5TH ANNUAL CAPE COASTAL CONFERENCE

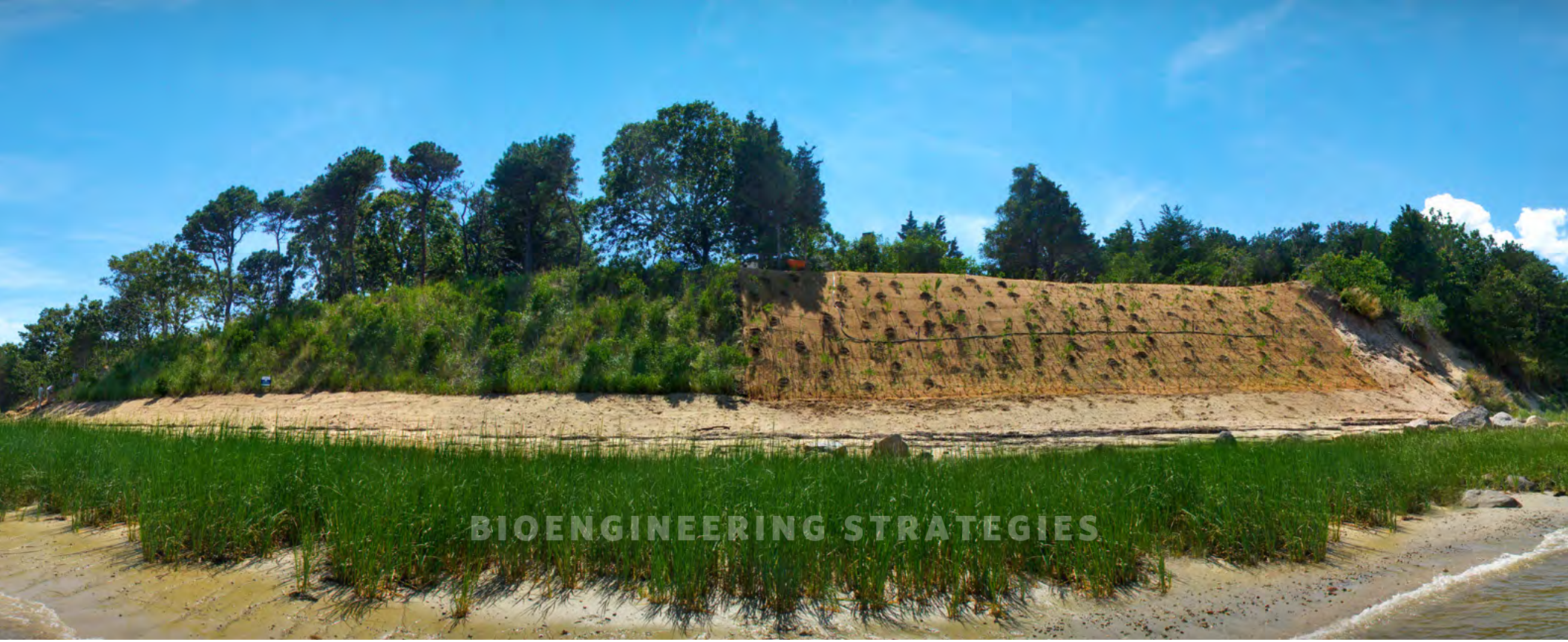
Key Considerations for Living Shoreline Projects

Seth Wilkinson, Restoration Ecologist, President
Wilkinson Ecological Design, Inc.

BIOENGINEERING STRATEGIES

Reducing Coastal Erosion and Coastal Storm Damage While Minimizing Impacts

WILKINSON
ECOLOGICAL DESIGN



Reducing Coastal Erosion and Coastal Storm Damage While Minimizing Impacts

Based on SITE SPECIFIC Criteria

Based on SITE SPECIFIC Criteria

Understanding if a beach has a
BASE ELEVATION.

Based on SITE SPECIFIC Criteria

Understanding if a beach has a BASE ELEVATION.

Understanding the function a FRINGE MARSH plays.

Based on SITE SPECIFIC Criteria

Understanding if a beach has a BASE ELEVATION.

Understanding the function a FRINGE MARSH plays.

Understanding near shore characteristics such as FETCH, WATER DEPTHS, SAND BARS, and location within a given LITTORAL CELL.

BIOENGINEERING STRATEGIES

MATERIALS

MATERIALS

Coir Fiber Rolls

Adds stability and protection to the toe of a bank and provides a window of opportunity to establish vegetation.

MATERIALS

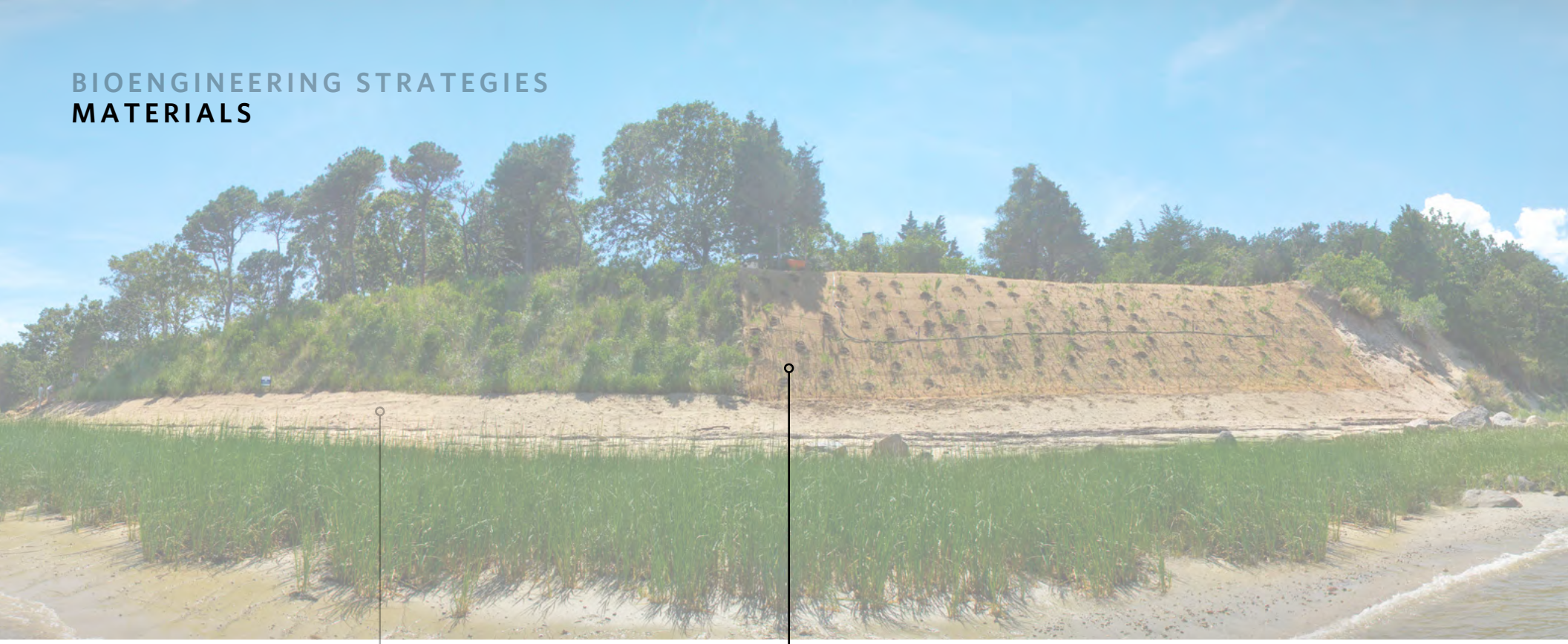
Coir Fiber Rolls

Adds stability and protection to the toe of a bank and provides a window of opportunity to establish vegetation.

Robust Anchoring System

BIOENGINEERING STRATEGIES

MATERIALS



Coir Fiber Rolls

Adds stability and protection to the toe of a bank and provides a window of opportunity to establish vegetation.

