



Coastal Protection and
Restoration Authority of Louisiana

Utilizing Mississippi River Sediments to Restore Coastal Wetlands

Jerry Carroll, P.E.
CPRA Engineering Division

July 31, 2013



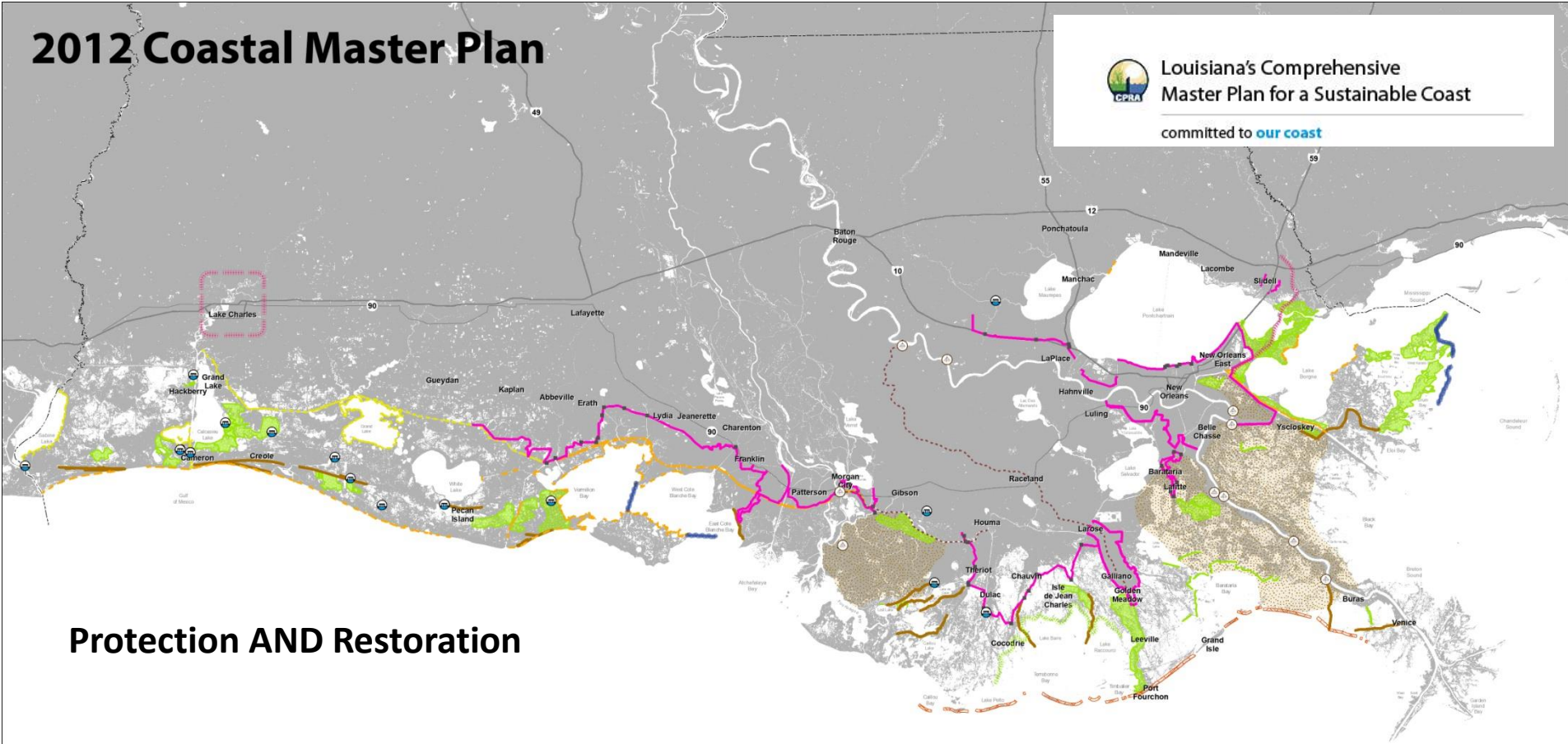
committed to our coast

2012 Coastal Master Plan



Louisiana's Comprehensive Master Plan for a Sustainable Coast

committed to **our coast**



Protection AND Restoration

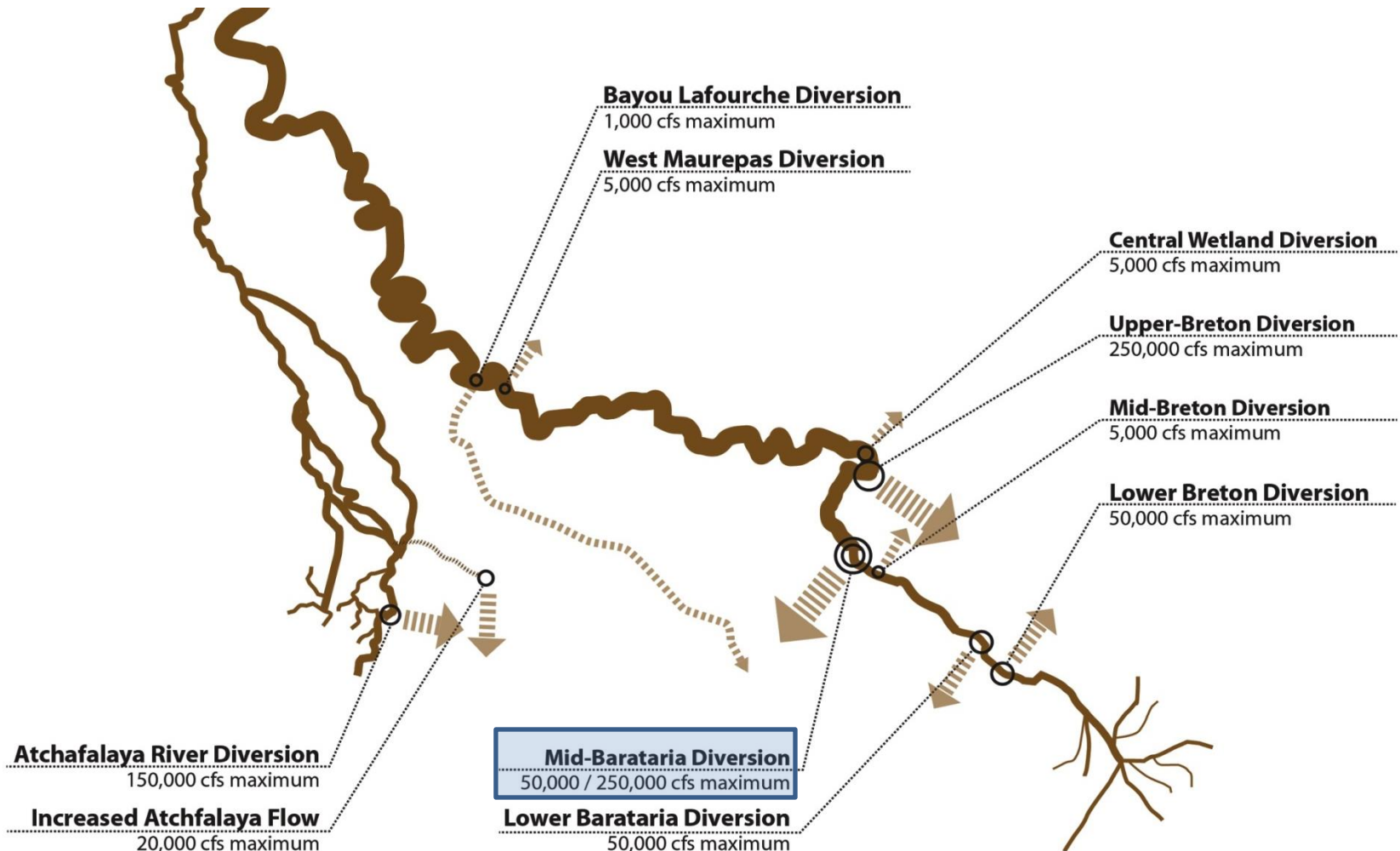
Projects Included:



Projects for Further Planning:



Keystone of the 2012 Master Plan: *Reconnecting the Mississippi River*



Sediment Diversion



Mid Barataria Sediment Diversion

Diversion Location:

- Plaquemines Parish; 8 mi E of Lafitte, LA
- RM 60.7

Problems in Outfall Area:

- Land Loss, Habitat Shift, Saltwater Intrusion, Subsidence, Hydrology alteration, Sediment deprivation

Diversion Size:

- 75,000 cfs Sediment Diversion Complex

Components of Sediment Diversion:

- Inlet structure (Gate and Controls), Channel, guide levees, outlet structure

Total Cost:

- \$571,00,000 E&D and Construction



Diversion size

75,000 cfs – Dr. Ehab Meselhe's results (sediment/water ratios)

	Mississippi River (Main Stem)	Diversion Channel OA-RM60.2-15K	Diversion Channel ND-RM60.7-15K	Diversion Channel MA-RM60.7-45K	Diversion Channel ND-RM60.7-45K	Diversion Channel ND-RM60.7-75K
Water Discharge (m3/s)	19,821	322	361	955	937	1,725
Water Discharge (CFS)	700,000	11,369	12,733	33,735	33,075	60,918
Sediment Load (metric tons/d) - 32 Micron	233,539	2,786	4,189	15,306	13,819	24,789
Sediment Load (metric tons/d) - 63 Micron	10,839	104	188	663	619	1,156
Sediment Load (metric tons/d) - 96 Micron	21,816	144	335	1,230	1,150	2,357
Sediment Load (metric tons/d) - 125 Micron	34,437	133	420	1,637	1,675	3,726
Sediment Load (metric tons/d) - 250 Micron	23,460	2	44	218	528	1,607
Total 63 - 250 Micron Load (metric tons/d)	90,554	383	987	3,748	3,972	8,847
Sediment/Water Ratio (SWR)		0.26	0.60	0.85	0.93	1.12

Location

Based on an intensive Mississippi River data collection and modeling effort, the location of ***the intake channel and the outfall channel alignment*** has been ***carefully selected at river mile 60.7 above Head of Passes to optimize the capture of sediment*** from the river.

