# A Synergistic Approach to Restoring the Caminada Headland

Amanda Taylor, P.E.
Project Engineer
Coastal Protection and Restoration Authority

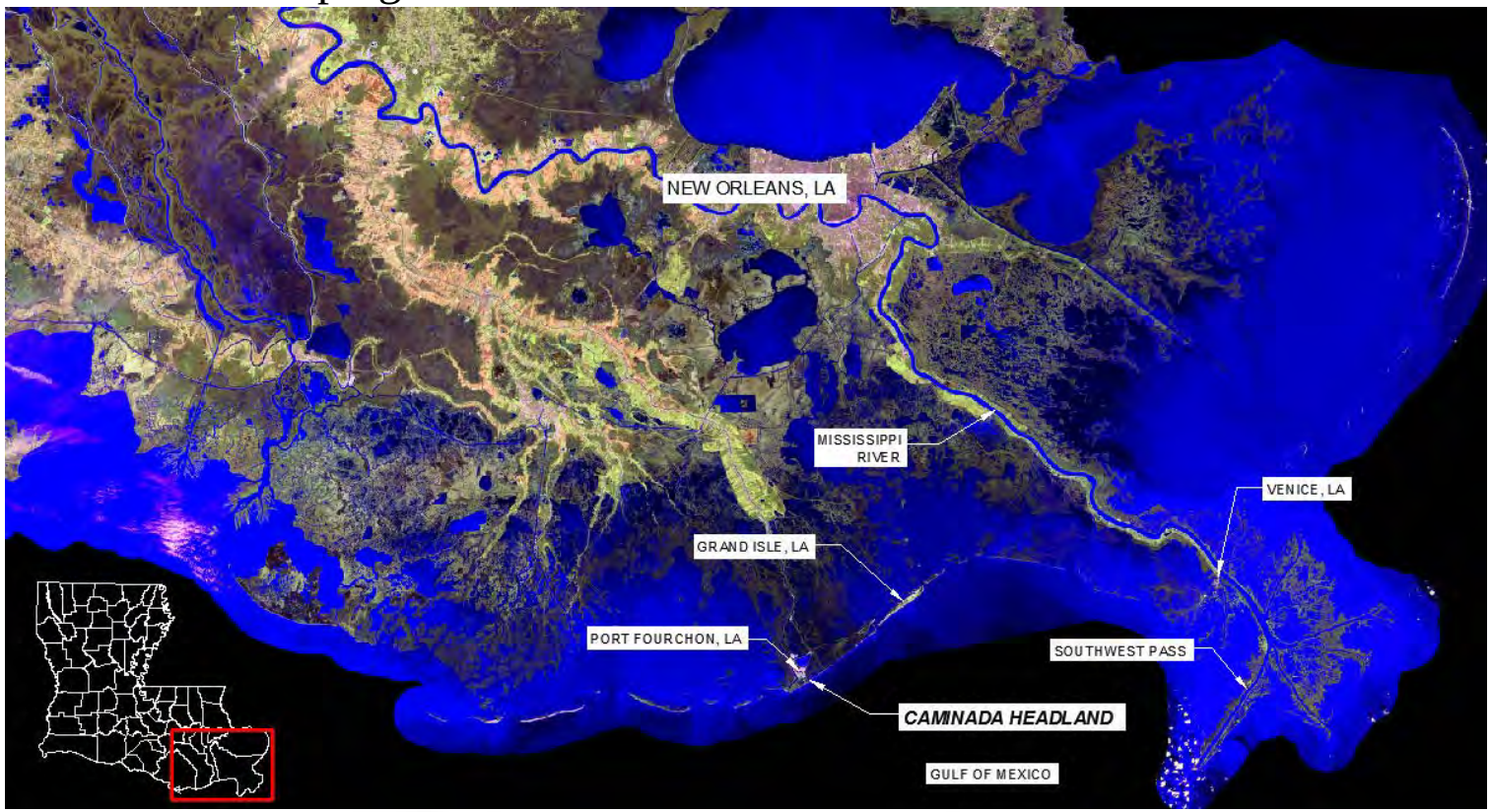
Steve Dartez
Managing Engineer
Coastal Engineering Consultants, Inc.

# Outline

- Caminada Headland Regional History
- Barataria Basin Barrier Shoreline Restoration Study
- Caminada Headland Beach and Dune Increments I & II
- Caminada Headland Back Barrier Marsh Creation Project Increments I & II
- Conclusions/Lessons Learned

