COAST & HARBOR ENGINEERING

MOTT MACDONALD

PORT OF BROWNSVILLE
the port that *works*

The Bahia Grande Hydrologic Restoration Project

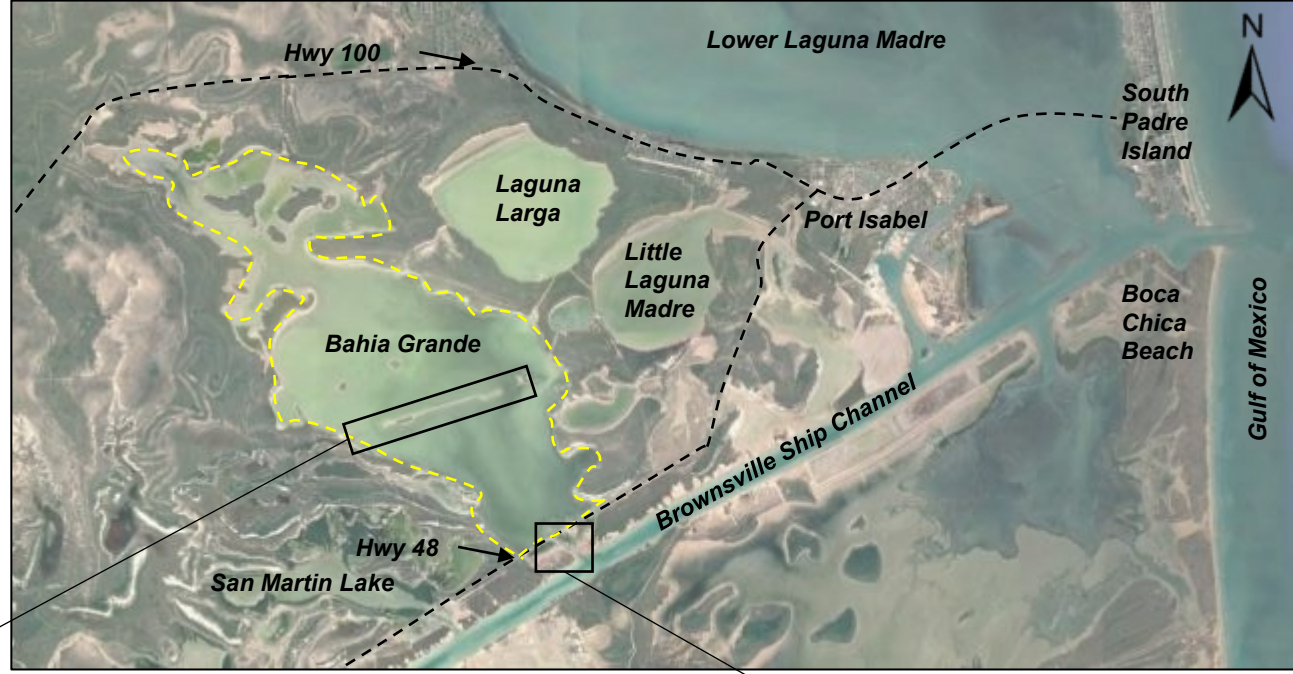
Coastal Wetland Restoration through Hydraulic Restoration

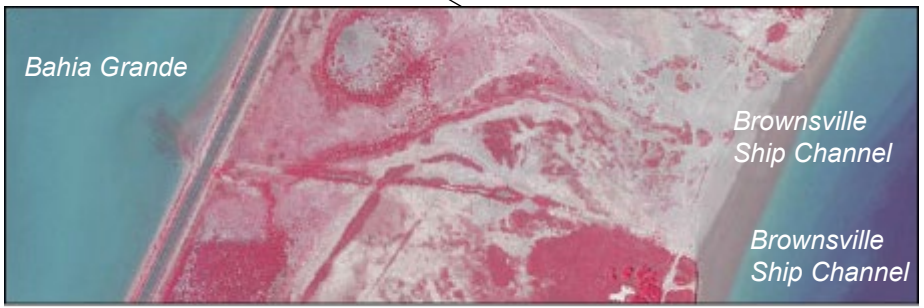
Josh Carter, PE, BC.CE
Aaron Horine, PE
Luis Maristany, PE
Derek Salazar, PE
Tessa Syvertson, PE
Allison Fischer

April 18, 2024

Project Location

- 1872: RGV Railroad Company Expansion
- 1930's: Brownsville Ship Channel
- 1953: HWY 48 Constructed





2004

Project Location

1884 surveyor's map of Bahia Grande and surrounding region. From J.J.Cocke (county surveyor), Map of the County of Cameron, Texas, Oct 25, 1884.

