

Senior Design Project in Civil Engineering



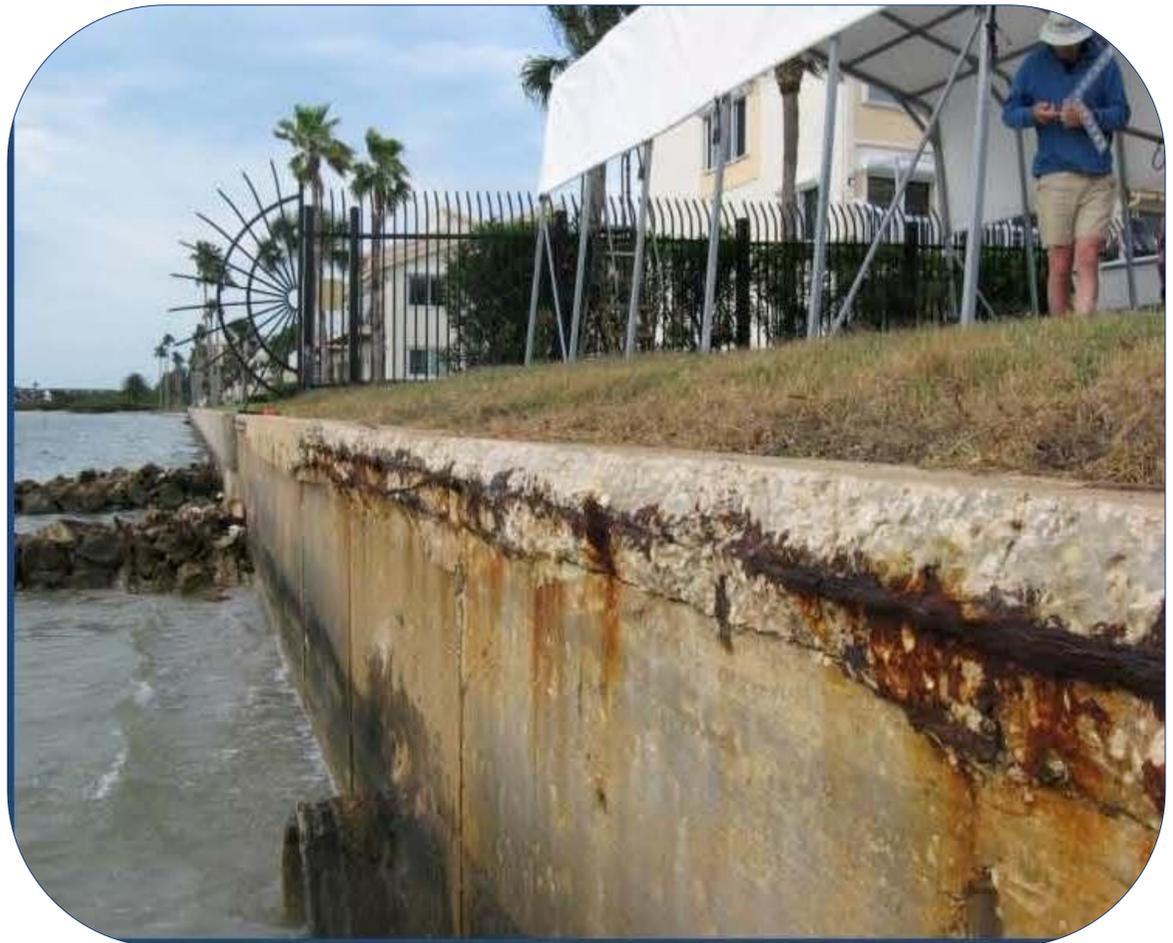
Station Sand Key Rehabilitation



Cadet 1/c Brett Godiksen, Kieron McCarthy, Mark Funke, Clay Niemec
Advisors: Dr. Jackson, LCDR Maggi
Sponsor: CEU Miami

Problem Statement:

The concrete bulkhead at Station Sand Key is deteriorated and cracking. Reinforcing rebar is being exposed as the concrete cap continues to decay. Many of the pile caps along the main pier contain closed corrosion spalls. These spalls have not yet affected the structural integrity but will soon require repairs. There is also a failed bolt connecting the gangway platform to the main pier.



