

The Bahia Grande Hydrologic Restoration Project

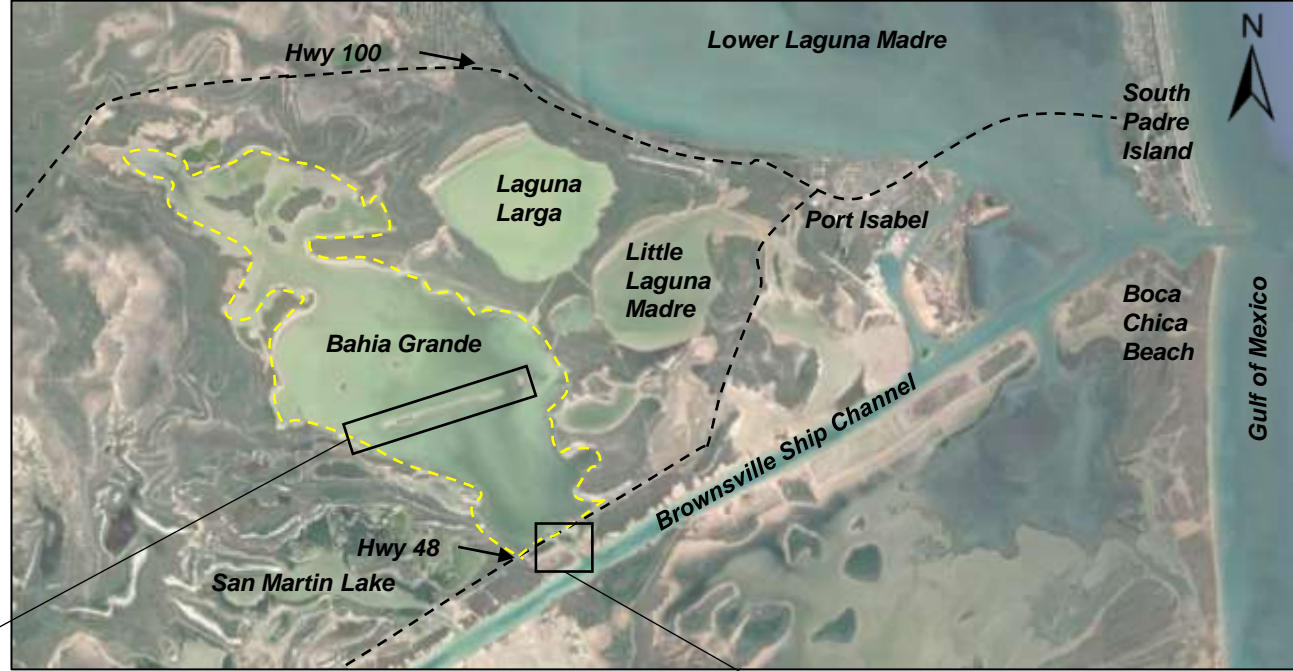
Dredging to Achieve One of The Largest Coastal Wetland Restoration Projects in The United States.