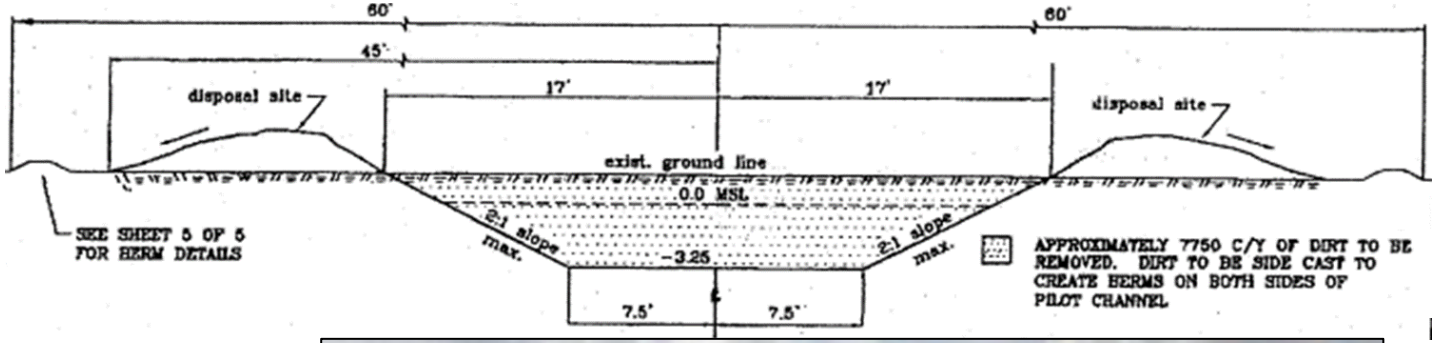
Effects of dust storms

Health, Environmental & Safety Hazards

Pilot Channel

July 2005 P.O.B.

- 2,250 ft length
- 15 ft bottom width
- ~3 ft depth
- Estimated 2.5% tidal exchange

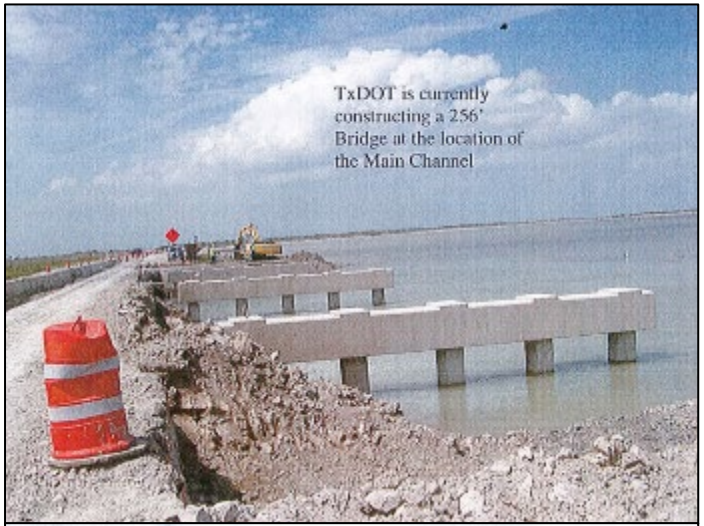


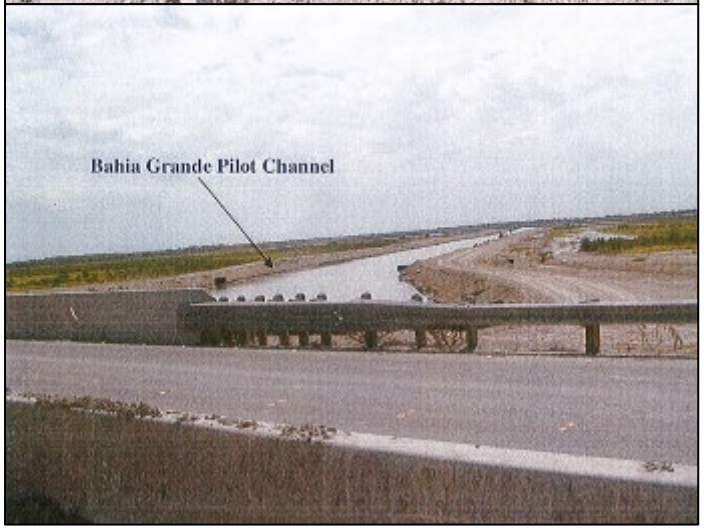
Heavy equipment opens the pilot channel in advance of Hurricane Emily, July 2005.

