From Mud to Marsh:
Restoring Lost Marsh Habitat in the Soft Soils of Dickinson Bayou

Philip Blackmar
Carla Kartman
Jan Culbertson
Project Location

Galveston Bay

Dickinson Bayou

Gulf of Mexico
Project Location
Project Need

Images courtesy of Texas Parks and Wildlife and Tobin Imagery
Project Need

- **Main Impacts**
  - Marsh loss
    - Approx. 9ft/yr of erosion
  - Shoreline retreat
  - Higher turbidity levels and lower water quality

- **Secondary Impacts**
  - Erosion exacerbated
  - Loss of valuable habitat
  - Loss of recreational and commercial fishing
Project Challenges

- Extremely Soft Soils
- Limited construction funds
  - Project had gone out for bids previously

Project Advantages

- Project location in close proximity to industry and construction yards
  - Potential for lower mobilization costs and competitive bids
- Motivated project team
Project Goals
- Create 10 acres of marsh complex
- Protect 17 acres of existing marsh

Project Components
- 2 marsh parcels
- 1 separate living shoreline structure
- Borrow areas focused on natural channel that has silted in in recent years.
Methods

- Utilize containment berms and existing shoreline to contain the soft dredge soils
- Dredge marsh fill from natural flow channel
- Construct living shoreline structures to protect constructed and existing marsh
Cost Efficiency Efforts

- Provide substantial information in plans and specs
  - Soft materials and challenging site conditions present liability for contractors
    - Document contractor’s responsibility
    - Document existing conditions

- Specify minimal means and methods ➔ Provide contractor flexibility
- Specified option for using crushed concrete or graded quarry stone
Containment Berm Construction
Containment Berm Construction
Dredging for Marsh Construction
Fill Material
Designing the Marsh Elevation

- Marsh will settle rapidly following construction
  - Fill material consolidation
  - Foundation material settlement

- Settlement will slow, but continue for years

- Contractor’s acceptance survey to be performed 2 weeks after dredging stops
Dredging for Marsh Construction
Decanting

Contractor required to manage the boards on the decant structure to allow “clear” water to overtop
Elevation Measurement

Use of grade control markers gives contractor and engineer visual reference for acceptance.
Living Shoreline Structures

- Contractor used crushed concrete option
- Did not specify timing requirement for crushed concrete
Construction

- Contractor: Apollo Environmental Strategies, Inc.
- April through August 2016
- No major issues

Post-Construction

- Texas Parks and Wildlife continues to monitor the project
- Numerous planting events have been held
Construction Photos
Post Construction
Summary

- Marsh restoration project to replace marsh loss in Dickinson Bayou
  - Approximately 10 acres of marsh complex constructed
  - Approximately 17 acres of existing marsh protected
- Worked with soft soils and tight budget
- Project will be monitored to review success
Questions