. When using HECPs, apply them after the SRFRs have been properly installed.

Wooden stakes or metal pins may be used to secure the SRFRs. If using wooden stakes the minimum dimensions of the stake should be ¾” x ¾” and long enough to provide anchoring

## Key Elements for Successful Product Installation (cont.)

and stability for the SRFR. Typically, the stake length below the soil surface is between 12" - 16". Site-specific conditions such as compacted soil or rocky subgrade will dictate what is realistic and practical for an adequate installation. First, make pilot hole through the center of the SRFRs using a straight metal rod (i.e. rebar), then insert the wooden stakes (this step may not be necessary if using porous SRFRs or metal pins.)

SRFRs may be secured by driving stakes through the body of the unit, or by penetrating the netting of the unit on an angle. Individual manufacturers provide product/project specific recommendations for the staking of SRFRs. For either staking method, drive the stakes or pins through the SRFR or the netting only, leaving no more than 1 to 2 inches of the stake or pin exposed. Stakes or pins should be placed according to manufacturer's recommendations. On very steep or erosive slopes, additional stakes or pins may be placed on the downslope side of the roll. In very compacted soil shorter stakes or pins may be necessary.

**Photo 1. SRFRs installed across the width of a swale.**

**CADD Drawings:**

- The drawings shown in this document are available for download at ECTC.org
- DWG files are available for designers to import into CADD.
- Designers are welcome to modify the drawings for usage in their project specifications.

## Installation Instructions on Bare (Unprotected) Soils

**Step One:** Prepare site by removing debris and obstructions and minimizing disturbances to yield a smooth, even ground surface. If seeding is required, place seed, as specified, prior to installation of SRFRs.

**Step Two:** Determine if an anchor trench is required. Verify manufacturer's recommendations based on site-specific characteristics and product properties. Map out the placement of SRFRs to determine location and profile of the anchor trench.

**Step Three:** For SRFRs that require an anchor trench, excavate an anchor trench along the area where the SRFR is to be placed. The depth and width of the anchor trench is dependent upon the soil type and dimensions of the SRFR. Typically, the anchor trench