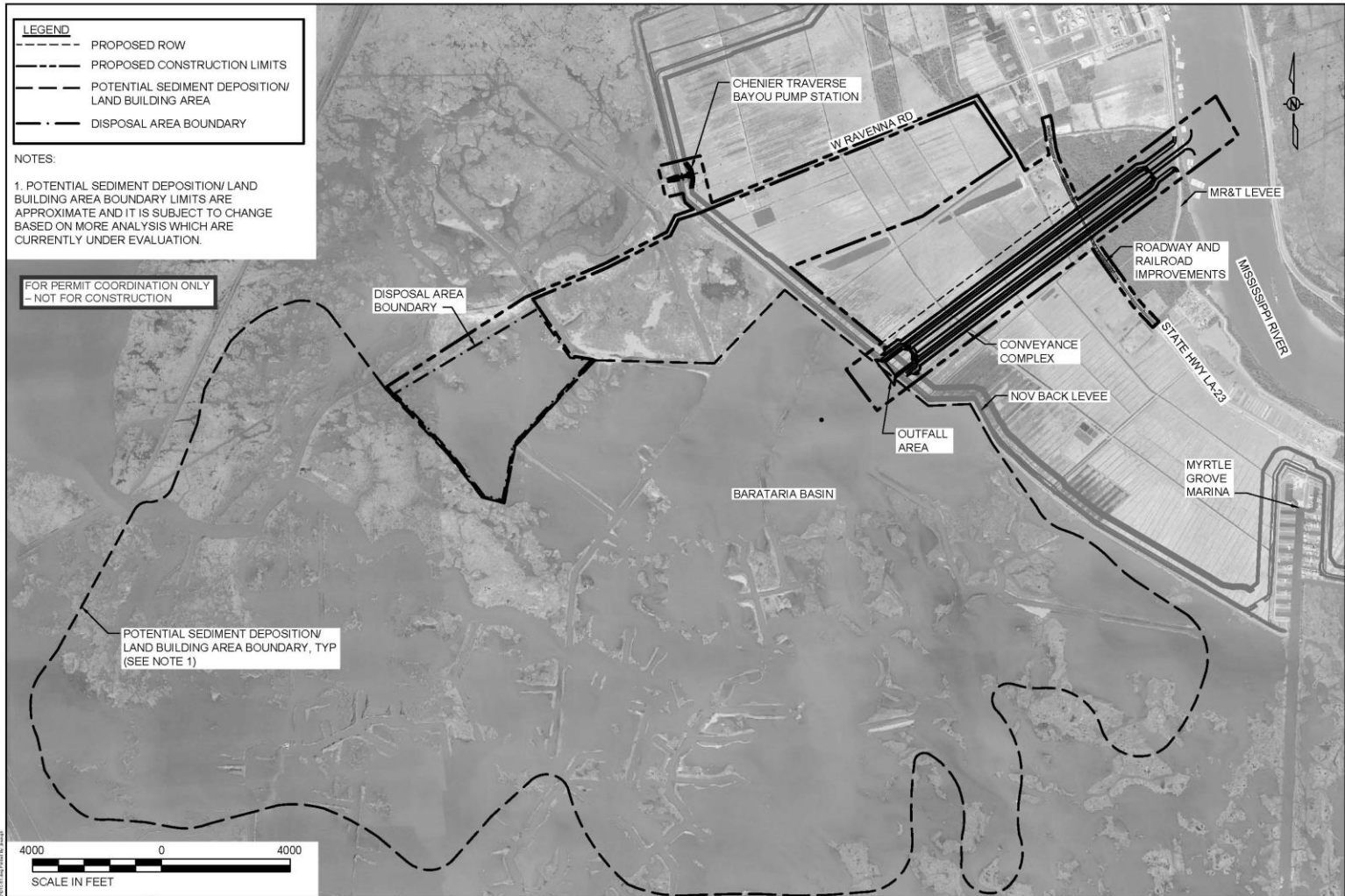


Design of Construction Features

Currently bringing the following to a 15% to 30% Level:

- Dredging plan for excavation in front of flume
- Revetment Removal
- MR&T Levee Tie-In
- Flume
- Structure
- Channel & Guide Levees
- Highway 23 Detour
- Highway 23 Bridge
- Pump station/Drainage Plan
- Back Hurricane Levee Tie-in





			COASTAL PROTECTION & RESTORATION AUTHORITY ENGINEERING DIVISION 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801		MID-BARATARIA SEDIMENT DIVERSION		POTENTIAL SEDIMENT DEPOSITION/ LAND BUILDING AREA	
			DRAWN BY: HDD	DESIGNED BY: PGG	STATE PROJECT NUMBER: BA-153 FEDERAL PROJECT NUMBER: BA-153	APPROVED BY: PAMELA GONZALES-GRANGER, P.E.	DATE: JULY 2013	DRAWING C-51



Restoration via Hydraulic Dredging



West Belle Pass Barrier Headland Restoration

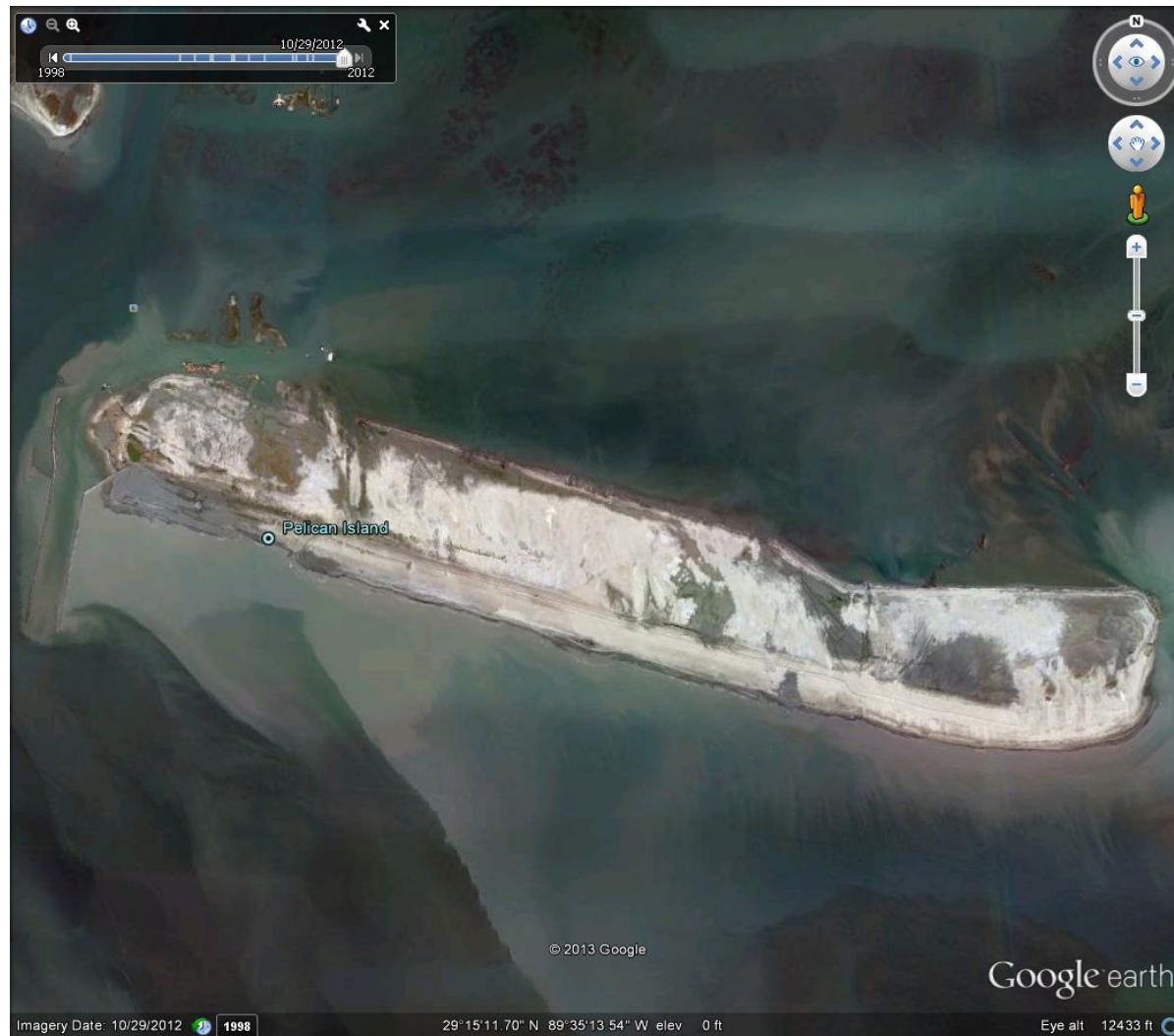
Inland Dredging - Marsh Restoration/Creation