Derek J. Salazar, EIT



Project Location

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



Mott MacDonald | Bahia Grande Hydrologic Restoration Project



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

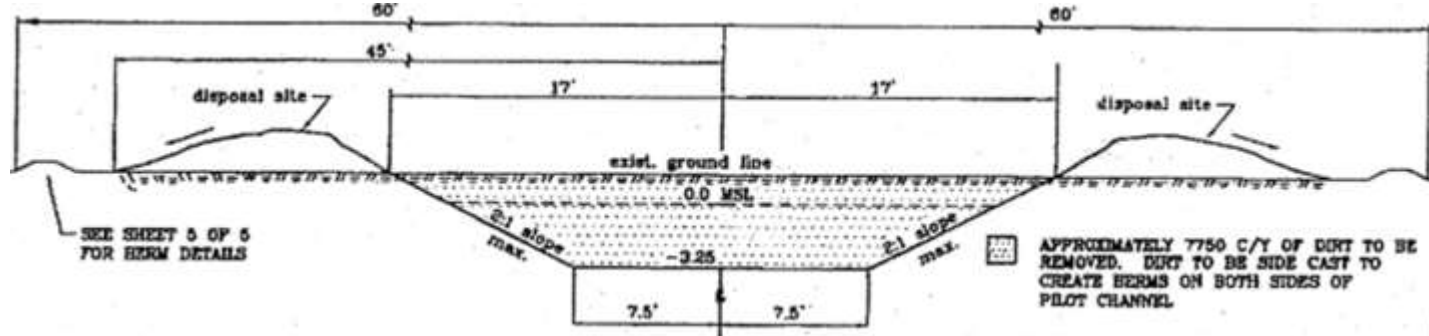
Health, Environmental & Safety Hazards



Pilot Channel

July 2005 P.O.B.

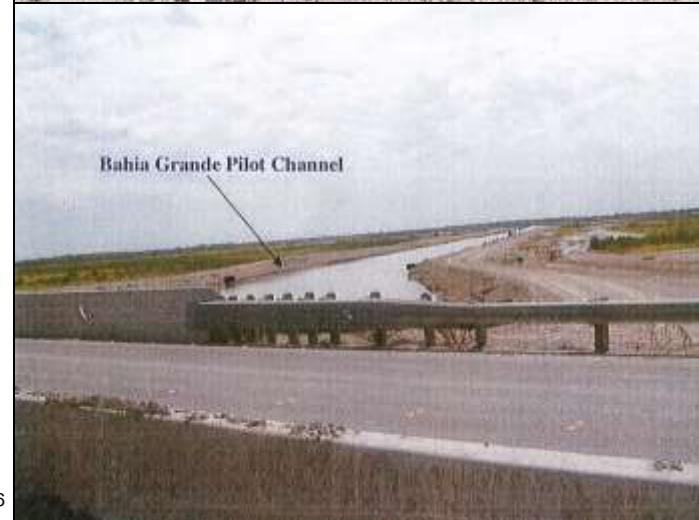
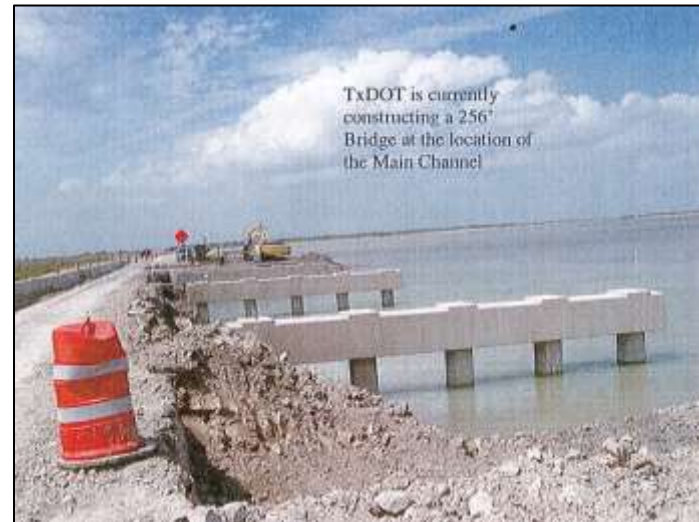
- 2,250 ft length
- 15 ft bottom width
- ~3 ft depth
- Estimated 2.5% tidal exchange