HWY 48 Bridge

2007 TXDOT

- Culverts replaced by a trapezoidal channel
- 150 ft bottom width (only at bridge)
- ~ 9 ft Depth
- Armored embankment
- Estimated 9% tidal exchange



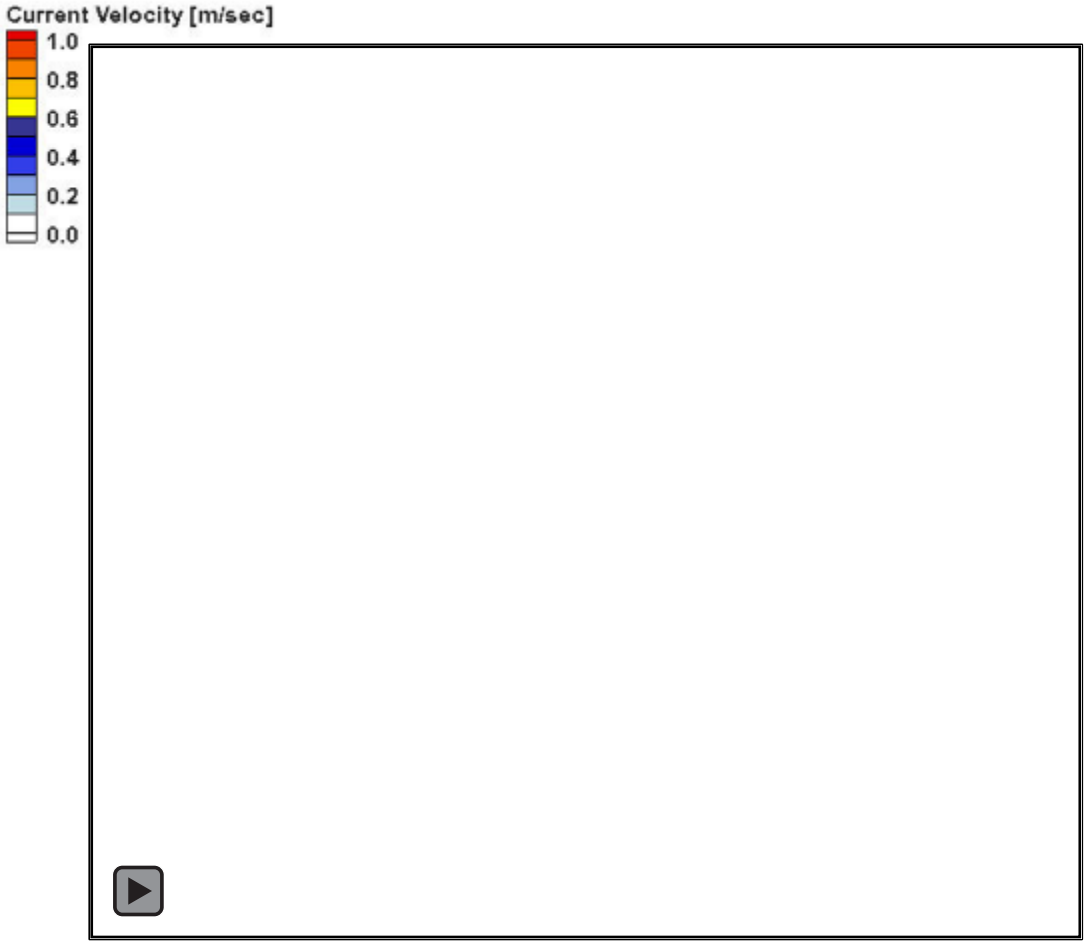


2021 Dredge Event - Project Goals

- Increase Tidal Exchange
- Reduce Salinity Levels
- Restore Vital Wetland Habitat

Summary of Work

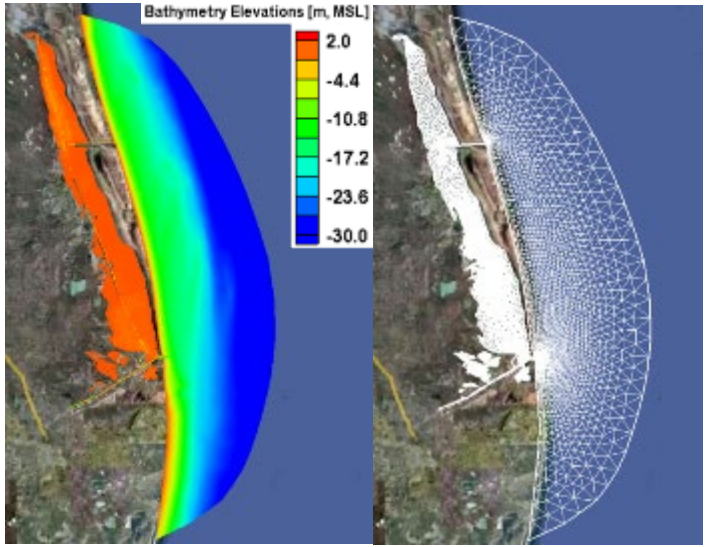
- Improve hydraulic connectivity between Bahia Grande and the Brownsville Ship Channel
- Channel dredging and material placement
- Scour protection installation around the Highway 48 Bridge.