Objective Statement:

The objective of this project is to find the most cost effective way to increase the longevity of the waterfront facilities by mitigating deterioration of the existing bulkhead and pier caps. Achieving this objective will ensure the mission readiness of United States Coast Guard Station Sand Key.

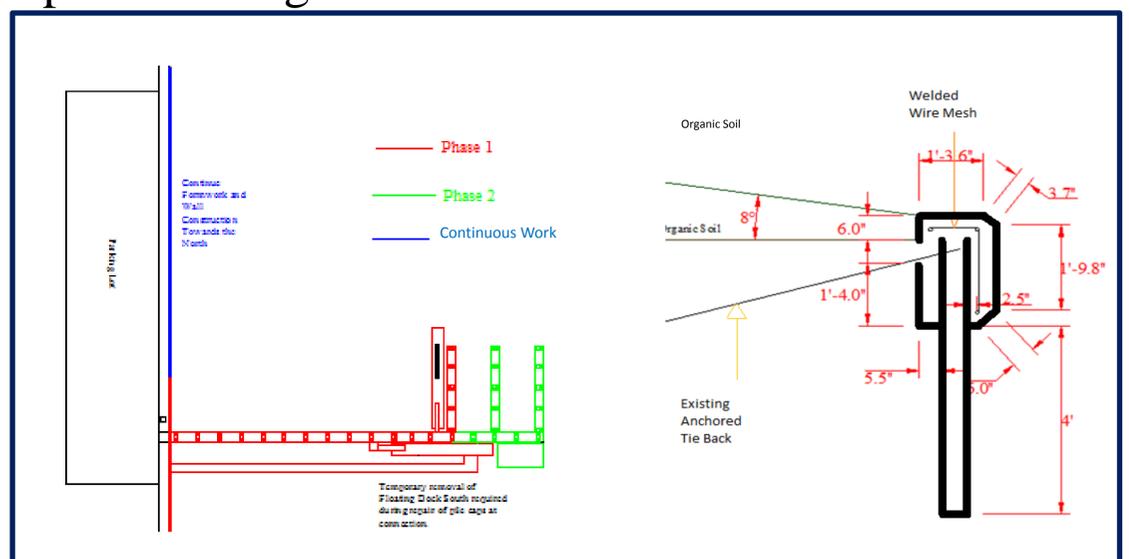
Project Schedule:

20OCT2011: Project Assigned
27NOV2011: Initial Research
07DEC2011: Poster/Problem Statement
30JAN2012: Initial Design Proposals
03FEB2012: Complete Site Investigation
18FEB2012: Complete Potential Designs
21MAR2012: Choose Best Design
30MAR2012: Submit Completed Design
15APR2012: Complete Cost Estimate
26APR2012: Present Final Proposal

Design:

Members of the team designed multiple alternatives and decided on the most optimum design based on cost, operational status, and service life. The existing anchored concrete bulkhead's structural integrity was assessed and proved to be adequate. Team members decided the repair of the existing concrete cap would be the most efficient option. The existing bulkhead requires patching along the face and a total replacement of concrete cap. The new concrete cap is designed to resist sulfate attack and protect the wall from salt water intrusion. Pile cap repairs resulted in a refurbishment of existing caps by removing degraded concrete and providing protective coating for existing rebar. Gangway connection will be repaired by replacing bolt connections with cast in place bolts both vertically and horizontally. Construction phasing was created as to not interfere with the operations of Station Sand Key.

Spec Drawings:



Cost Analysis:

Option 1: Repair \$287,000 (RECOMMENDED)
Option 2: Replacement \$915,000



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