Dedicated Dredging at Barataria Landbridge



Offshore Dredging - Barrier Island Restoration

Pelican Island Restoration



Dredging from the Mississippi River



Renewable Sediment Sources

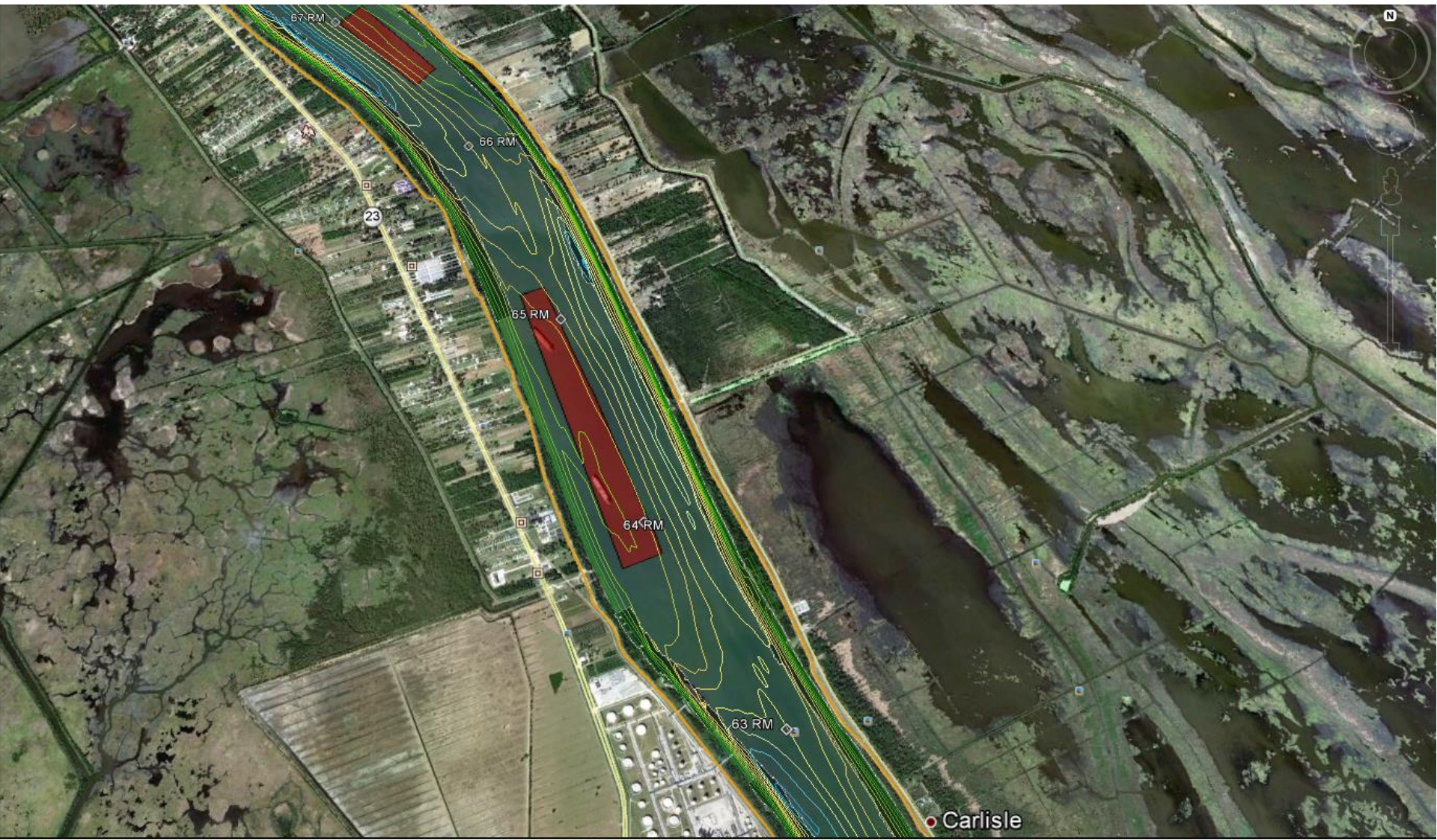


Renewable Sediment Sources





Alliance Anchorage Borrow Site



Alliance Anchorage Borrow Site





BORROW AREA

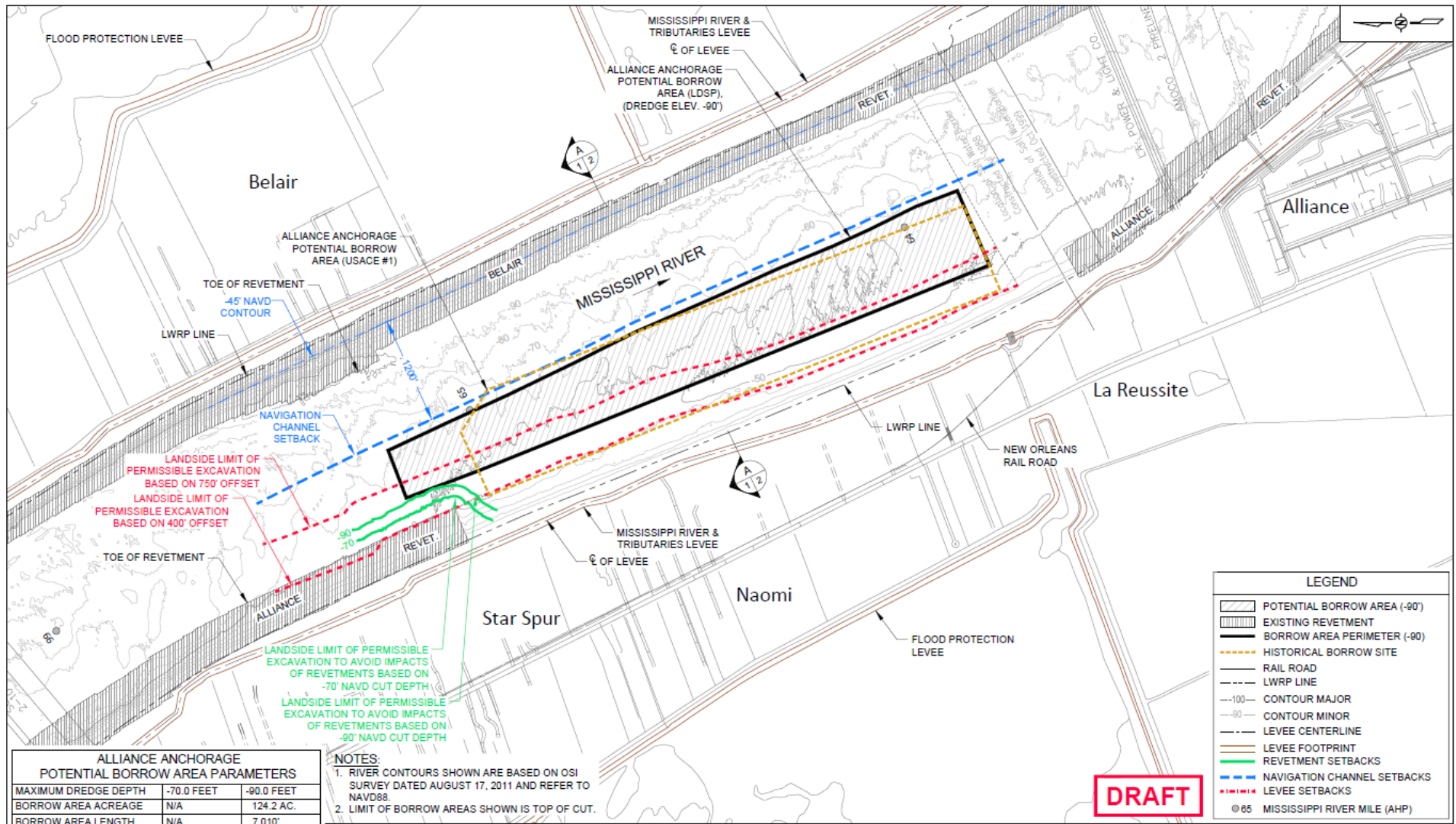
Alliance Anchorage

CUT TO 90 ft	CUT TO 70 ft	DRAWINGS
Area	124 acres	
Length	7010 feet	
Width	600 - 900 feet	
Thickness	30 to 40 feet	
Volume	6.5 MCY	

DRAFT Investigation of Potential Mississippi River Borrow Areas

 Coastal Protection and Restoration Authority of Louisiana

 moffatt & nichol



ALLIANCE ANCHORAGE POTENTIAL BORROW AREA PARAMETERS

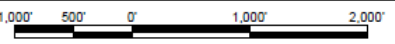
MAXIMUM DREDGE DEPTH	-70.0 FEET	-90.0 FEET
BORROW AREA ACREAGE	N/A	124.2 AC.
BORROW AREA LENGTH	N/A	7,010'
BORROW AREA WIDTH	N/A	600' TO 900'
BORROW AREA THICKNESS	N/A	30' TO 40'
BORROW AREA VOLUME	N/A	6.5 MCY

- NOTES:**
- RIVER CONTOURS SHOWN ARE BASED ON OSI SURVEY DATED AUGUST 17, 2011 AND REFER TO NAVD88.
 - LIMIT OF BORROW AREAS SHOWN IS TOP IS TOP OF CUT.

