

Adaptability During Design and Construction of Large Scale Coastal Restoration Projects in Louisiana



*27th Annual National Conference on
Beach Preservation Technology
February 13, 2014*

*Presented by:
Michael Poff, P.E.*



A.K.A “A TALE OF TWO FIRSTS”



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Outline

- Design / Permitting
 - Anthropogenic Effects
 - Hurricanes
 - Fill Template Tolerances
 - Means & Methods Options

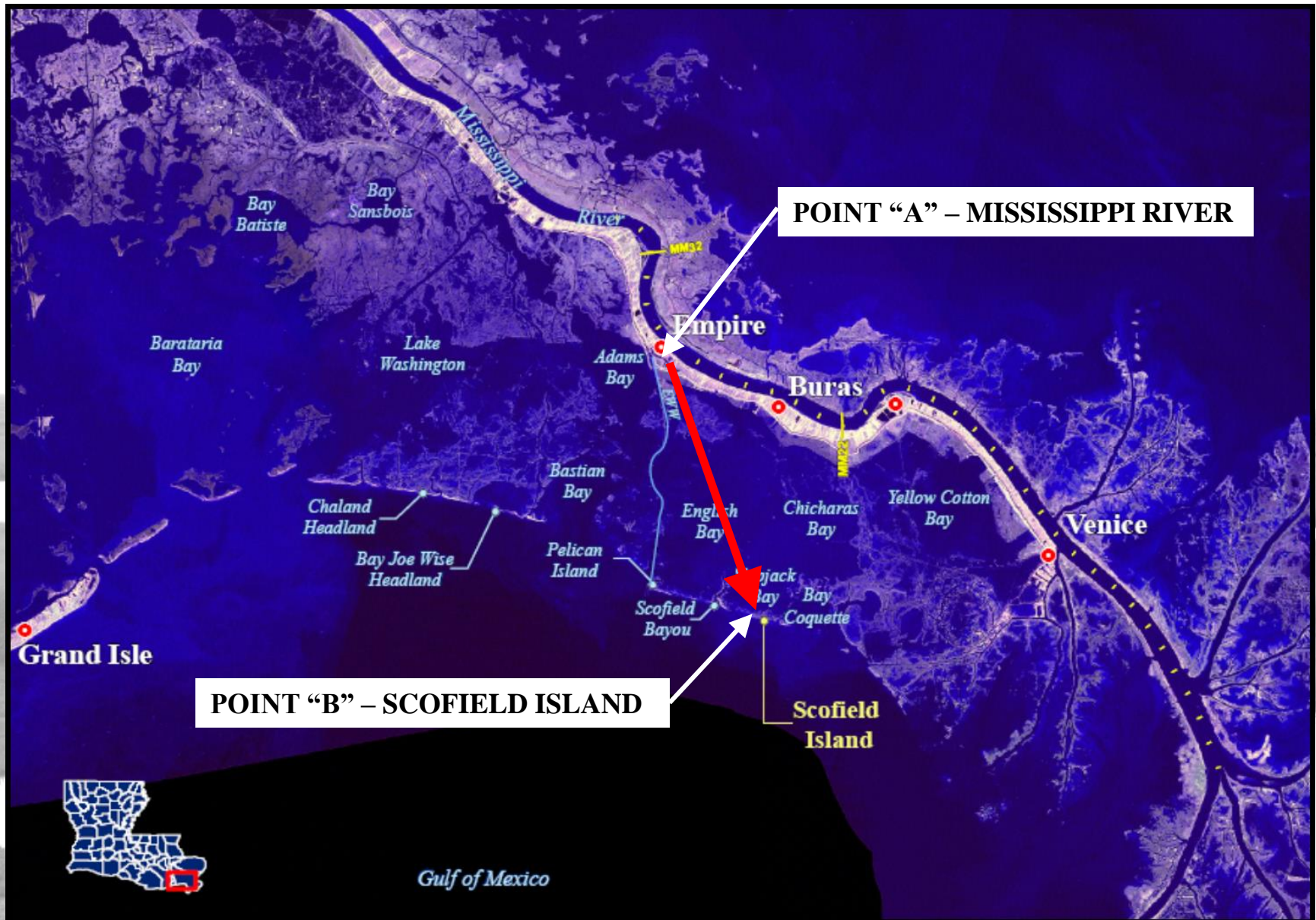


Outline

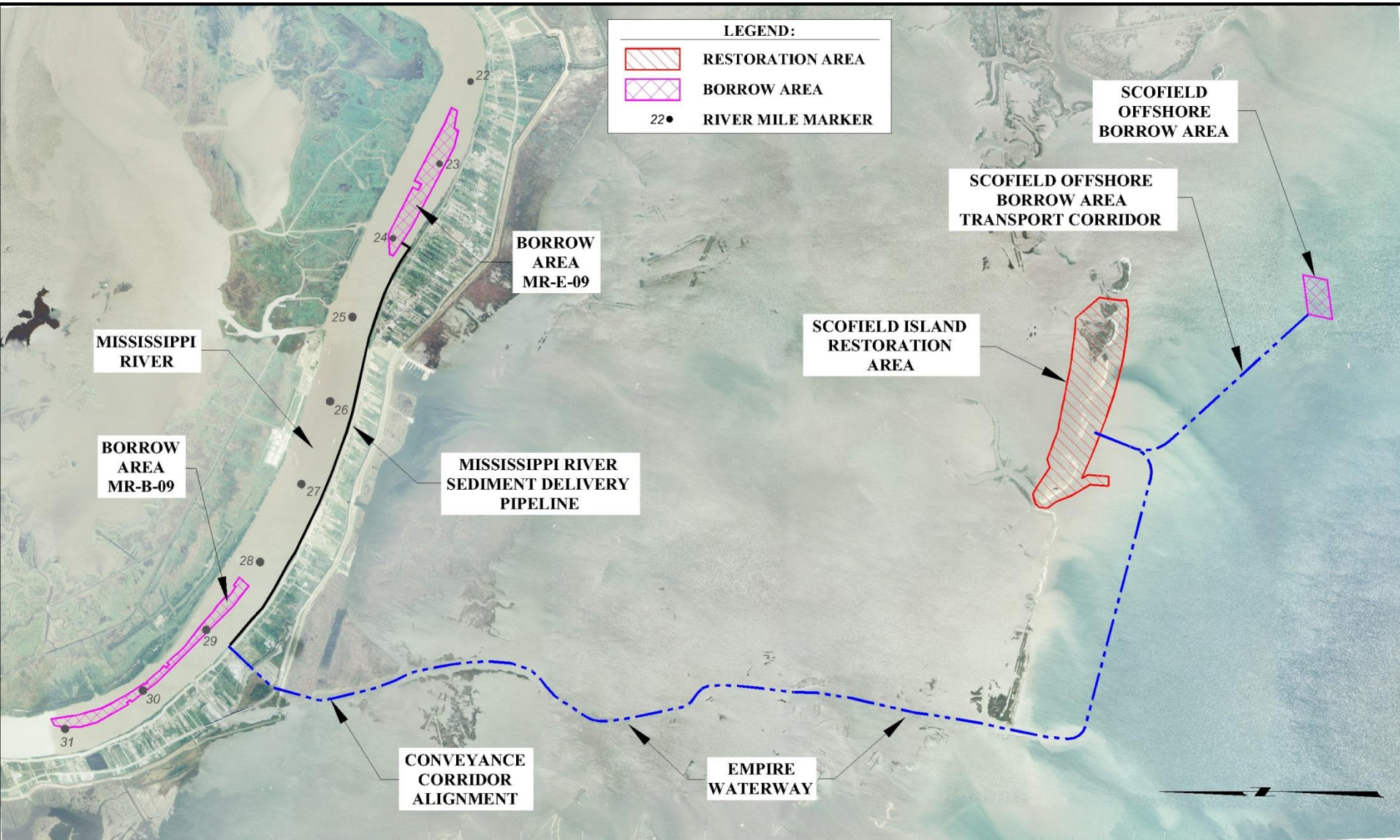
- Construction
 - Anthropogenic Effects
 - Hurricanes
 - Fill Template Tolerances
 - Means & Methods Options



Project #1 - Scofield Island



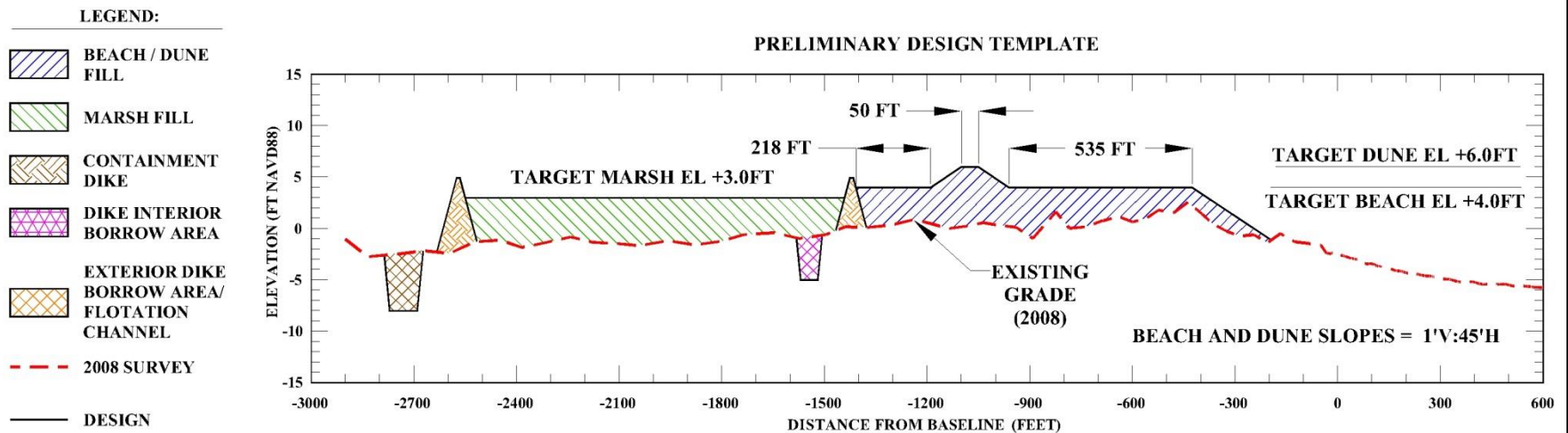
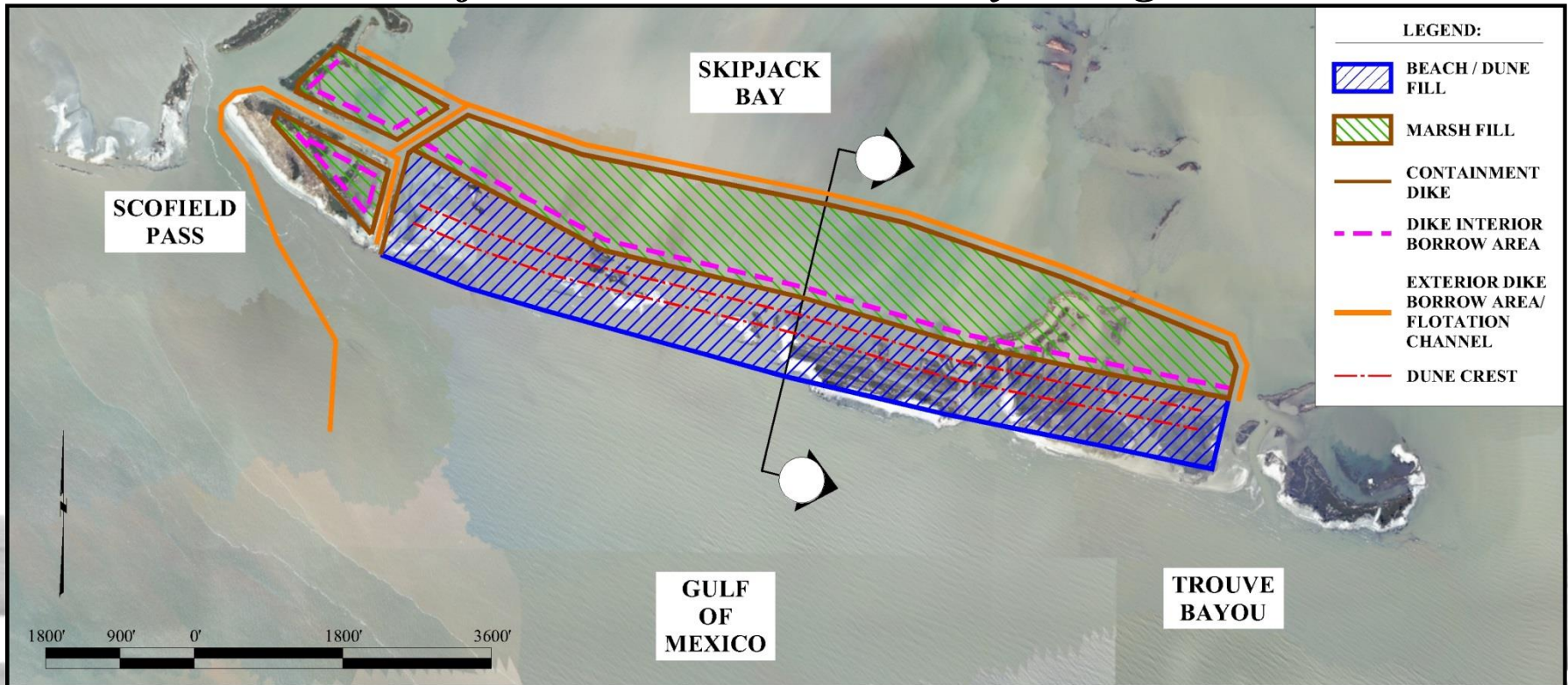
Project #1 Elements



