Marsh Enhancement With Toe Protection: Great Egg Harbor Bay, NJ

Region: Northeast
Coastal Risks Addressed: Erosion, waves

New Jersey DOT stabilized approximately 1 mile of bay island shorelines as part of a transportation project near Ocean City, NJ (see location overview on Figure 5-21). Replacement of the Route 52 causeway across Great Egg Harbor Bay required realignment of two existing navigation channels, exposing quickly eroding marsh shorelines to additional boat wakes (Traylor 2017). New Jersey DOT implemented nature-based solutions to stabilize the eroding marsh banks to address these boat wake concerns raised by the New Jersey Department of Environmental Protection and USACE.

The marsh shorelines are subjected to boat wakes and wind waves of moderate height, resulting from fetch lengths of approximately 3 miles or less. The estuarine conditions, experiencing a moderate tide range of less than 4 feet, support recreationally and commercially important fisheries, shellfish resources, and wildlife. Prior to project implementation, eroding marsh shorelines were severely scarped.

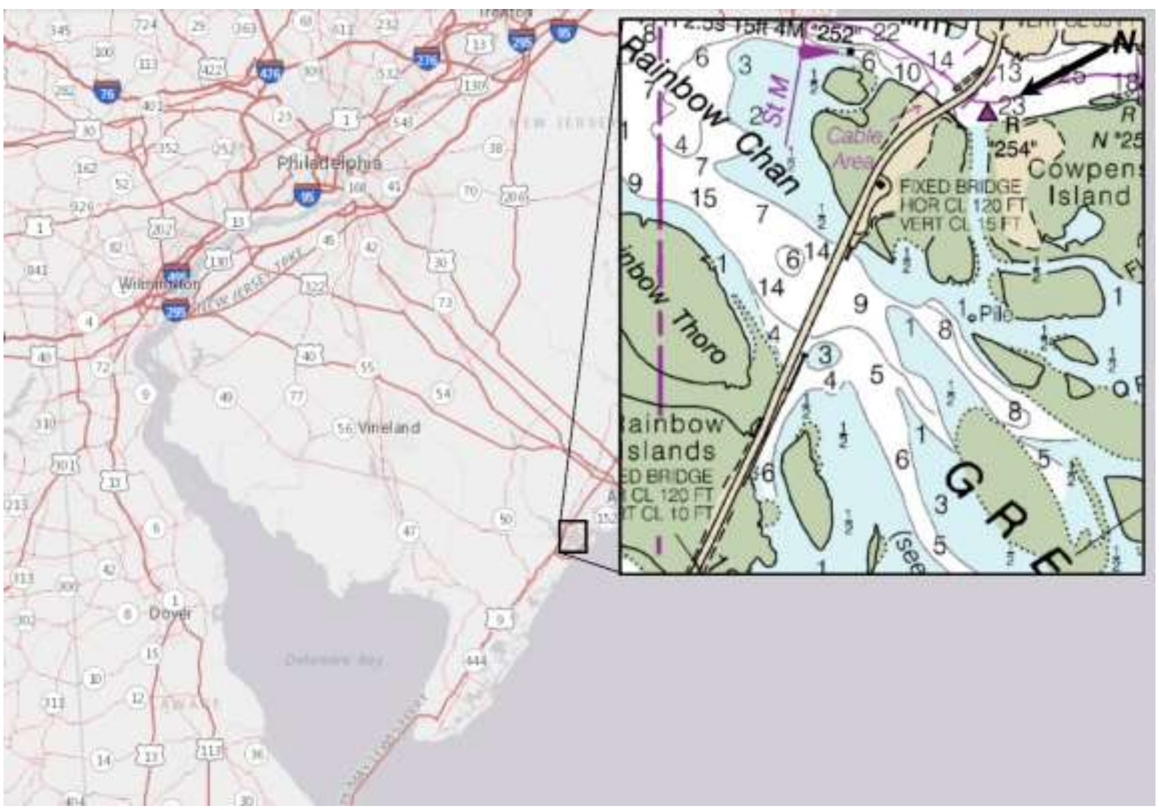


Figure 5-21. Great Egg Harbor, NJ, location overview (NOAA Nautical Chart 12316 inset, depths in feet).

New Jersey DOT developed four unique nature-based solution designs to mitigate the marsh shoreline erosion and to correct the over-steepened intertidal shoreline (see Figure 5-22 and Figure 5-23). Each design accommodated a different level of wave energy exposure, with high energy sites incorporating structural features to further stabilize the restored marsh edge. The designs generally consisted of shoreline regrading using available onsite material, coir fascine edging to stabilize the marsh toe, and planting of *Spartina alterniflora* landward of the coir fascine. A stone marsh toe revetment and a sheet pile wall were incorporated into the design details for shorelines experiencing higher wave energies.