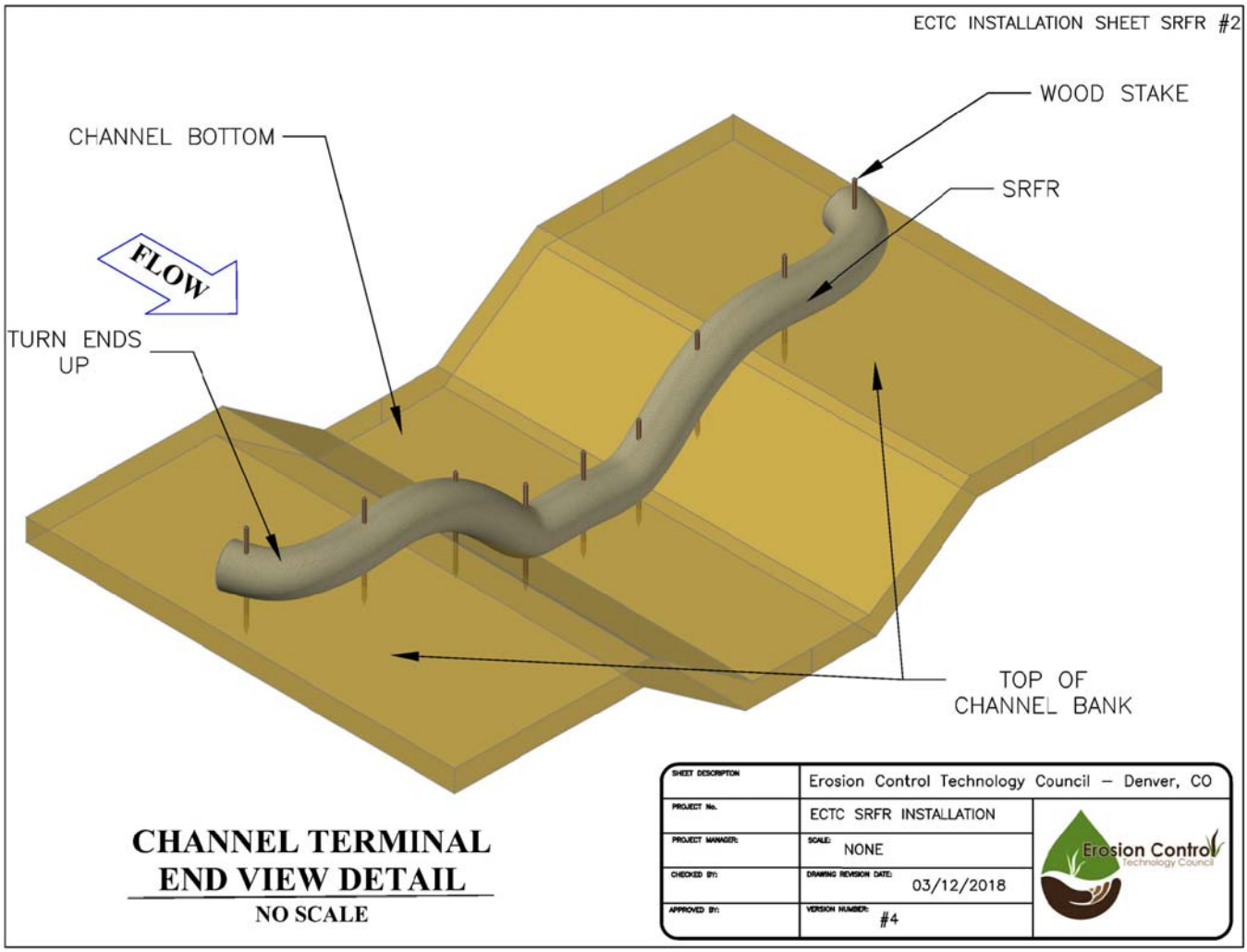



**Figure 2. Terminal End Detail.**

## Installation Instructions on Bare (Unprotected) Soils (cont.)

should be a range of 1 to 3 inches. The anchor trench is utilized to minimize under-cutting of soil on the upstream side of the slope. The anchor trench should match the installation profile and contour of the installed device. SRFRs installed on flat surfaces as perimeter control or inlet protection may not require an anchor trench, per manufacturer's recommendation. For SRFRs that do not require an anchor trench, secure the SRFRs directly to the ground surface, as directed by Steps 5 and 6.

**Step Four:** Channel Applications: The SRFR should be placed across the width of the channel and perpendicular to the centerline of the channel (direction of flow). The SRFR must be installed sufficiently up the channel banks to prevent flanking or concen-