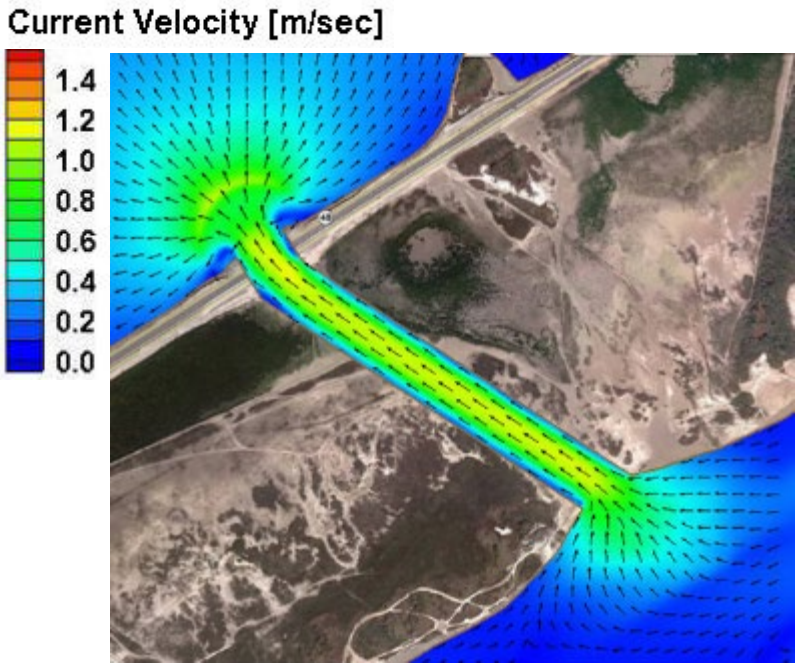


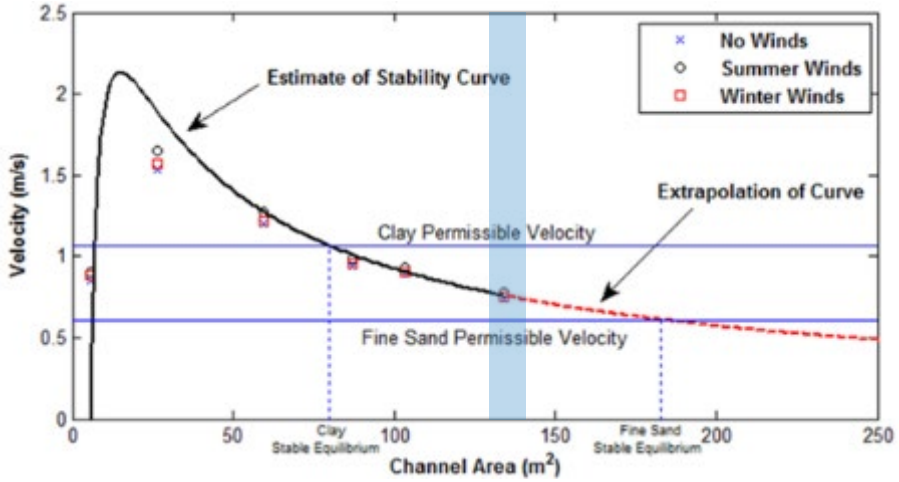
Circulation

MORPHO – MM proprietary model

- Existing vs Proposed evaluated
- Indicated natural tendency of inlet to open
- Preferred Alternative: 25% tidal exchange