HWY 48 Bridge

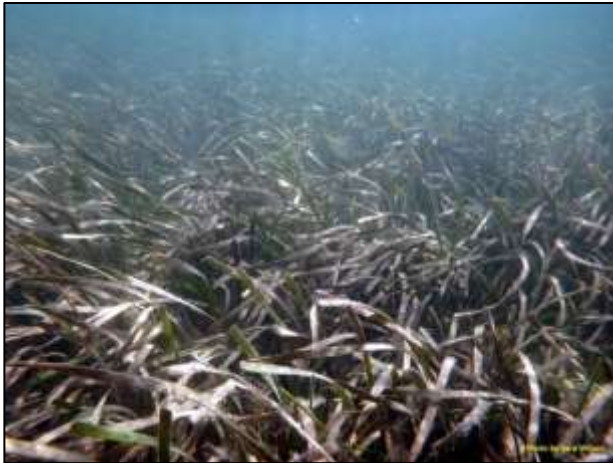
2007 TXDOT

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



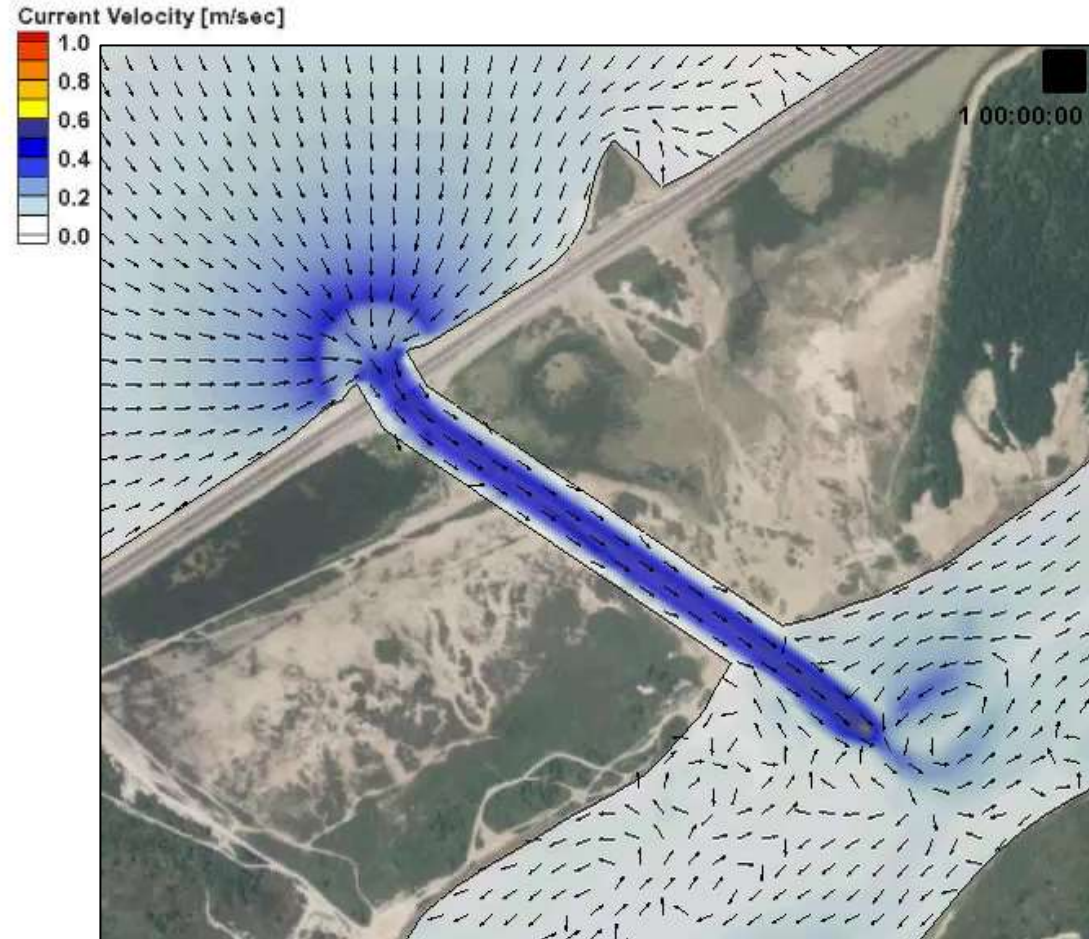
2021 Dredge Event - Project Goals

- 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.