LEGEND

- POTENTIAL BORROW AREA (-90')
- EXISTING REVELTMENT
- BORROW AREA PERIMETER (-90')
- HISTORICAL BORROW SITE
- RAIL ROAD
- LWRP LINE
- 100' CONTOUR MAJOR
- 90' CONTOUR MINOR
- LEVEE CENTERLINE
- LEVEE FOOTPRINT
- REVELTMENT SETBACKS
- NAVIGATION CHANNEL SETBACKS
- LEVEE SETBACKS
- 85 MISSISSIPPI RIVER MILE (AHP)

DRAFT



MOFFATT & NICHOL

ONE AMERICAN PLACE
301 MAIN STREET, SUITE 600
BATON ROUGE, LA 70825
225-937-7193

REV	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY

450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

DRAWN BY: YC DESIGNED BY: SA

INVESTIGATION OF POTENTIAL MISSISSIPPI RIVER BORROW AREAS

STATE PROJECT NUMBER: _____

APPROVED BY: _____

ALLIANCE ANCHORAGE POTENTIAL BORROW AREA

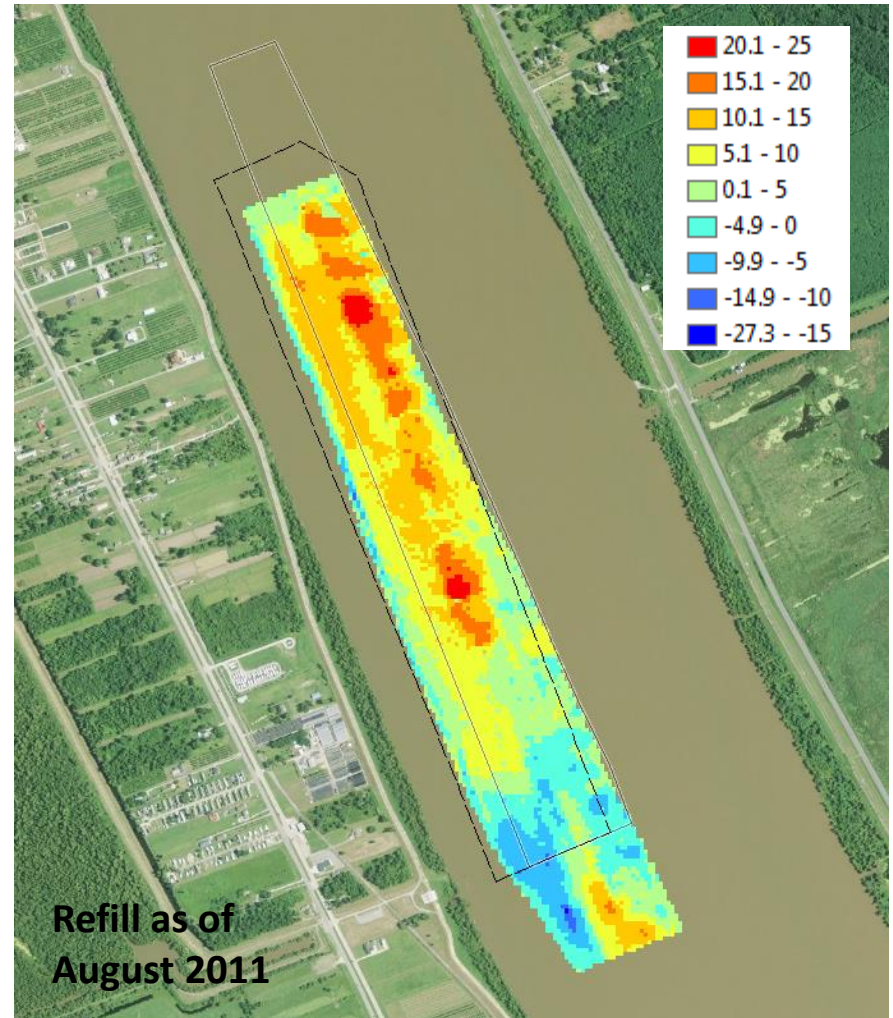
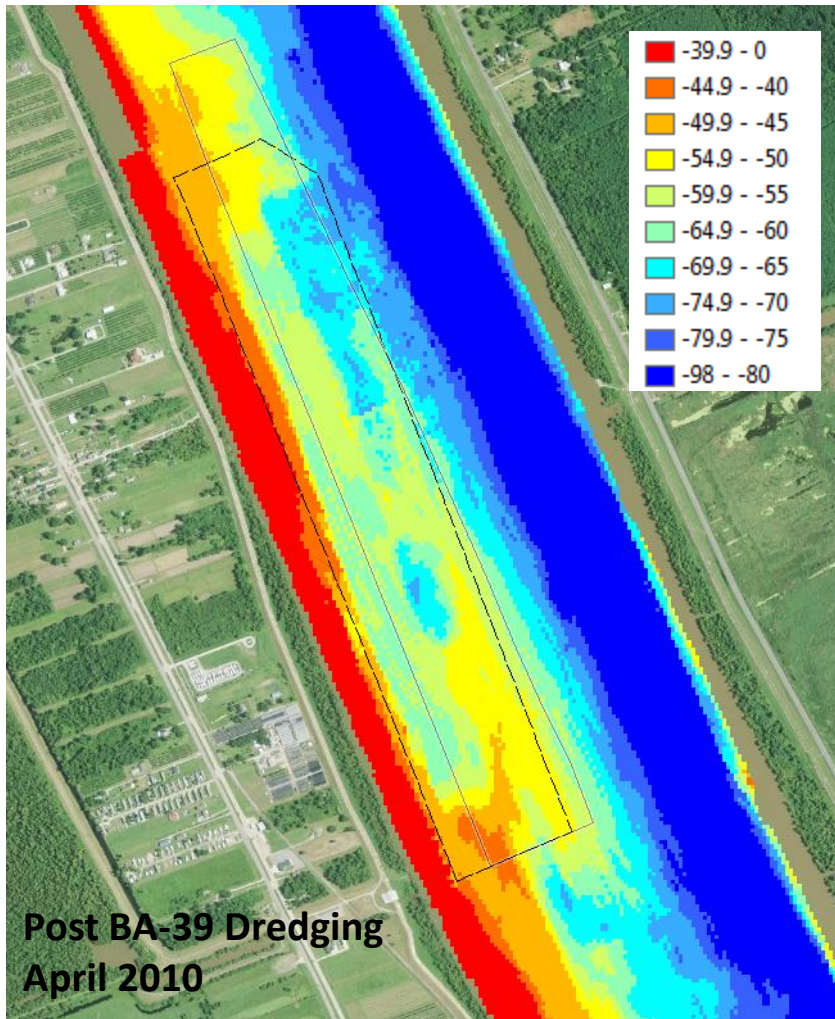
DATE: MAY 3, 2012

SHEET 13 OF 32

Mississippi River Borrow Area Design Criteria

- USACE Mississippi River Permissible Dredging Restrictions and dredging offsets.
- Navigational Safety Concerns- MNSA.
- Proposed USACE Saltwater Barrier Sill Coordination.
- Existing Revetment offset requirements.
- Mississippi River Levee Crossing Requirements.
- Mississippi River Stage Seasonal Variation.
- Required Volume for Marsh Fill Areas.
- Required Volume for dredging- Cut Volume typically 1.3 -1.5 times fill volume.
- Need additional volume due to unforeseen conditions- debris, anomalies, etc.
- Monitor Mississippi River Borrow Infilling rates.

Observed Refill Rates after BA-39 Dredging



Borrow Area Refill Rates

<i>Alliance Anchorage</i>	1 yr	~3 yrs
SWB Measured -60 ft cut (1.1 Mcy)	72% (0.8 Mcy)	93%
BA-39 Measured -60 to -70 ft cut (3.9 Mcy)	45% (1.7 Mcy)	?
LDSP Modeled -70 ft cut (3.4 Mcy)	63% (2.4 Mcy) +/- 16% (0.6Mcy)	90%
LDSP Modeled -90 ft cut (6.5 Mcy)	67% (4.4 Mcy) +/- 20% (1.3 Mcy)	95%

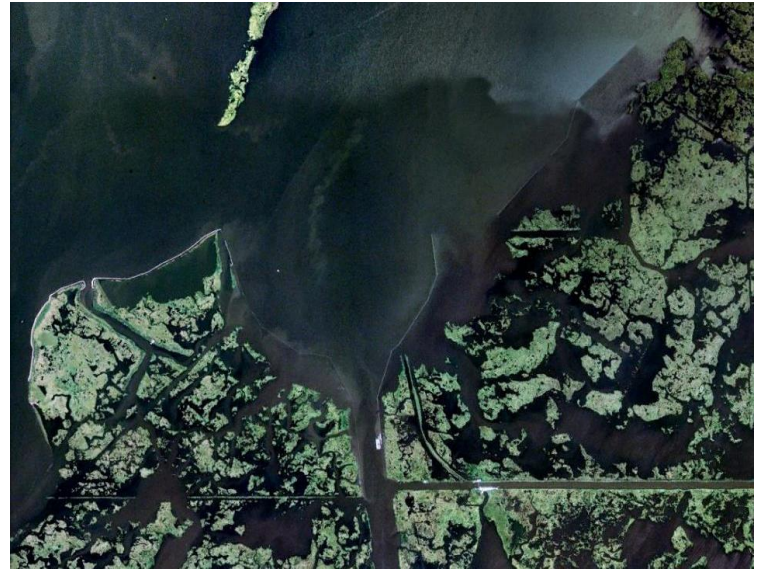
<i>3 Sites dredged to -90 ft</i>	1 yr	~3 yrs
Wills Point Anchorage	47%	77%
Alliance Anchorage	42%	80%
Alliance South	20%	40%