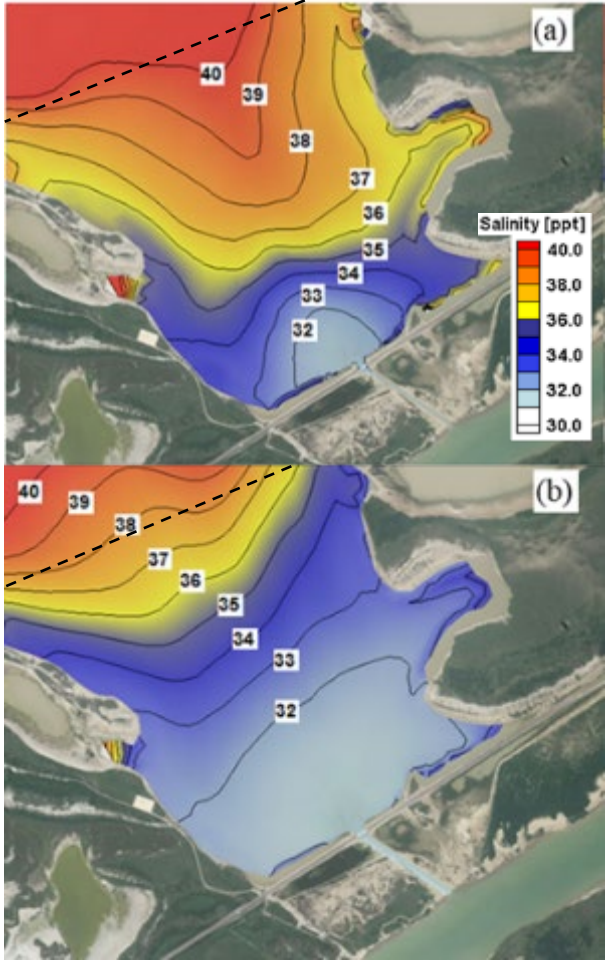
Inlet Dynamic

2014 vs 2021 (pre-dredge event) inlet widening

Salinity Modeling

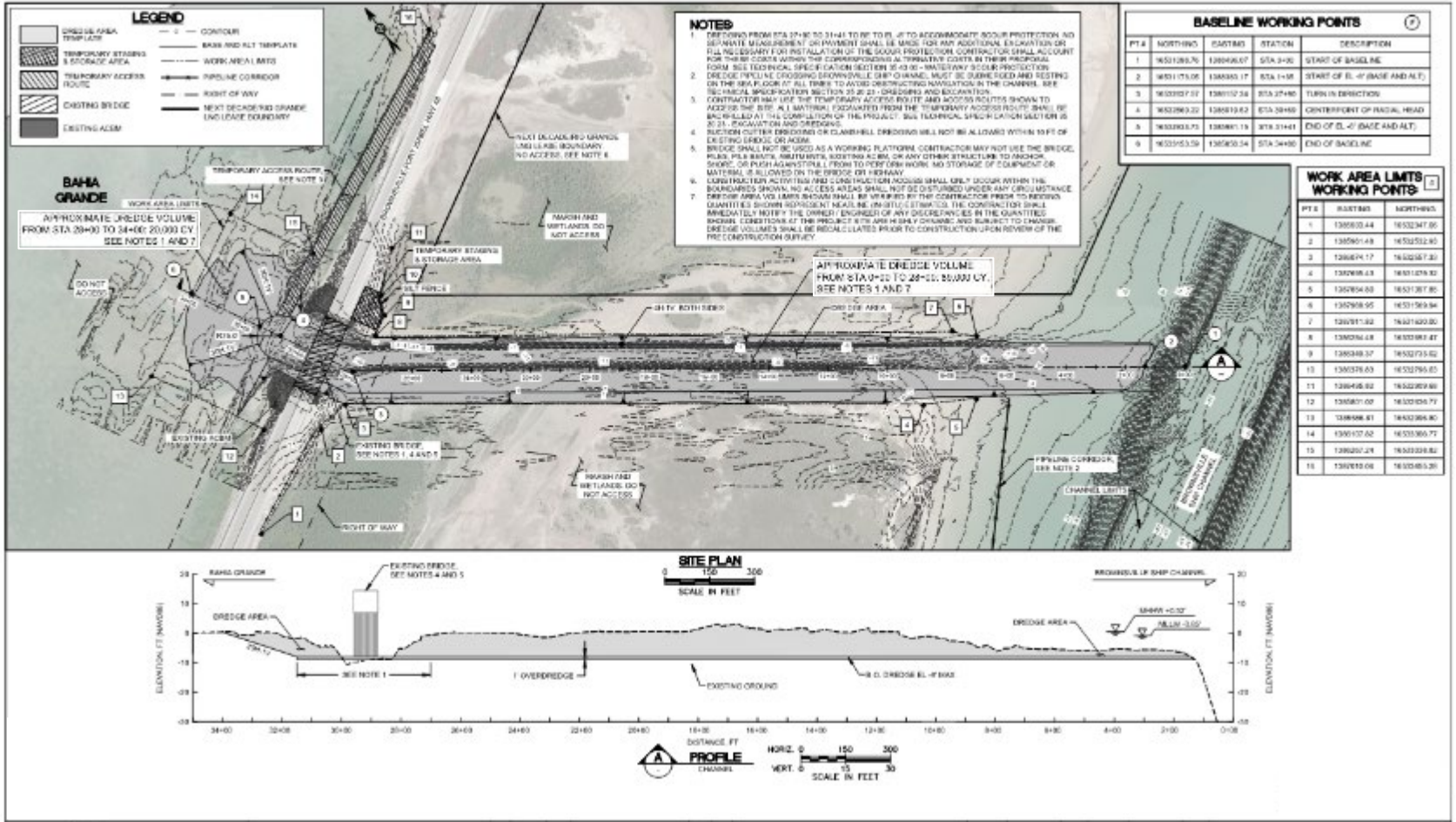
MORPHO – MM proprietary model

- Calibrated Hydrodynamic model used for salinity modeling
- Measured evaporation, precipitation, river inflow, and salinity data used
