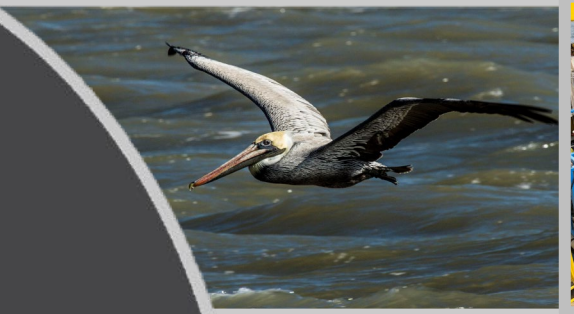
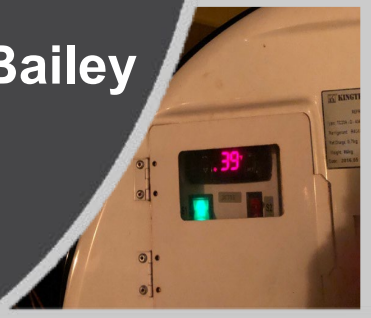
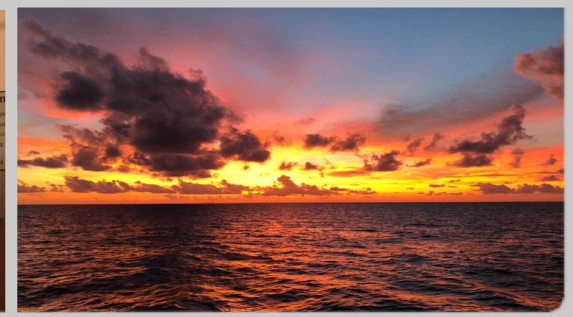
U.S.ARMY

# Sabine-Neches Waterway

## A Case Study of a Cost Effective and Technically Defensible Sampling Strategy for a 35-Mile-Long Study Area







**E.M. Bourne, C.R. Montgomery, B.N. Stevens , and S.E. Bailey**

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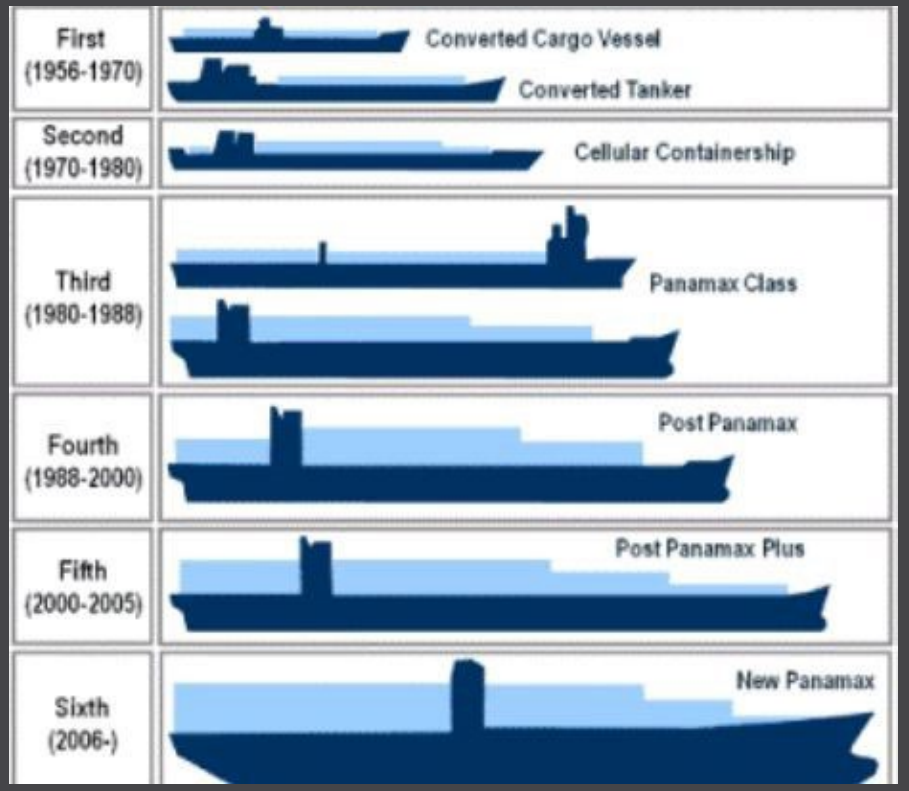
# INTRODUCTION & BACKGROUND