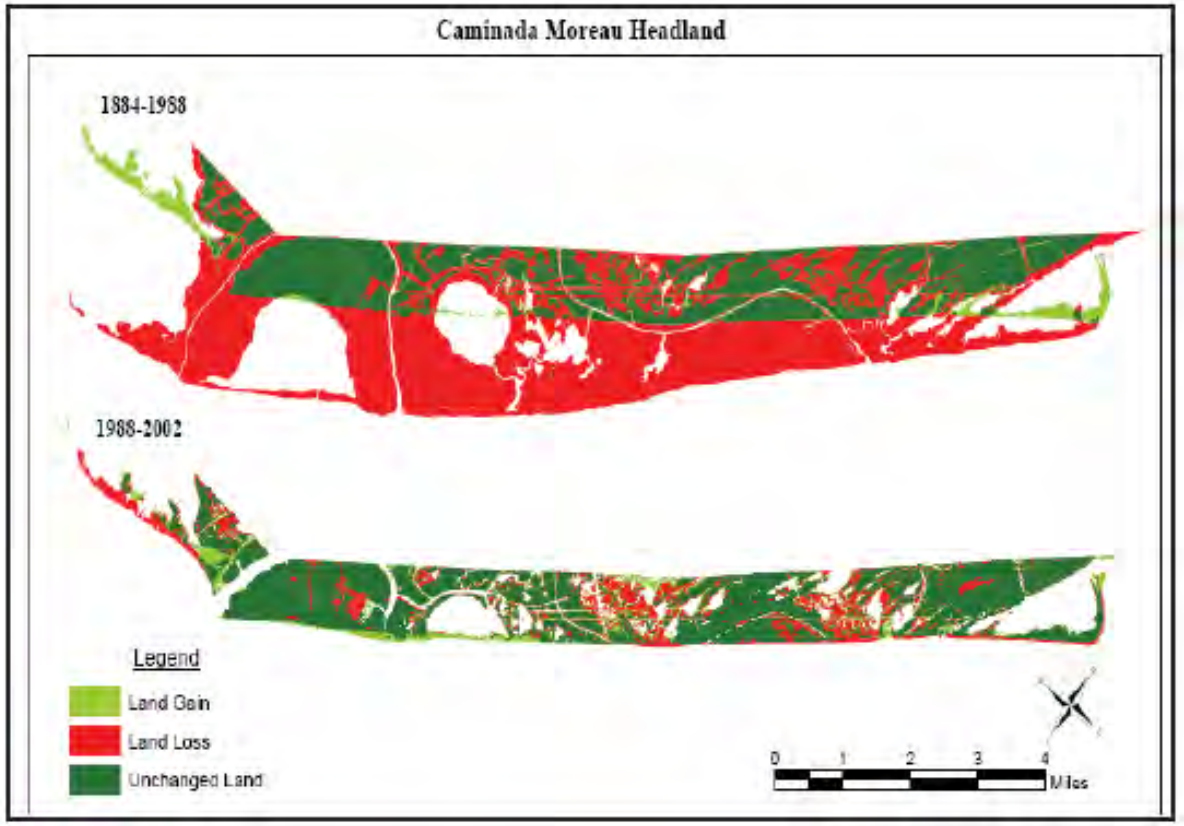
# Caminada Headland Regional History

- Former site of the mouth of the Mississippi River (abandoned ~1,000 years ago)
- Consists of narrow, low lying sand dune and beach berms, barrier marshes, and chenier ridges
- Critical habitat for Piping Plover in addition to other wildlife



# Caminada Headland Regional History

- Hurricanes and tropical storms caused multiple breaches along the Headland
- Breaches exposed back barrier marshes and chenier ridges to increased wave action and salt water intrusion



# Barataria Basin Barrier Shoreline Restoration Study

- Shoreline loss is estimated at approximately 45 ft/yr (past 100-years)

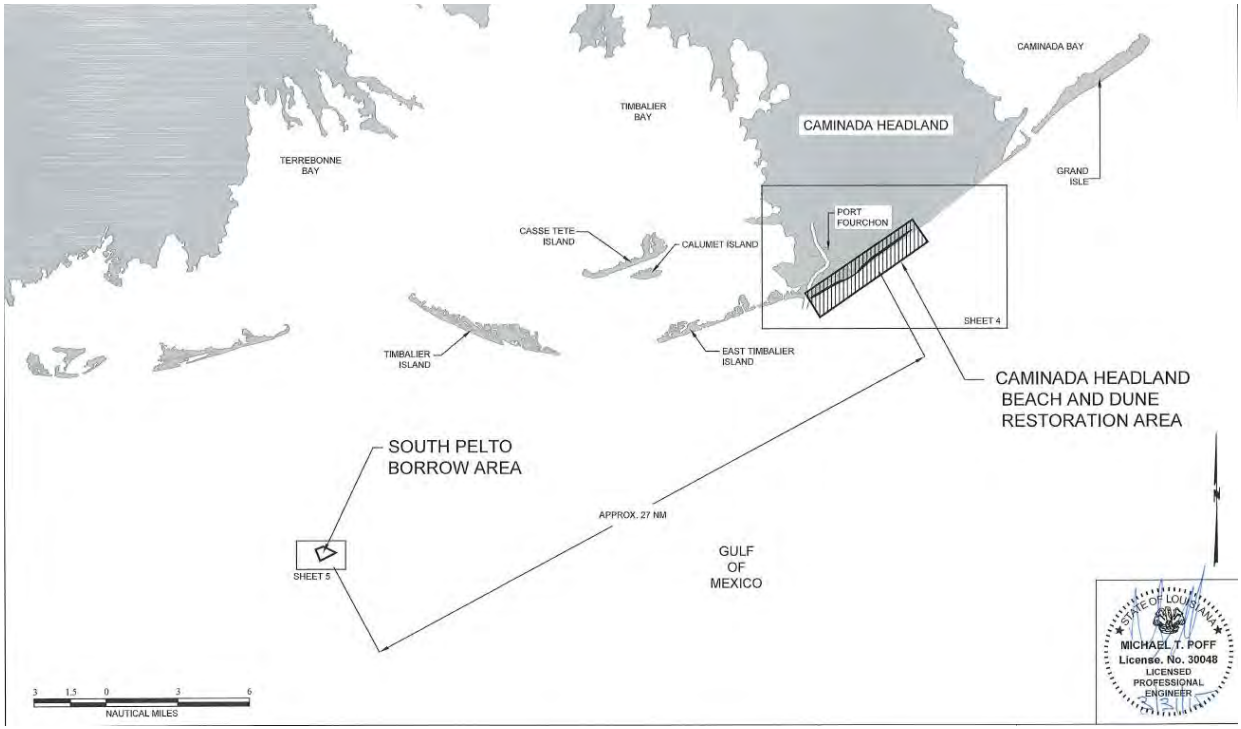
- Barataria Basin Barrier Shoreline Restoration Study (BBBS) developed as a large-scale joint study between USACE New Orleans District and the State of Louisiana