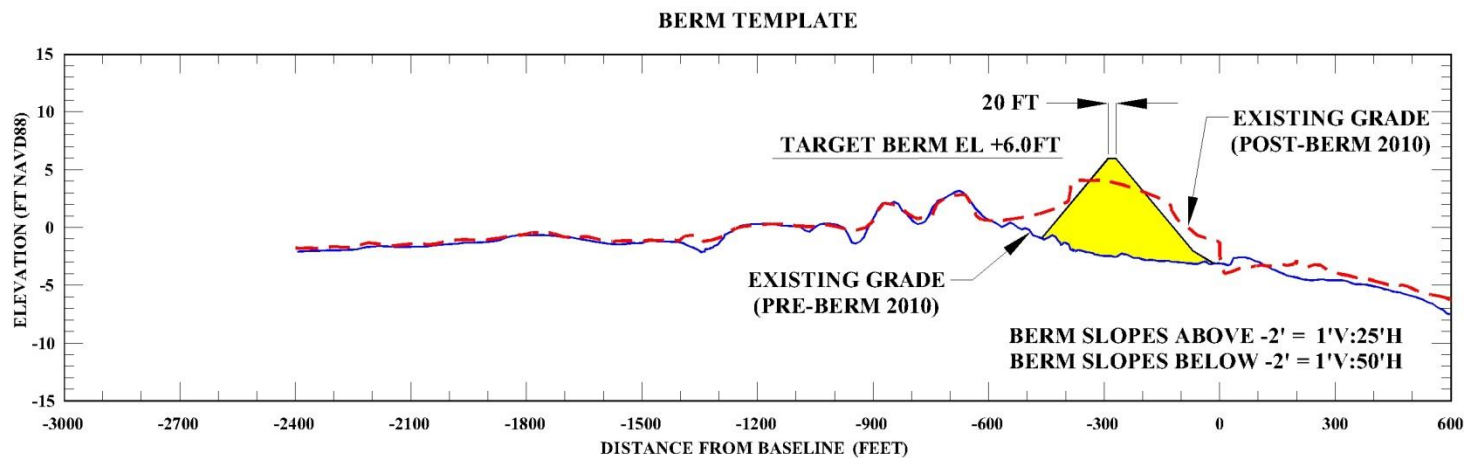
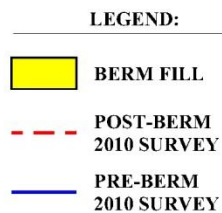
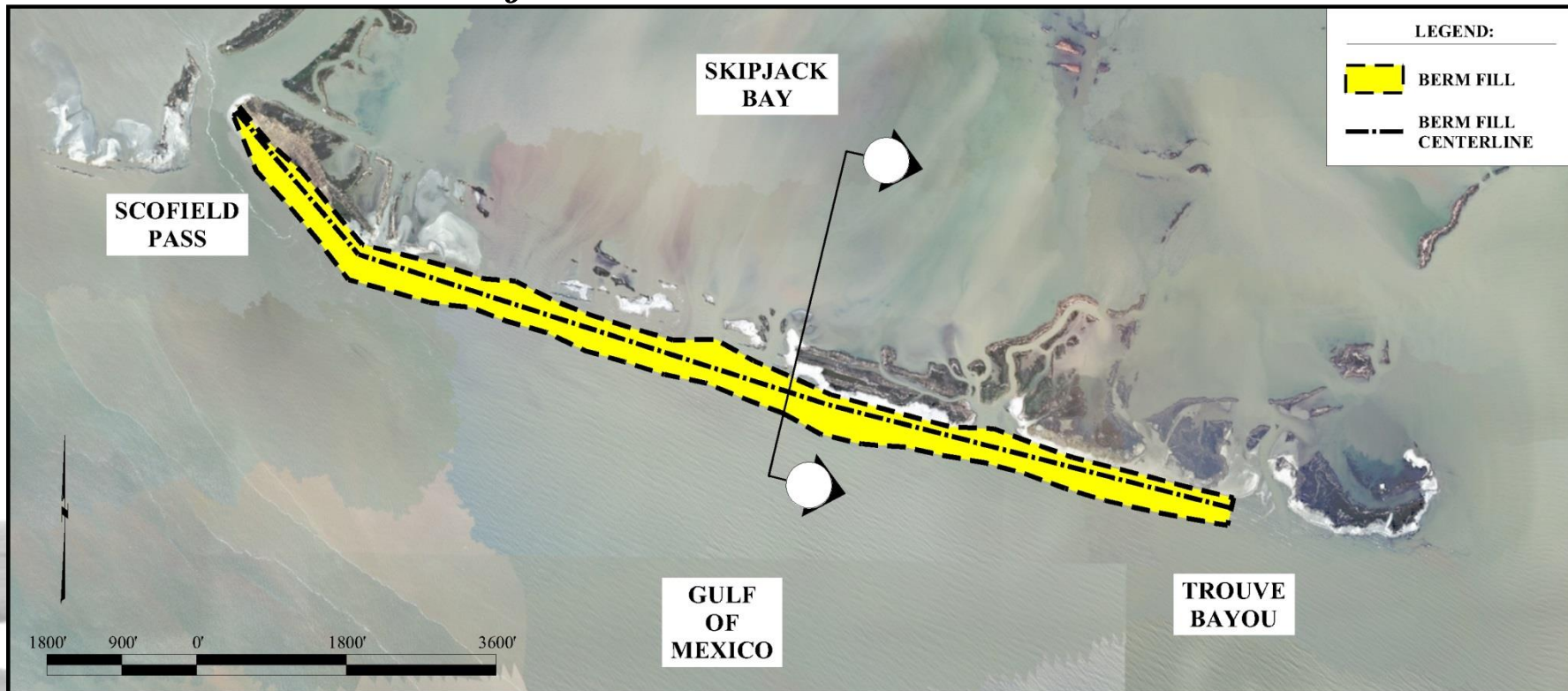
A grayscale photograph of a coastal landscape. In the foreground, there is a grassy field with some low-lying vegetation. A body of water, possibly a lagoon or a bay, stretches across the middle ground, reflecting the sky. The background shows a distant shoreline with more vegetation and a few small structures or trees. The overall scene is calm and serene.