## NEW WORK DREDGE MATERIAL INTENDED FOR OCEAN DISPOSAL

- Each port in the US has an authorized Federal Ship Channel
- Authorized channel is a specific width and depth
- Widening and deepening of the Panama Canal allows larger ocean freighters to travel between the Atlantic and Pacific Oceans
- Larger boats → more goods → access to ports
- Port Authorities are improving their ship channels to accommodate  this demand
- SNWW has main channel + anchorage basins inland



# SABINE NECHES WATERWAY

## PHYSICAL DESCRIPTION OF THE SHIP CHANNEL – CURRENT AND FUTURE

**CURRENT**

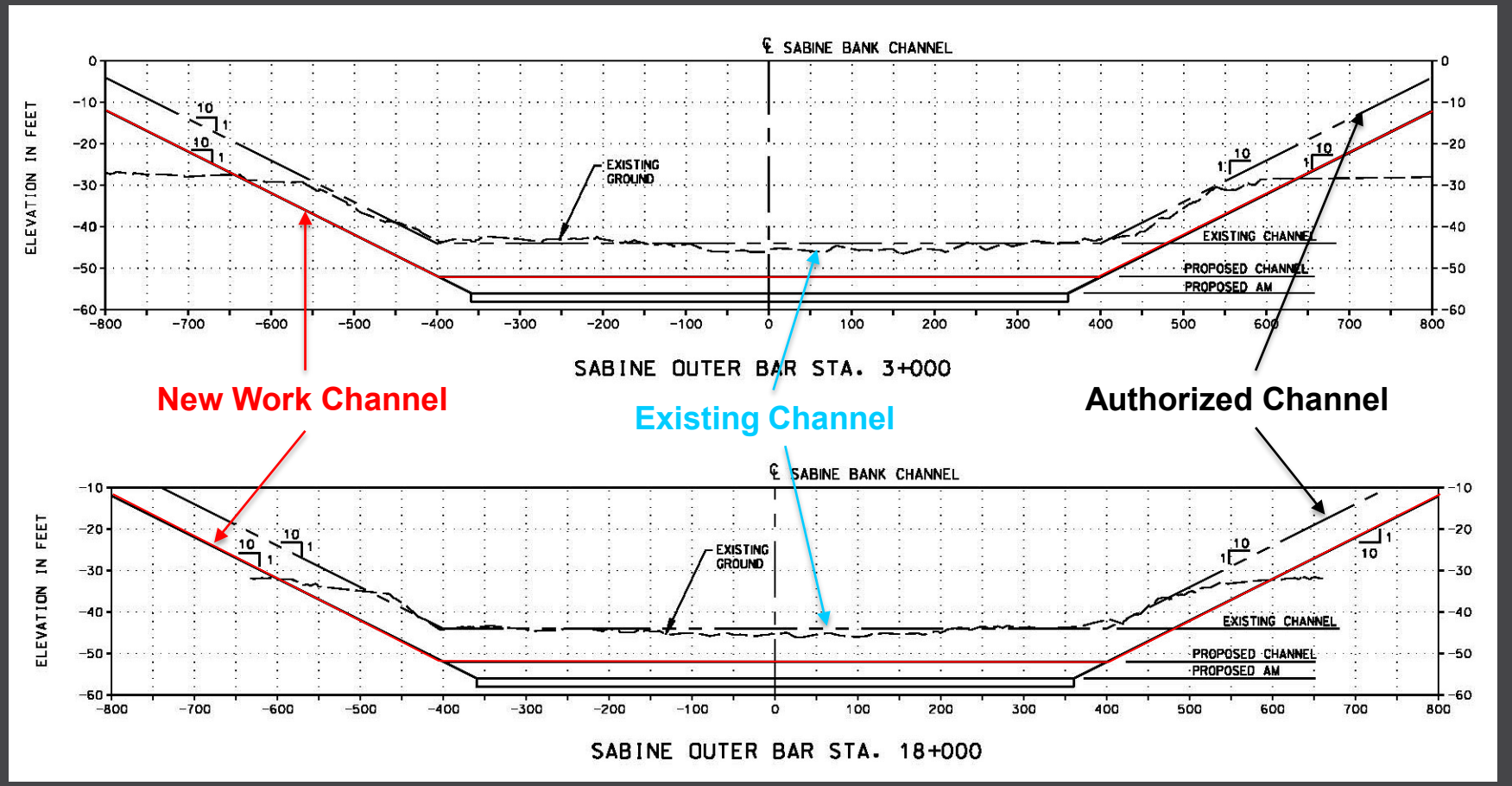
- Center Channel: -40 to -45 MLLW deep and 500 to 800 ft wide