Robust Anchoring System

Erosion Control Blanketing

blanketing of natural fibers are used to stabilize soils allowing time for NATIVE SALT TOLERATE PLANTS BECOME ESTABLISHED.

BIOENGINEERING STRATEGIES
MATERIALS

Coir Fiber Rolls

Adds stability and protection to the toe of a bank and provides a window of opportunity to establish vegetation.

Robust Anchoring System

Erosion Control Blanketing

blanketing of natural fibers are used to stabilize soils allowing time for NATIVE SALT TOLERATE PLANTS BECOME ESTABLISHED.

- **Resists degradation from the marine environment.**
- **Absorbs some of the force of wave energy unlike many hard solutions that deflect the energy of wave action to surrounding areas.**
- **Materials life-expectancy to stabilize sediments matches the time required to ESTABLISH NATIVE PLANTS.**

BIOENGINEERING STRATEGIES

MATERIALS

Native Shrubs

Native Grasses

BIOENGINEERING STRATEGIES

MATERIALS

Pre-vegetated Fiber Rolls

Native Shrubs

Native Grasses

BIOENGINEERING STRATEGIES
MATERIALS

Salt Marsh

Pre-vegetated Fiber Rolls

Native Shrubs

Native Grasses

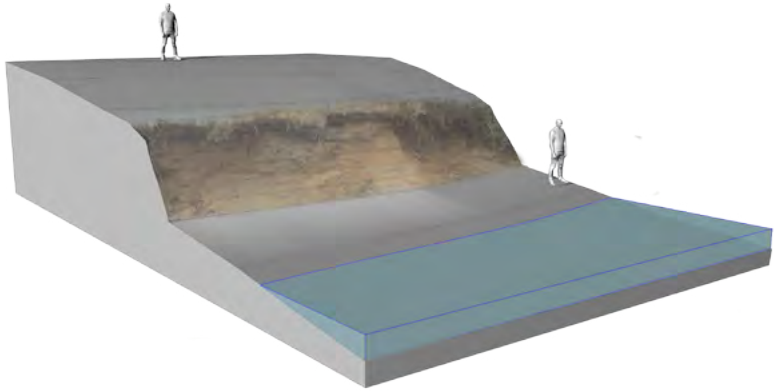
MATERIALS

Root Depths of Native Plant Species

BIOENGINEERING STRATEGIES

INSTALLATION & CASE STUDIES

Typical Eroding Bank

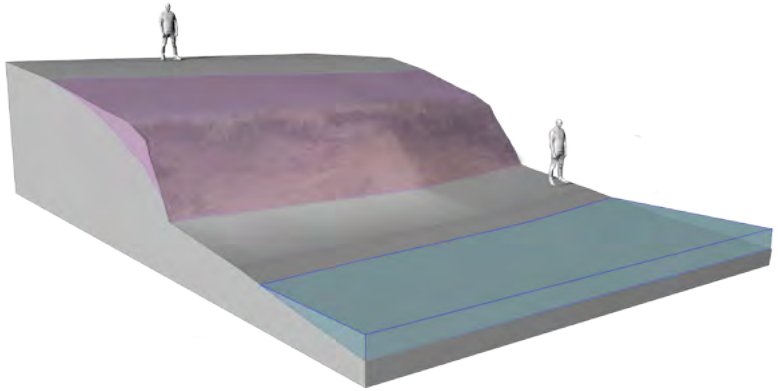


1

Importance of Establishing a Stable Slope

- If the slope of the bottom of the bank is steeper that the upper bank, it is likely unstable and prone to slumping or collapses .

(Storm Smart Properties Fact Sheet 4)

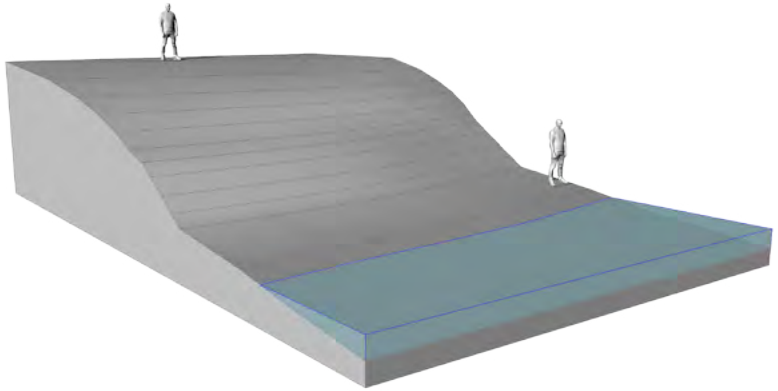


1

Importance of Establishing a Stable Slope

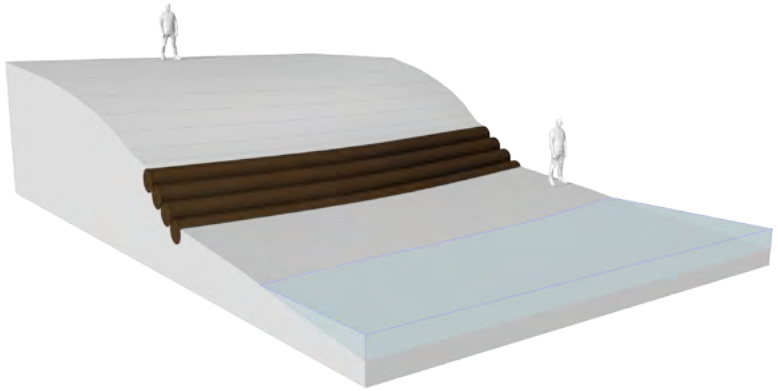
- Utilizing a portion of the upper bank can create a more stable slope angle.
- Adds increased stability and storm damage prevention to the bank.
- Without this step, an investment in bioengeneering can be lost due to bank collapses.

(Storm Smart Properties Fact Sheet 4)



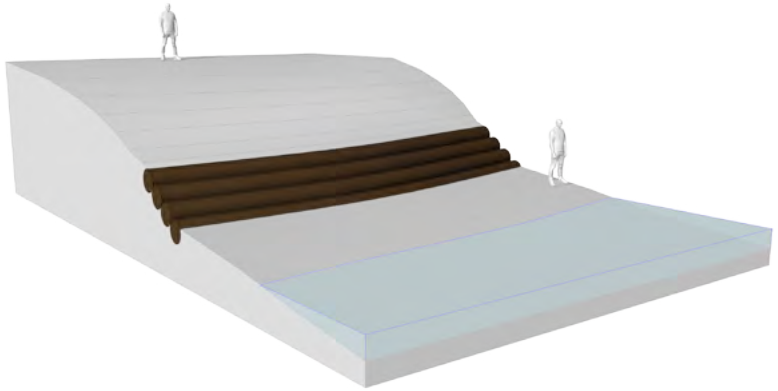
Stabilizing toe of bank - Fiber rolls

- Installation begins at the base of the array and proceeds up bank.
- Proper anchoring strategy to hold toe protection in place.
- Synthetic filter fabrics DO NOT ENHANCE success of a bioengineering project.



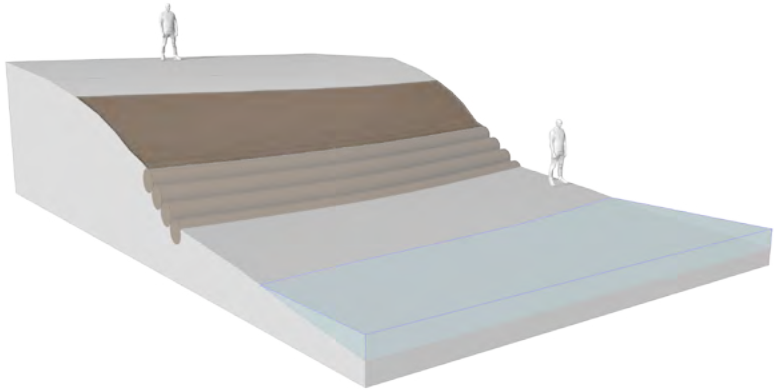
Stabilizing toe of bank - Pre-vegetated fiber rolls

- Use of pre-vegetated fiber rolls along top of array.
- Added vegetation to the root matrix.
- Full season of plant growth prior to installation.