- Included multiple alternatives for the restoration of the beach, dune, and back barrier marsh

- Served as the basis of design for the four Caminada Headland restoration projects

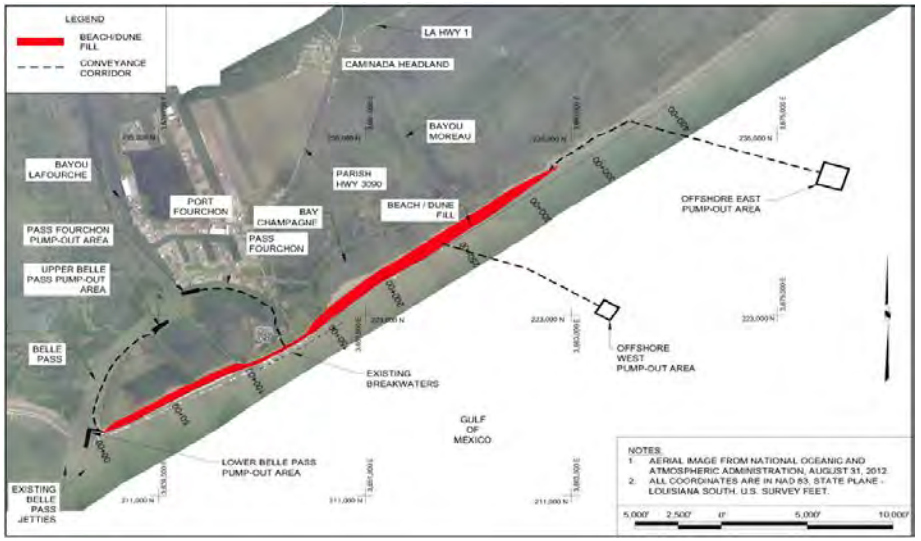
# Caminada Headland Beach and Dune Projects

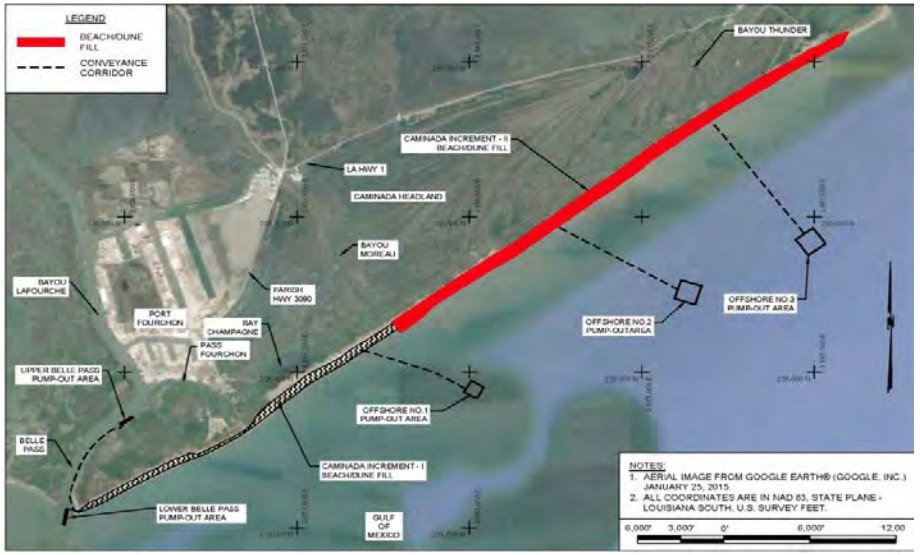
- 13 miles total
  - Increment 1 ~5 mi
  - Increment 2 ~8 mi
- Beach and Dune constructed with sand from South Pelto Borrow Area in Ship Shoal
  - ~27 nautical miles from fill area
- Two Funding Sources
  - Increment 1: CIAP
  - Increment 2: NRDA

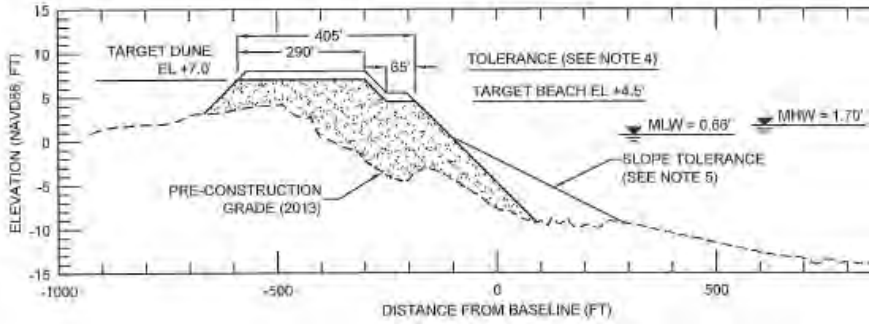


# Caminada Headland Beach and Dune Design

- Coastal Engineering Consultants served as design engineer and Engineer of Record
- Three alternative beach and dune widths evaluated with GENESIS and STWAVE models