Current Projects Utilizing Mississippi River Sediment



Marsh Creation at Bayou Dupont

Marsh Creation

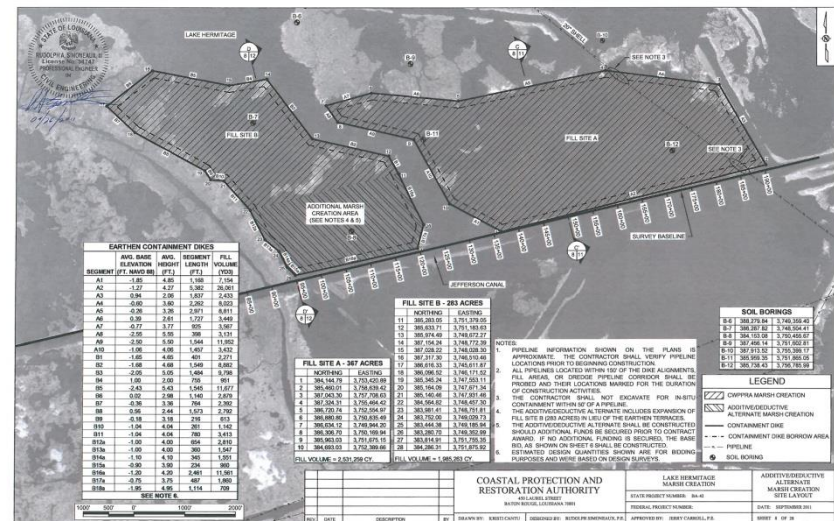
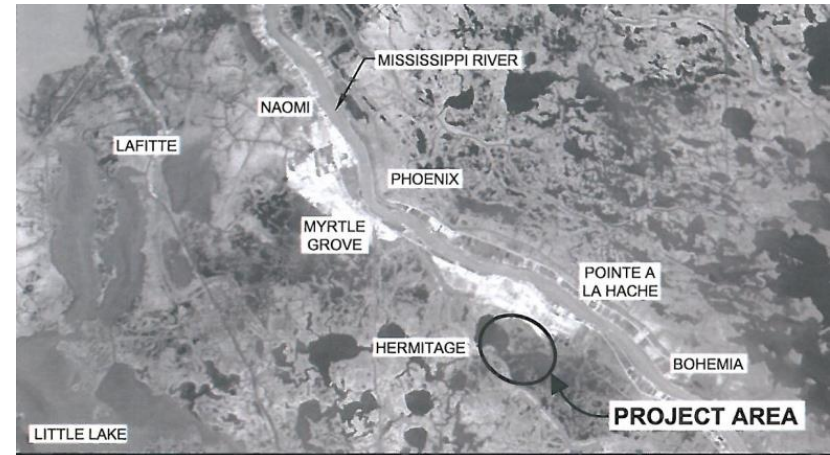


Dedicated Dredging at the Barataria Landbridge

Lake Hermitage Marsh Creation

Project Overview

- Largest CPRA Marsh Creation Project to utilize Mississippi River sediment
- Sediment dredged and pumped through over 9 miles of pipeline
- Volume of Sediment: 4,516,522 CY
- Acres Created: 650 acres
- Cost: \$32,697,879



Lake Hermitage Marsh Creation

Pipeline Conveyance



Lake Hermitage Marsh Creation

Construction



Lake Hermitage Marsh Creation

Construction



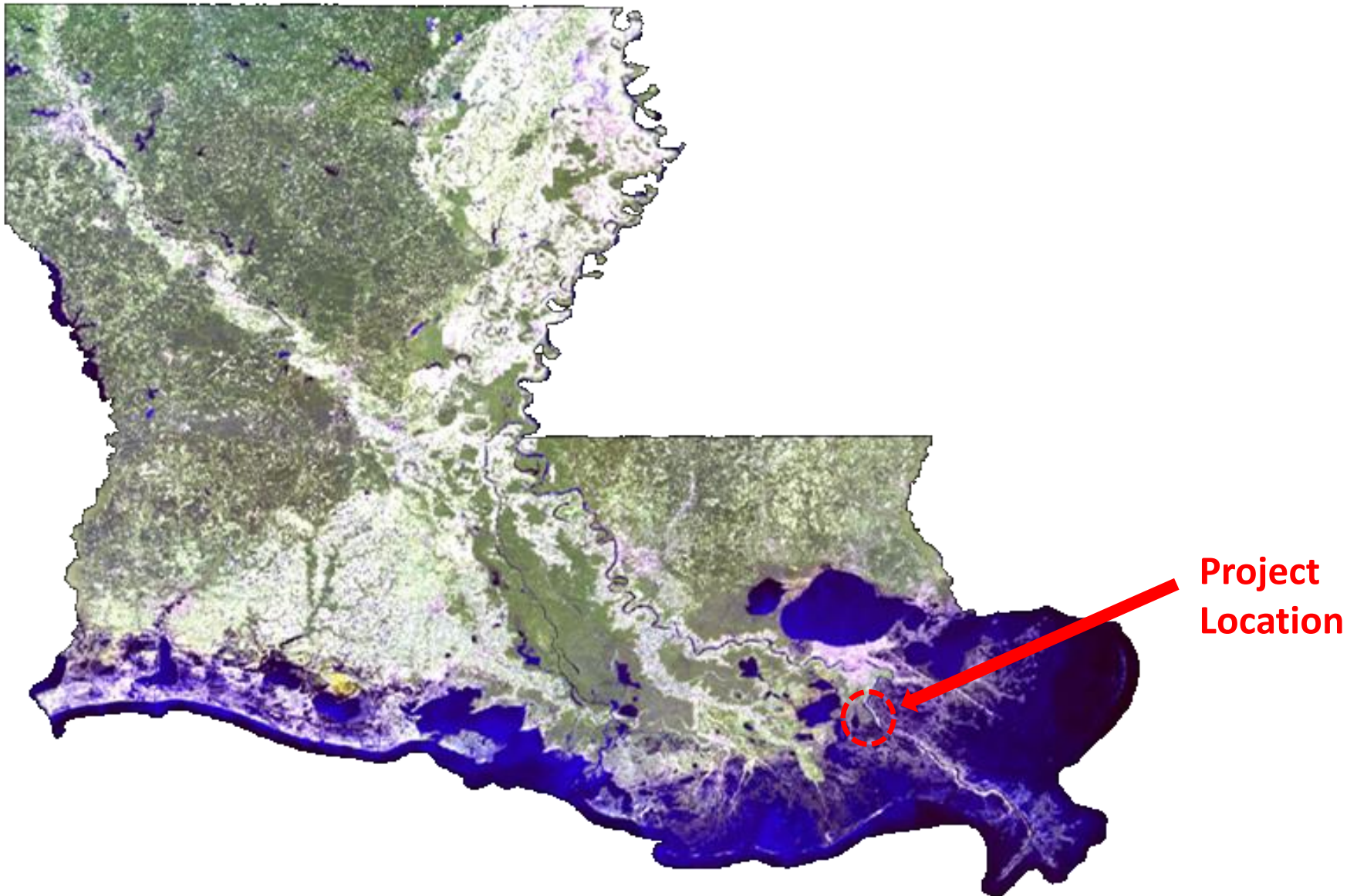
Lake Hermitage Marsh Creation

Construction

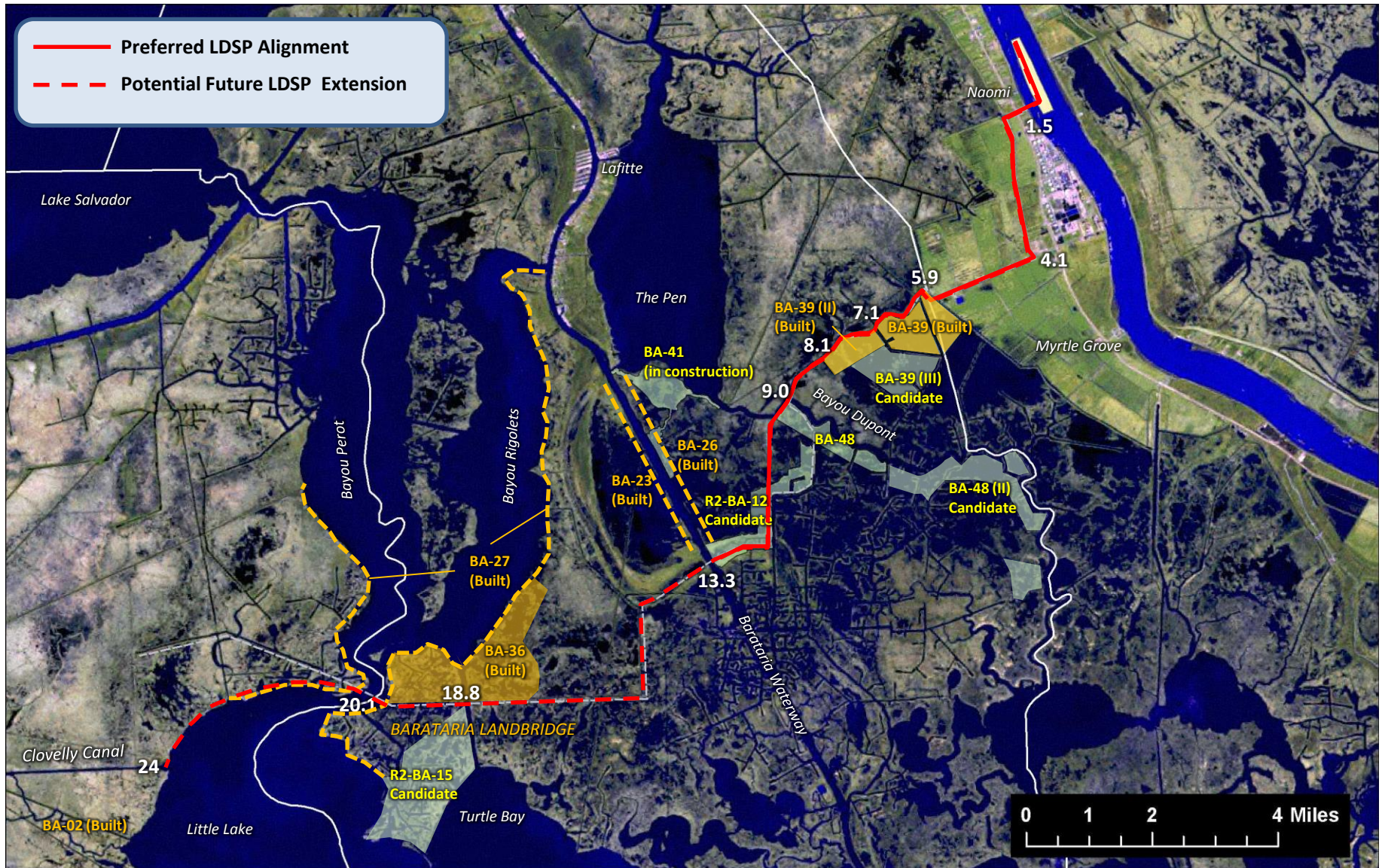


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Slidell, LA 985.788.3458
"Ready when you are."