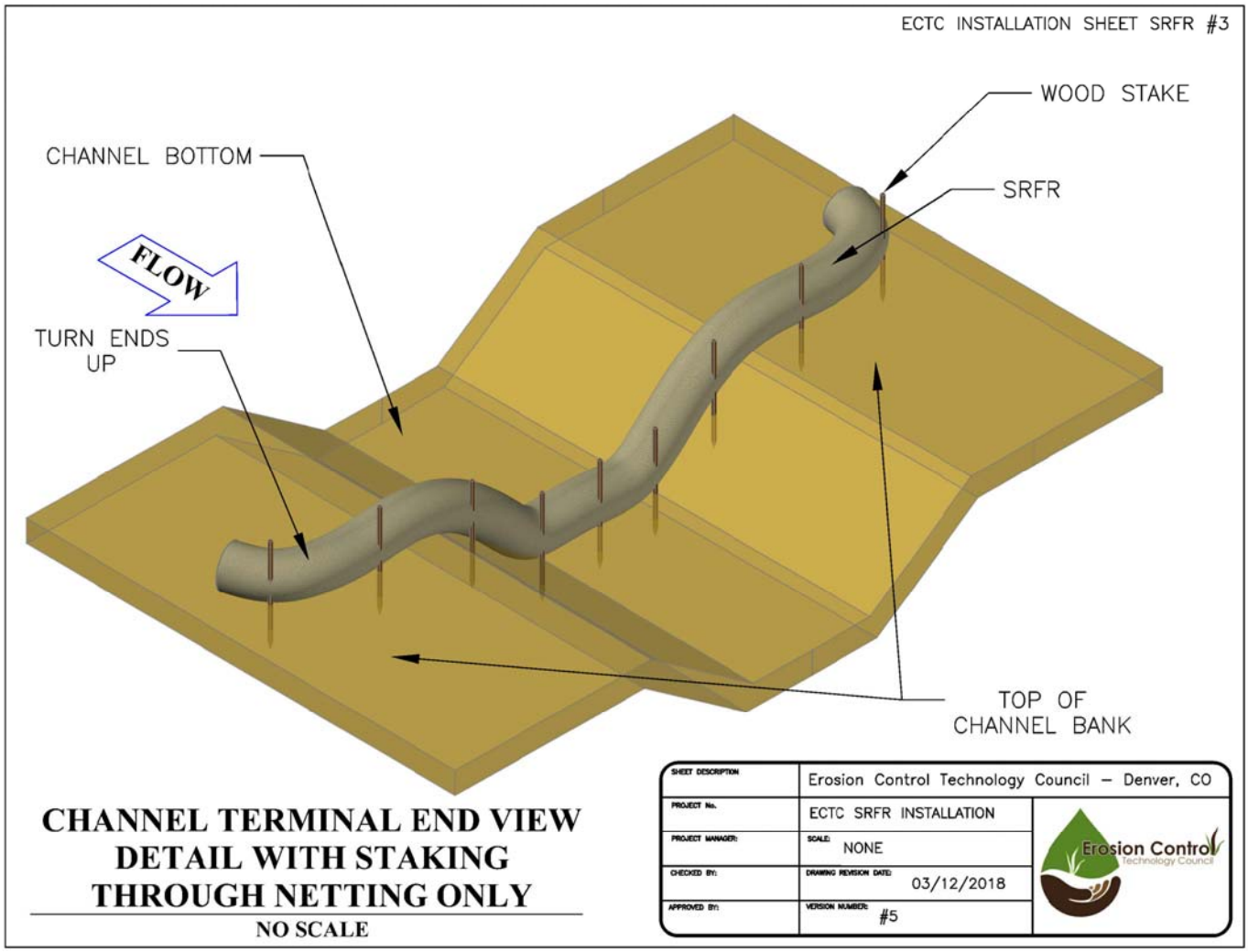



**Figure 3. Terminal End Detail**

## Installation Instructions on Bare (Unprotected) Soils (cont.)

trated flow around the ends of the SRFR. Slope Applications: Units should be placed perpendicular to the downslope flow line. Ends of the unit should be turned upslope forty-five degrees to prohibit flanking of the installation. **See Figures 2 and 3** for examples of slope installation terminal end.