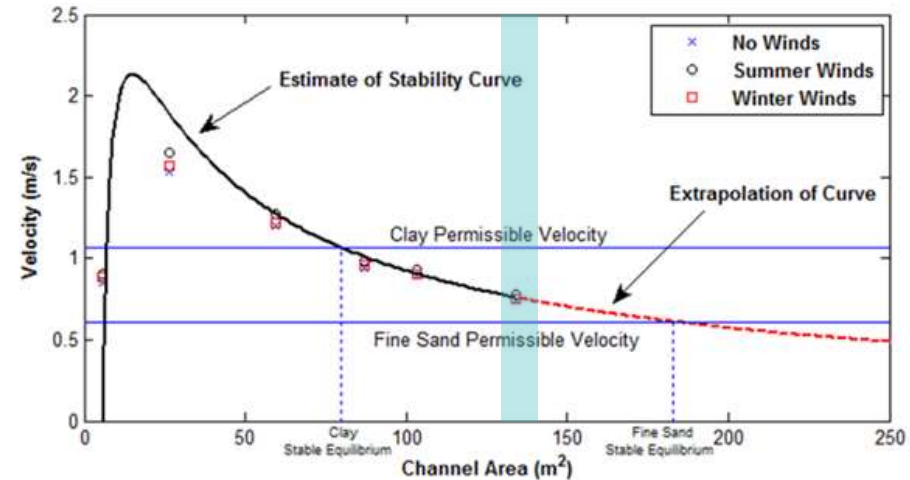
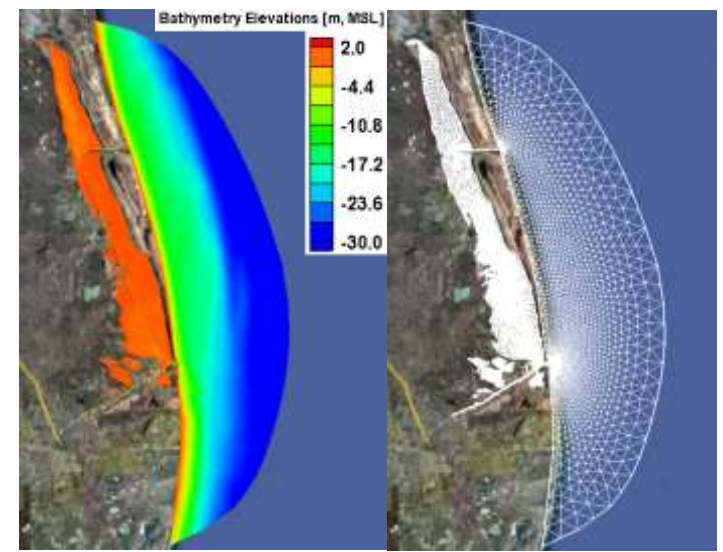
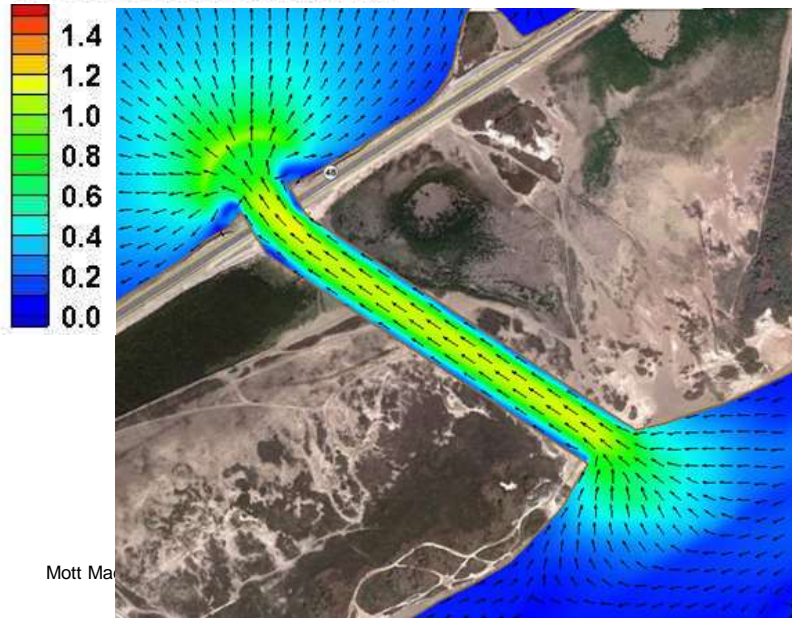


Circulation

MORPHO – MM proprietary model

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

Current Velocity [m/sec]