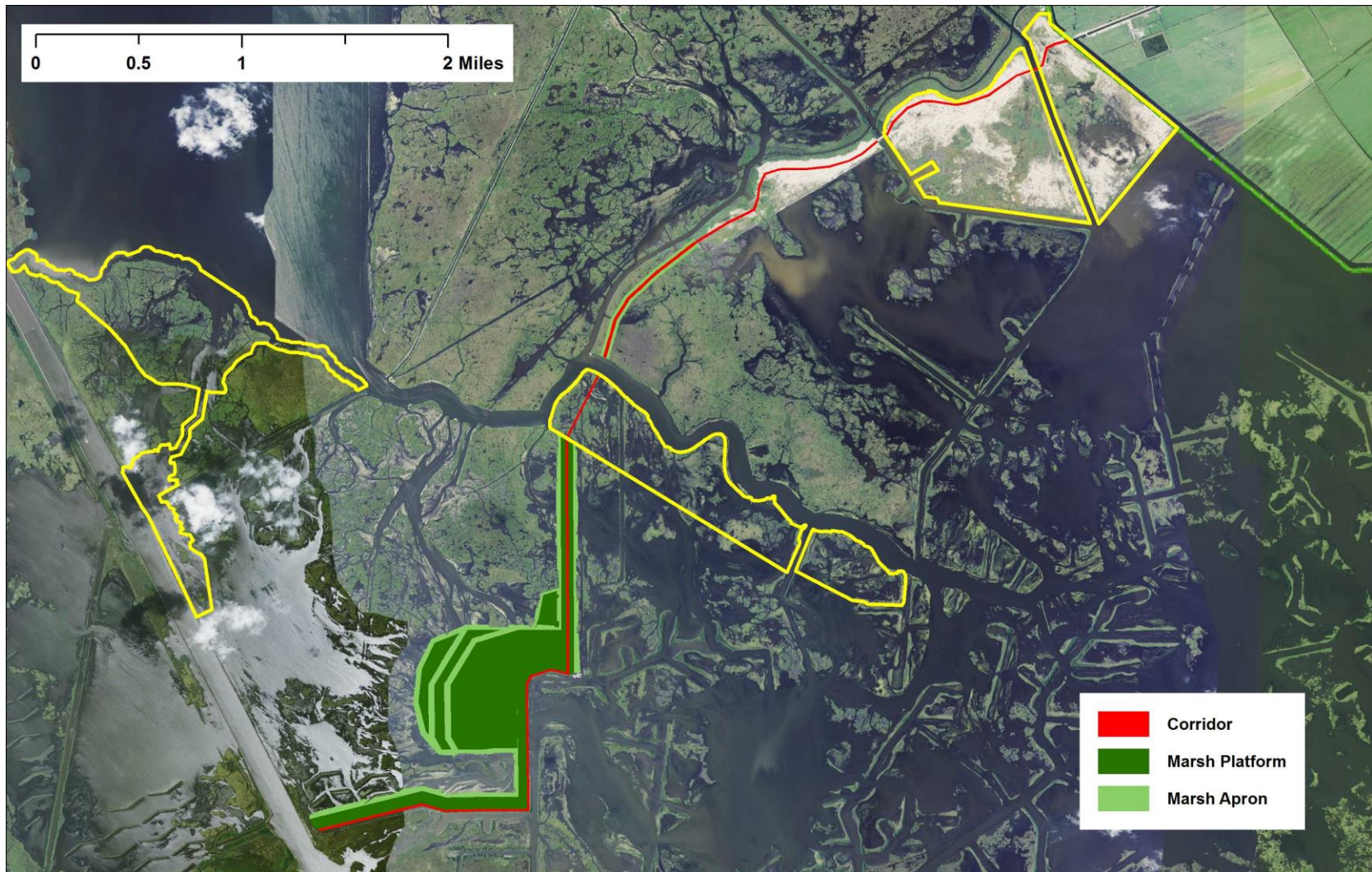
Mississippi River Long Distance Sediment Pipeline/Bayou Dupont Ridge/Marsh



Linking Existing & Proposed Projects to Re-establish Backbone of Barataria Landbridge



Mississippi River Long Distance Sediment Pipeline/Bayou Dupont Ridge/Marsh



Project Objectives

- Design and construct an efficient sediment delivery pipeline system from a renewable resource in the Mississippi River to strategic locations in Barataria Basin.
- The LDSP project is designed to:
 - Facilitate large-scale marsh creation in Barataria Basin by reducing future costs
 - Provide immediate restoration to natural landscape features: *Ridge and Marsh Complex*
 - Re-establish multiple benefits to the landscape by combining existing and new projects (ridge, marsh creation, freshwater introduction)

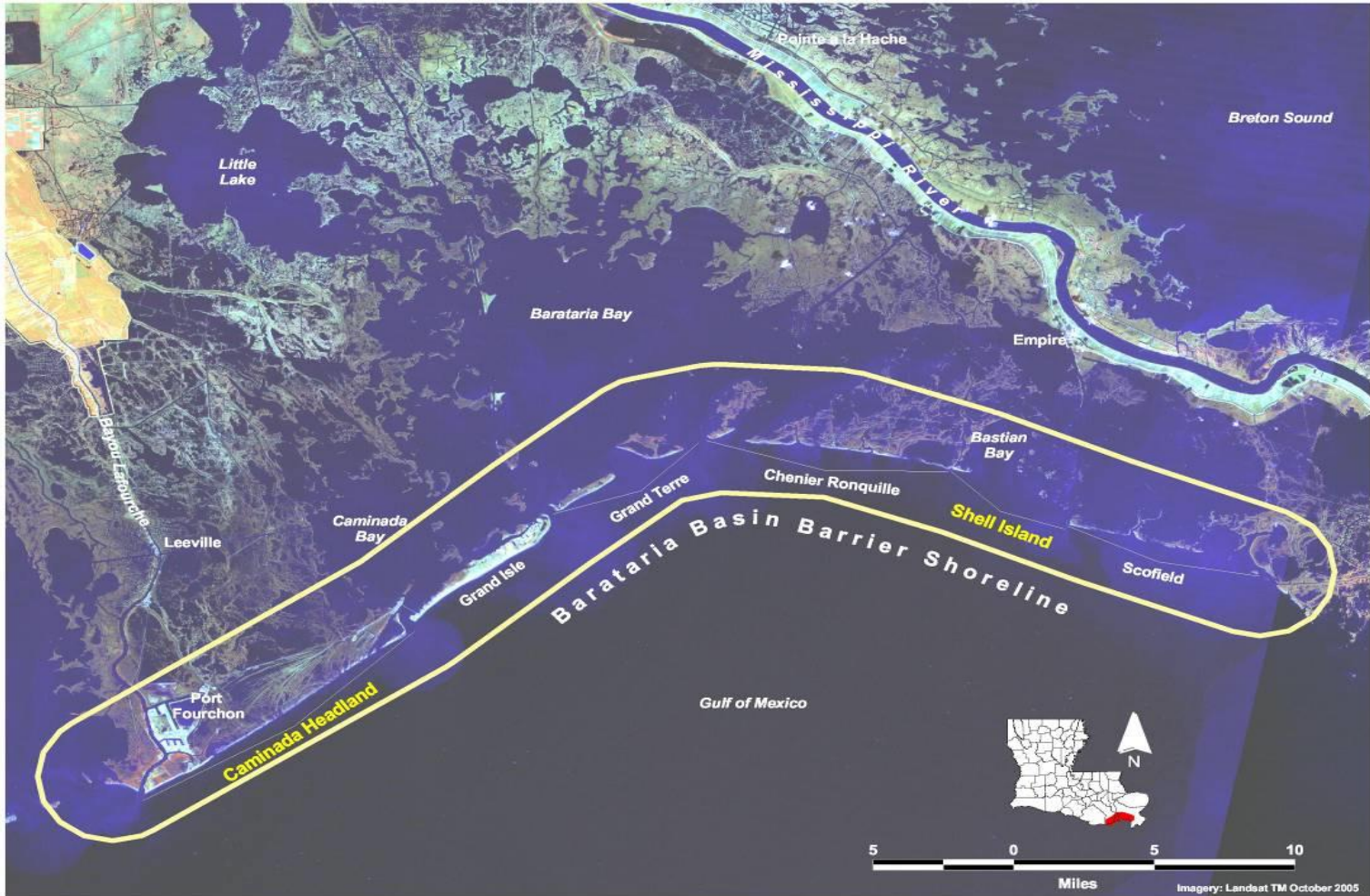
Design Quantities

Project	Marsh Area (acres)	Fill Volume (Mcy)	Dredged Volume (Mcy)
Bayou Dupont (BA-48)	Create 196 Nourish 93 Ridge 20	2.15	3.23
MR Long Distance Sediment Pipeline	338	2.64	3.95
Total	647	4.8	7.2