Stabilizing soils above toe protection

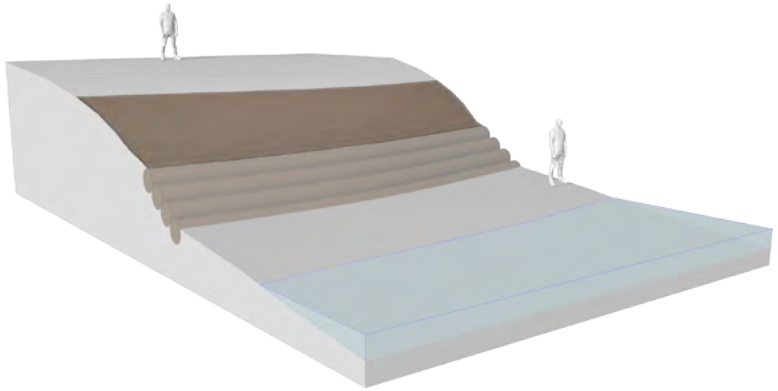
- Native salt tolerant grasses are seeded into the bank prior to installation of erosion control blankets.
- Protect soils from erosion and helps to retain moisture to promote seed germination.



LITTLEBLUE STEM | SWITCH-GRASS | SIDEOATS GRAMA

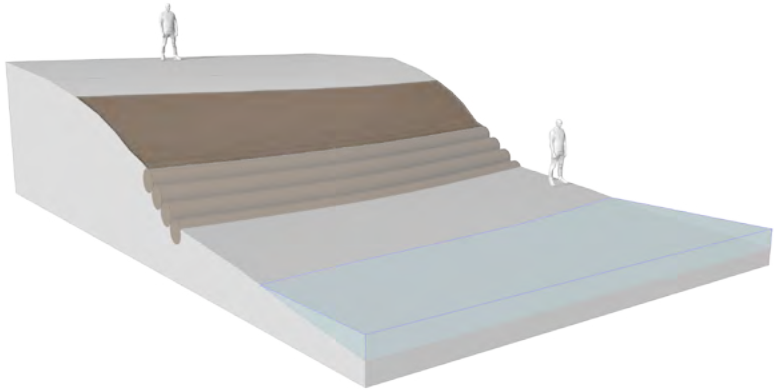
Stabilizing soils above toe protection

- 6″ deep lock-in trench at top and bottom of slope.
- Overlap blankets a minimum of 6″.
- Use appropriate staking to match the sediment.
- Only run orientation of blankets perpendicular to the contours (up and down slope).



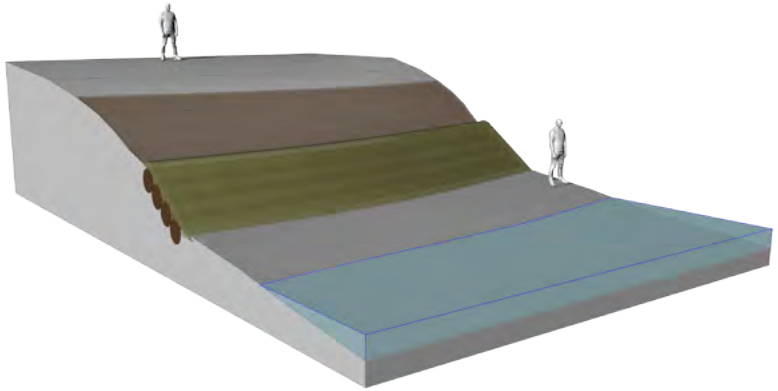
Native shrub species

- Native beach plum and bayberry planted through erosion control blanketing.
- Temporary above ground irrigation for plant establishment.



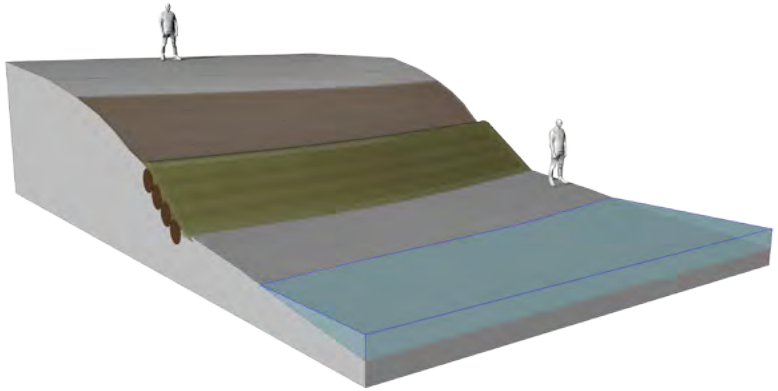
INSTALLATION & CASE STUDIES

- Establishment of native vegetation after two seasons of growth.
-



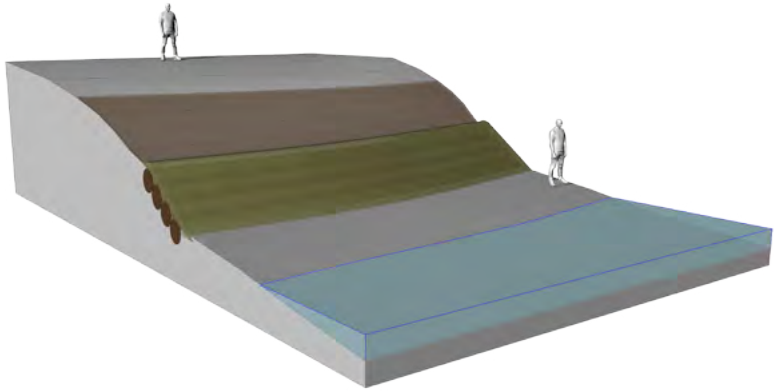
1 2 3 4 5 **6**

Condition of fiber roll array following Hurricane Sandy 11/2012

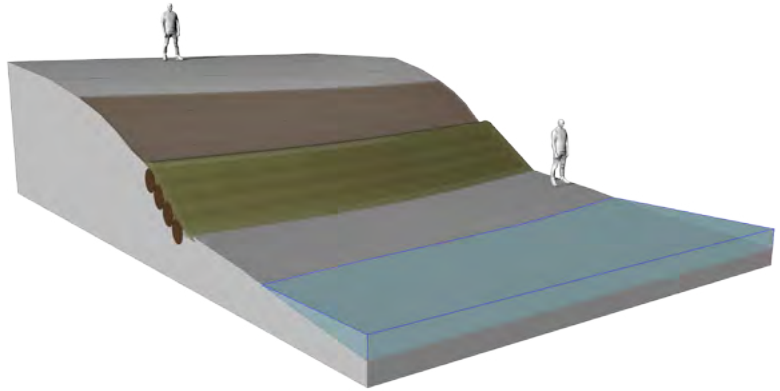


Waves reached above fiber roll array with no damage.