Berm to Barrier Island

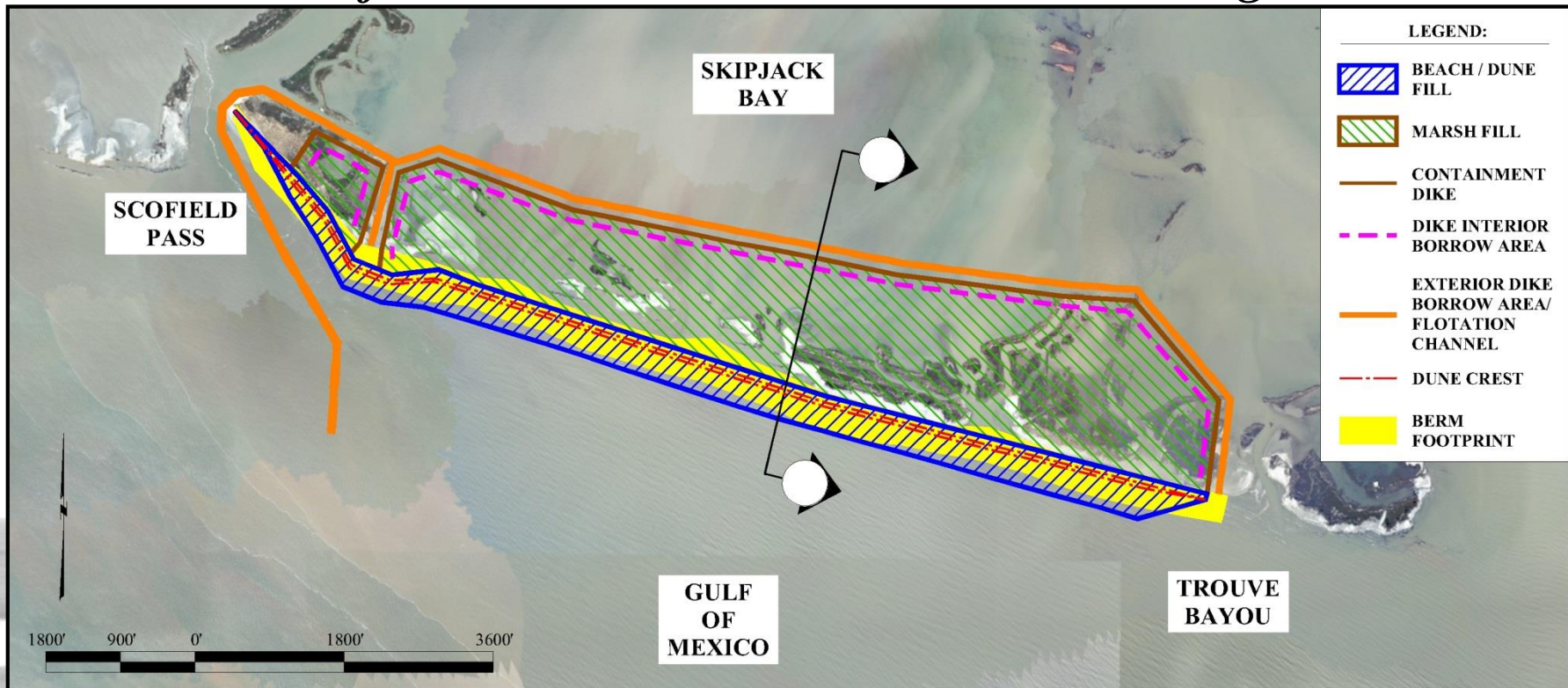
Scofield Island Preliminary Design



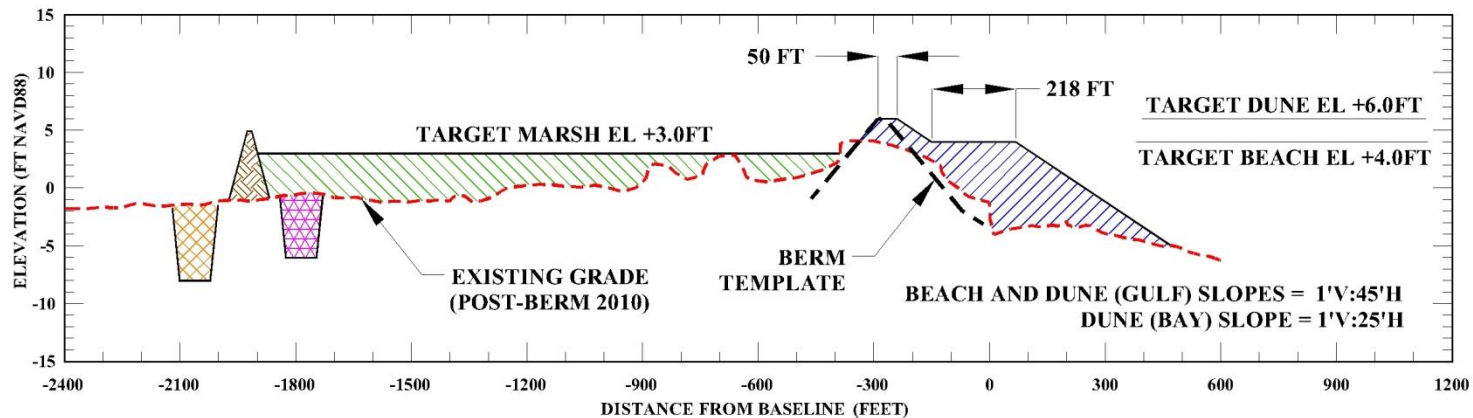
Scofield Island Protective Berm



Scofield Island - Final Construction Design



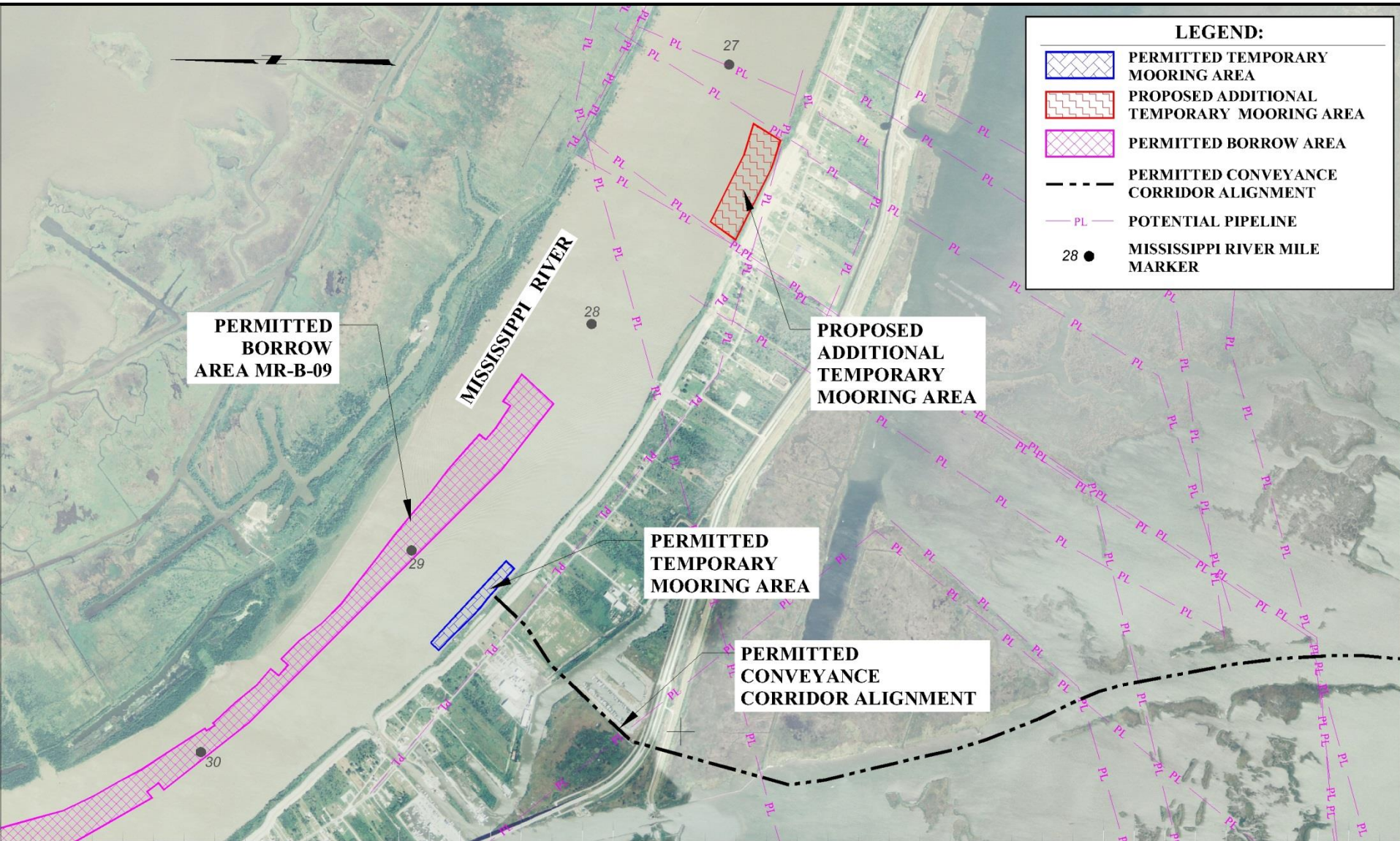
POST-BERM GULFWARD TEMPLATE - FINAL CONSTRUCTION TEMPLATE



Permit Modifications



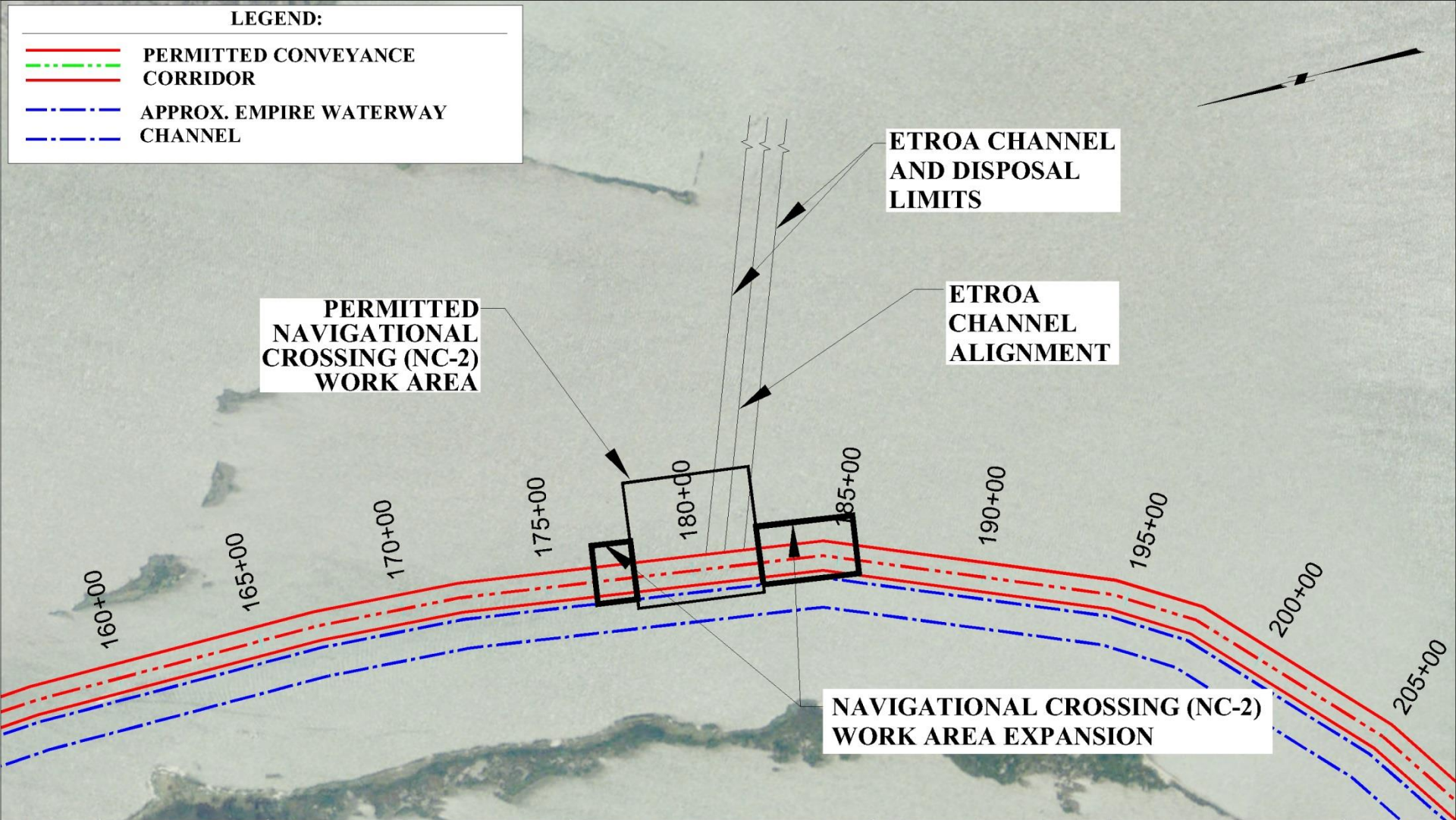
Permit Modifications - Additional Temporary Mooring Area



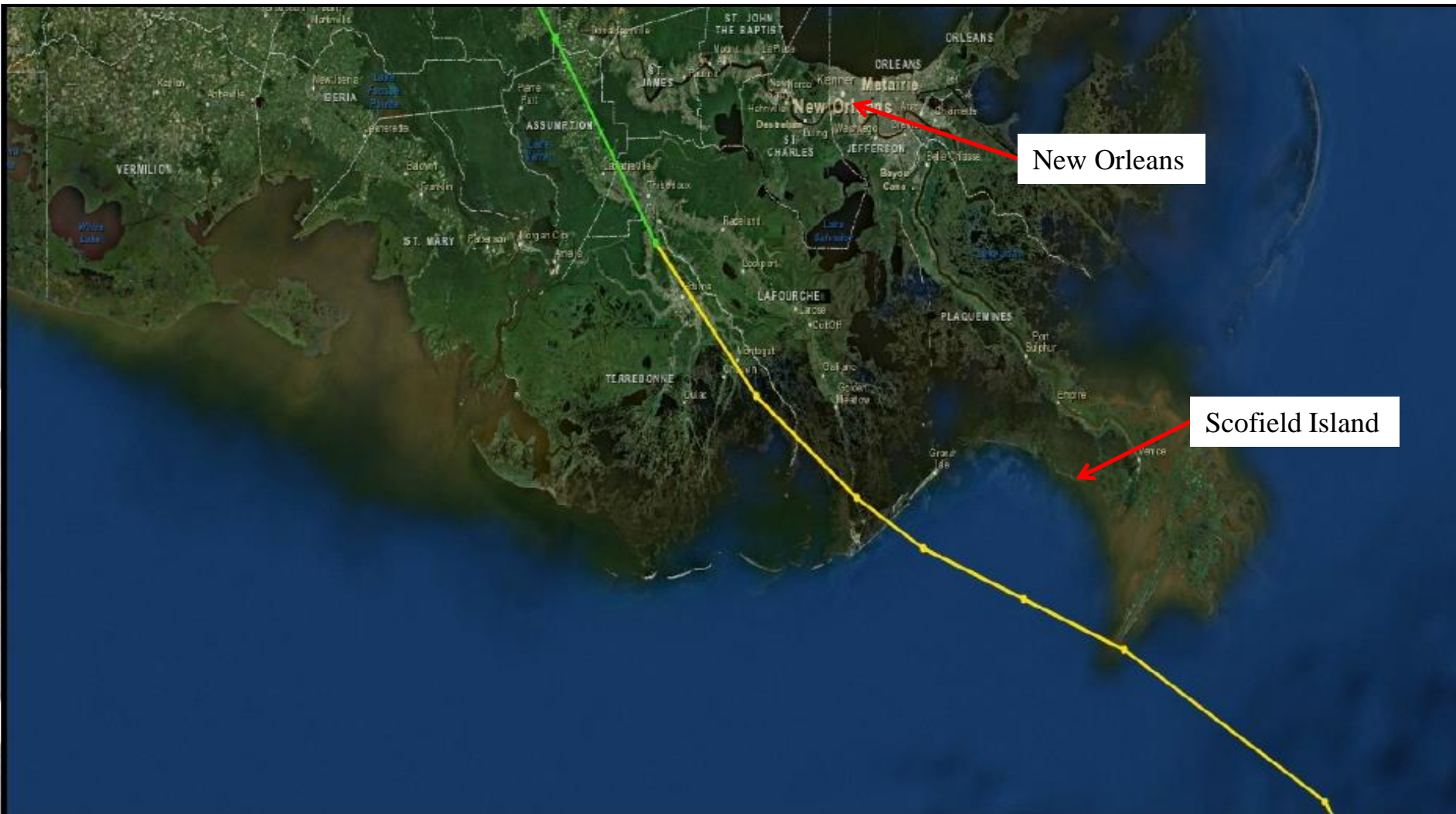
Permit Modifications - Navigational Crossing

LEGEND:

- PERMITTED CONVEYANCE CORRIDOR
- APPROX. EMPIRE WATERWAY CHANNEL



Hurricane Isaac Track



Pre – Hurricane Isaac



Reference Point
(Oil & Gas Facility)



727.520.8181
www.aerophoto.com

Scofield Island

Image # 120802 6013
Date 08.02.12

Post – Hurricane Isaac



727.520.8181
www.aerophoto.com

Scofield Island

Image # 121002 6049
Date 10.02.12

Pre – Hurricane Isaac Breach



**Reference Point
(Oil & Gas Facility)**



727.520.8181
www.aerophoto.com

Scofield Island

Image # 120802 6026
Date 08.02.12

Post – Hurricane Isaac Breach



**Reference Point
(Oil & Gas Facility)**



727.520.8181
www.aerophoto.com

Scofield Island

Image # 121002 6038

Date 10.02.12

Hurricane Isaac Impacts

Original Construction Volumes

Beach and Dune

1,632,000 cy

Marsh

1,761,500 cy

Hurricane Impacts

Beach and Dune

- 257,310 cy (-15.8%)