Barrier Island Restoration



Pelican Island Restoration



Coastal Protection and Restoration
 Authority of Louisiana

Scofield Island Restoration

Project Overview

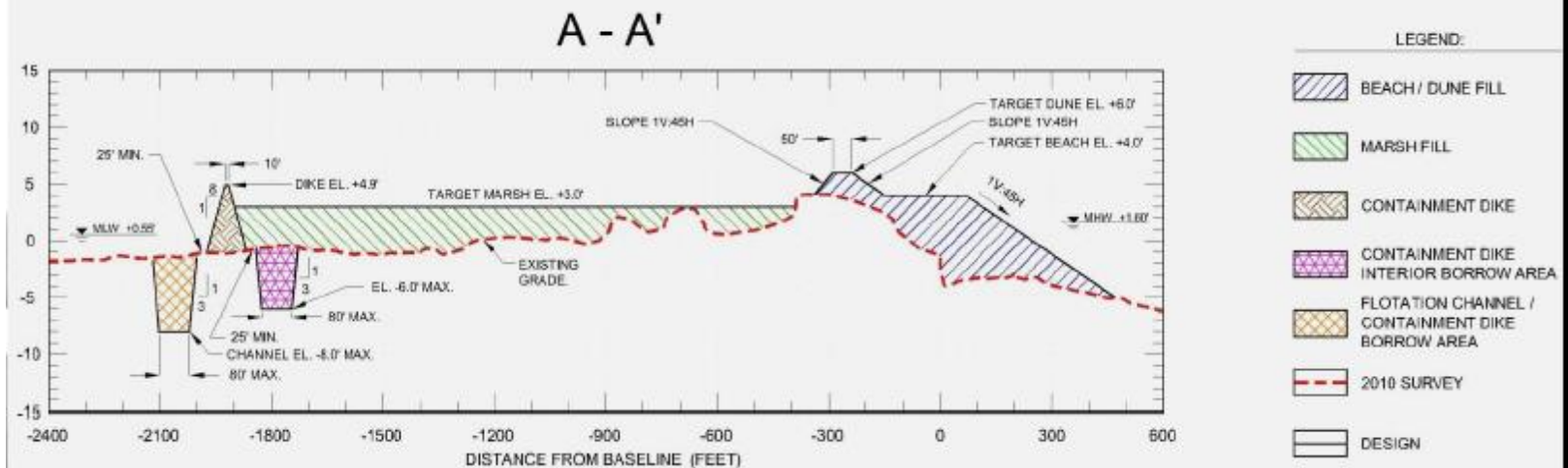
- Historical Erosion Rates:
 - ~16.5 ft/yr
 - Near term rate over 49 ft/yr
- **Acres Created/Restored:** 640 acres
- **Volume of Sediment:** 3,393,500 CY
- Sediment dredged from the Mississippi River and pumped over 22 miles through pipeline (includes two levees and a harbor canal)
- **Cost:** \$46,482,913
- **Completion Date:** September 2013



Unique Aspects of the Project

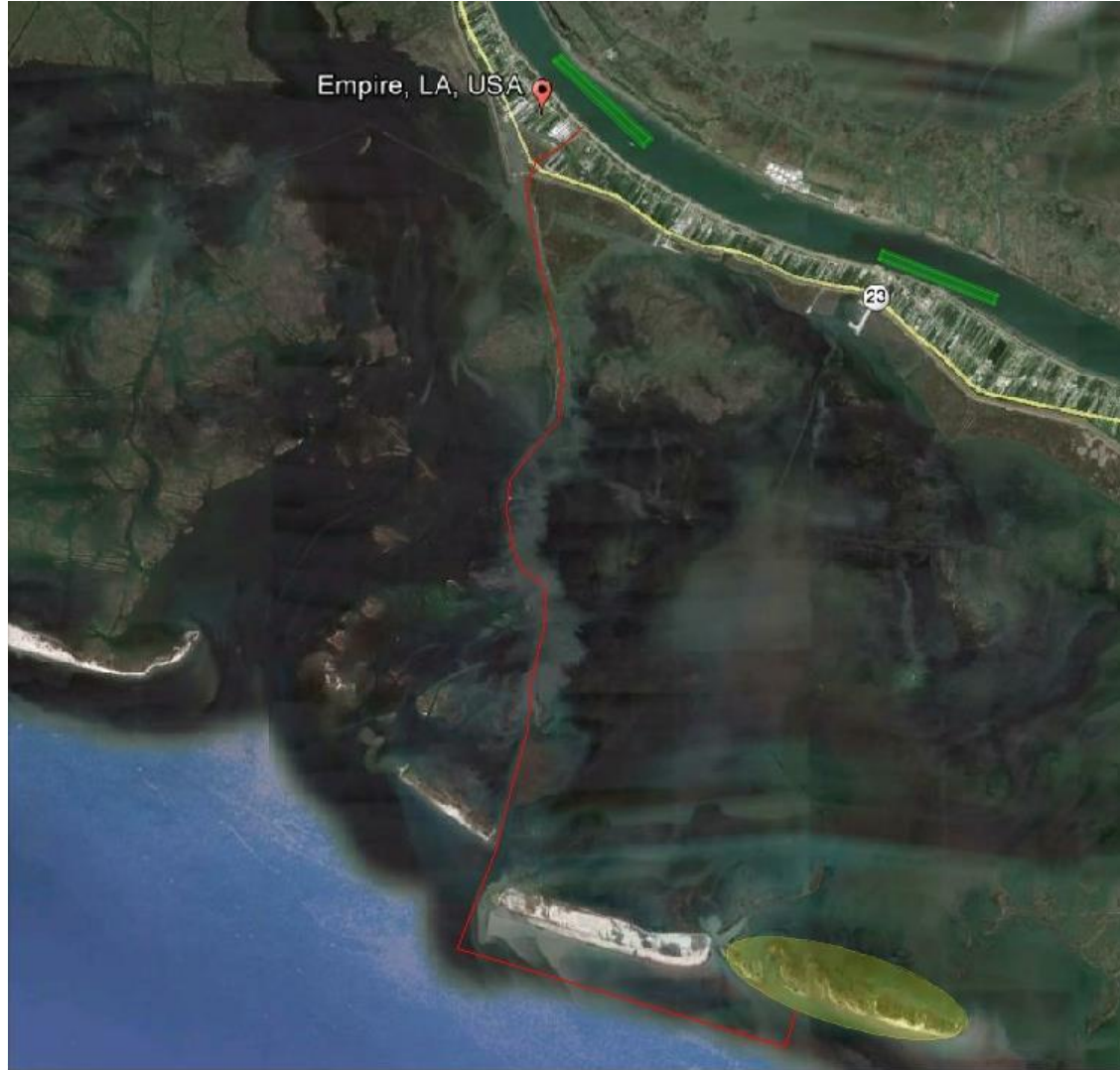
- Excavation of riverine sediments in one of the nations busiest navigational waterways
- Delivery of riverine sediments over 22 miles
- A conveyance corridors that requires:
 - Micro-tunneling casing pipe installation under two highways
 - Crossing of 2 levees and a harbor canal
 - Pipeline installation along 18 miles of the Empire Waterway
 - Providing 6 navigational crossings for commercial and recreational use over sediment pipeline

