



United States Department of Agriculture
Natural Resources Conservation Service

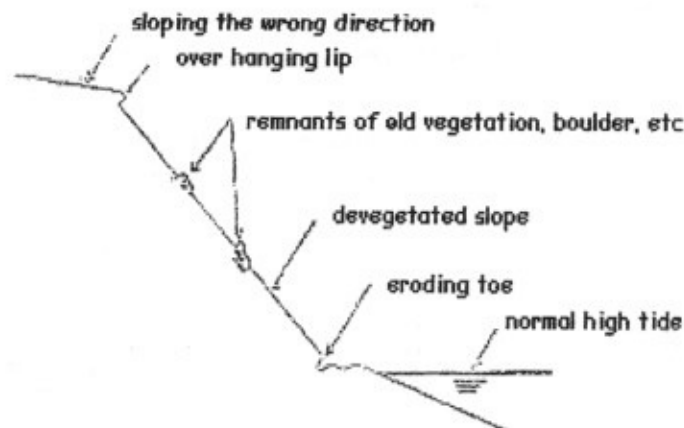


Suffolk County
Soil & Water Conservation District

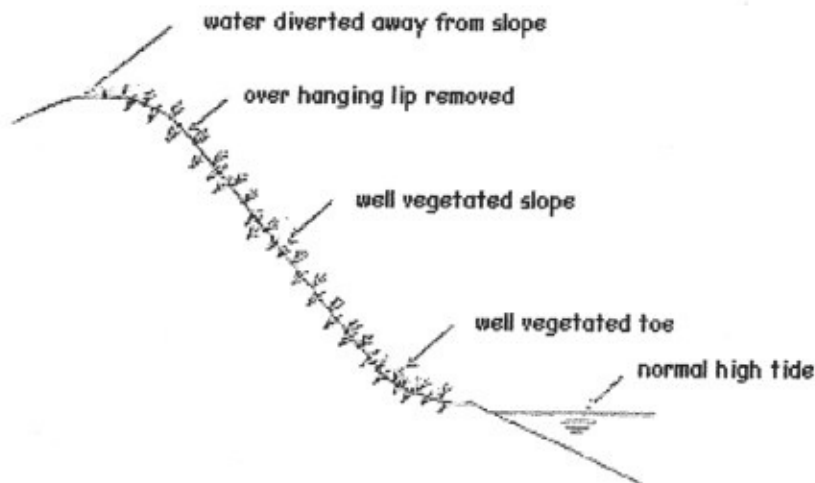
STABILIZATION OF ERODING BLUFFS

- I.* The coastal shoreline is affected by many different forces and is exposed to many harsh conditions. A result of these forces and conditions is erosion. Bluff erosion is a natural process that can be slowed but not stopped. The only prediction that can be made is that bluff erosion will occur; the timing and degree of the erosion cannot. Areas along the coastline may experience accelerated rates of erosion due to factors such as winter storms and extreme high tides. In these instances, houses and structures built on the top of the bluffs are at risk from erosion.
- II.* The erosion of high sandy bluffs along coastlines has challenged conservationists since they were first observed. Typical of such bluffs are those along the north shore of Long Island. The soil material is sandy and erosive, easily moved by wind or water. Bluff height varies from a few feet, to well over 100 feet. The slope is usually about 1:1, or at whatever angle the material is stable. The profiles of eroding and stable bluffs are represented below.

Typical characteristics of eroding bluffs



Typical procedures that have had a desirable effect on slowing bluff erosion



- III. Numerous attempts have been made by landowners to stabilize bluff slopes; only a few have succeeded. Although no procedure can guarantee a permanent solution or stop this erosion, the following measures have been found to be the most effective in obtaining the best possible stabilization of the bluff face.

Stabilization of the toe and top of the bluff (ideally simultaneously) must occur. Implementing practices (such as revegetation, terracing, geo-textiles) without achieving this stability will not be successful. Resulting in a loss of time, resources, and financial investment as these areas are compromised by erosion.

Once both of these areas are stabilized, efforts should be focused on remediating the bluff face. Although stabilization of the toe and top is recommended first, the environment should be evaluated holistically. Thereby, remediation of the bluff face should occur in conjunction with and/or as soon as possible after the remediation of the top and toe.

Top Stabilization:

- a. Remove the overhanging lip at the top of the slope creating a natural angle of repose. This is generally a 1:1 slope or 45 degree angle.
- b. Any trees along the top edge of the bluff should be cut at the base leaving the roots in place. Tall trees swaying in the wind will loosen the bluff soils.
- c. Do not allow surface water (i.e. pool water, runoff, irrigation water) to flow over the top of the slope. Installation of a diversion with a catch basin drain and a vegetated natural buffer both serve this purpose.
- d. No ground disturbing activities should occur within 10 feet of the edge of the bluff. This includes installation of landscaping plants, irrigation systems, decks, and fences.
- e. Pools should be installed with an in ground drain to facilitate drainage (unless clay lenses exist within the bluff profile).