**Step Five:** Place the SRFR in the anchor trench. The SRFR must be installed ensuring intimate contact with

**Figures 4, 5 & 6 Entrenchment and Staking Details.**

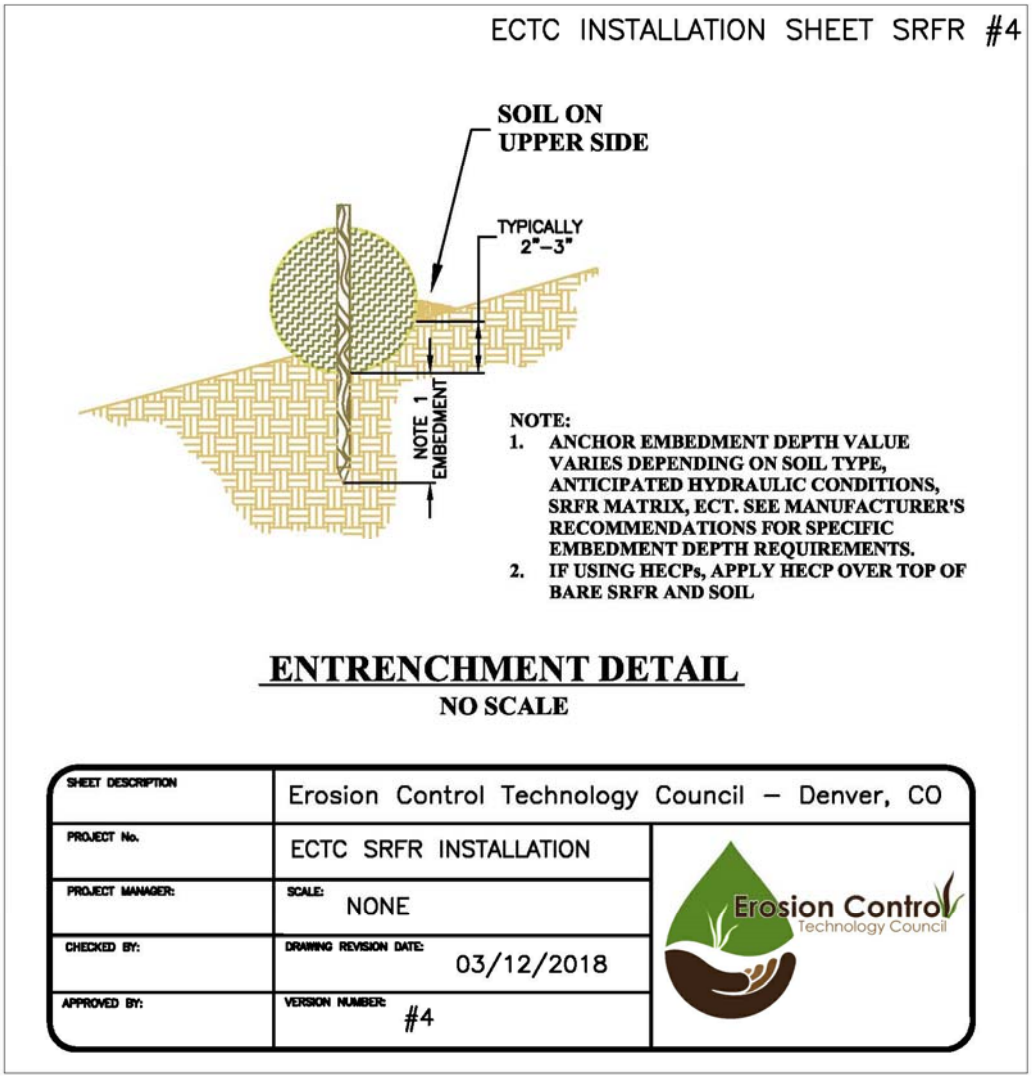



**Figure 4. Stake through the middle of the SRFR.**

## Installation Instructions on Bare (Unprotected) Soils (cont.)

the soil surface along the entire length of the unit.

**Step Six:** Secure the SRFR with stakes or pins along the length of the unit. Stakes should be driven in vertically, perpendicular to a horizontal ground plane (see **Figures 4, 5 and 6**, "Entrenchment and Staking Details"). Driving stakes perpendicular to a sloped ground surface may compromise the stability of the SRFR.