Condition of fiber roll array following named stormed Nemo 2/2013



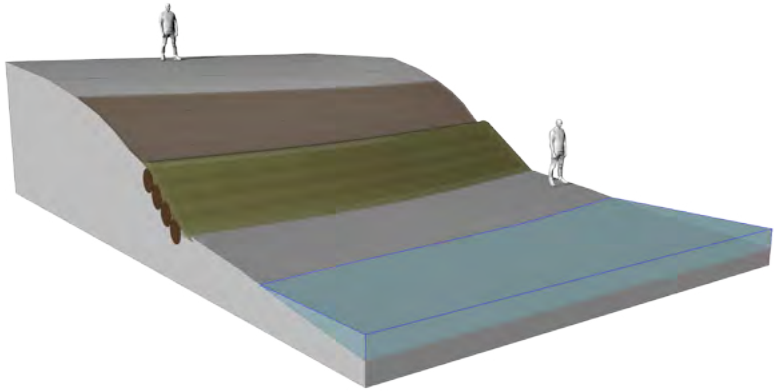
Condition of fiber roll array following named stormed Nemo 2/2013

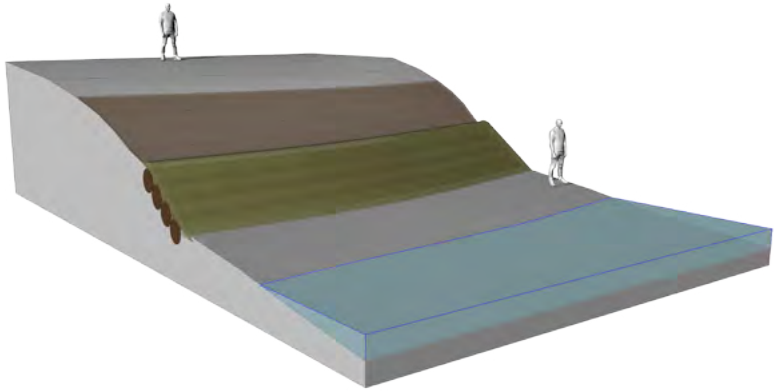


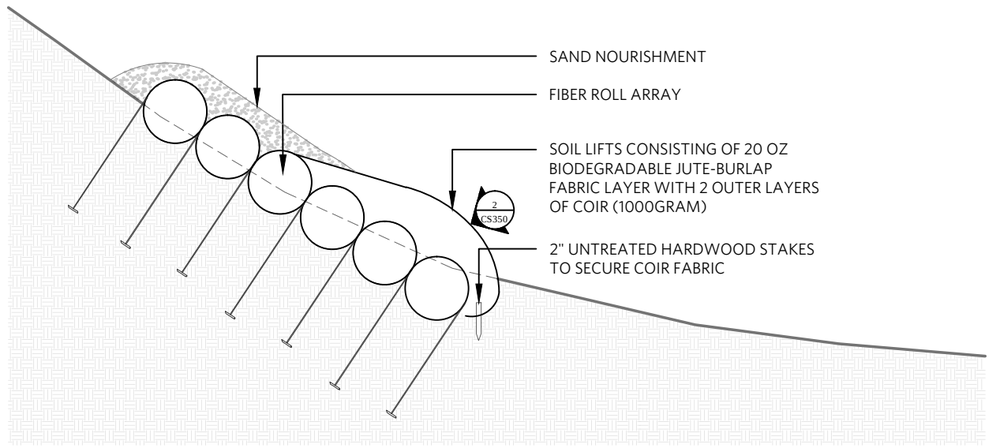
1 2 3 4 5 6 7 **8**

Waves reached above fiber roll array with no damage.

Fiber roll array increased in length by 90′
6/2013





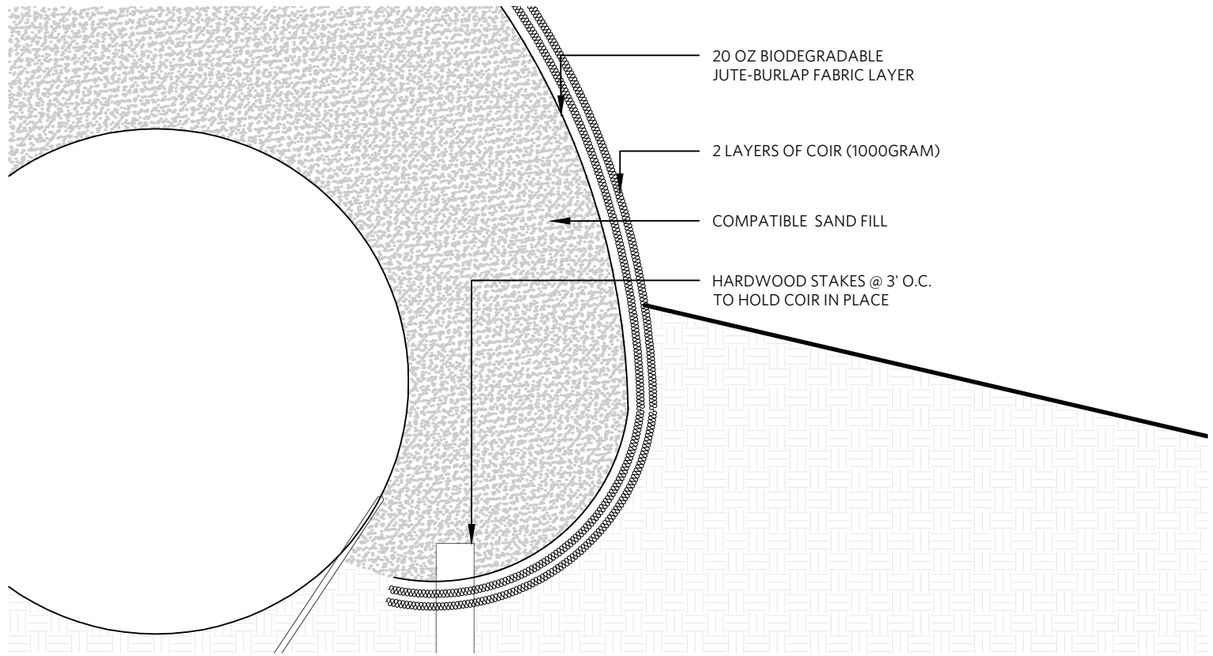


1

SOIL LIFT SECTION, TYPICAL

DETAIL PROVIDED BY WILKINSON ECOLOGICAL DESIGN, SPECIALISTS IN COASTAL STABILIZATION CONSTRUCTION

Scale: 1/4" = 1'



2

SOIL LIFT DETAIL, TYPICAL

DETAIL PROVIDED BY WILKINSON ECOLOGICAL DESIGN, SPECIALISTS IN COASTAL STABILIZATION CONSTRUCTION

Scale: 2" = 1'

WILKINSON
ECOLOGICAL DESIGN

28 Lots Hollow Rd., Orleans, MA 02653
TEL: (508) 255-1113 FAX: (508) 255-9477
www.wilkinsonecological.com

THIS DRAWING AND ALL IDEAS EMBODIED THEREIN IS PROPRIETARY INFORMATION OF WILKINSON ECOLOGICAL DESIGN, INC. (WED) AND SHALL NOT BE COPIED, REPRODUCED, OR DISCLOSED IN CONNECTION WITH ANY WORK OTHER THAN THE PROJECT FOR WHICH IT HAS BEEN PREPARED, IN WHOLE OR PART, WITHOUT PRIOR WRITTEN AUTHORIZATION FROM WED.

© 2016 WILKINSON ECOLOGICAL DESIGN, INC.

SURVEY PROVIDED BY:

NOTES:

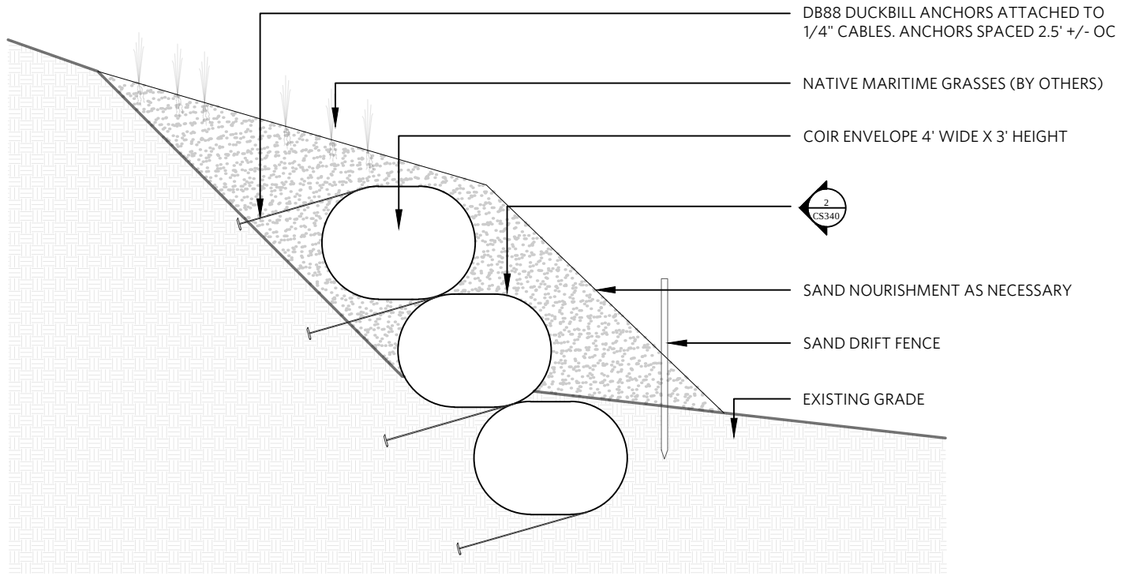
LEGEND:

REV	DATE	DESCRIPTION

DATE: 09/12/2016	SCALE: 1/4" = 1'-0"
DRAWN BY: JS	CHECKED BY: SW

FOR PERMITTING PURPOSES ONLY
THIS DRAWING IS NOT INTENDED FOR CONSTRUCTION

COASTAL STABILIZATION | CS350

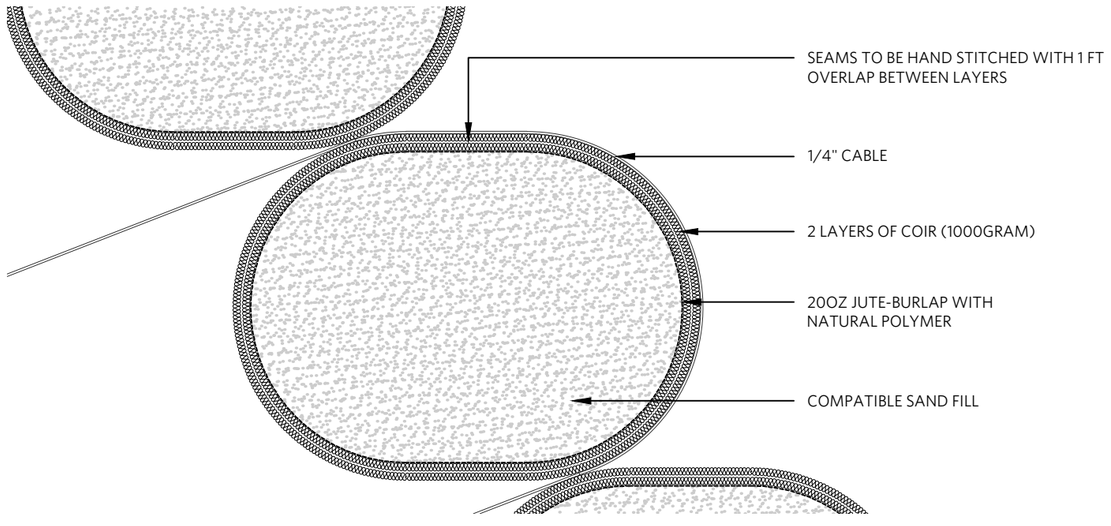


1

COIR ENVELOPE SECTION TYP.

DETAIL PROVIDED BY WILKINSON ECOLOGICAL DESIGN, SPECIALISTS IN COASTAL STABILIZATION CONSTRUCTION

Scale: 1/4" = 1'



2

COIR ENVELOPE DETAIL

DETAIL PROVIDED BY WILKINSON ECOLOGICAL DESIGN, SPECIALISTS IN COASTAL STABILIZATION CONSTRUCTION

Scale: 3/4" = 1'

WILKINSON
ECOLOGICAL DESIGN

28 Lots Hollow Rd., Orleans, MA 02653
TEL: (508) 255-1113 FAX: (508) 255-9477
WWW.WILKINSONECOLOGICAL.COM

THIS DRAWING AND ALL IDEAS EMBODIED THEREIN IS PROPRIETARY INFORMATION OF WILKINSON ECOLOGICAL DESIGN, INC. (WED) AND SHALL NOT BE COPIED, REPRODUCED, OR DISCLOSED IN CONNECTION WITH ANY WORK OTHER THAN THE PROJECT FOR WHICH IT HAS BEEN PREPARED, IN WHOLE OR PART, WITHOUT PRIOR WRITTEN AUTHORIZATION FROM WED.

© 2016 WILKINSON ECOLOGICAL DESIGN, INC.

SURVEY PROVIDED BY:

COMPANY NAME
ADDRESS
CITY, STATE, ZIP CODE
PHONE NUMBER

NOTES:

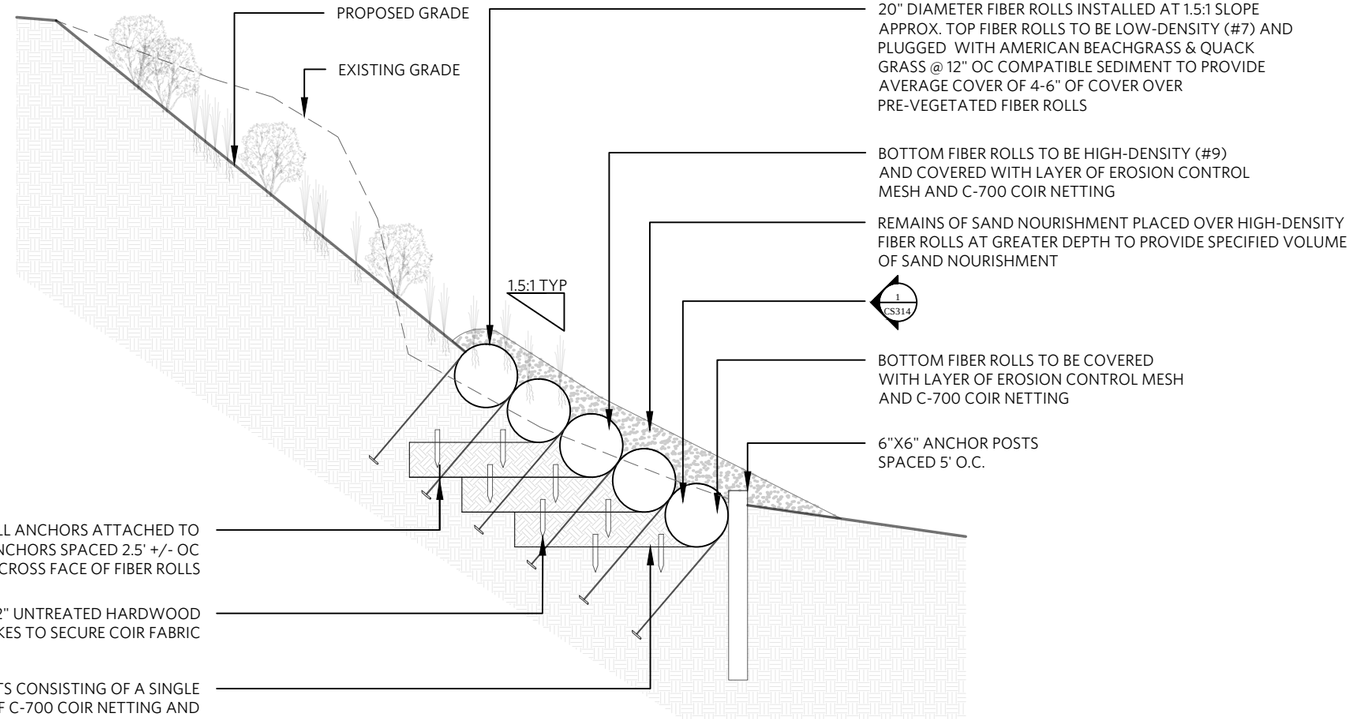
LEGEND:

REV	DATE	DESCRIPTION

DATE: 09/12/2016	SCALE: 1/4" = 1'
DRAWN BY: JS	CHECKED BY: SW

FOR PERMITTING PURPOSES ONLY
THIS DRAWING IS NOT INTENDED FOR CONSTRUCTION

COASTAL STABILIZATION | CS340



1

FIBER ROLL REINFORCED LIFT SECTION ,TYPICAL

DETAIL PROVIDED BY WILKINSON ECOLOGICAL DESIGN, SPECIALISTS IN COASTAL STABILIZATION CONSTRUCTION
PATENT PENDING

Scale: 1/4" = 1'

WILKINSON
ECOLOGICAL DESIGN

28 Lots Hollow Rd., Orleans, MA 02653
TEL: (508) 255-1113 FAX: (508) 255-9477
WWW.WILKINSONECOLOGICAL.COM

THIS DRAWING AND ALL IDEAS EMBODIED THEREIN IS PROPRIETARY INFORMATION OF WILKINSON ECOLOGICAL DESIGN, INC. (WED) AND SHALL NOT BE COPIED, REPRODUCED, OR DISCLOSED IN CONNECTION WITH ANY WORK OTHER THAN THE PROJECT FOR WHICH IT HAS BEEN PREPARED, IN WHOLE OR PART, WITHOUT PRIOR WRITTEN AUTHORIZATION FROM WED.