- f. Houses should be fitted with gutters and down spouts which discharge into dry wells in order to reduce runoff flowing over the bluff edge.
- g. Sprinklers should not discharge water onto or near the bluff face.
- h. Irrigation scheduling should not exceed the peak consumptive requirements of the turf grasses (approximately 1" per week).

Toe Stabilization:

- a. The use of vegetation is the preferred method to maintain a stabile toe. However, vegetation alone is not always successful. A good indicator of whether or not vegetation will stabilize the toe is the location of the mean high tide (MHT) mark. If MHT reaches the toe of the bluff, it is unlikely that vegetation alone will stabilize this site. If this is the situation, a consultation with NRCS or the SC SWCD can provide you with other alternatives.
- b. If a hardening structure, such as a bulkhead or rock revetment exists, it is critical that proper maintenance occurs to these structures. Such regular maintenance prolongs the life. The additional benefits are the protection the toe of the bluff and reduction in repair/replacement costs. The following are the maintenance activities that should occur on the bulkhead.
 - Decaying and or damaged boards should be replaced.
 - Holes behind the bulkhead should be filled with sand.
 - Geotextile must be maintained between the bulkhead or revetment in order to retain sand behind the structure. The lack of geotextile in combination with wave action will pull sediment through the structure eventually cause collapse and failure.
 - Vegetation (beach grass, *Spartina patens*, Coastal Panic grass) should be maintained on top of the bulkhead.

Bluff Face:

- a. Any trees along the top edge and on the bluff face should be cut at the base leaving the roots in place.
- b. Trash, grass clippings, leaves and branches should not be disposed of on the bluff face. This creates instability as the debris adds weight to the bluff face and dually smothers vegetation. Thus, such debris should be removed from the bluff face and disposed of properly.
- c. A natural angle of repose should occur on the bluff face. Depending on the height and location of the vertical faces, such an angle may not be practical. Grading is a satisfactory practice to create such a natural slope at locations where such an angle can be achieved. Care should be taken to not disturb stabile areas of the bluff in an attempt to stabilize the eroding locations. Such precautions will prevent additional erosion problems on the bluff.
- d. Re/Vegetate the slope.
 - 'Cape' American beach grass and *Spartina patens* plugs should be used for this purpose and transplanted while dormant in the late winter or

May 2007

Cape Am. beach grass 10/15 to 3/31
 fertilize 30 days after installation

early spring. Planting should occur from the top of the bluff face down. Both *Spartina* and Beachgrass should be planted 12" apart. Rows should be separated by 12" and the plants should be staggered with plants in adjacent rows.

- Each full row should consist of entirely Beachgrass or *Spartina* and the rows should alternate between these the two species. For Beachgrass, one 35mm film canister of Osmocote slow release fertilizer should be placed into each planting hole and then plant three stems or culms per hole.
- To add diversity to the bluff planting, reduce the threat of disease, and compensate for natural beach grass die out, it is recommended to broadcast the following warm season grass mixture immediately prior to planting the 'Cape' American beach grass. The warm season grass mixture should consist of:

'Blackwell' Switch grass (<i>Panicum virgatum</i>)*	4 PLS lb/Ac
'Atlantic' Coastal panic grass (<i>Panicum amarum</i>)*	5 PLS lb/Ac
'Niagara' Big bluestem (<i>Andropogon gerardii</i>)*	5 PLS lb/Ac
Coastal Little bluestem (<i>Schizachyrium scoparium v. littorale</i>)*	3 PLS lb/Ac
Sheep fescue (<i>Festuca ovina</i>) for quick, temporary cover	10 lb/Ac
'Monarch' Seaside Goldenrod (<i>Solidago sempervirens v. Monarch</i>)	1 lb/Ac
'Golden Jubilee' Black-eyed Susan (<i>Rudbeckia hirta</i>)	1 lb/Ac
Partridge Pea (<i>Chamaecrista fasciculata</i>)	1 lb/Ac
Common Evening Primrose (<i>Oenothera biennis</i>)	1 lb/Ac

(*Rates are in Pure Live Seed Pounds Per Acre.)

Spreading this seed mix just prior to planting the Beachgrass and *Spartina*, allows for the incorporation of the seed by foot traffic and sand disturbance as the beach grass is planted. This action is critical to a good seed establishment.

- Adapted shrubs and vines can be added when the slope is well stabilized with the above listed grasses. Species include Bayberry, Beach pea, Shore rose, and Beach plum.
- Apply 20 lb/ac of nitrogen in June if beach grass vigor is declining.
- Maintenance of the vegetated slope will be required on a continuous basis. Remove debris from planted areas; keep all water diverted from the slope; do not over-irrigate the lawn above; avoid excessive foot traffic and repair any damaged or eroding areas.