Marsh

+133,260 cy (+7.6%)

Final Construction Volumes

Beach and Dune

1,889,310 cy

Marsh

1,628,240 cy



Offshore Borrow Area Redesign

Scofield Offshore Borrow Area Redesign








ORIGINAL BORROW AREA PARAMETERS

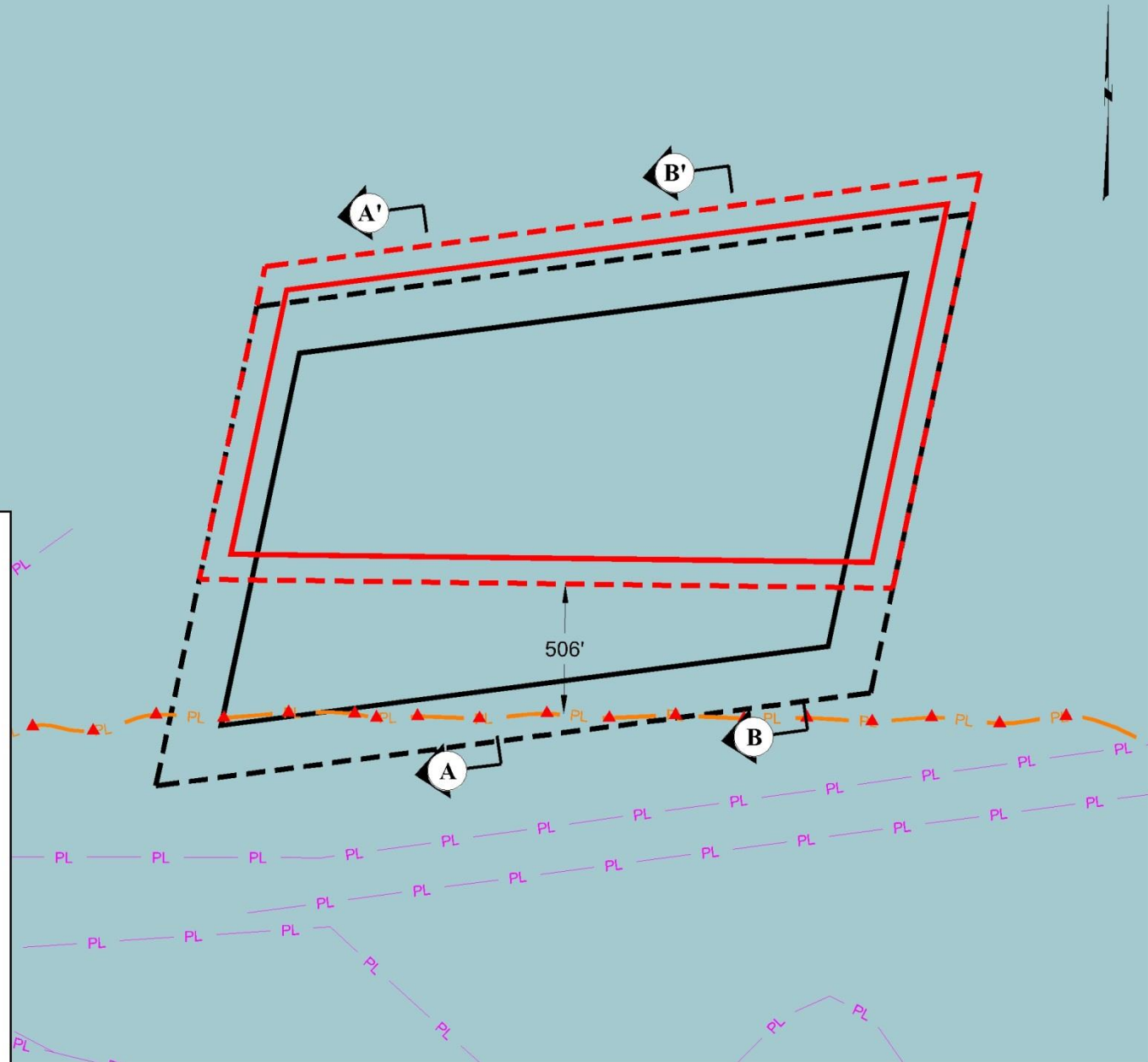
BORROW AREA LENGTH	2,800 FT
BORROW AREA WIDTH	1,900 FT
BORROW AREA CUT DEPTH	-40 FT
BORROW AREA VOLUME (-40' NAVD88)	3.30 MCY

REVISED BORROW AREA PARAMETERS

BORROW AREA LENGTH	2,810 FT
BORROW AREA WIDTH	1,650 FT
BORROW AREA CUT DEPTH	-42 FT
BORROW AREA VOLUME (-42' NAVD88)	3.02 MCY

LEGEND:

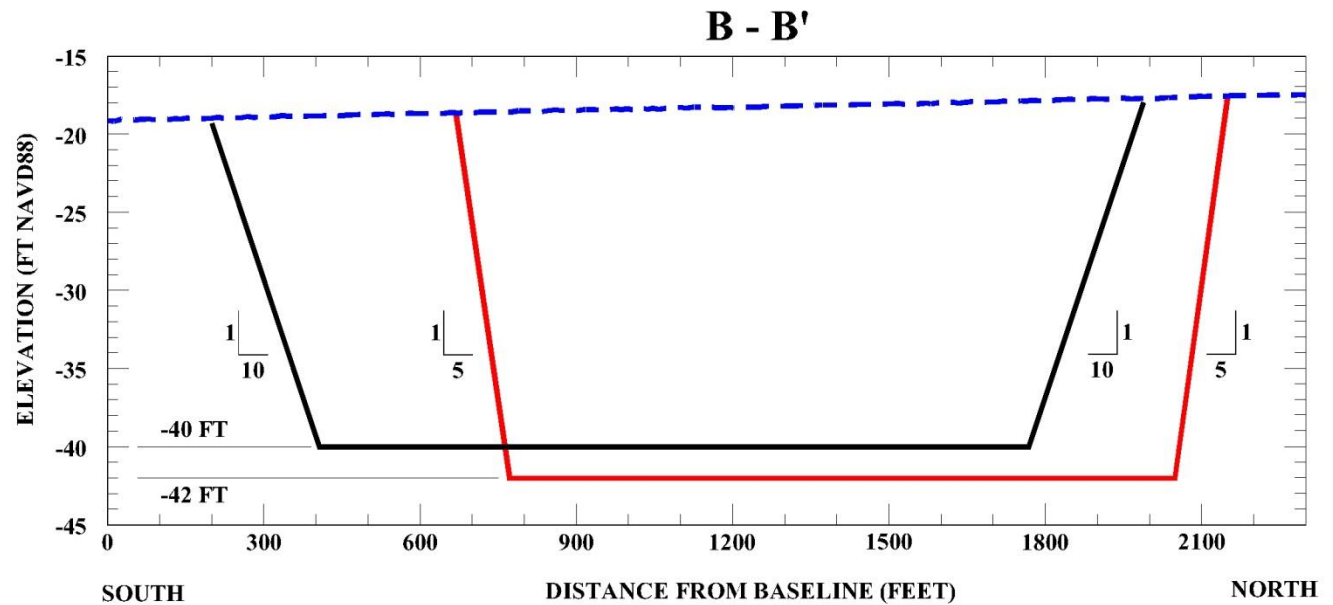
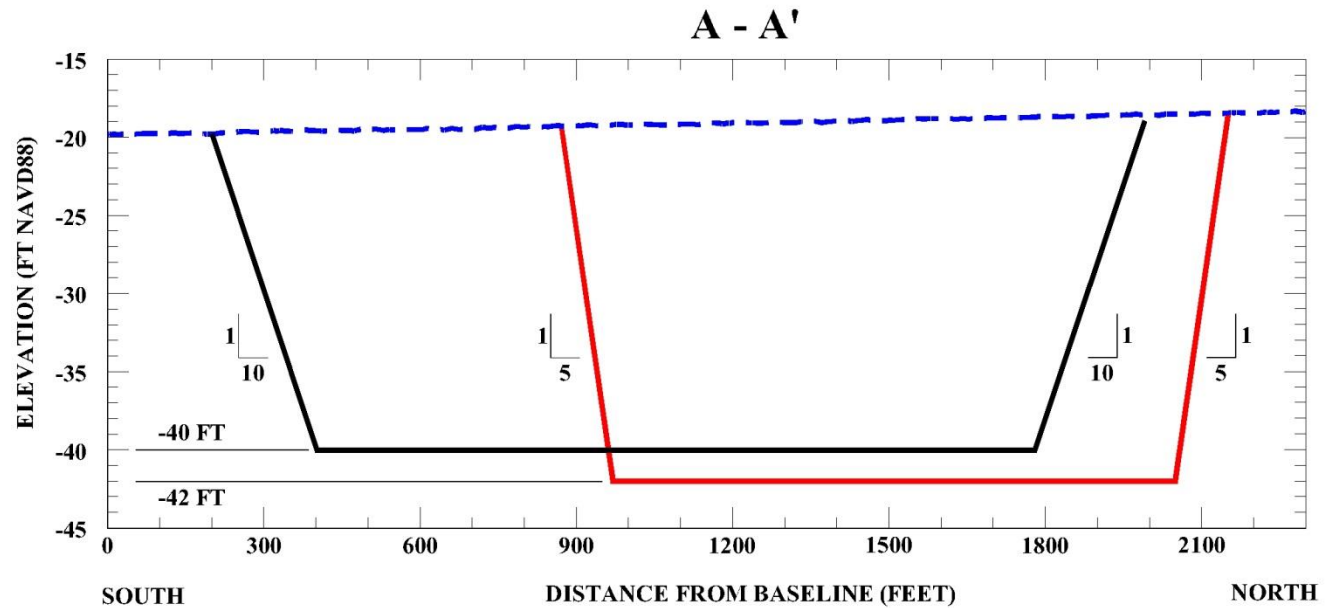
-  ORIGINAL BORROW AREA PERIMETER (BOTTOM OF CUT)
-  ORIGINAL BORROW AREA PERIMETER (TOP OF CUT)
-  REVISED BORROW AREA PERIMETER (TOP OF CUT)
-  REVISED BORROW AREA PERIMETER (TOP OF CUT)
-  MAGNETOMETER ANOMALY
-  PIPELINE POSITIONED BY MAGNETOMETER SURVEY
-  PIPELINES (LDNR, 2009)



Scofield Offshore Borrow Area Redesign

LEGEND:

- EXISTING GRADE
- ORIGINAL BORROW AREA DESIGN
- REVISED BORROW AREA DESIGN

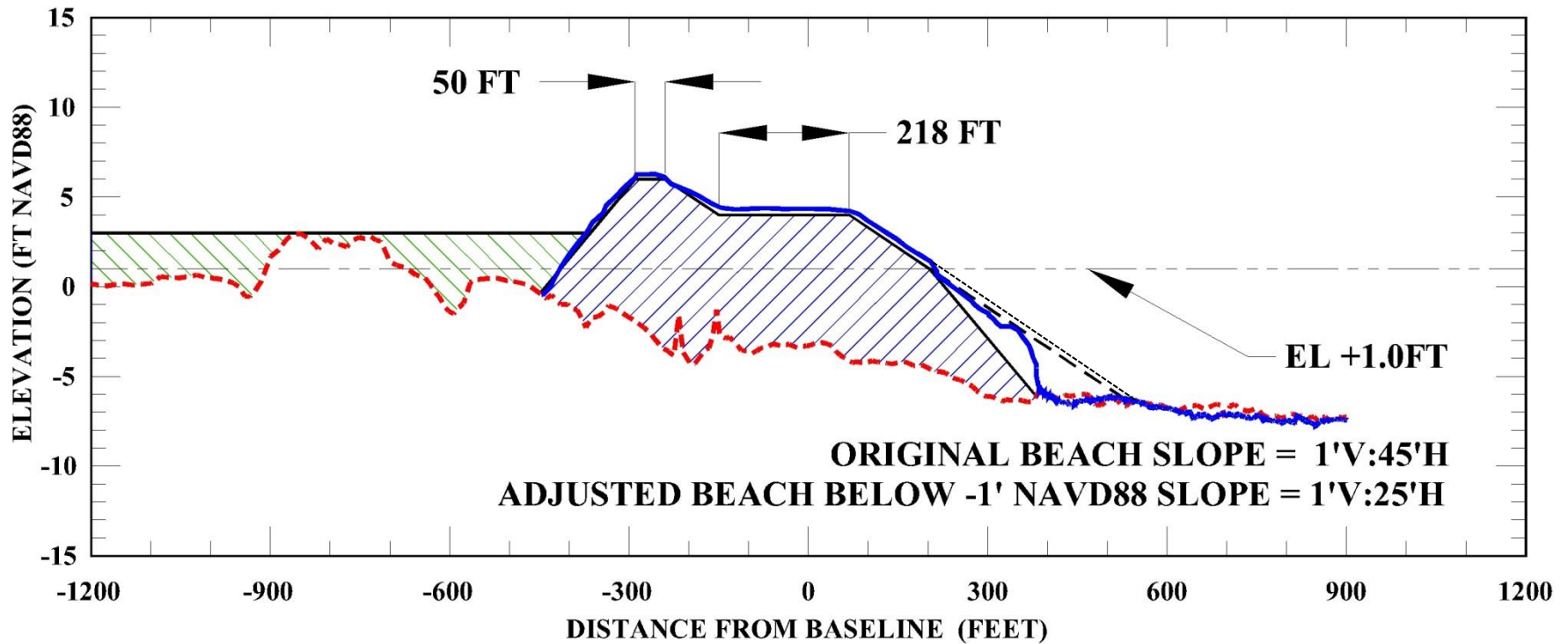


A grayscale photograph of a coastal landscape. In the foreground, there is a grassy dune. In the middle ground, a calm body of water reflects the sky. The background shows a flat, grassy area extending to the horizon. The text is overlaid on a white rectangular background in the center of the image.

