

Encapsulated soil lifts can be installed in constrained areas to stabilize shorelines such as this area in Wilmington, VT where the road was built very close to Lake Raponda and was actively eroding.

5.5 Encapsulated Soil Lifts

Description

A technique that encases soil with erosion control blankets and fiber coir blocks to build terraces to restore a stable bank. Each terrace or lift is planted for long term stabilization.

Purpose

A technique that rebuilds a natural, stable shore to protect water quality, recreate wildlife habitat, and dissipate wave energy.

Conditions Where Practice Applies

When stabilizing a bank, there are two options for establishing a gentle slope for planting: slope back towards the shore or slope out toward the lake. Encapsulated soil lifts are often used when sloping back toward shore is not an option because roadways or other infrastructure are in the way and the only option is to slope out toward the lake. Encapsulated soil lifts are not appropriate for vertical drops more than 12-15 feet for two reasons. First, they would encroach more than 30 feet into the lake, which is not likely to be permitted. Second, the increased weight and risk of weakening the soil layers when building more than five levels of lifts of 12 -15 inches in height is too great.

Tips and Considerations

Mean water level should be one foot below the top of stone base. Lifts should be built starting above the mean water level. If cutting through the erosion control blanket with scissors or a knife, make an "X" for faster plantings. Alternatively, use a blow torch to burn a hole through the fabric for the plantings along the top level.

Plans and Specifications

Install turbidity curtain first and the geotextile fabric second.

Starting from the bank, roll out half of the geotextile fabric along the bottom of the lake in preparation of building the stone base. Tuck the other half of fabric against the bank until the stone is added. Add stone over the set fabric to establish the foundation for the lifts and then cover the stone with the remaining half of fabric that had been tucked against the bank (like wrapping the rock in a burrito shell). Position the first fiber coir block, rigid side towards lake, and lay a separate layer of erosion control blanket within the block's flaps.

Prior to filling the block with soil, place live plantings horizontally underneath the block with roots on top of rock base and stems pointing towards lake. Willows do well in this first tier as their long, fast growing roots will grow back toward the bank and they can be inundated during intermittent periods of high water.

Backfill with clean topsoil to the height of the fiber coir block and level the soil. Tamp the soil in place and seed the lakeside one third of soil with native wildflower seed. Wrap the soil with the inner erosion control blanket and outer layer of block flaps. Level and fasten these materials on top of the soil with biodegradable staples. Approximately every four feet, pound in a four-foot stake to secure the erosion control blankets in place, creating the first lift.

To position the next block for the second lift, it is helpful to use a long stake to establish the placement of the block back from the outer edge of the first lift to



achieve the desired slope of 2:1 or 3:1. Lifts may be spaced one to several feet from each other depending on the design. For the second lift, establish the fiber coir block with block toward the lake and place the inner layer of erosion control blanket between the block's flaps, as done on the first lift. Before filling with soil, place the plants horizontally under the second block, resting the plants on top of the first lift, roots towards bank and stems towards the lake. Backfill the block with soil, tamp soil down, seed outer exposed lift area (about a third, lakeside), and wrap with the erosion blankets. Secure the erosion blankets with staples and stakes.

Repeat this layering of lifts, until the top lift is added. After filling the top block with soil, seed this top layer completely before being wrapped in the erosion control blankets and secured with staples and stakes.

Plant trees, shrubs, and herbaceous plantings on top of the last lift about three feet apart (see <u>Section 4</u> for plant species recommendations).

Water the plants immediately after planting. Regular watering is very important for the first three months. For larger scale projects, a pump may be needed to provide a watering system. A hose or dripline system works best as it avoids weakening the lifts by walking on them; avoid trampling the outer edge of the blocks when watering.

Fence off the restoration site to keep dogs, people, and wildlife out. Newly build lifts look stable, but they are very vulnerable until the plants have a growing season to establish. The terraces and plants should be protected from being trampled for three years. After three years, the fencing can be removed.

Dimension	Name	Typical Unit	Guidelines	Description
A	Stone Base	Maximum Dimension	12 inches for smaller sites, 30 inches for larger sites.	VTrans Type I (706.04(A)) / VTrans Type II (706.04(B))
В	Coir blocks height	Feet	12 inches for smaller sites, 16 inches for larger sites.	Height of the coir block
с	Soil lift offset	Feet	Varies based on design bank slope.	Lateral distance from face of soil lift to the face of the soil lift below (bench).
D	Organic Soil backfill	Feet	Within 24 inches of coir block or 6 inches from the surface.	Lateral distance from coir block and vertical distance from surface in compacted lifts.
E	Tie in slope	Foot:Foot, Percent (%)	Typically not steeper than 2:1 (50%) / minimum 12 foot width.	Ratio of horizontal run to elevation rise of face of transitional slope from face of highest soil lift to the existing ground.
F	Buffer	Feet	Minimum 15 feet.	Width of shoreline plantings vegetated buffer zone.
G	Vegetation	Feet / Density	Potted plants 2 feet on center / bare root 1 foot on center.	Lateral spacing of plantings along the lift slope.

Design Criteria

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ENCAPSULATED SOIL LIFTS



Install turbidity curtain Install stone base with nonwoven geotextile fabric or gravel cushion



Fill with soil and compact, spread native seed on outer 1/3 of soil lift



Place plants horizontally on top of each lift after the blocks and ECB are placed and before soil is added



Lay out lifts, tie together Roll out additional ECB Slide plant root balls under lifts



Pull ECB back over soil and stake every few feet with wooden stakes, REPEAT!



Bury edge of ECB top layer and plant in the top encapsulated soil lift



HOLLY GREENLEAF 2021

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Compact soil: Hand tamp / Backhoe / Stomp



Plan design: Watershed Consulting Associates, LLC.