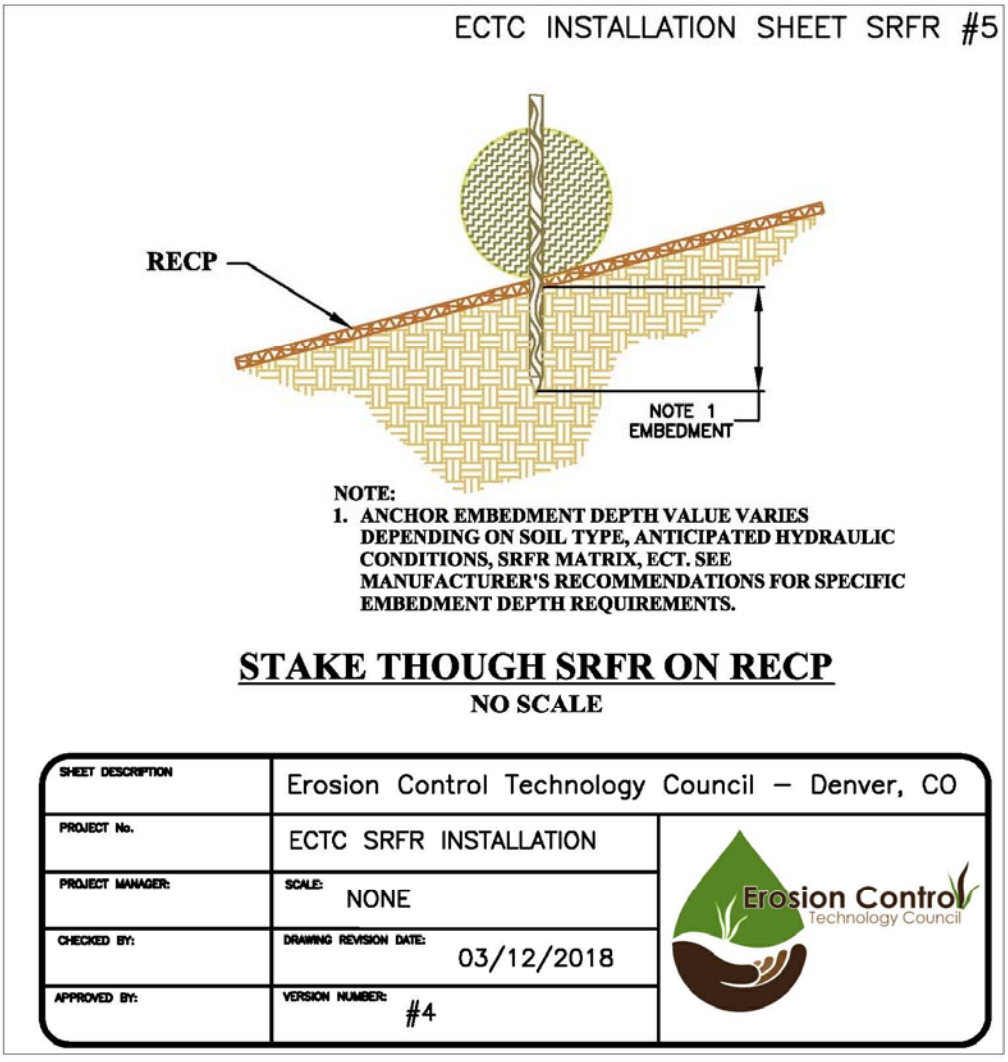



**Figure 5 Stake through RECP on top of RECP/HECP.**

## Installation Instructions on Bare (Unprotected) Soils (cont.)

An optional method of securing the SRFR is to drive stakes on both sides of the SRFR and lace rope between the stakes securing the SRFR. After the rope is laced around the stakes, the stakes are then driven into the slope so that the rope will hold the fiber roll tightly to the slope. If metal stakes are used the rope may be laced and knotted at the bend at the top of the metal stakes. Secure ends of each SRFR. See **Figure 7** for schematics of Stake Lacing.