Beach Fill Design Slope Adjustment

Design Slope Adjustment

CONSTRUCTION SLOPE ADJUSTMENT



LEGEND:

	BEACH / DUNE FILL		PRE-CONSTRUCTION GRADE		ORIGINAL SLOPE
	MARSH FILL		POST-CONSTRUCTION GRADE		DESIGN

Lessons Learned

- Stakeholder coordination early and continuously through the project to completion.
- Sand quality of the Mississippi River performance versus offshore sand source performance
- Flexibility of construction tolerances to benefit the Project, Owner, and Contractor.

The First “First”



GLDD's California in MR



Mississippi River Levee Crossing



Hurricane Protection Levee Crossing

12.17.2012

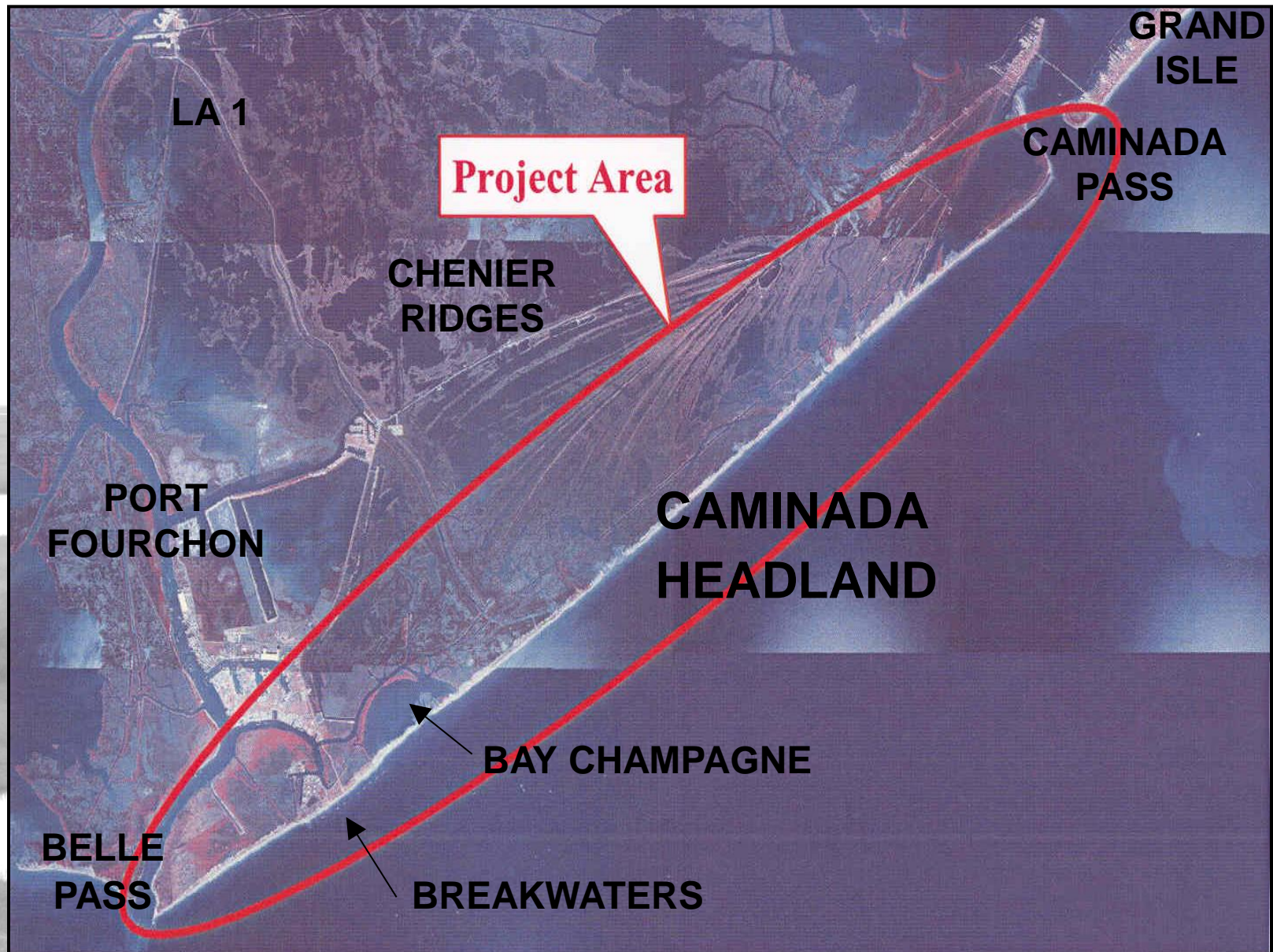
The First “First”



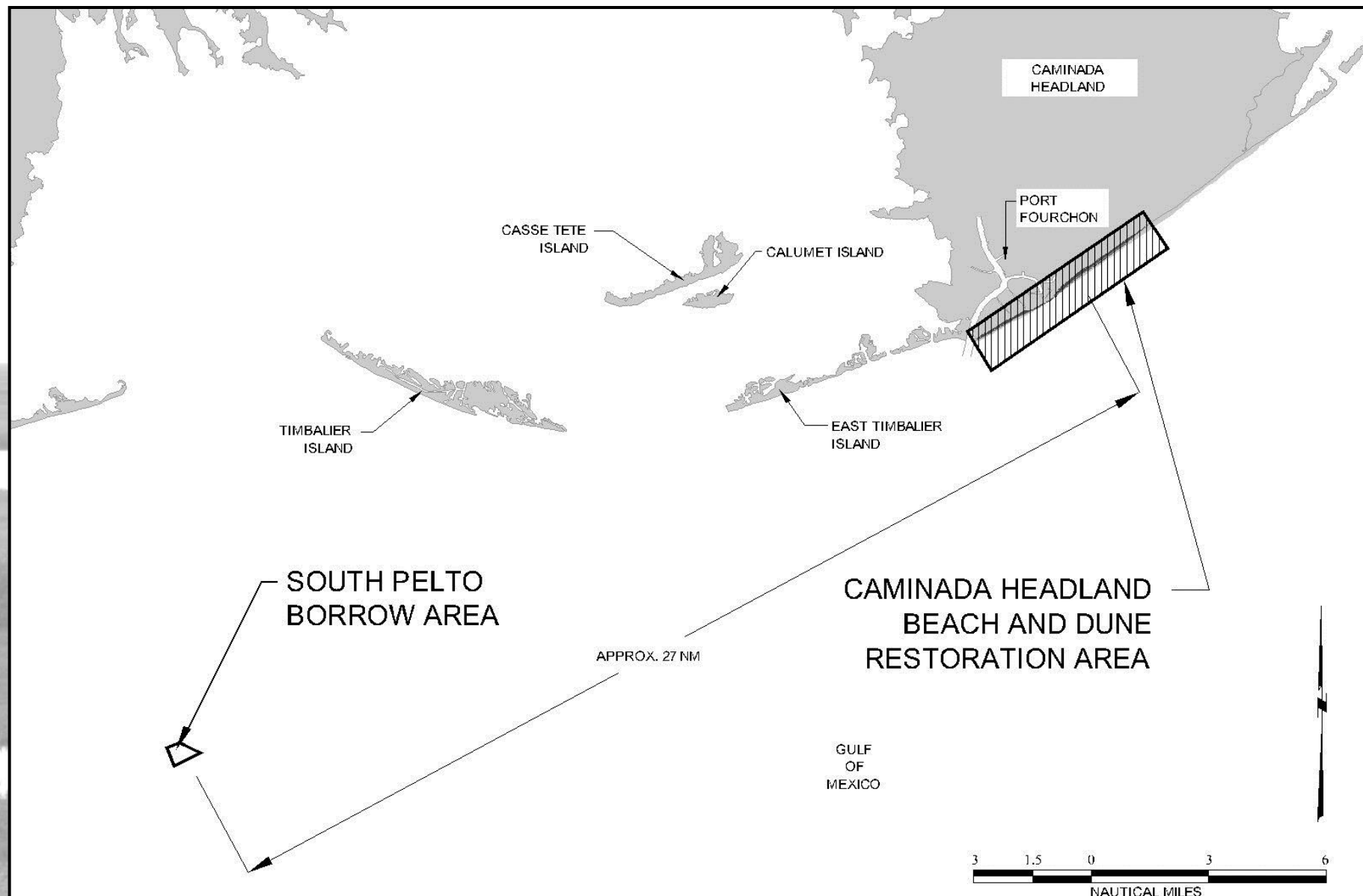
12-18-12 First grains of MR sand arrive at Scofield Island