**FUTURE**

- Sabine Neches Nav District is widening and deepening portions of the channel, depending on channel segment and existing widths/depths
- Center Channel: -48 to -50 MLLW deep and 500-800 ft wide

# NEW WORK DREDGE PRISM

## SHIP CHANNEL CROSS SECTIONS – VERTICAL (Z AXIS)



# CHANNEL SAMPLING – TWO APPROACHES

## *NEW* USE PROJECT GEOTECH BORINGS FOR STUDY DESIGN

### STANDARD

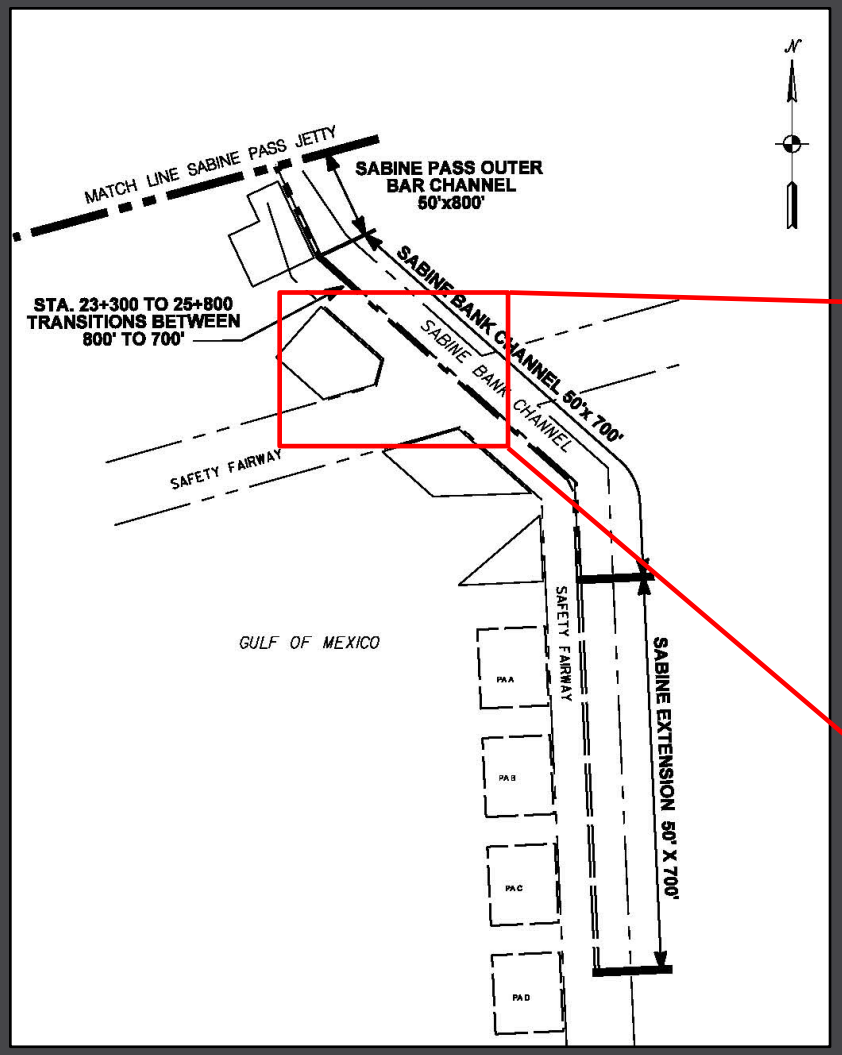
- View the ship channel by length
- Divide the length into segments (i.e., dredge material management units, DMMUs)
- Sample in each DMMU
- Uniform distribution