### Figures 4, 5 & 6 Entrenchment and Staking Details (cont.)

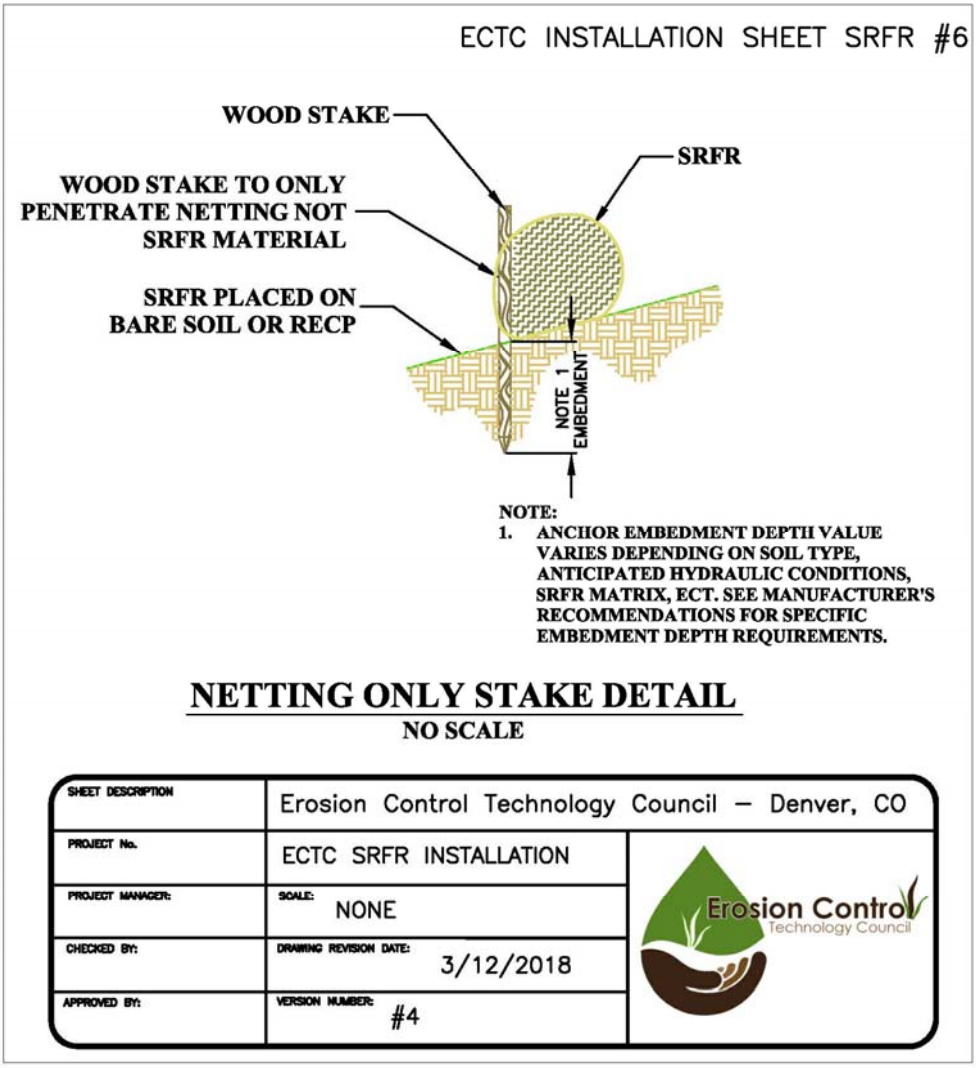


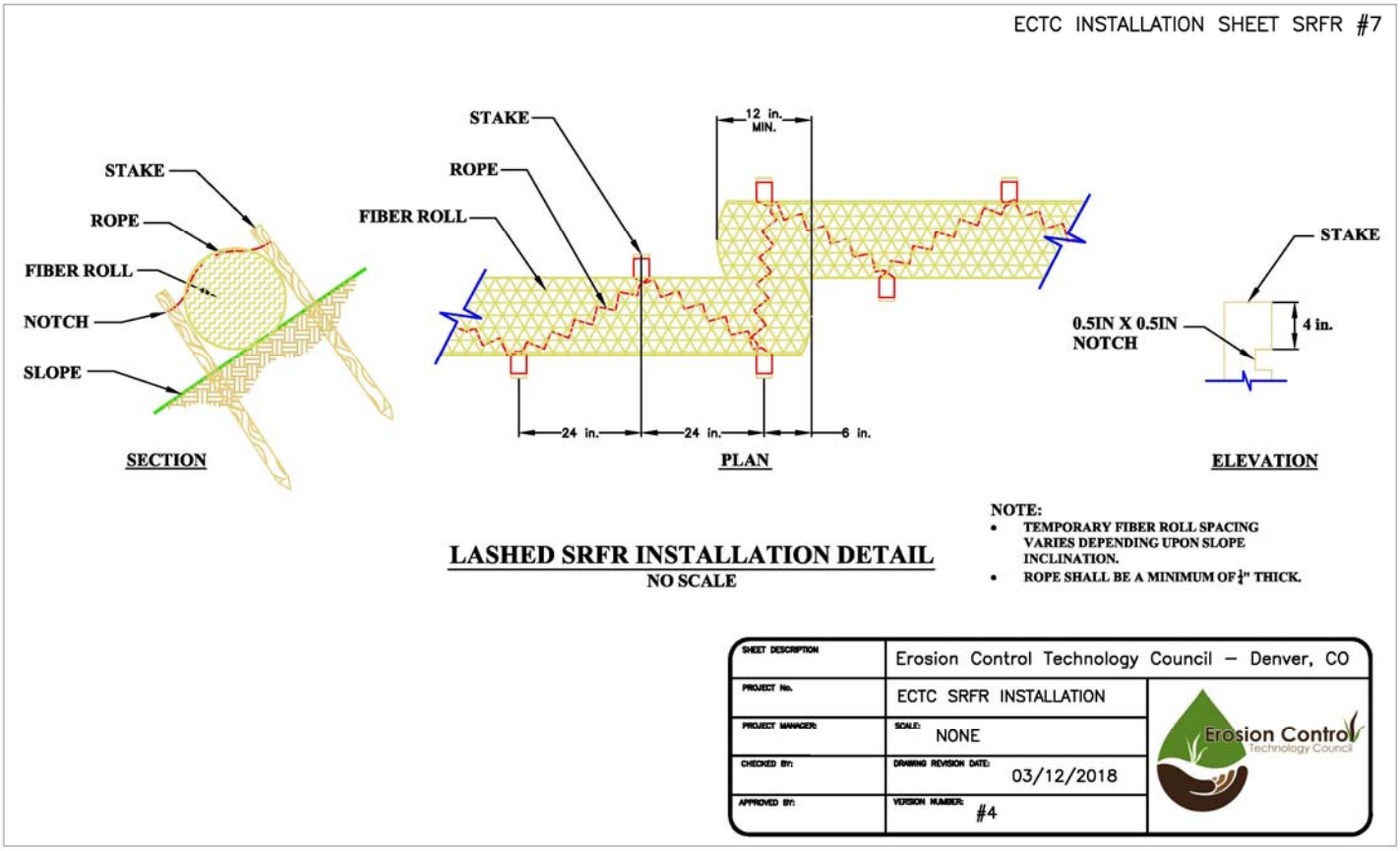

**Figure 6. Stake through netting only on soil.**

## Installation Instructions on Bare (Unprotected) Soils (cont.)

**Step Seven:** See manufacturer's recommendations regarding joining methods for adjacent units. A one foot overlap, directed up-gradient, is recommended for most products; however, abutting and securing with a common stake is recommended for some of the more porous SRFRs. **Figures 8, 9 & 10** show details for these methodologies.