Project #2 Caminada Headland



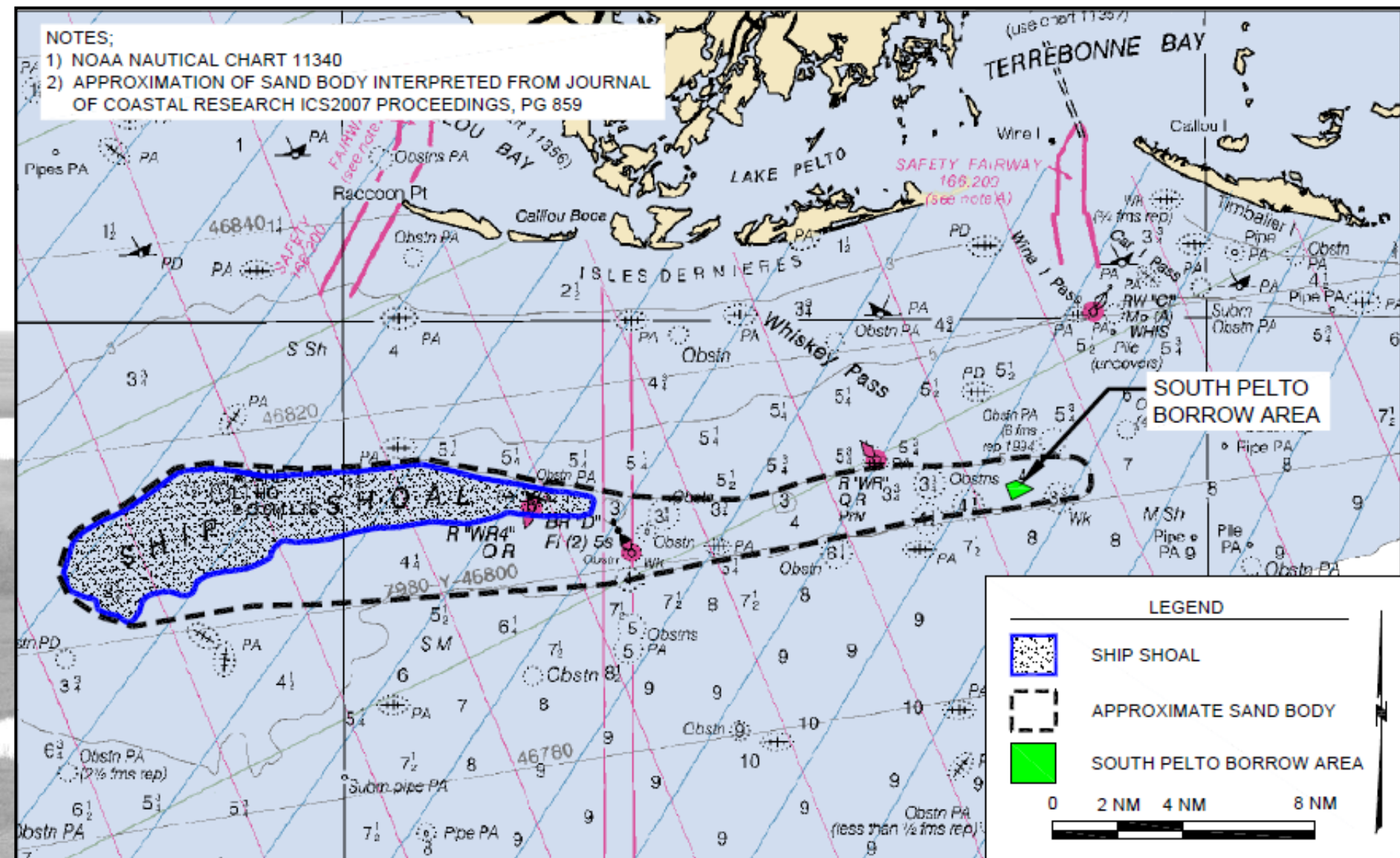
Project #2 Elements



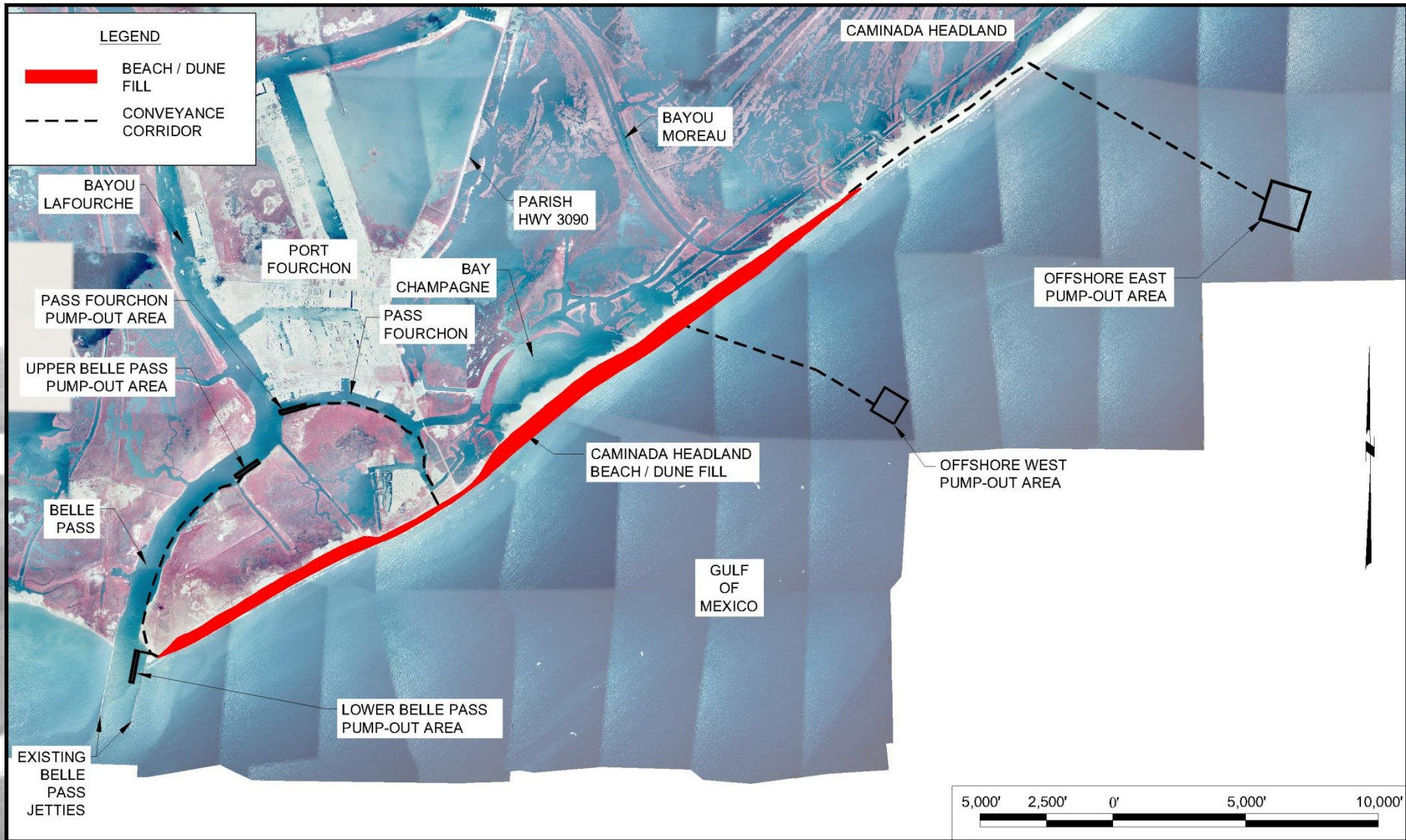
Ship Shoal Overview Map

NOTES:

- 1) NOAA NAUTICAL CHART 11340
- 2) APPROXIMATION OF SAND BODY INTERPRETED FROM JOURNAL OF COASTAL RESEARCH ICS2007 PROCEEDINGS, PG 859