Scofield Island Typical Section



Scotfield Island Restoration

Pipeline Conveyance



Scotfield Island Restoration

Construction



Scotfield Island Restoration

Construction



Scofield Island Restoration

Construction



Scofield Island Restoration

Construction



Scofield Island Restoration

Construction



Scofield Island Restoration

Construction



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Scofield Island

Image # 130701 6184
Date 07.01.13

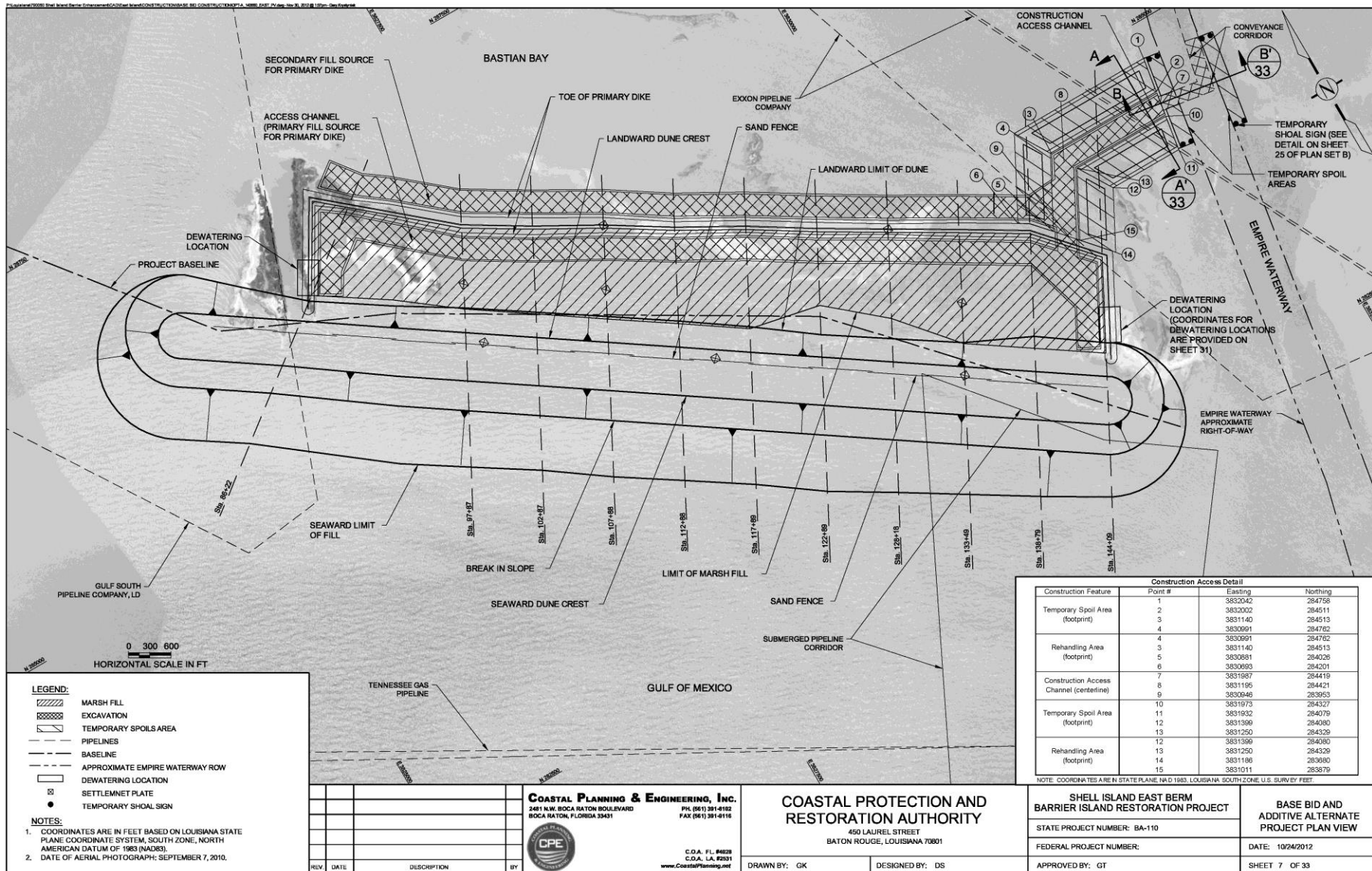
Shell Island Restoration

Project Overview

- **Acres Created/Restored:** 307 acres
- **Volume of Sediment:** 2,525,000 CY
- Sediment dredged from the Mississippi River and pumped over 22 miles through pipeline (includes two levees and a harbor canal)
- **Cost:** \$43,000,000
- **Completion Date:** Fall 2013



Shell Island - Project Plan View



- LEGEND:**
- MARSH FILL
 - EXCAVATION
 - TEMPORARY SPOILS AREA
 - PIPELINES
 - BASELINE
 - APPROXIMATE EMPIRE WATERWAY ROW
 - DEWATERING LOCATION
 - SETTLEMENT PLATE
 - TEMPORARY SHOAL SIGN
- NOTES:**
- COORDINATES ARE IN FEET BASED ON LOUISIANA STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
 - DATE OF AERIAL PHOTOGRAPH: SEPTEMBER 7, 2010.

0 300 600
HORIZONTAL SCALE IN FT

REV.	DATE	DESCRIPTION	BY

COASTAL PLANNING & ENGINEERING, INC.
 2481 N.W. BOCA RATON BOULEVARD
 BOCA RATON, FLORIDA 33431
 PH (561) 381-6182
 FAX (561) 381-6116

C.O.A. FL #4628
 C.O.A. LA #2331
 www.CoastalPlanning.net

COASTAL PROTECTION AND RESTORATION AUTHORITY
 450 LAUREL STREET
 BATON ROUGE, LOUISIANA 70801

DRAWN BY: GK DESIGNED BY: DS

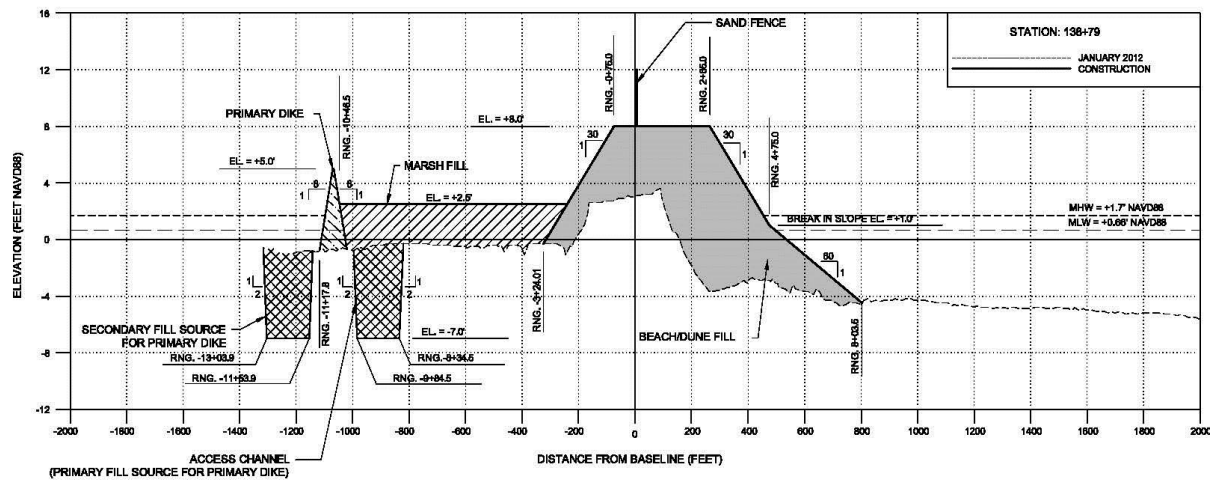
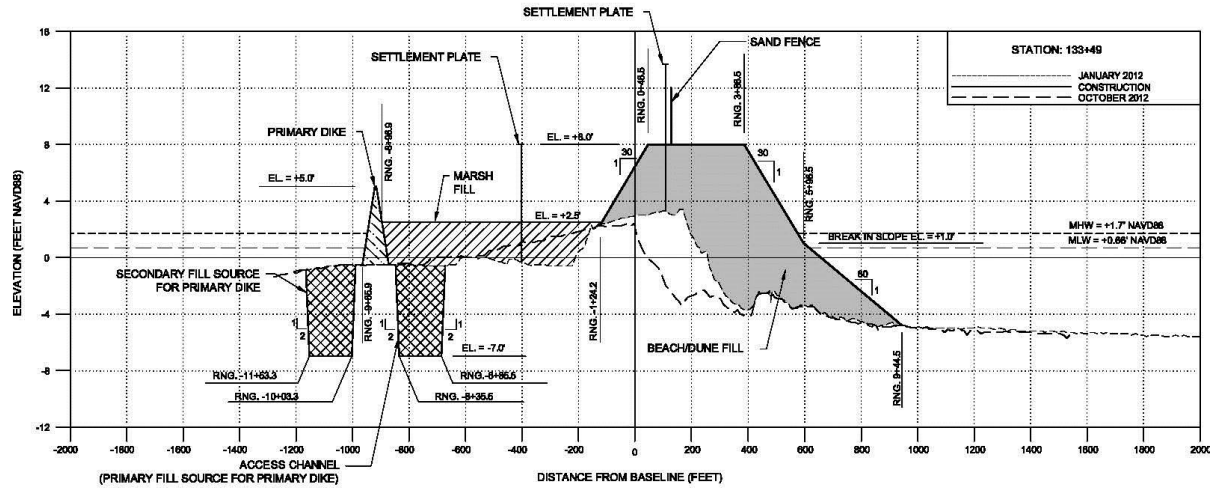
SHELL ISLAND EAST BERM BARRIER ISLAND RESTORATION PROJECT
 STATE PROJECT NUMBER: BA-110
 FEDERAL PROJECT NUMBER:

APPROVED BY: GT

BASE BID AND ADDITIVE ALTERNATE PROJECT PLAN VIEW
 DATE: 10/24/2012
 SHEET 7 OF 33



Construction Cross-Sections: Stations 133+49 and 138+79



- NOTES:**
- ELEVATIONS SHOWN HEREON ARE IN FEET BASED ON NAVD 1988.
 - LAYOUT ALL FILL AREAS BY CROSS SECTIONS.
 - POSITIVE RANGES ARE SOUTH OF BASELINE. NEGATIVE RANGES ARE NORTH OF BASELINE.

LEGEND:

- PRIMARY DIKE FILL
- MARSH FILL
- EXCAVATED MATERIAL
- BEACH/DUNE FILL



REV.	DATE	DESCRIPTION	BY

COASTAL PLANNING & ENGINEERING, INC.
 3911 BLVD BOCA RATON BOULEVARD
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COASTAL PROTECTION AND RESTORATION AUTHORITY
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 BATON ROUGE, LOUISIANA 70801
 DRAWN BY: GK DESIGNED BY: DB

SHELL ISLAND EAST BERM BARRIER ISLAND RESTORATION PROJECT
 STATE PROJECT NUMBER: BA-110
 FEDERAL PROJECT NUMBER:
 APPROVED BY: GT

CONSTRUCTION PROFILES
 DATE: 10/24/2012
 SHEET 12 OF 33



Shell Island Restoration

Construction



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Shell Island East Barrier Island Restoration

Image # 130504 6205
Date 05.04.13

Shell Island Restoration

Construction



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Shell Island East Barrier Island Restoration

Image # 130701 6180
Date 07.01.13

QUESTIONS

Jerry Carroll, P.E.
jerry.carroll@la.gov



Coastal Protection and
Restoration Authority of Louisiana