The first installations occurred in summer 2010, but experienced mixed results because of implementation issues, environmental conditions, and material performance. Projects exposed to lower wave energies and/or in sandy substrate generally performed better than those subject to higher wave energies and/or overlying silty substrate. Adaptive management techniques were used to address shortcomings and improve project performance. The coir fascines were re-installed at higher elevations, pre-vegetated coir mattresses were substituted for marsh plugs, riprap sizes were increased, and the contractor was given more flexibility. Routine monitoring was performed for 5 years. After the first 3 years of monitoring, all sites experienced increases in marsh coverage, average stem height, and average plant density. The sites were undamaged by Hurricane Sandy (2012), which affected the area only a few months following implementation of the adaptive management techniques (Traylor 2017).

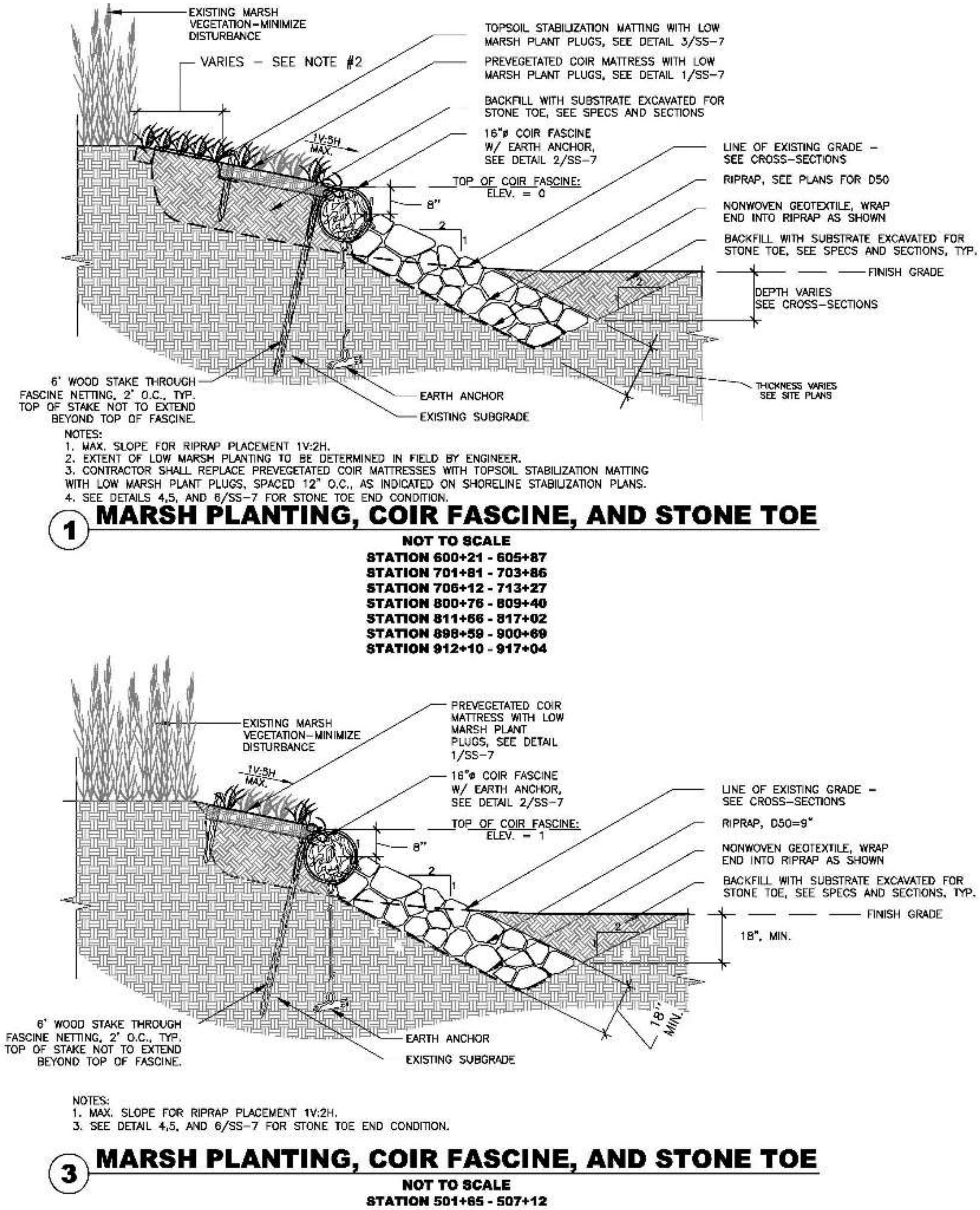
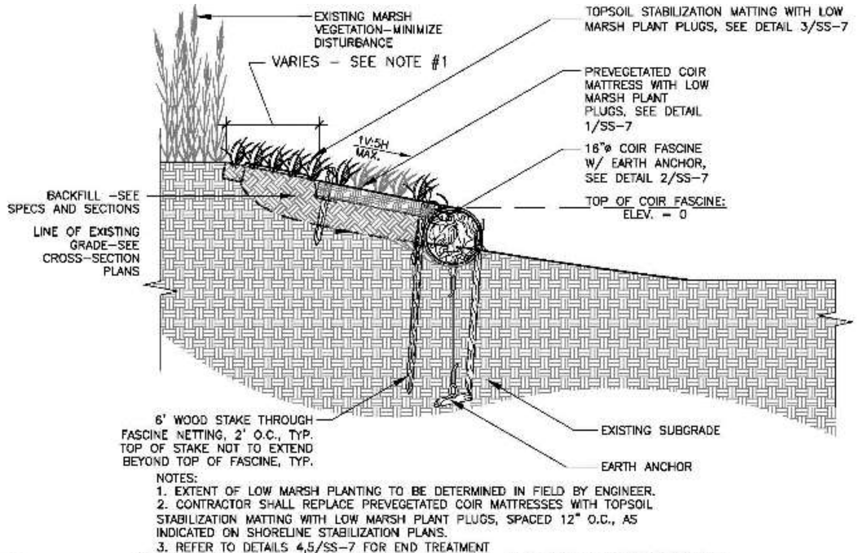
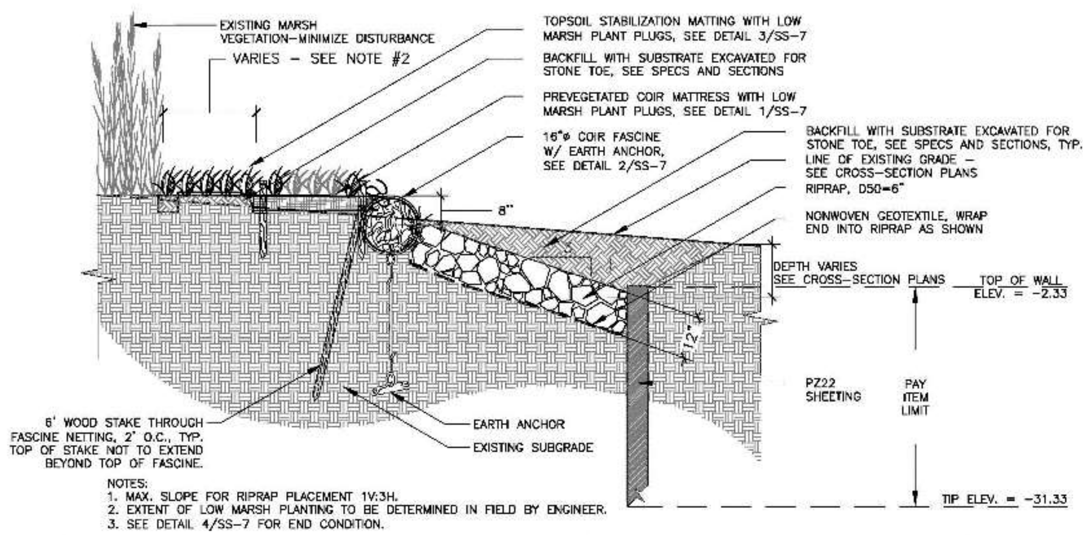


Figure 5-22. Cross-section design details for marsh shoreline stabilization in Great Egg Harbor Bay, NJ (Traylor 2017; NJDOT 2009). Details 1 and 3 were used in high wave energy locations.



2 MARSH PLANTING AND COIR FASCINE

NOT TO SCALE
STATION 700+82 - 701+81
STATION 813+47 - 816+85
STATION 902+50 - 903+40
STATION 909+92 - 912+10



4 MARSH PLANTING, COIR FASCINE, STONE TOE, AND SHEET PILE WALL

NOT TO SCALE
STATION 900+69 - 902+50

Figure 5-23: Cross-section design details for marsh shoreline stabilization in Great Egg Harbor Bay, NJ (Traylor 2017; NJDOT 2009). Detail 2 was used along shorelines with the lowest wave energy exposure. The project engineers specifically designed Detail 4 to address increased exposure to boat wake energy as a result of navigation channel realignment.