Mississippi Coastal Improvements Program (MsCIP)

“Comprehensive Barrier Island Restoration Plan”

PIANC
2012 Dredging Conference

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Presentation Outline

• History of the Mississippi Coastal Improvements Program (MsCIP)
• Development of the Comprehensive Barrier Island Restoration Plan
• Selection of Sand Placement Locations
• Identification of Borrow Sources
• Construction Alternatives/Methods Considered
• Recommended Plan
Mississippi Coastal Improvements Program

- P.L. 109-148, 30 December 2005
- Comprehensive Planning to Address
  - Hurricane and Storm Damage Reduction
  - Salt Water Intrusion
  - Shoreline Erosion
  - Fish and Wildlife Preservation
  - Other Water Related Resource Projects
- Cost Effective Projects in lieu of NED benefits
- No Incremental Benefit-Cost Analysis
- Report requirements
  - Interim Report within 6 months
  - Comprehensive Plan within 2 years
- Compatible with State Coastal Restoration Plan
Comprehensive Plan Elements

Hurricane / Storm
Salt Water Intrusion
Shoreline Erosion
Fish & Wildlife

Interim Projects
Phase I Projects
Ecosystem Restoration Studies
Other Studies

Hancock County
Harrison County
Jackson County

Bay St. Louis
Waveland
Gulfport
Biloxi
Gautier
Pascagoula
Moss Point
Petit Bois

High Hazard Risk Area
1% Chance Flood Risk
Katrina Inundation Limits
Littoral Zone Placement of Sand
O&M Beneficial Use Placement
Comprehensive Barrier Island Restoration Plan

- Sediment budget of barrier island chain
- Revised dredge material disposal plan for Pascagoula navigation channel
- Northern shoreline of West Ship Island
- Eastern shoreline of Cat Island
Original Placements for Restoration of Sediment Budget – Mississippi Barrier Islands

Legend:
- Railroads
- Channel Centerlines
- Limited Access Highway
- Major Highway
- 2005 Barrier Island Shoreline
- Municipalities
- Littoral Sand Addition Zone

Original Borrow
45 miles
Recommended Placements for Restoration of Sediment
Budget – Mississippi Barrier Islands
Criteria for Selection of a Borrow Source

- Sand compatibility
  - Particle shape (roundness)
  - Gradation ($D_{50}$ of sand on Ship Island = 0.30 mm)
  - Color
- Out of active littoral transport system
- Minimal wave focusing
- Cost
Borrow Sites Being Considered

- Ship Island Borrow Area
- Da-10
- Petit Bois Borrow Area
Ship Island Borrow Site

GULF ISLANDS NATIONAL SEASHORE
(protected area: 36 CFR 7.12)
DA-10 Borrow Site
Petit Bois Borrow Site

**MOBILE DISTRICT**

**US Army Corps of Engineers**

**GULF OF MEXICO**

**BUILDING STRONG™**

**Petit Bois Borrow Site**

<table>
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<tr>
<th>Column1</th>
<th>Column2</th>
<th>Column3</th>
<th>Column4</th>
<th>Column5</th>
<th>Column6</th>
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**SCALE 1:40,000**

**Statute Miles**

**Statute Miles**
Other Borrow Sites Being Considered
# Available Borrow Quantities

<table>
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<tr>
<th>Borrow Site</th>
<th>D50 (mm)</th>
<th>Computed Volume (mcy)</th>
<th>Dredge Efficiency %</th>
<th>Available for Use (mcy)</th>
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<td>Petit Bois</td>
<td>0.32</td>
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<td>Lower Tombigbee</td>
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Construction Alternatives/Methods Considered

- Alternative 1
  - Camille Cut: (16.0 m.c.y, $D_{50} = 0.28$ mm)
    - Dredge coarser sand from Petit Bois using hopper dredge (8.0 m.c.y.)
    - Dispose coarser sand on top of finer sand in Ship Island Borrow (8.0 m.c.y.)
    - Use cutterhead to make single cut and place “mixed” material in Camille Cut
  - East Ship Island: (Same for all alternatives)
    - Dredge DA-10 using cutterhead and load into scows
    - Pump-off directly to East Ship Island (4.8 m.c.y., $D_{50} = 0.33$ mm)
  - Pros:
    - Mixing will be achieved with the use of one dredge during final placement
  - Cons:
    - Sand from Petit Bois will have to be pumped off due to the depth of water in Ship Island Borrow
    - Material will have to be double-handled ($$$$$$)
    - Wave focusing due to excavation of Ship Island Borrow
Construction Alternatives/Methods Considered

• Alternative 2
  – Camille Cut: (16.0 m.c.y, D₅₀=0.28)
    • Dredge coarser sand from Petit Bois using hopper dredge
    • Dispose coarser sand south of finer sand in Ship Island Borrow in deeper water
    • Use two cutterhead dredges with merged discharge lines to place “mixed” material in Camille Cut
  – East Ship Island: (Same for all alternatives)
    • Dredge DA-10 using cutterhead and load into scows
    • Pump-off directly to East Ship Island (4.8 m.c.y., D₅₀ = 0.33 mm)
  – Pros:
    • Hopper dredges carrying Petit Bois sand can directly dispose in deep water south of Ship Island Borrow
  – Cons:
    • Material will have to be double-handled ($$$$
    • Wave focusing due to excavation of Ship Island Borrow
Construction Alternatives/Methods Considered

• Alternative 3 – Recommended
  – Camille Cut: (14.5 m.c.y., $D_{50} = 0.32$ mm)
    • Dredge coarser sand from Petit Bois using hopper dredge and dispose directly into Camille Cut via pump-off (13.5 m.c.y.)
    • Dredge finer sand from Ship Island Borrow using a cutterhead dredge and pump directly to Camille Cut (1.0 m.c.y.)
    • Ship Island sand will serve as a cap on the fill section to facilitate the growth of beach vegetation
  – East Ship Island: (Same for all alternatives)
    • Dredge DA-10 using cutterhead and load into bottom dump scows
    • Pump-off directly to East Ship Island (4.8 m.c.y., $D_{50} = 0.33$ mm)
  – Pros:
    • Coarse material which results in a more stable fill section
    • No double-handling of material
    • Minimal wave focusing due to the small quantity from Ship Island Borrow
    • Most cost effective alternative
Recommended Plan – Phases of Construction

• Construction Phases
  – Phase 1 (6.1 m.c.y.)
    • Initial closure of Camille Cut
    • Top of Berm = EL. +5 ft NAVD88
    • Crest Width = 500 ft
  – Phase 2 (4.8 m.c.y.)
    • East Ship Island
    • Top of Berm = EL. +6 ft NAVD88
    • Crest Width = 1,100 ft
  – Phase 3 (7.4 m.c.y.)
    • Widen and raise Camille Cut Fill
    • Top of Berm = EL. +7 ft NAVD88
    • Crest Width = 1,000 ft
  – Phase 4 (1 m.c.y)
    • Cap Camille Cut Fill
    • Finer grained sand
Summary

• Restoration of the Mississippi Barrier Island Sediment Budget
  – Placement Locations – Camille Cut/East Ship Island
  – Borrow Sources – Ship Island, DA-10, Petit Bois, and Lower Tombigbee River
  – Recommended Plan – 14.5 M c.y. in Camille Cut & 4.8 M c.y. at East Ship Island
  – Construction – 5 Phases
    • Phases 1-4: Dredging/Placement to Construct Restoration Berms
    • Phase 5: Plant dune vegetation