- Alternatives increased the area below the 35 ppt salinity level by almost 2.5 times (880 acres for preferred alternative v/s 330 acres for existing conditions)
- Reduction of salinity levels within the Bahia by approximately 11-13%,



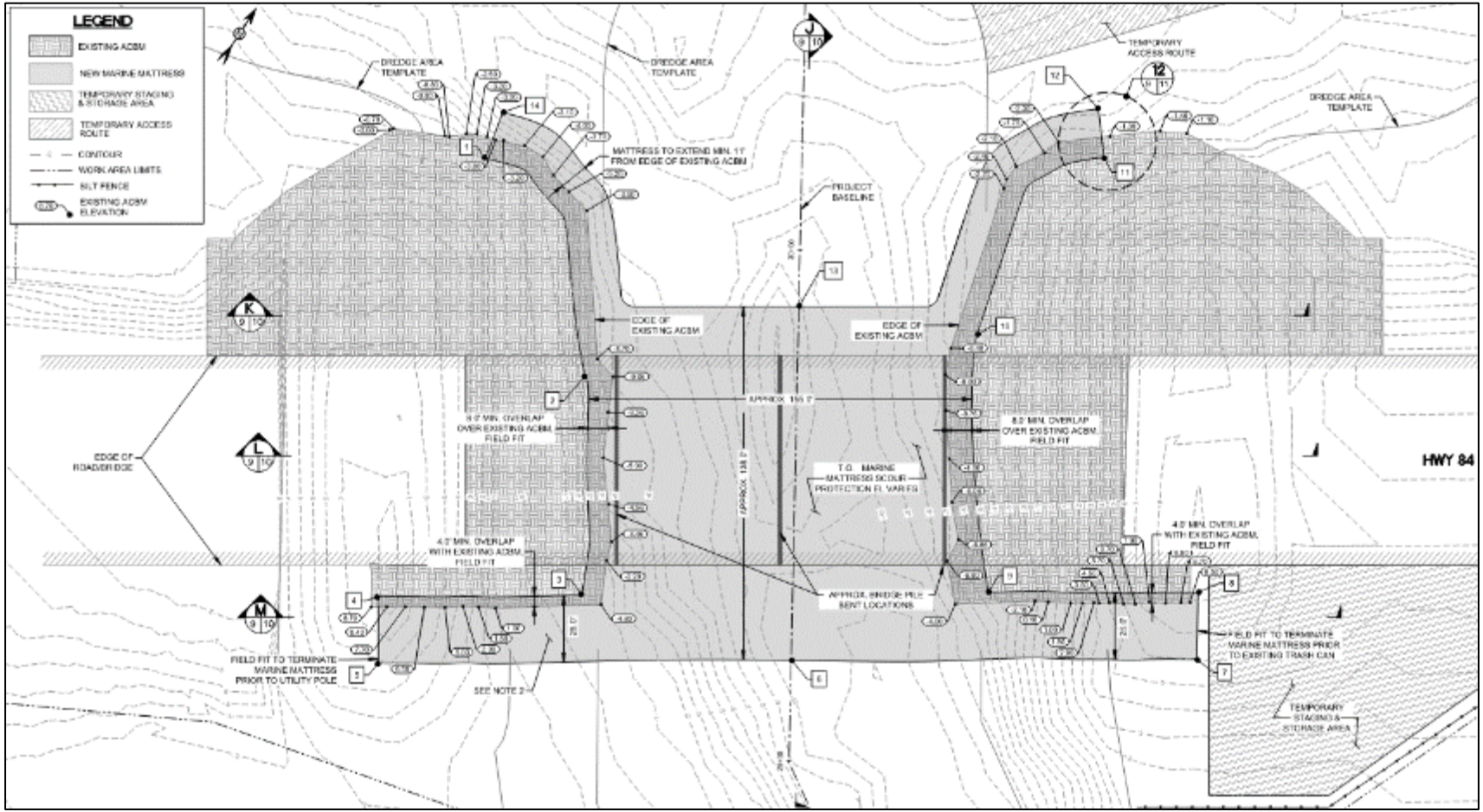
Average salinities (represented by the 25-74% PNE) for (a) Existing (b) Preferred Alternative

