The erosion of beach and dune that has been occurring immediately north of the center parking lot groin now directly threatens public infrastructure as well as private property. The current effort to reinforce the area consists of the placement of a “soft” biogradeable structure to buttress the remaining dune. While It does not solve the erosion problem, it should greatly reduce the loss of sand from the dune during storms.

The proprietary system consists of a series of interlocking sand filled tubes that are of varying length and approximately 3-4 feet in diameter. The tubes are fabricated in place on the beach and consist of three layers of “fabric”. The tube’s exterior consists of two layers of a coconut fiber “coir” mat with an approximate 1”x 1” mesh. These provide “structural” protection for the interior liner.

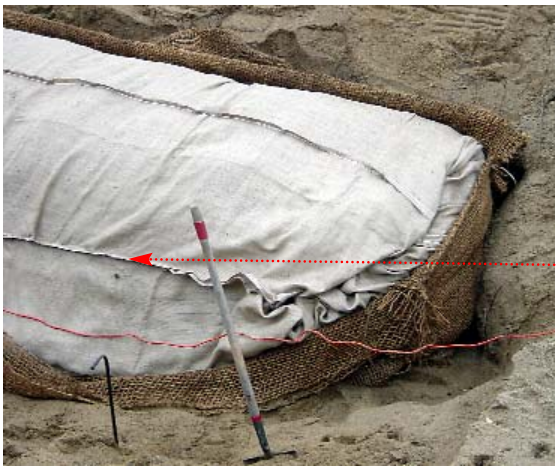
The interior layer consists of a finely woven burlap fabric. Collectively these layers create an envelope that constrains the sand and allows water to drain away.

Cumulatively the interlocked bags when backed by the existing dune provide a coherent structure of sufficient mass to reduce any tendency to shift or disassemble. Additionally, since the sand is flexible, the tubes can effectively absorb and dissipate wave energy.

The structure is not invulnerable, however. Impact from large floating objects (e.g. tree trunks, limbs and lumber) can sufficiently damage the envelope, and result in loss of sand and thus integrity. Another potential hazard lies in human activity such as walking or climbing on the structure.

The following pages illustrate the fabrication of the tubes.

The installation process begins with a trench excavated in the beach. Along the seaward side plywood forms are positioned to form a wall approximately 4 feet in height. Two mats of coconut fiber (coir) are rolled into the trench with the right or seaward side draped over the plywood forms. Seen in this photo installers are positioning the inner liner of a finely woven burlap. Square end panels of both the coir mat and burlap are stitched to close the ends. This assembly forms the bottom, sides and ends of the tube. When completed a "BobCat" type front end loader will carefully fill the space where the workers are standing with sand.



Once the sand has been added the burlap flap that had been draped over the form is folded over the sand and the shoreward edge of the burlap are pulled together and folded to form a seam. A portable electric sewing machine is used to stich the seam closed, and then to close the ends. This image shows one end of the tube after it has been closed.

When the burlap has been stitched, the coir mats are pulled over and hand stitched together using long curved "needles" and coir twine of the same diameter as the warp and weft of the mat.

On the left the installer is seen stitching the end closed. Note the length of coir twine in his right hand.

On the Right installers are seen completing the stitching of the outside coir mat, while two other installers are moving the forms into position to start another tube.

To the left the tube is being back filled with sand until it is completely covered. It abuts a tube on the near end that was placed earlier and will in turn abut the tube that will be placed where the forms are set at the far end. Eventually a second parallel line of tubes will be placed and these will form the base of the structure.

December 2, 2008, several additional tubes have been placed and a second team has started to the north constructing bags in a southerly direction. The second layer of tubes have been placed. These are 6 foot long and have been placed at a right angle to and on top of the tubes shown in the proceeding pictures.

December 5, 2008
Installation of the second layer of 6' tubes has been completed to the northern terminis and is being extended southward to the groin.