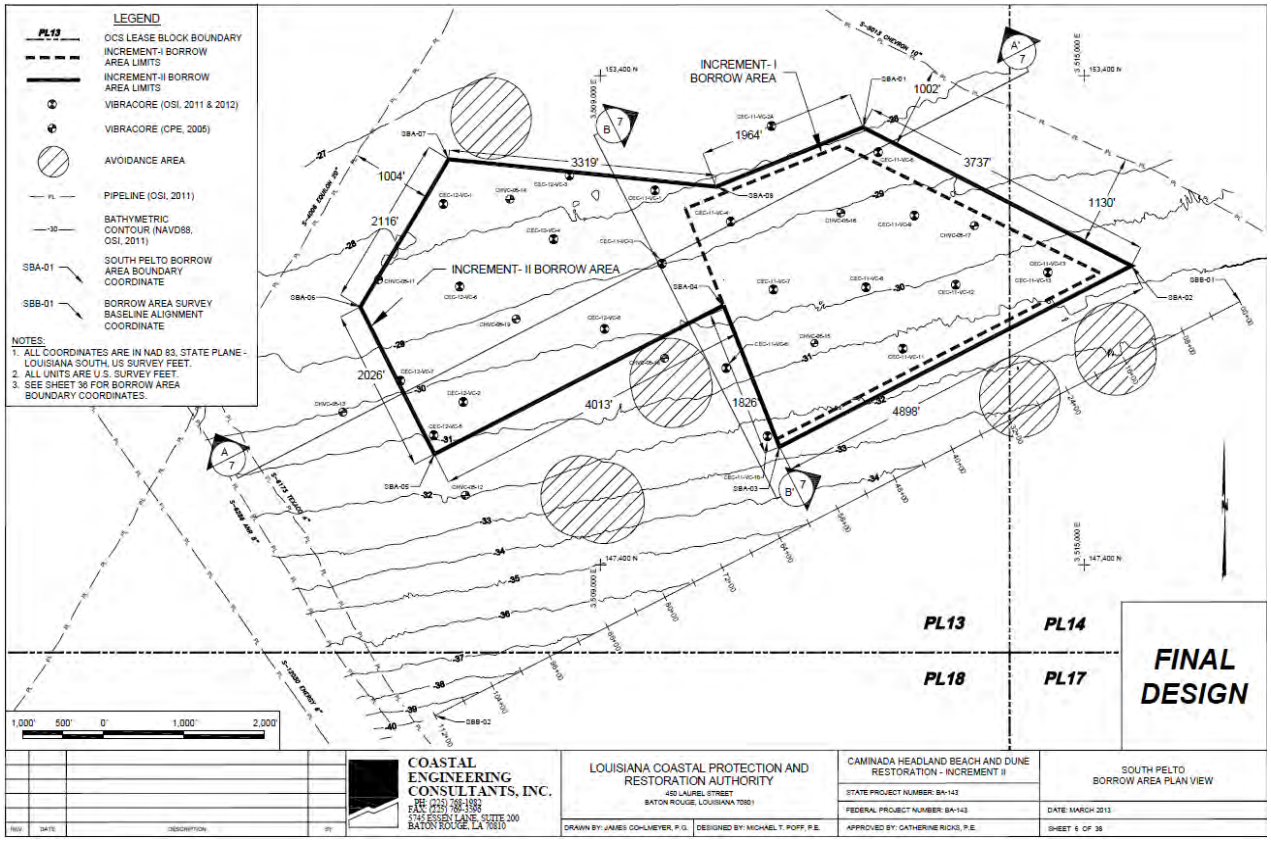


# Beach and Dune Borrow Area Design

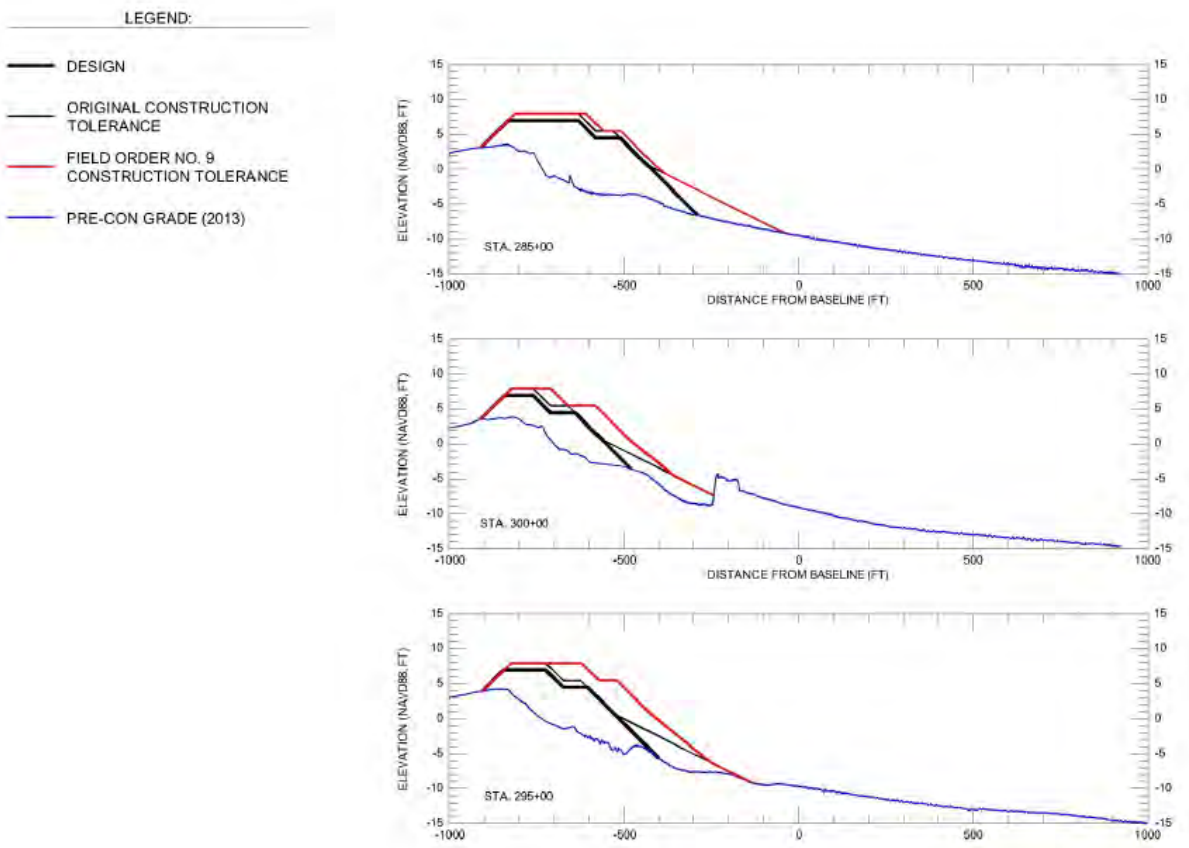
- Remnant of a barrier headland and island approximately 40 miles long and two to six miles wide
- Sand leases were acquired from BOEM
- Chosen due to similarity to native sand