Headland Overview Map



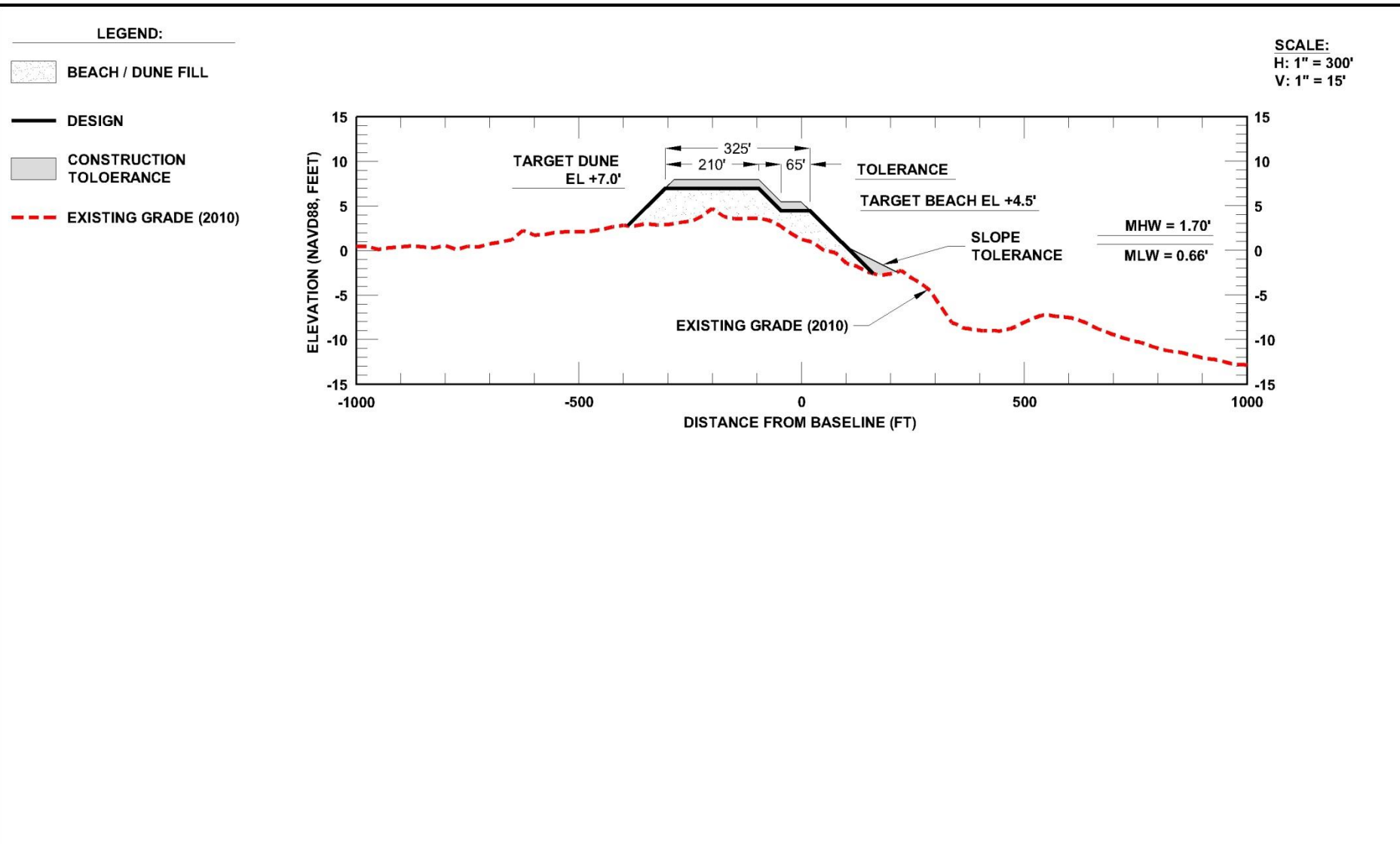
Critical Infrastructure



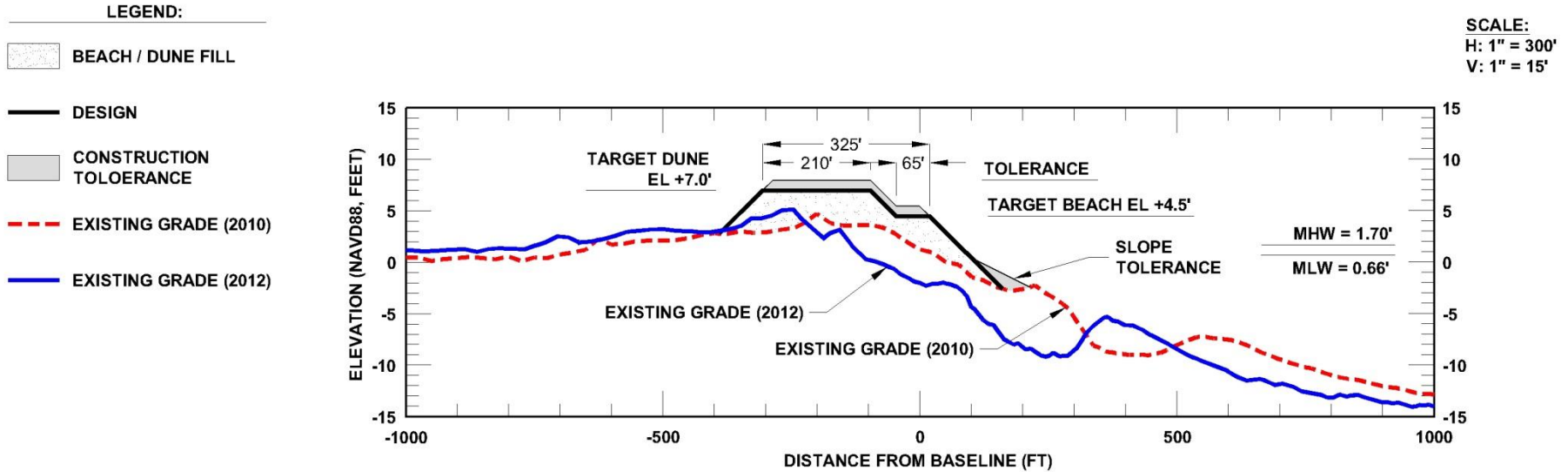
Native Beach Sediment Sampling



Typical Design Template








Post – Hurricane Profile Adjustment

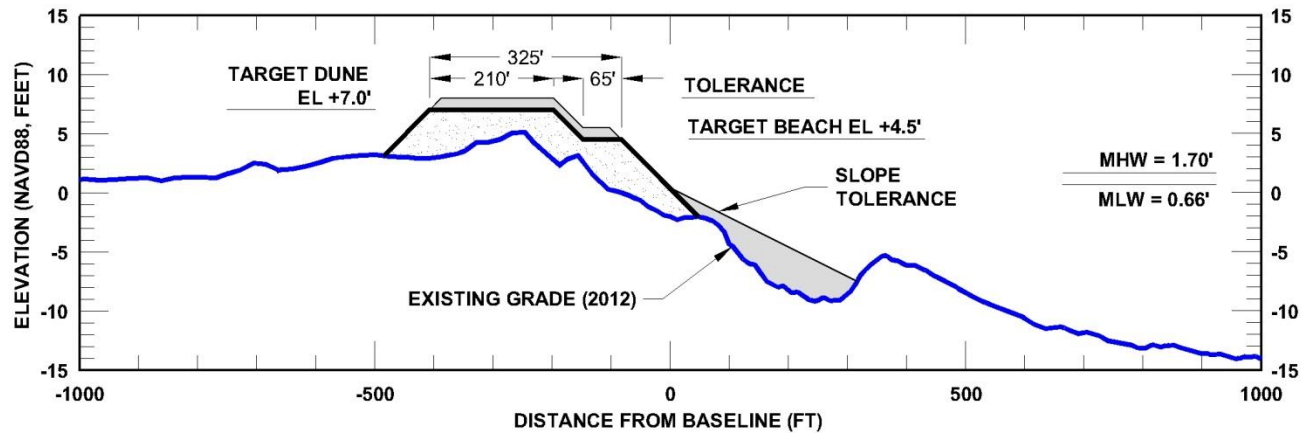
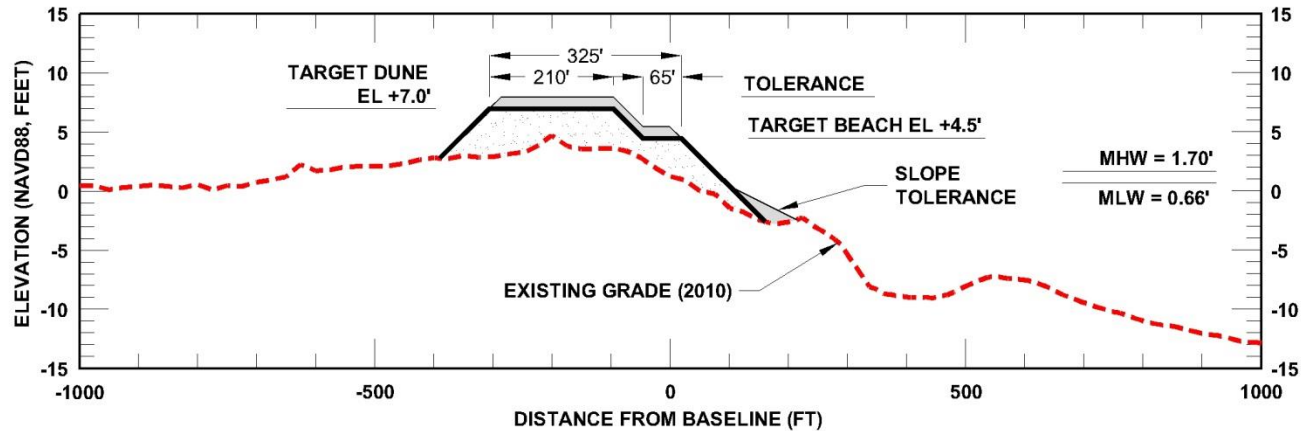


Post- Hurricane Typical Design Template Adjustment

LEGEND:






-  BEACH / DUNE FILL
-  DESIGN
-  CONSTRUCTION TOLERANCE
-  EXISTING GRADE (2010)
-  EXISTING GRADE (2012)

SCALE:
H: 1" = 300'
V: 1" = 15'

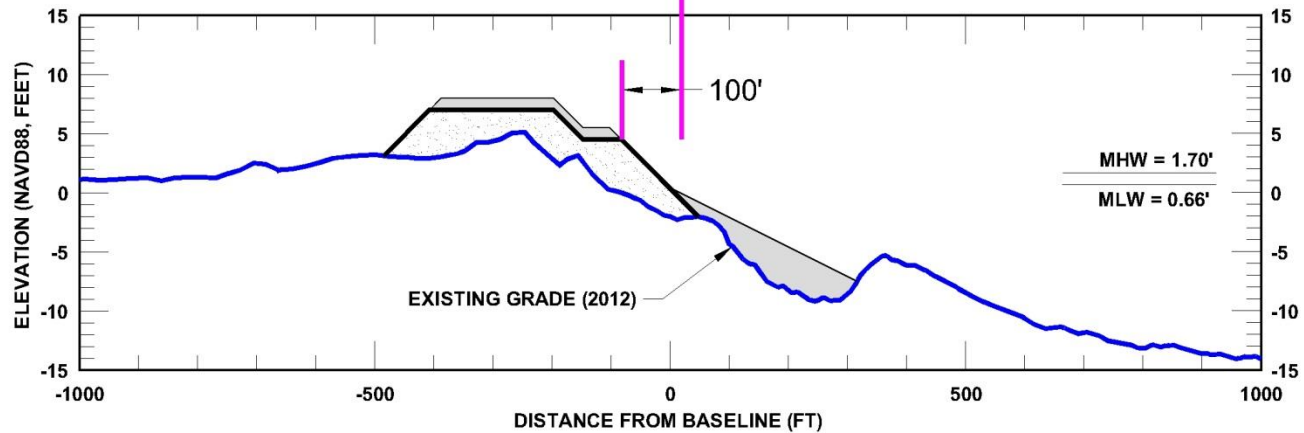
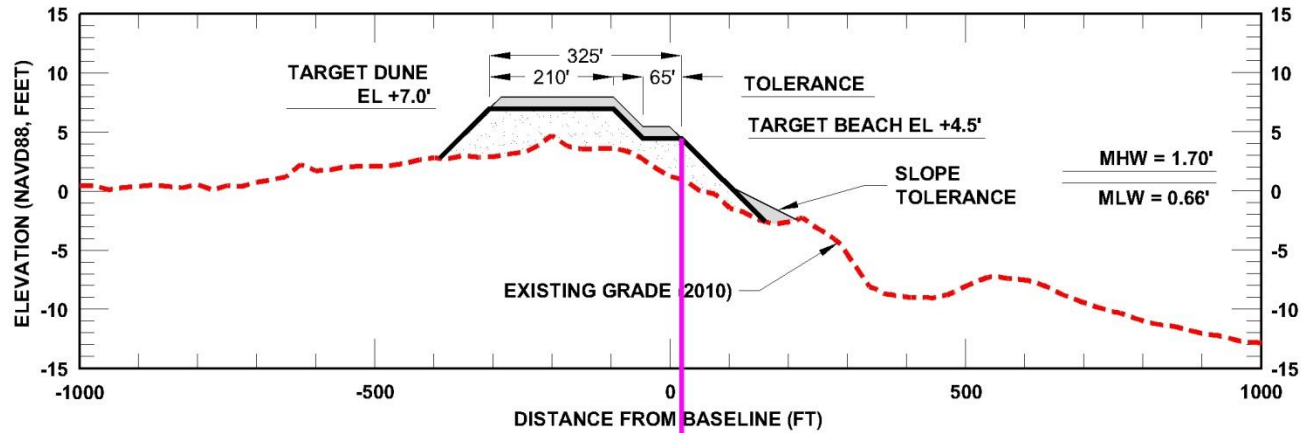


Post- Hurricane Typical Design Template Offset

LEGEND:

-  BEACH / DUNE FILL
-  DESIGN
-  CONSTRUCTION TOLERANCE
-  EXISTING GRADE (2010)
-  EXISTING GRADE (2012)

SCALE:
H: 1" = 300'
V: 1" = 15'



Project Timeline

- Final Design Review in May 2012
- Hurricane Isaac Landfall on August 29, 2012
- Advertised for Construction on October 12, 2012
- Post-Isaac Re-survey of Headland Oct. – Nov. 2012
- Pre-Bid Meeting on November 8, 2012
- Bid Addendum Issued on December 10, 2012
- Construction Bids Opened on December 18, 2012
- Dredging Started on July 31, 2013

Jetty Maintenance

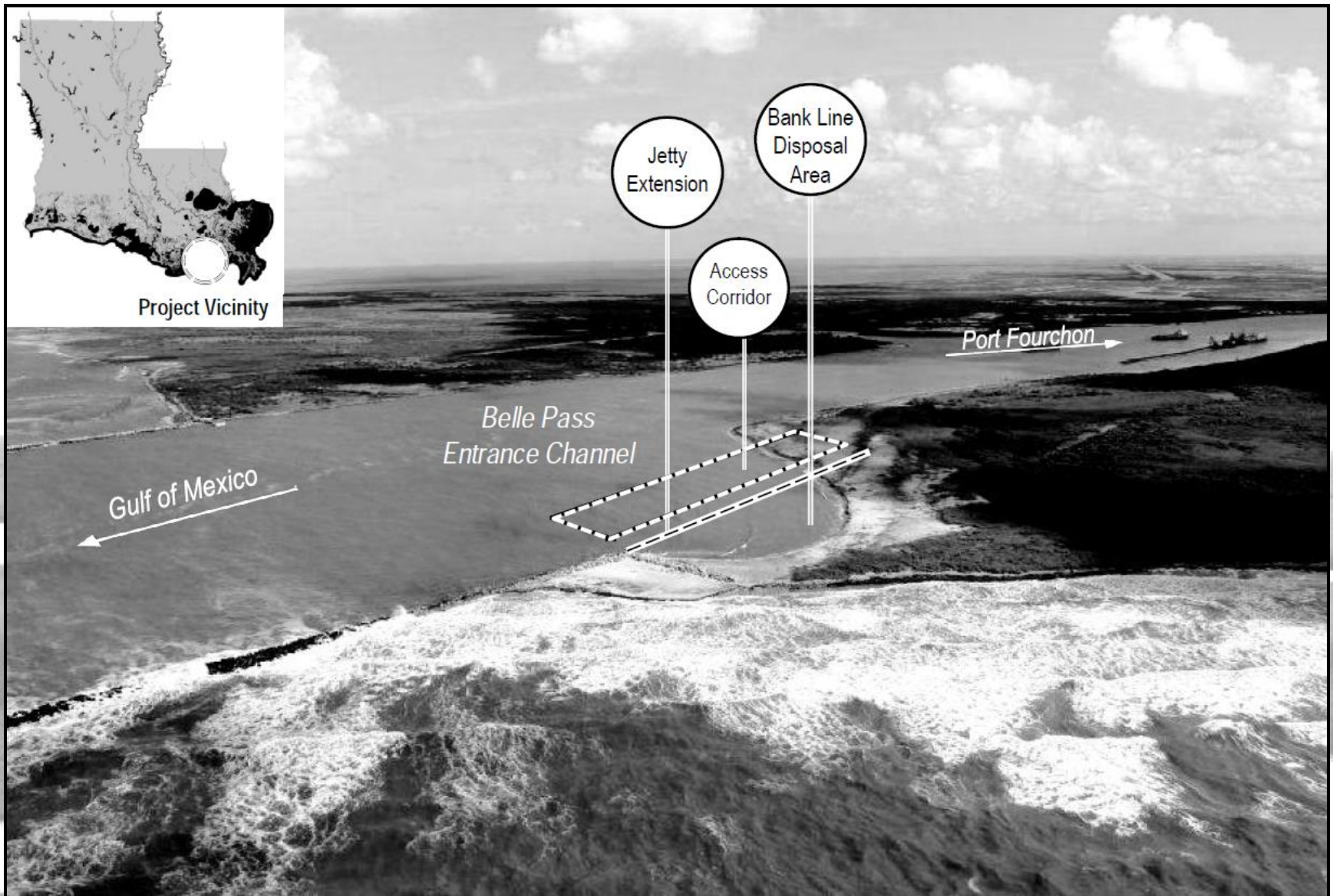
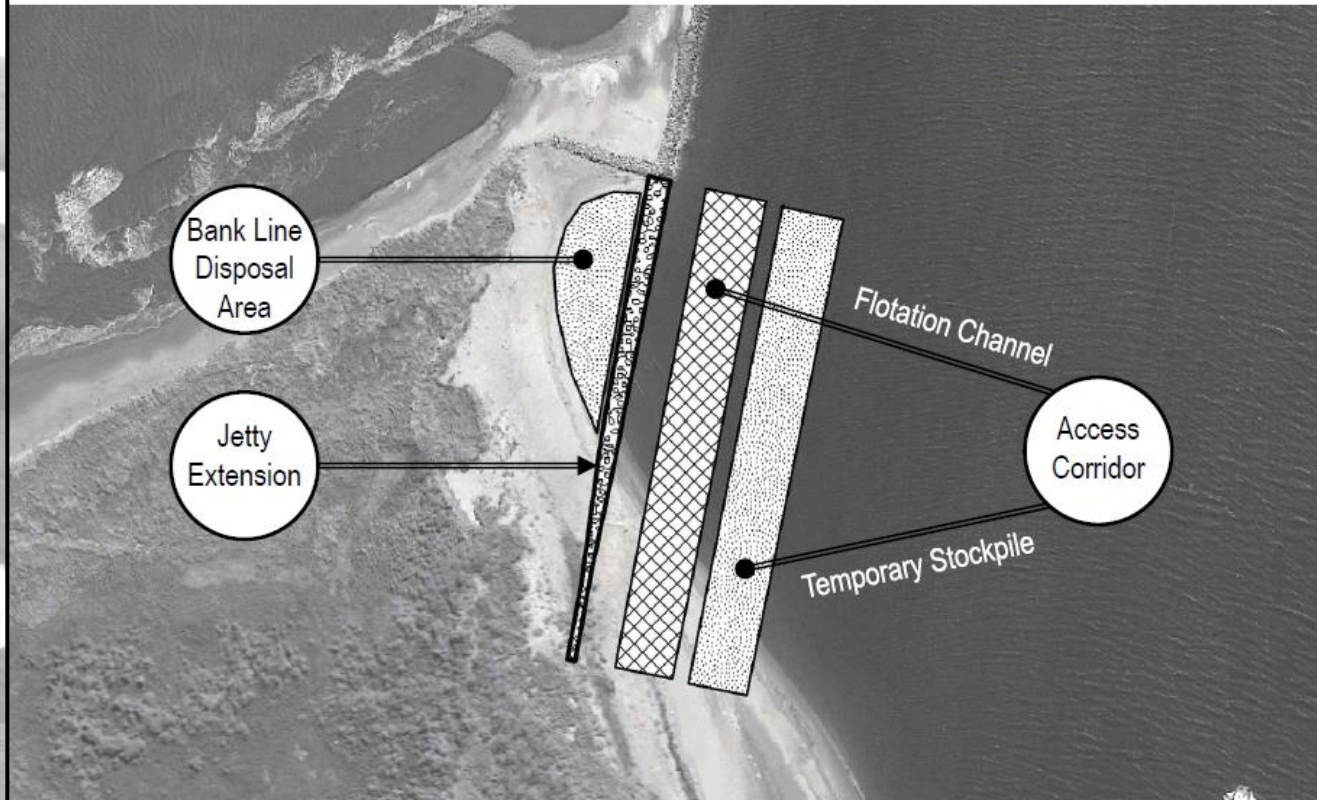
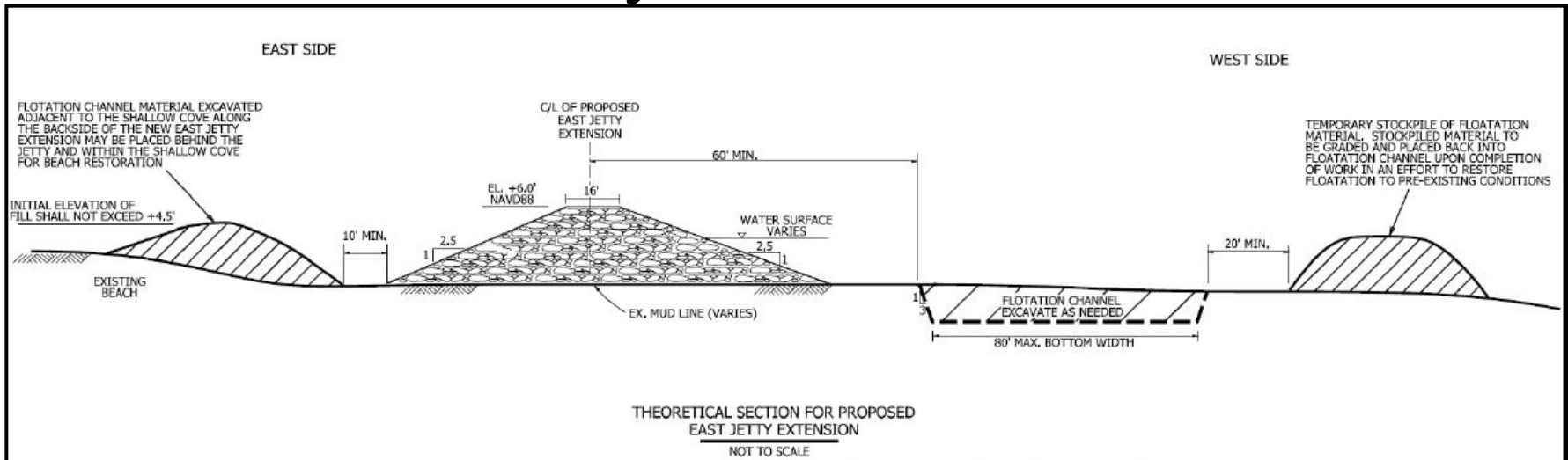