© 2016 WILKINSON ECOLOGICAL DESIGN, INC.

SURVEY PROVIDED BY:

NOTES:

LEGEND:

REV	DATE	DESCRIPTION

DATE: 09/12/2016 | SCALE: 1/4" = 1'-0"
DRAWN BY: JS | CHECKED BY: SW

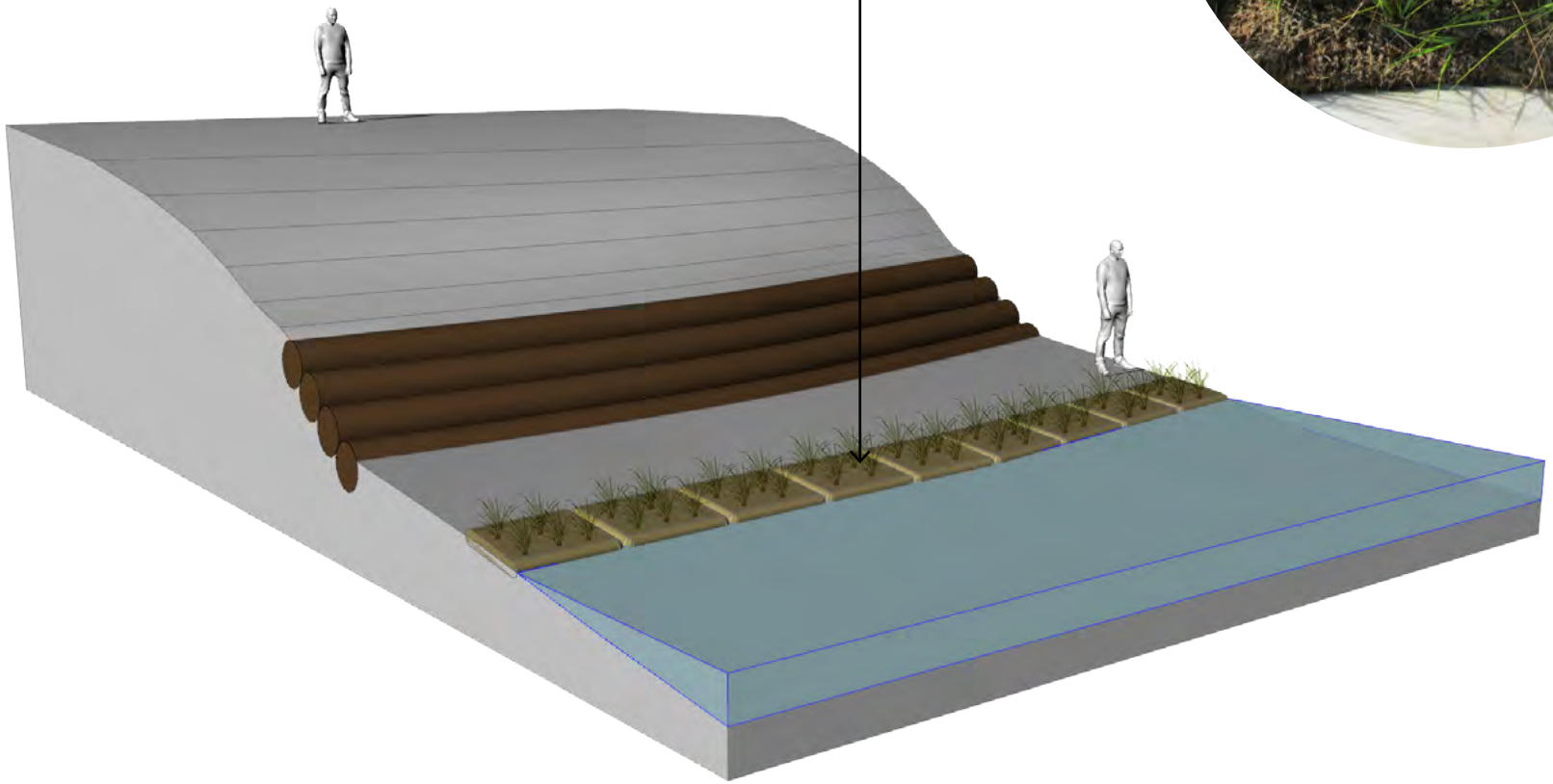
FOR PERMITTING PURPOSES ONLY
THIS DRAWING IS NOT INTENDED FOR CONSTRUCTION

COASTAL STABILIZATION | CS312

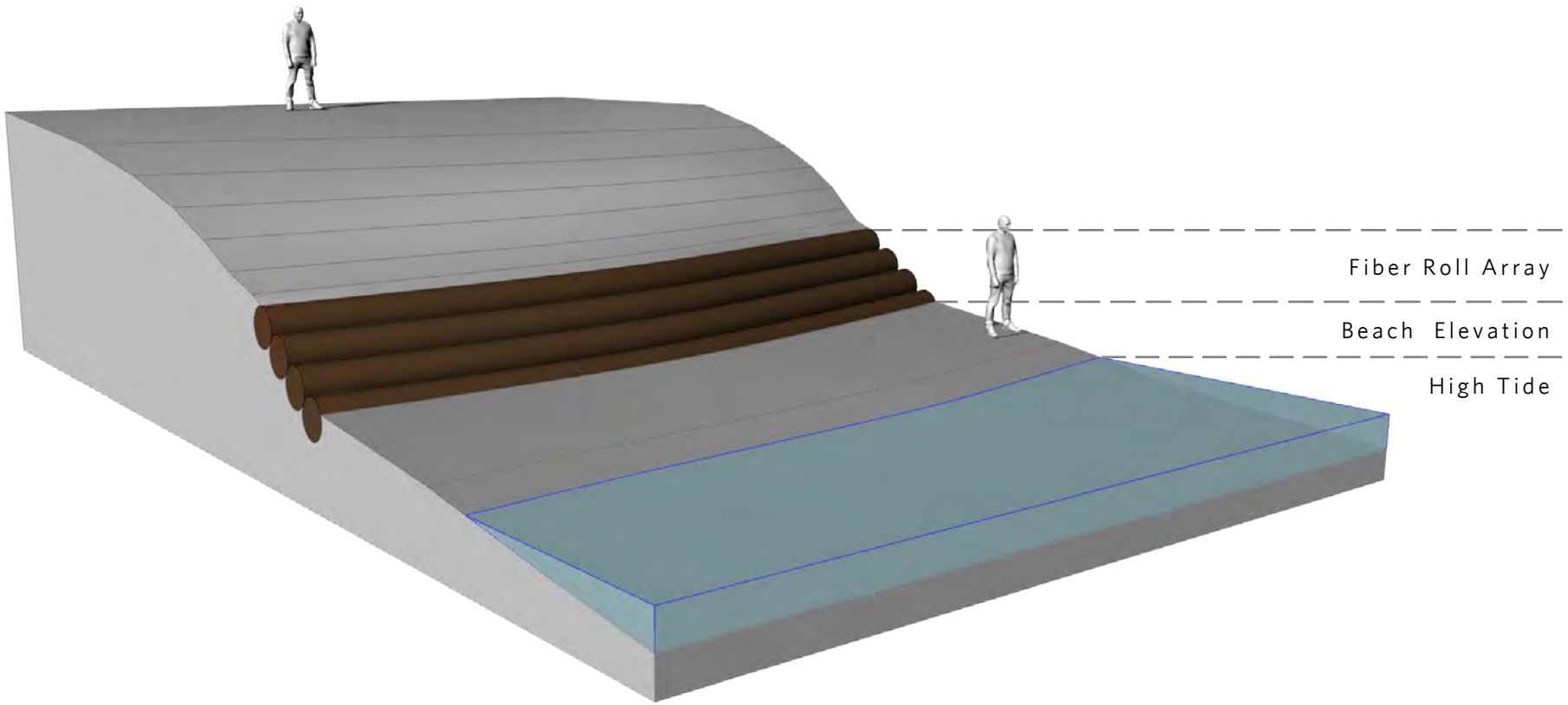
Importance of Fringe Marshes in Coastal Stabilization