# Caminada Headland Beach and Dune Construction

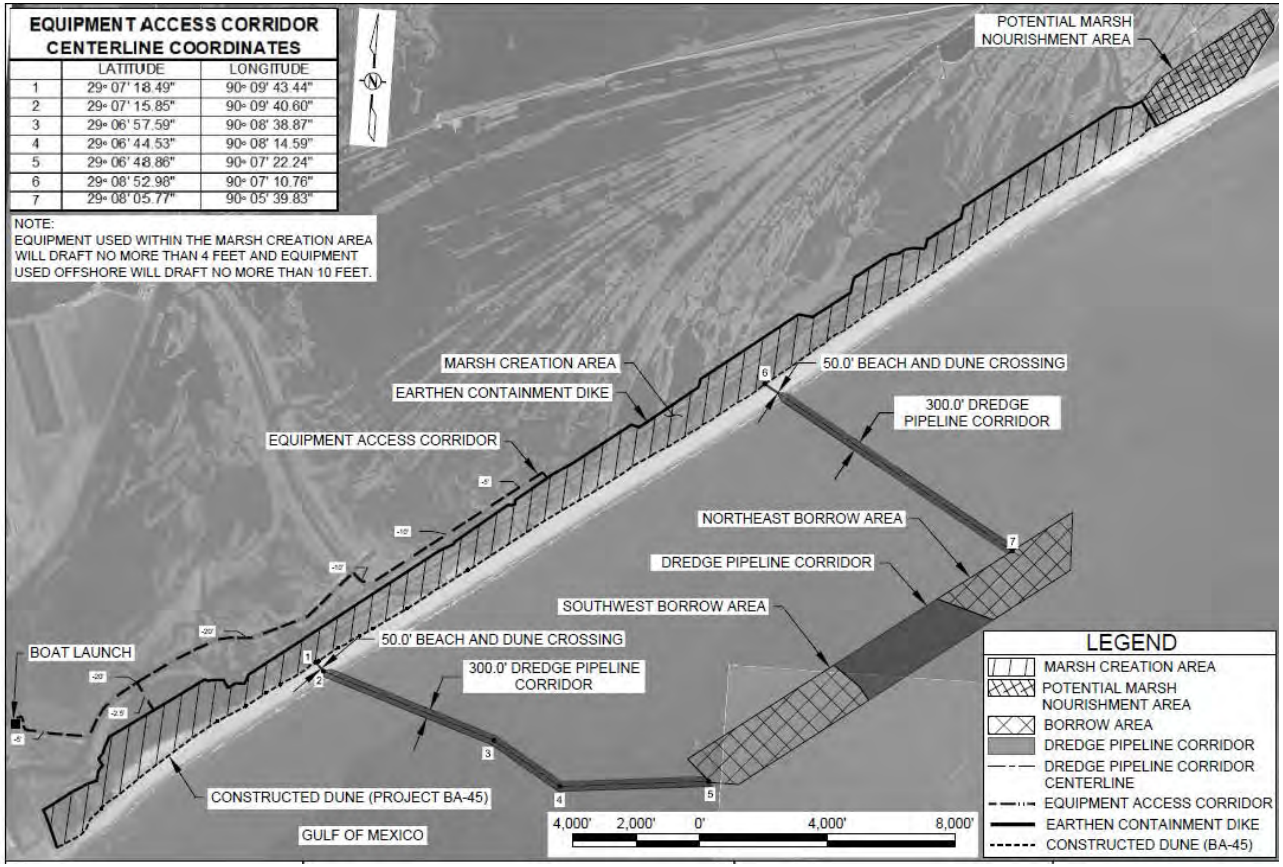
- Weeks Marine, Inc. served as Prime Construction Contractor
- Excavation/transportation methods
  - Spider Barge/Scow Barge
  - Hopper Dredge
- Bulldozers shaped and graded material entrained by training dikes into the beach template