Inlet Dynamic

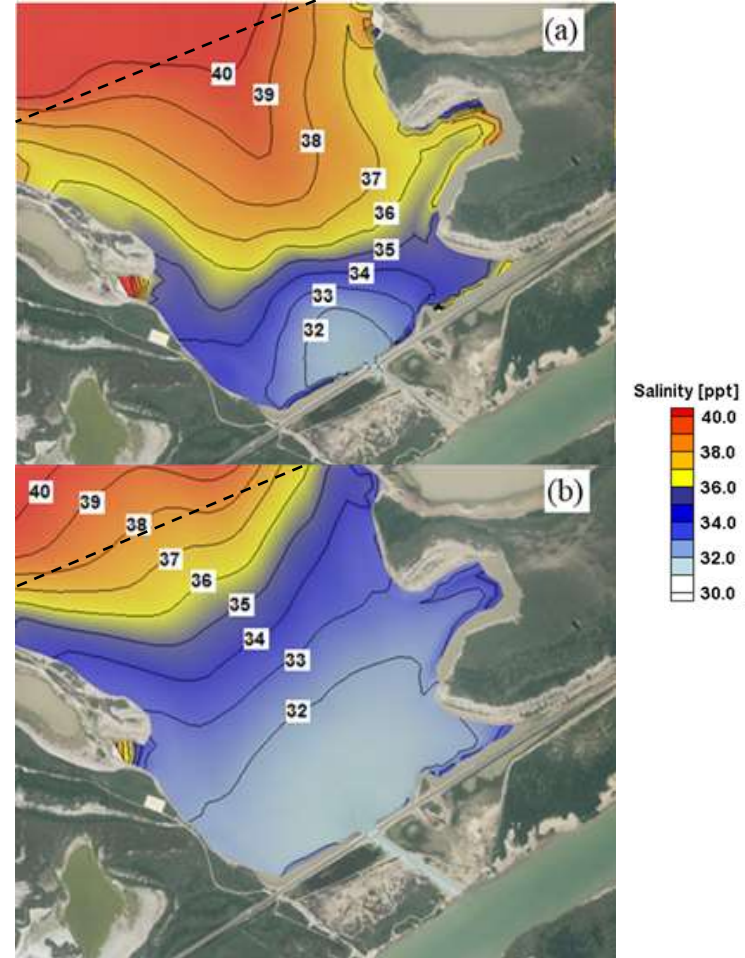
2014 vs 2021 (pre-dredge event) inlet widening