### REPRESENTATIVE

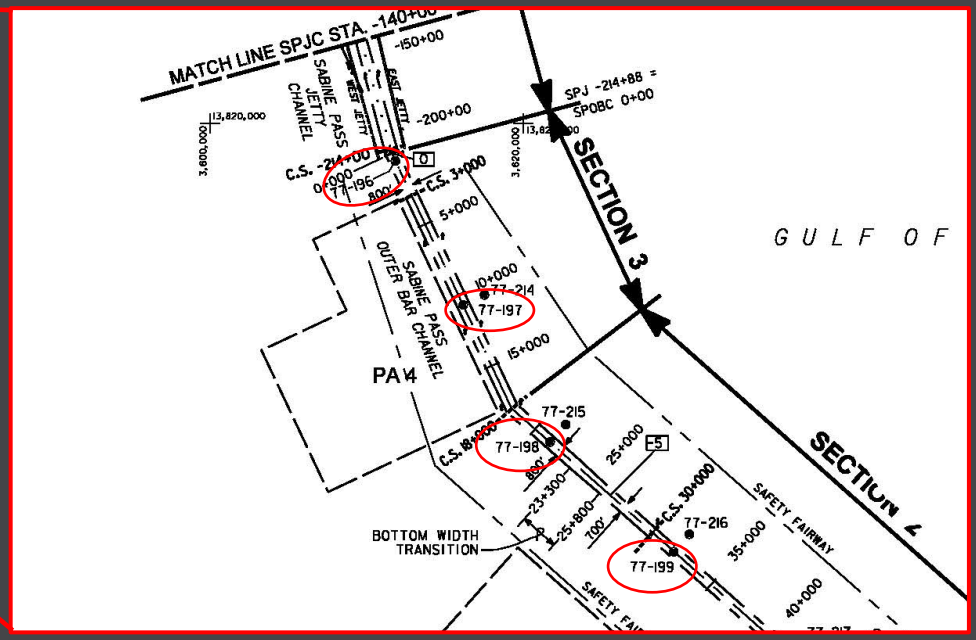
- Treat the ship channel in total
- Review geotechnical borings
- Group borings by composition and spatial distribution
- Span a range of textural types
- Sample in each major boring composition area