Figure 1. Project vicinity & overview. The jetty extension would tie the existing jetty to a natural high ridge along the bank line, crossing an area of shallow open water and beach. Equipment would access the construction site from Belle Pass. Dredged material excavated to provide equipment access would be temporarily stockpiled within the access corridor for later use as construction backfill, and/or placed beneficially in a shallow cove to rebuild a portion of the eroded bank line.

Jetty Maintenance

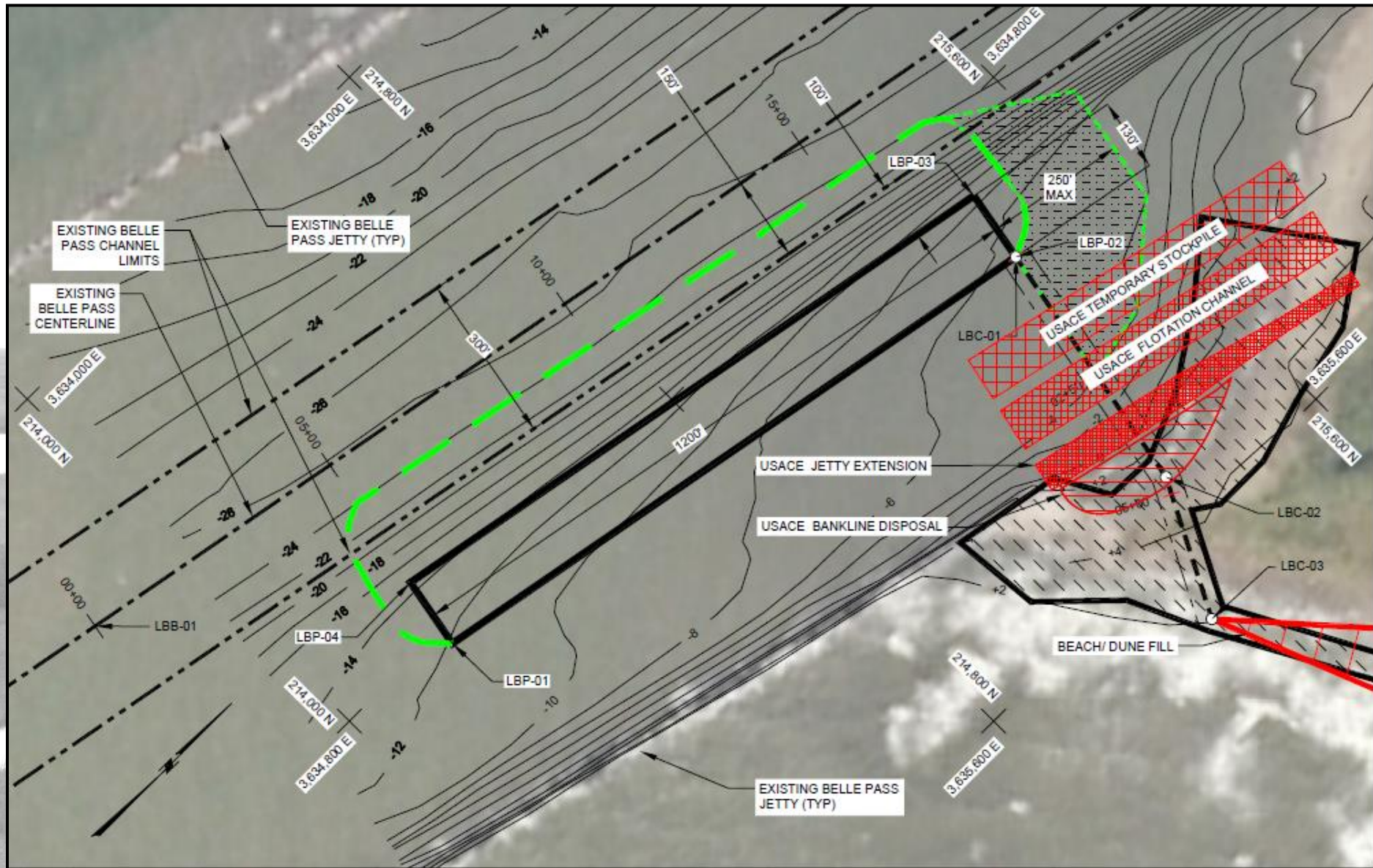


Figures 2 and 3. Theoretical cross-section (above) and plan view (left) of the jetty extension, flotation channel, temporary stockpile area, and bank line disposal area.

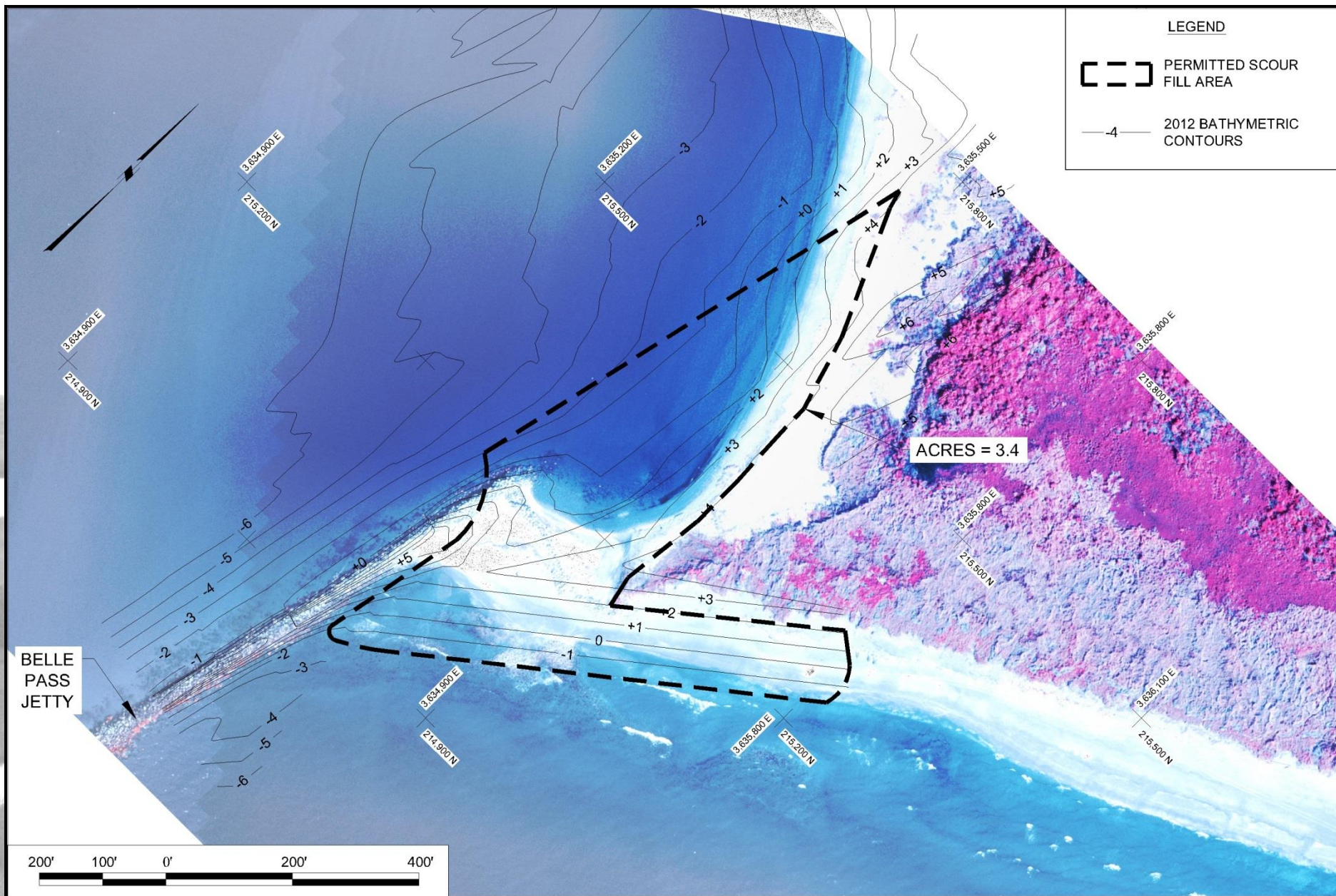
The jetty extension would tie the existing jetty to a natural high ridge along the bank line.

A flotation channel would be excavated to provide equipment access for construction of the jetty extension. Dredged material would be temporarily stockpiled adjacent to the channel for later use as backfill, and placed beneficially in the bank line disposal area to restore an eroded section of the bank line.

Jetty Maintenance and Caminada Headland Project Areas



Scour Fill Area Solution



The Second “First”

Weeks’ Cutterhead Suction Dredge EW Ellefsen and ‘Spider’ Barge



Patrick M. Quigley
www.gulfcoastairphoto.com
Slidell, LA 985.788.345

The Second “First”

*Weeks’ Unloader, Booster {Borinquen}
and Hopper Barge*



Discharge Into Project Template



Lessons Learned

- Reduce contractors risk by providing the most updated site information possible.
- If possible, permit multiple points of access such that contractor's can bid projects utilizing their available dredging equipment.
- Reach out to project stakeholders and have an open dialogue with regulatory officials.
- Expect the unexpected.