Importance of Fringe Marshes in Coastal Stabilization

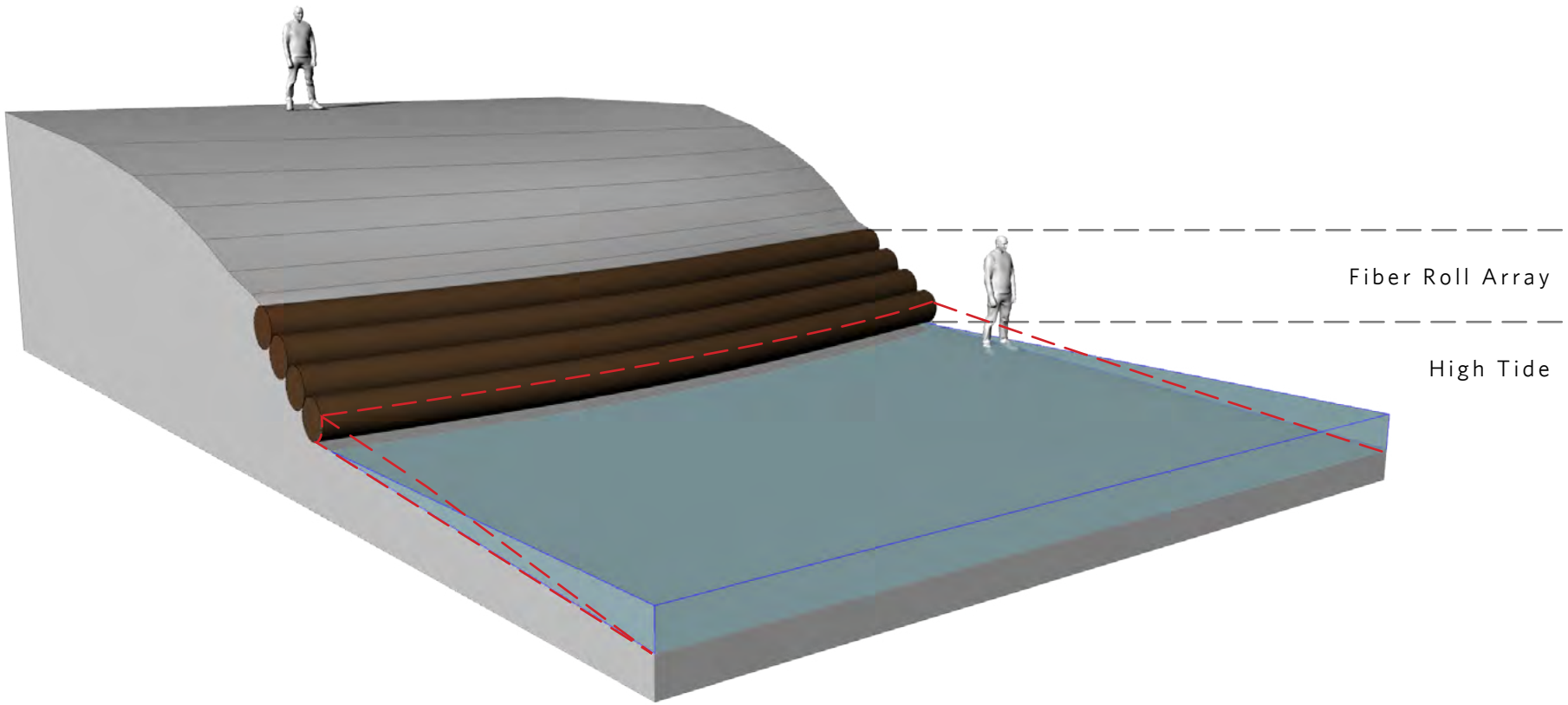
- Woven coir mats used as a growing medium.
- Pre-vegeated to establish prior before installation.



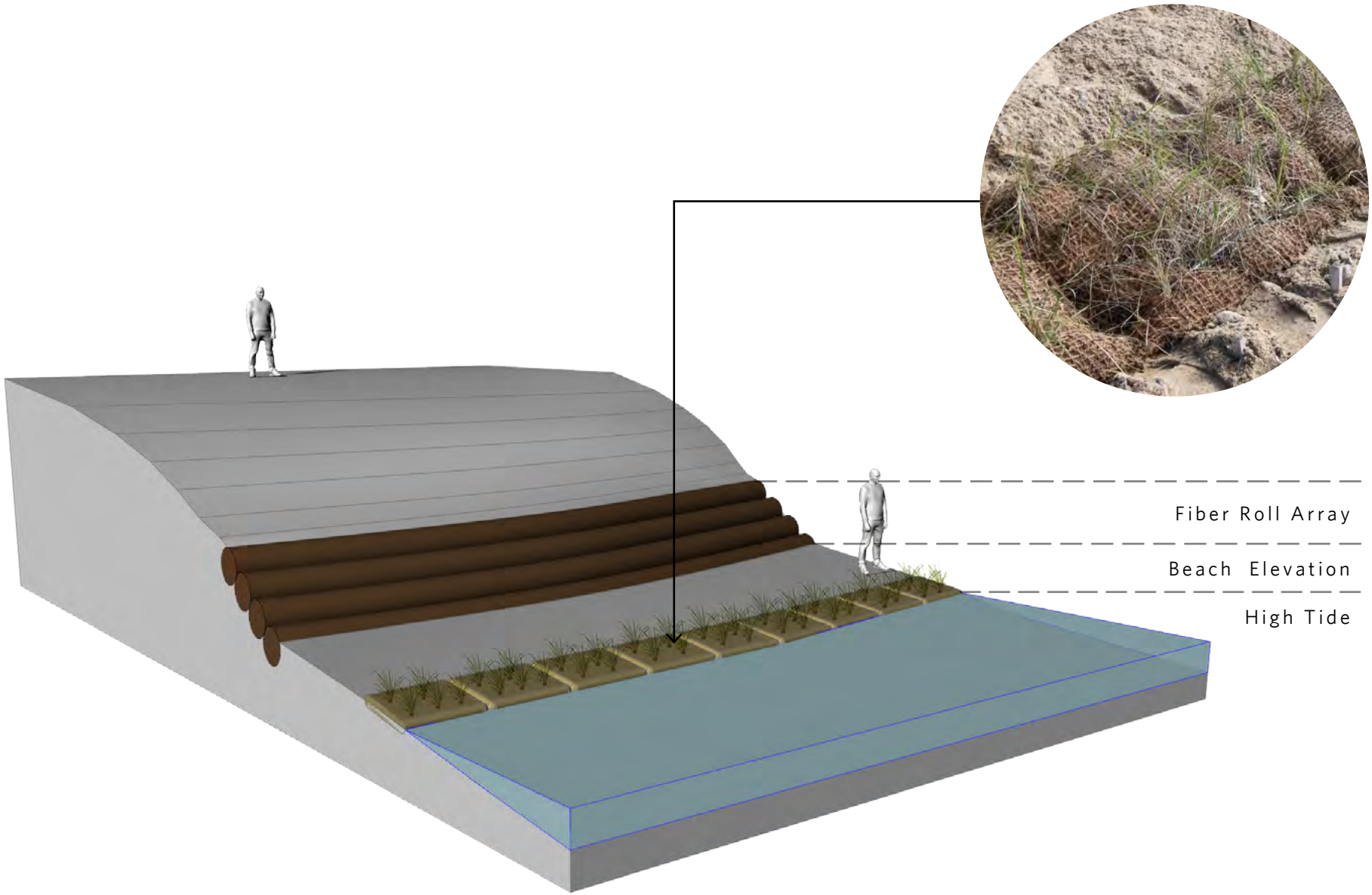
Importance of Fringe Marshes in Coastal Stabilization