# Caminada Headland Beach and Dune Construction Challenges




- Construction Tolerance Adjustment
  - Steepened slope below MLW
  - Expanded Beach template
- Additional Fill Sections
  - Scour protection for jetties
- Coordination with USACE, Port Fourchon, and Elmer's Island Projects
  - Geotube project
  - Elmer's Island Parking and Road Repairs
- Nesting Birds

# Back Barrier Marsh Creation Projects



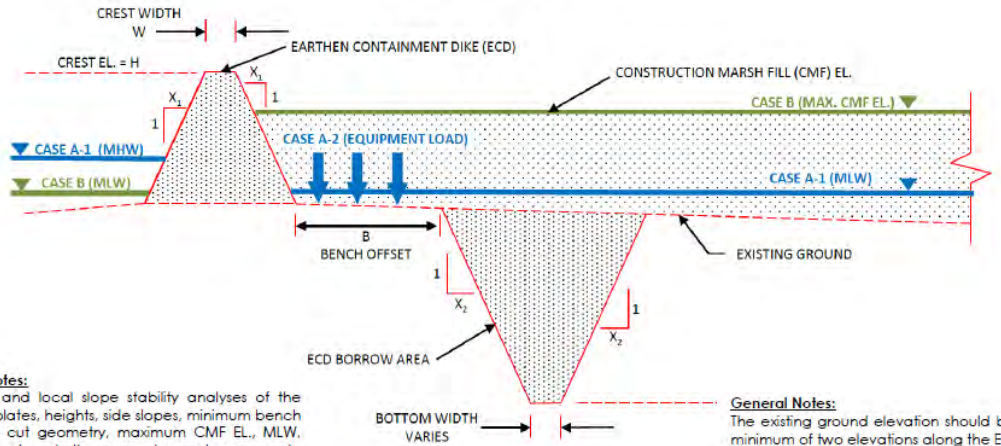

- Approximately 8 miles of back barrier marsh
- Mixed sediment (fines) borrow area approximately 1.5 miles offshore
- Fully contained
  - In-Situ Earthen Dikes
  - Constructed Dune
- Funding Source- CWPPRA
  - Initially two projects

# Back Barrier Marsh Creation Project Design

- CPRA Marsh Creation Design Guidelines
- Slope Stability of Earthen Containment Dikes
- Settlement of Marsh Fill and Foundation Soils

**Coastal Protection and Restoration Authority:**
**Geotechnical Standards for Marsh Creation and Coastal Restoration Projects**

Typical Earthen Containment Dike
Slope Stability Cases




**Stability Analyses Notes:**
Conduct a global and local slope stability analyses of the proposed ECD templates, heights, side slopes, minimum bench offset, borrow area cut geometry, maximum CMF EL., MLW, multi-lift CMF if required, and other cases deemed necessary to ensure ECD stability.

A minimum FOS of 1.20 is required during construction.

*CASE A-1: Global stability check: During ECD borrow excavation; MHW (opposite side of borrow), MLW (borrow side).*

*CASE A-2: Local stability check: During ECD borrow excavation; Distributed load from excavation equipment, MLW (borrow side).*

*CASE B: Dredged Material placed to CMF EL.; CMF (max. elevation), MLW (opposite side of borrow).*

**General Notes:**
The existing ground elevation should be analyzed at a minimum of two elevations along the ECD; 1) the lowest bottom elevation/critical condition 2) the average open water and/or existing marsh elevation/general conditions.

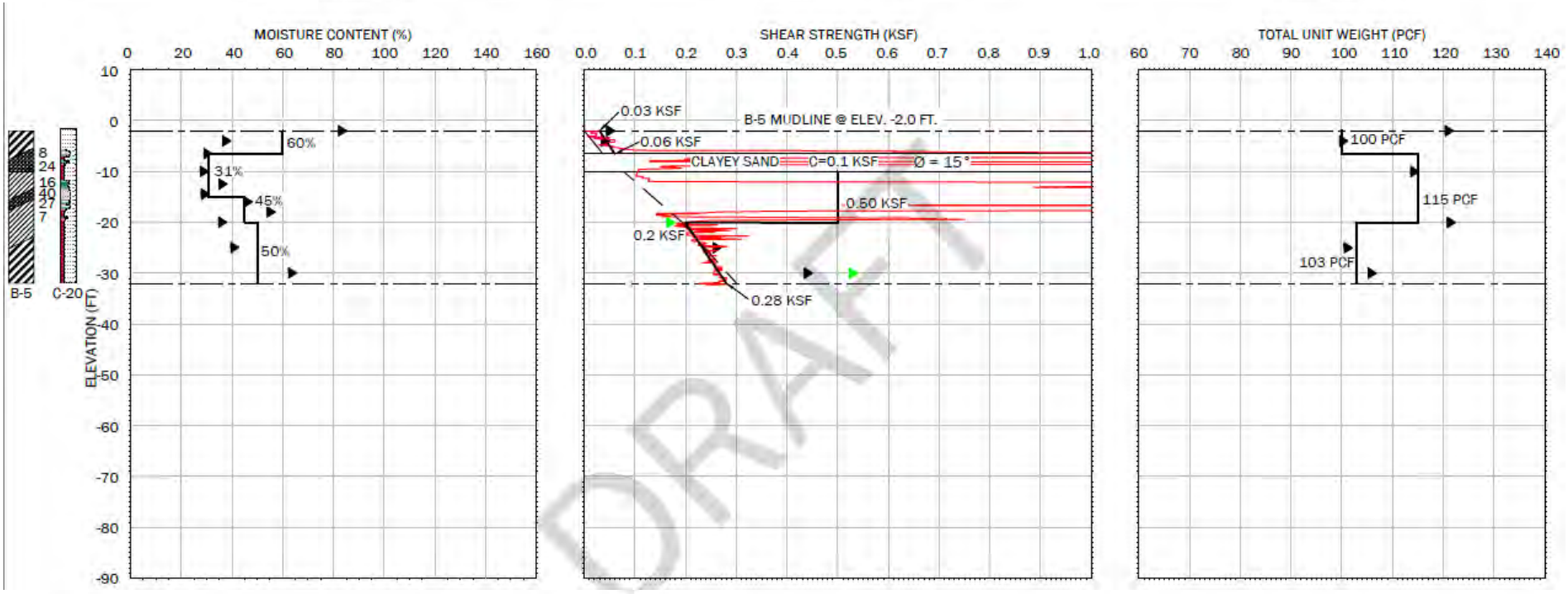
The ECD unit weight and cohesion is typically expressed as a percentage of the ECD Borrow Area soil parameters.