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%,

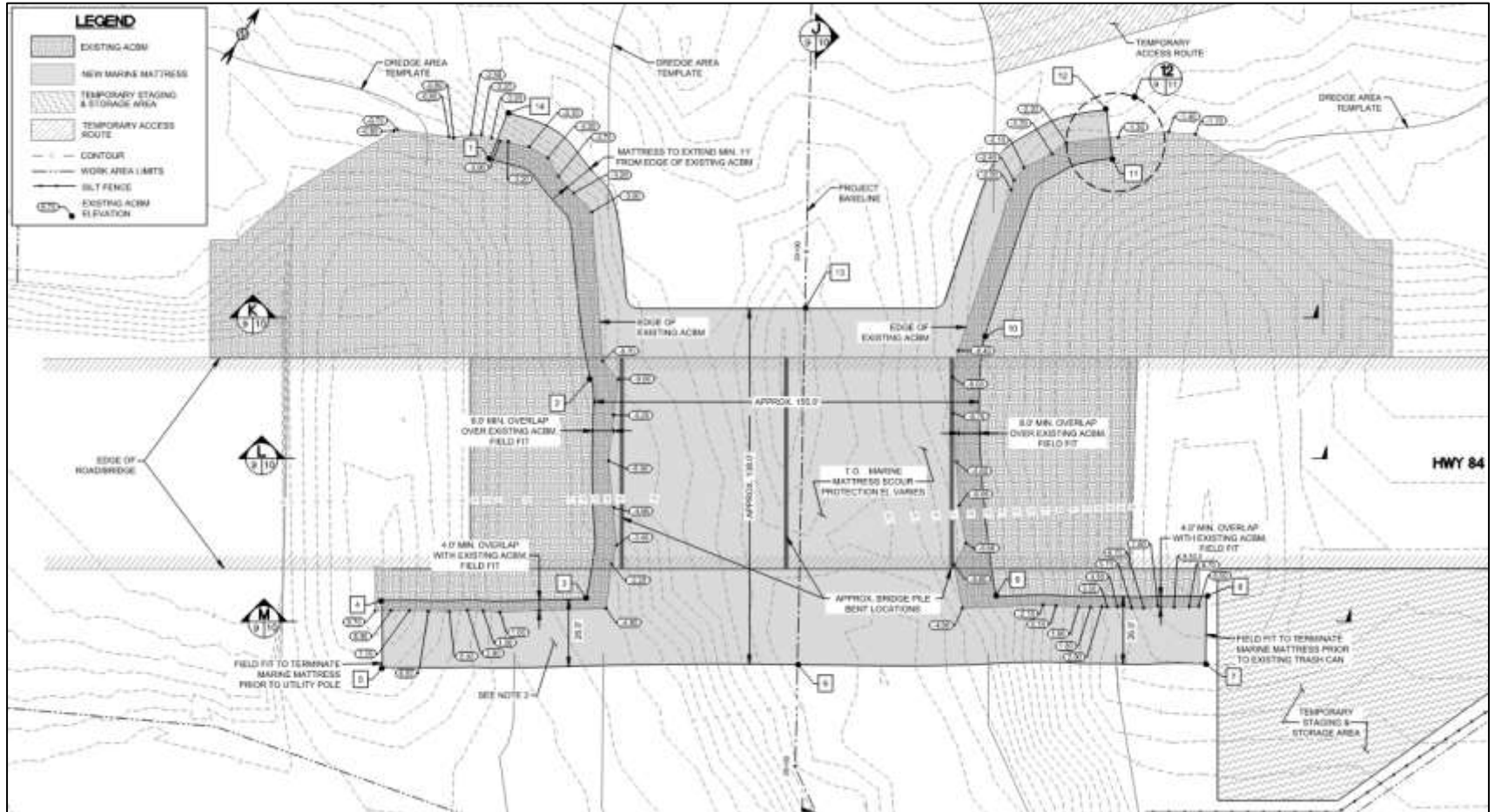


Average salinities (represented by the 25-74% PNE) for (a) Existing (b) Preferred Alternative

Disposal Area



Scour Protection – Marine Mattress



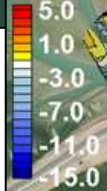
Aerial Comparison

Construction Update

February 2021



Pre-Construction El. [ft NAVD88]



March 2022



Post-Construction El. [ft NAVD88]



Construction

...Wouldn't be construction without a few hiccups



Dredging



Dredging



Dredging



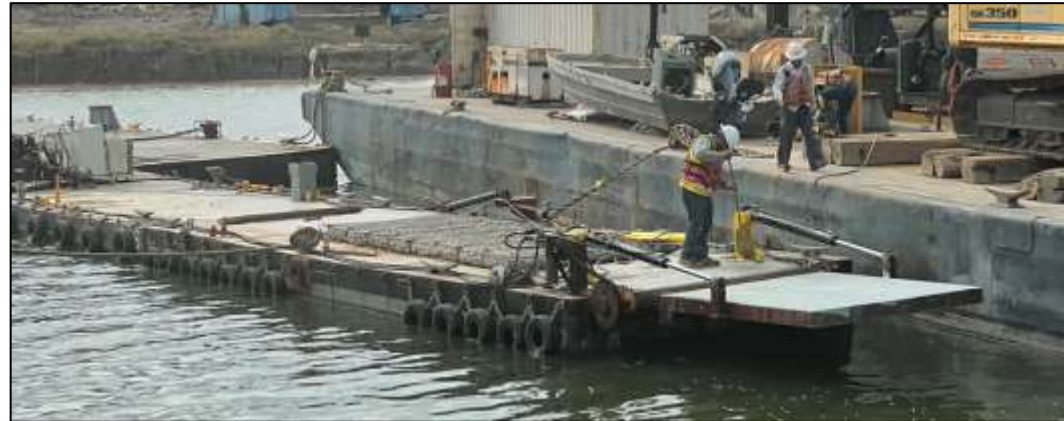
Material Placement – USACE Managed DMPA



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





Thank you

Any Questions?

Derek Salazar, EIT
Engineering – Coastal

derek.salazar@mottmac.com
D:361.203.6923