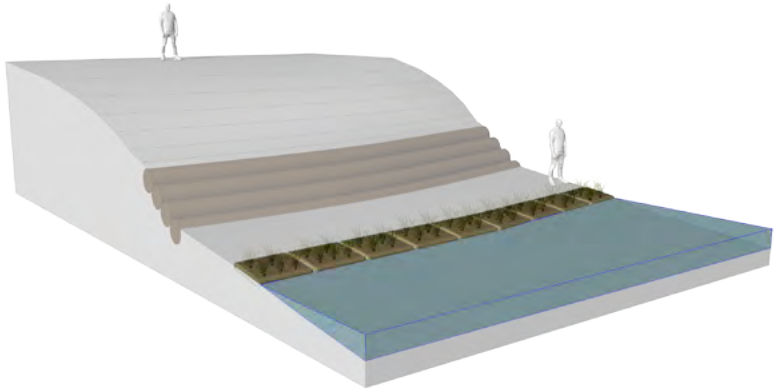
Importance of Fringe Marshes in Coastal Stabilization



Importance of Fringe Marshes in Coastal Stabilization

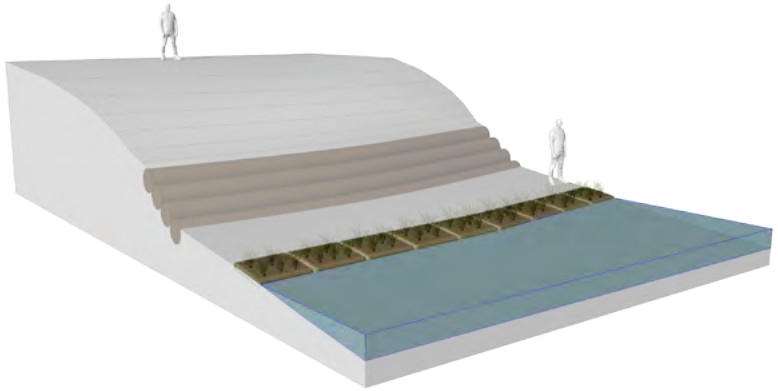


Fringe Marshes



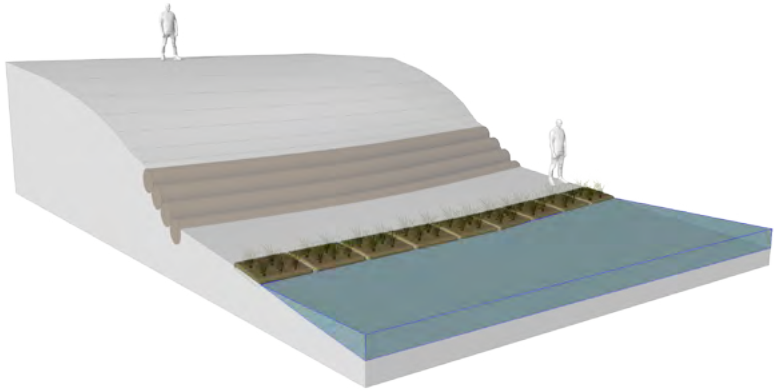
1

Fringe Marshes

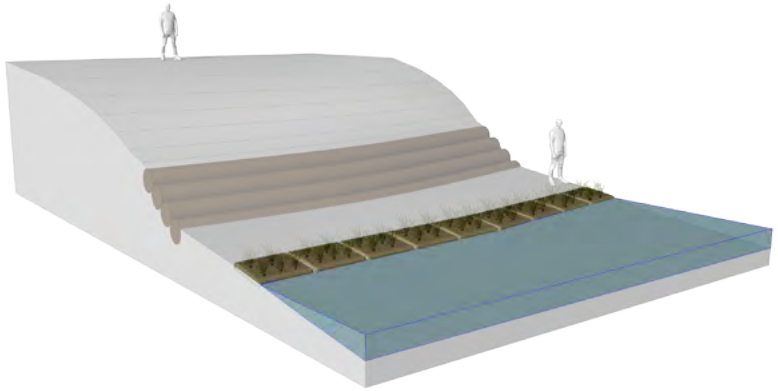


1 **2**

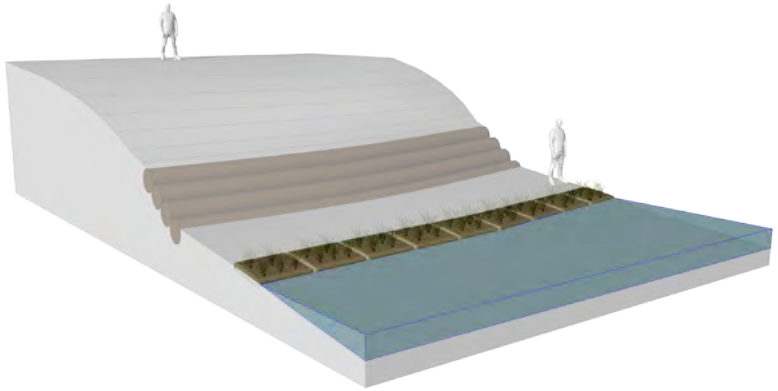
Fringe Marshes



Fringe Marshes

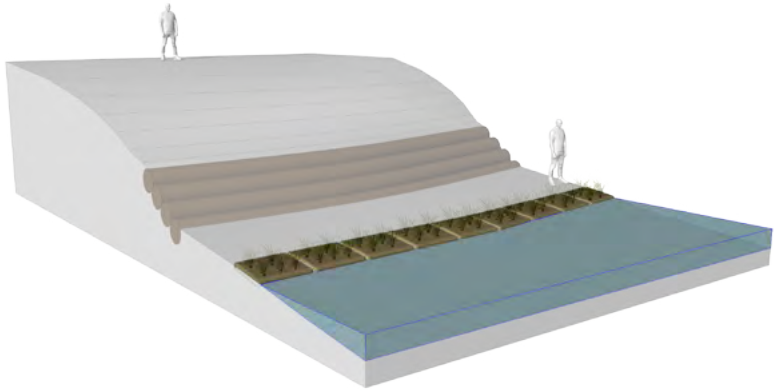


Fringe Marshes

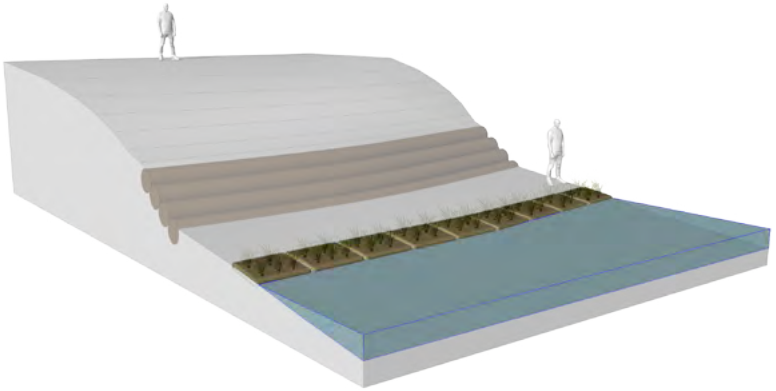


1 **2**

Fringe Marshes



Fringe Marshes



BIOENGINEERING STRATEGIES

Reducing Coastal Erosion and Coastal Storm Damage While Minimizing Impacts