**Step Eight:** For trenched SRFRs, place soil on up-slope side of the roll and compact well. The compacted up-slope soil is placed to act as a sealant of the SRFR-soil interface in order to prevent undermining the SRFR. See Figure 4 for Entrenchment Detail.

**Step Nine:** For slope applications, the terminal ends of the SRFRs should be turned 45 degrees upslope and secured by stakes to prevent water flow around the terminal ends of the SRFRs. See Figure 2 for Terminal End Detail.




**Figures 7 Schematics of Stake Lacing**

## Figures 8, 9 and 10 Joining Methods of Adjacent SRFRs.

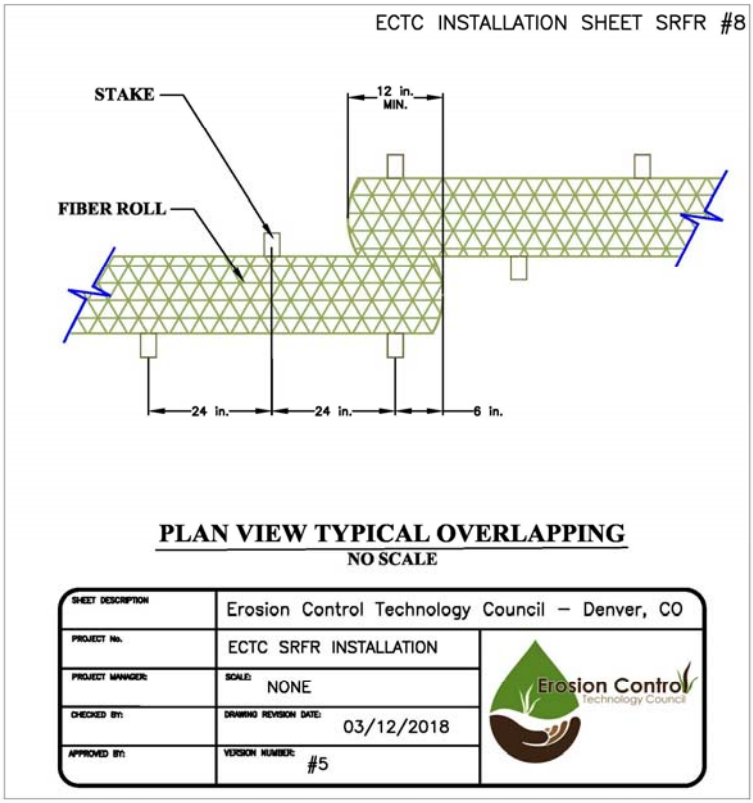



**Figure 8. Overlapping SRFRs with laced stakes.**

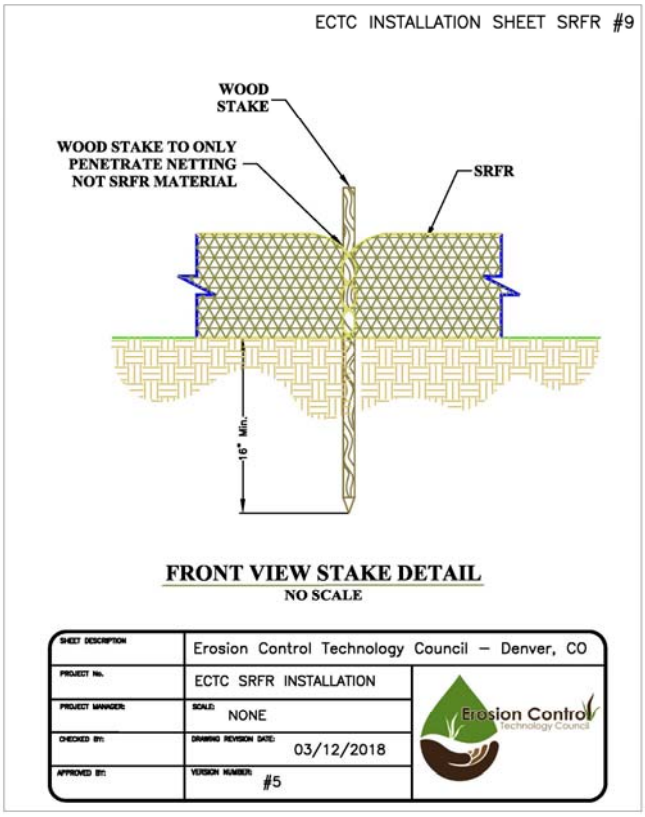



**Figure 9. Abutting SRFRs with a common stake.**

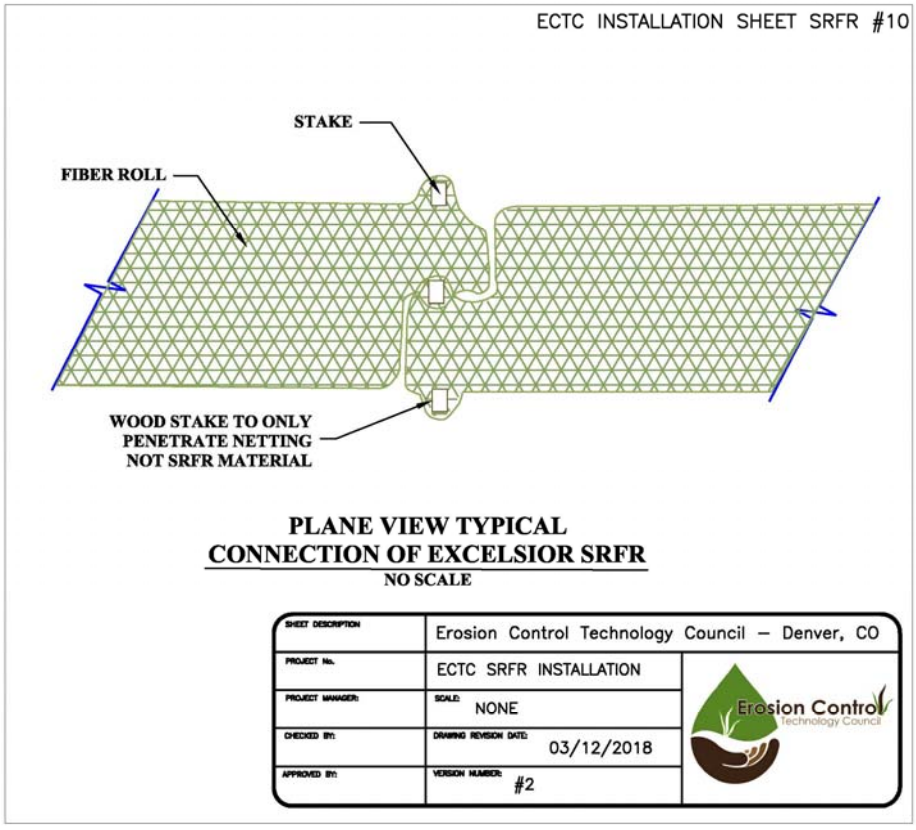



**Figure 10. Typical connection of a wood SRFR.**

## Installation Instructions in Conjunction with RECP / HECP

For placement in conjunction with an HECP, install SRFR as directed in Step One through Step Eight above; then install the HECP as directed by manufacturer's instructions.

For placement in conjunction with RECPs, install RECPs as per manufacturer's instructions, then install SRFRs on top of RECP ensuring intimate contact with the RECP along the entire length of the unit. Secure SRFR(s) as directed in Steps Five through Seven.

## Maintenance and Installation

Refer to the manufacturer for maintenance guidelines as this document is only intended for typical installation recommendations. For the most effective SRFR installation, use guidelines as recommended by the manufacturer. Manufacturers may also provide site specific recommendations.

## About ECTC

**The Erosion Control Technology Council (ECTC) is committed to promoting cost-effective erosion and sediment control solutions through leadership, standardization and education. ECTC assists agencies, engineers, designers, contractors and other entities in the proper application, installation and specification of erosion control technologies while establishing guidelines for product quality, testing and performance.**

**ECTC's mission has grown even more important as new end-users look for guidance in employing RECPs, HECPs and SRFRs to comply with more stringent erosion/sediment control regulations.**

Erosion Control Technology Council

Education and Standardization for a Growing Industry

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