# REPRESENTATIVE SAMPLING

## GEOTECHNICAL INFORMATION – HORIZONTAL (X/Y AXIS)




Select borings within the footprint of the new ship channel



# SELECTION OF LOCATIONS - GEOTECHNICAL

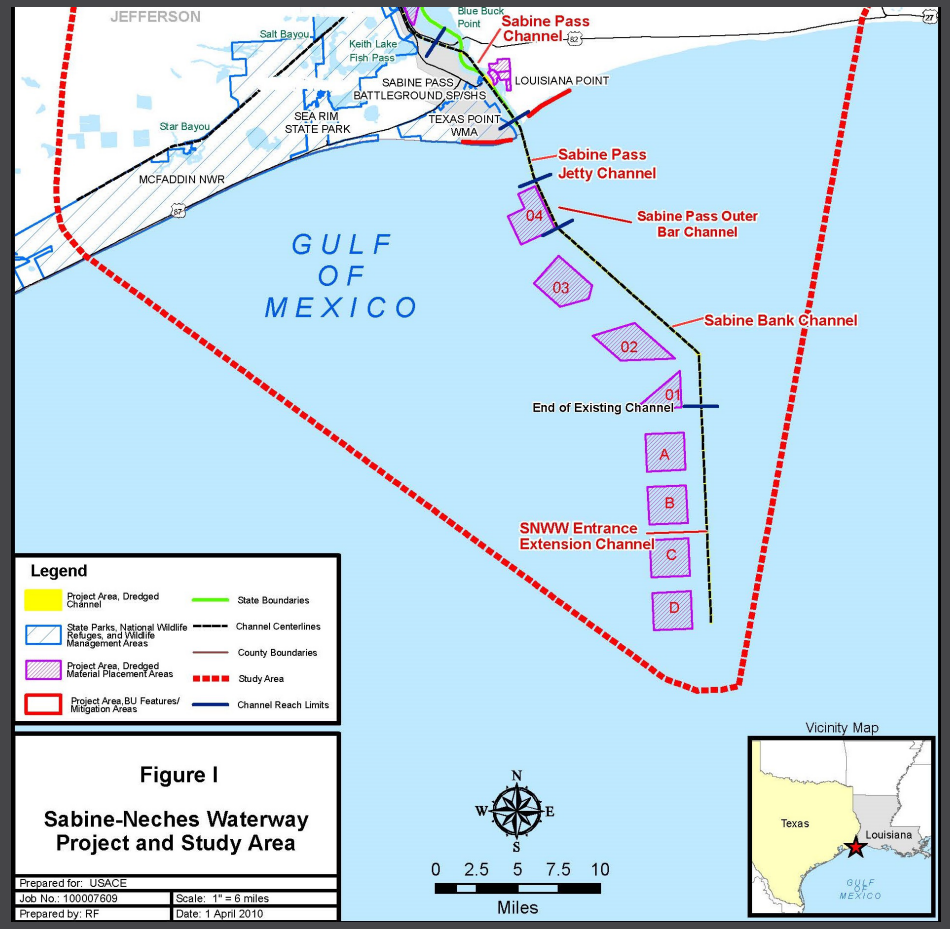
## MAIN SHIP CHANNEL = 4 SAMPLES, GROUPED BY COMPOSITION

| Sample Number | Boring Designation | CH*= Clay w/ High Plasticity | CL*= Clay (low plasticity) | ML* = Inorganic Silt/Fine Sand | SM* = Silty Sands/Sand Silt Mix |
|---|---|---|---|---|---|
| 1 | 77-209 | 10 | 20 | X | 80 |
| 2 | 77-204 | 100 | X | X | X |
| 3 | 77-199 | X | 50 | X | 50 |
| 4 | 3ST-17 | 100 | X | X | X |

*** Unified Soil Classification System (USCS)**

# GEOTECHNICAL SELECTION OF LOCATIONS
## INTEGRATING DREDGE PRISM and GEOTECHNICAL INFORMATION

- 35 miles of ship channel between the entrance channel extension and north end of Sabine Pass Channel Segment
- 4 channel locations selected
- Each location was a composite of equal volumes of material from left and right sidewall and center of the main channel




= Estimated sample location

# SEDIMENT SAMPLING RESULTS


Sediment composition did not vary widely along the channel

| Sample ID | USC Group Symbol | USC Group Name |
|---|---|---|
| SNWWNew-01 | CH | Fat Clay with Sand |
| SNWWNew-02 | CH | Fat Clay with Sand |
| SNWWNew-03 | CH | Fat Clay |
| SNWWNew-04 | CH | Fat Clay |

# CONCLUSIONS

## REPRESENTATIVE SAMPLING WAS COST EFFECTIVE, TECHNICALLY DEFENSIBLE AND GAINED REGULATORY ACCEPTANCE

- Only 4 samples were needed to characterize ~35 miles of ship channel
- Developed the approach cooperatively with EPA R6 → regulatory buy in
- Technically defensible
- Cost effective

Follow-On

- Ocean placement required three additional phases of work:
  - Tier 3 biological testing and suitability determination for ocean disposal (Montgomery & Bourne 2020)
  - STFate modeling to support the development  operational guidance disposal (Montgomery & Bourne 2020)
  - Development of operational guidance for ocean disposal of new work sediments (Montgomery et al 2021)

# ACKNOWLEDGEMENTS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- EPA Region 6 Ocean Dumping Program


## QUESTIONS???