Dredging Plan



Disposal Area

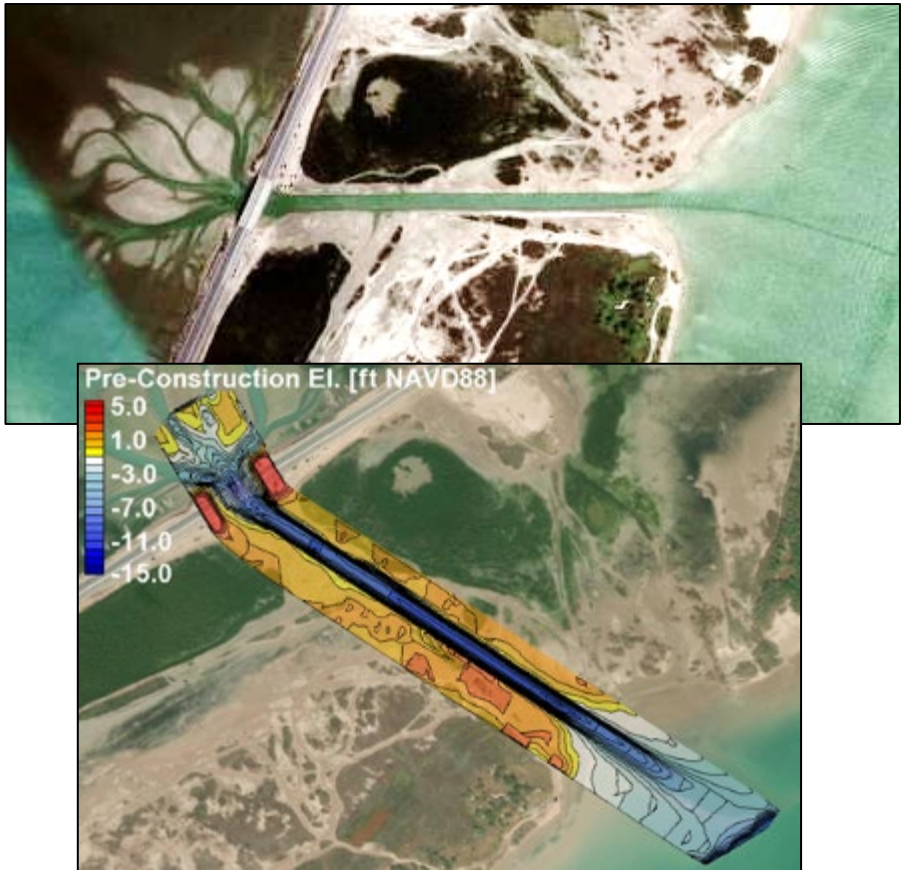
Scour Protection – Marine Mattress



Aerial Comparison

Construction Update

February 2021



March 2022

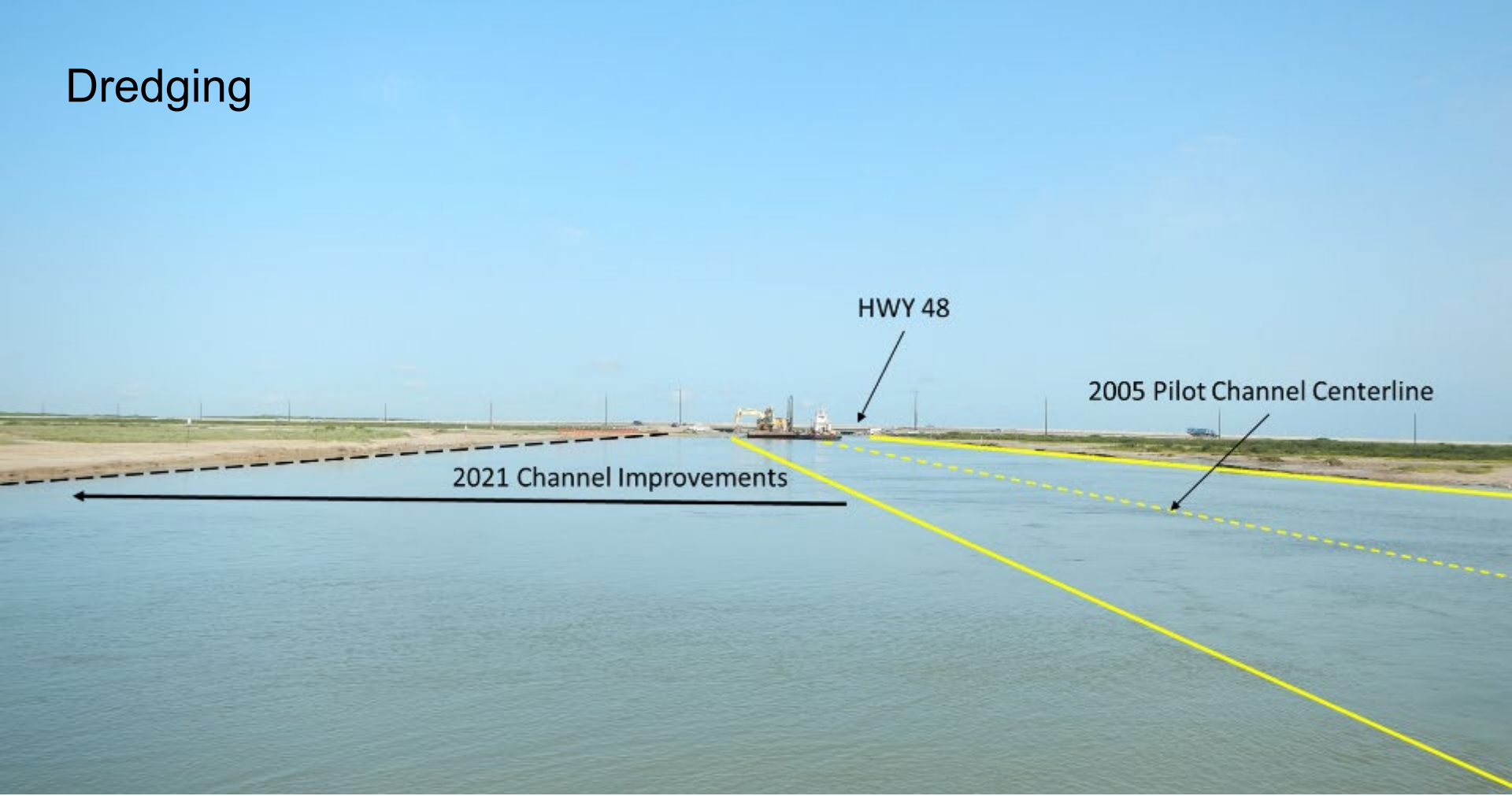
Construction

…Wouldn't be construction without a few hiccups

Dredging

Dredging

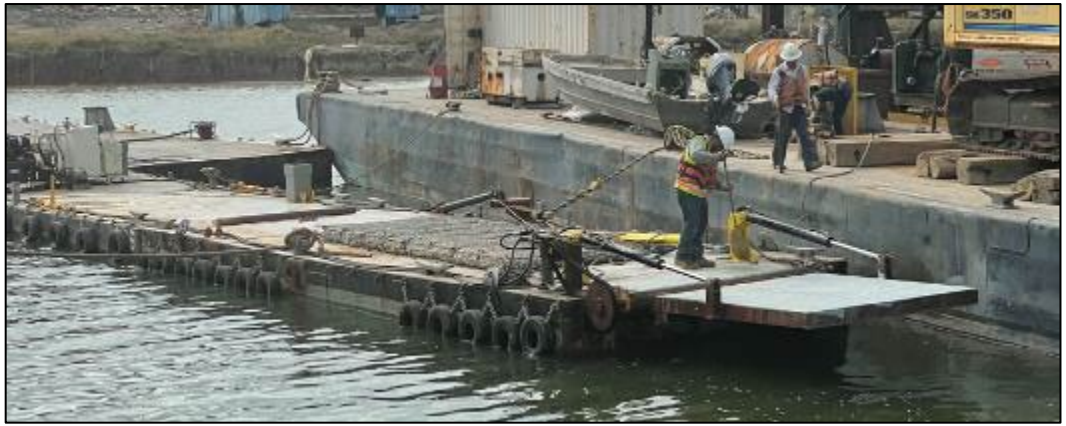
Dredging


HWY 48
2005 Pilot Channel Centerline
2021 Channel Improvements

Material Placement – USACE Managed DMPA

Scour Protection Fabrication

Scour Protection Installation



Scour Protection Installation

Next Steps

- Dredging complete
- Scour Protection complete
- UTRGV conducting flow monitoring effort (ADCP)
- MM conducting post-con monitoring for 5 years

COAST & HARBOR ENGINEERING

MOTT MACDONALD

PORT OF BROWNSVILLE
the port that *works*

Thank you

Any Questions?

Josh Carter, PE, BC.CE
Principal

D:512.615.0816