A distributed load of 260 psf is typically used based on large marsh hoe/marsh buggy equipment. The ECD is constructed in several lifts.

A geosynthetic reinforcement fabric may be utilized to achieve the minimum FOS.

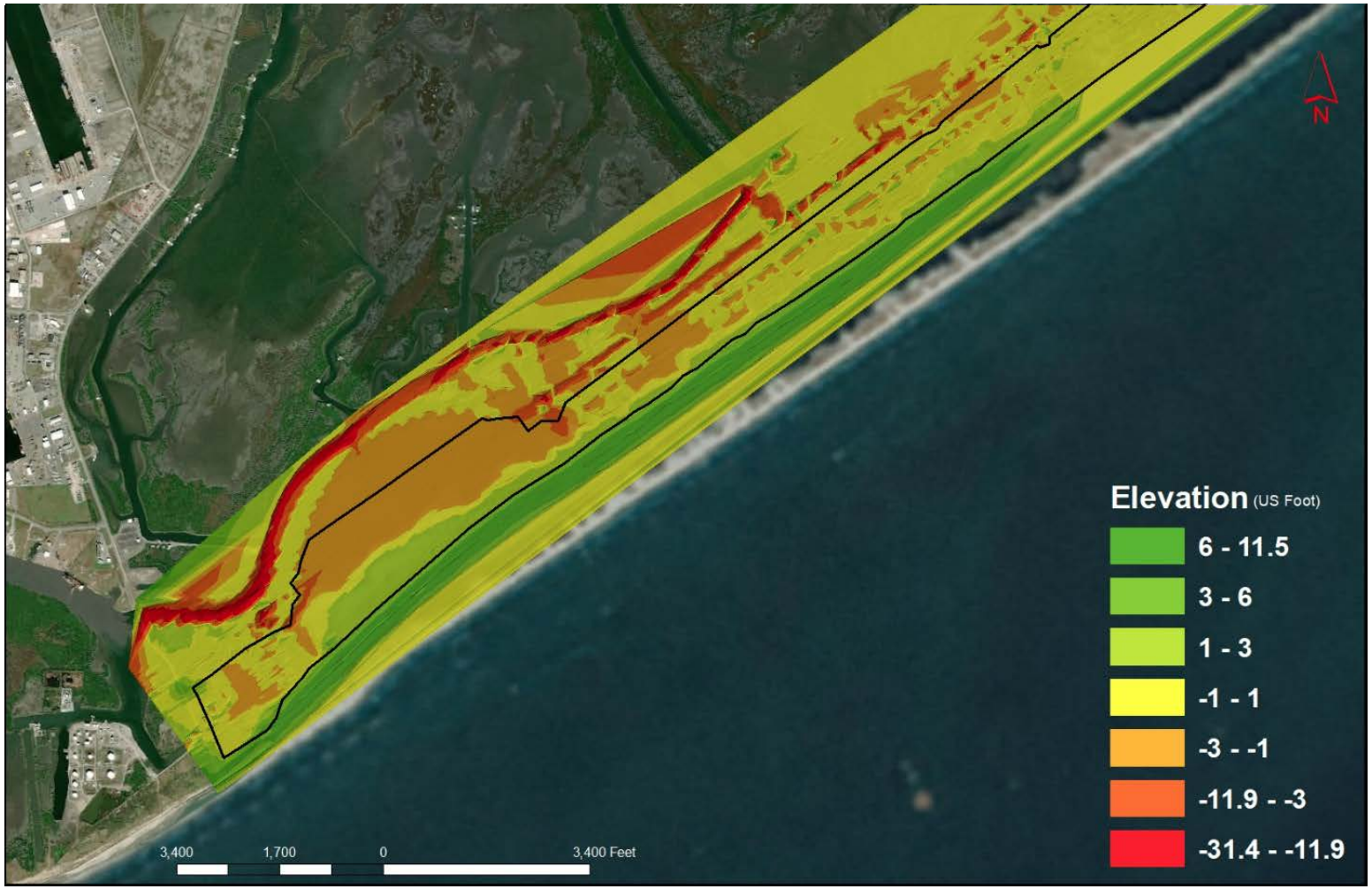
# Back Barrier Marsh Creation Project Design Challenges

- Weak soils along containment alignment



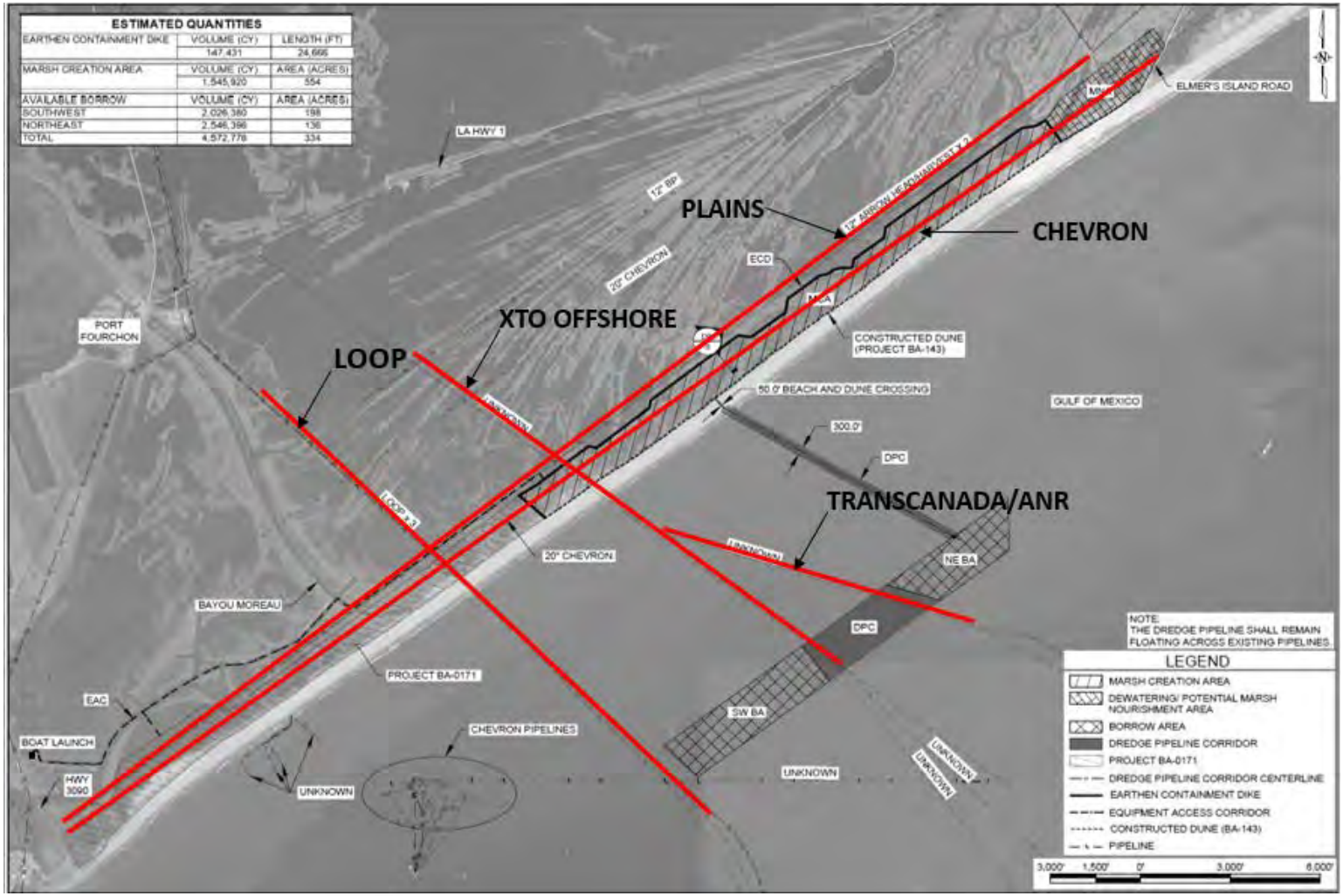
# Back Barrier Marsh Creation Project Design Challenges

- Varying elevations in fill area



# Back Barrier Marsh Creation Project Design Challenges

- Pipelines



# Back Barrier Marsh Creation Construction

- Bid Late 2019/Early 2020
- Hydraulic Dredging
- Earthen Containment Dike Construction
- Construction Monitoring

# Conclusions/Lessons Learned

- Caminada Beach and Dune Projects were the first projects to utilize Ship Shoal as a borrow source
  - Strengthened relationships and communication between State and Federal partners
  - Sediment properties and construction methodologies determined during these projects currently being used on other Beach/Dune Restoration projects in Louisiana

- Caminada Back Barrier marsh design and imminent construction brought forth new methods of monitoring and control when dealing with mixed sediment borrow areas
  - Projects further strengthened communication and relationships between stakeholders, State, and Federal partners
  - Lessons learned in respect to building containment over pipelines and ensuring safety during construction of the Contractor and pipeline currently being utilized on other Marsh Restoration Projects.

# Acknowledgements


- **Coastal Engineering Consultants, Inc.**: Design and Construction Administration for Beach and Dune Projects

- **Weeks Marine, Inc.**: Construction of both Increments of the Beach and Dune Projects

- **Coastal Wetlands Planning Protection and Restoration Act (CWPPRA)**: Authorized design and construction of the Back Barrier Marsh Creation Projects

- **Environmental Protection Agency (EPA)**: Served as Federal Partners during the design and construction of the Back Barrier Marsh Creation Projects

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