

Seabrook, New Hampshire

National Shoreline Erosion Control and
Demonstration Program
Section 227

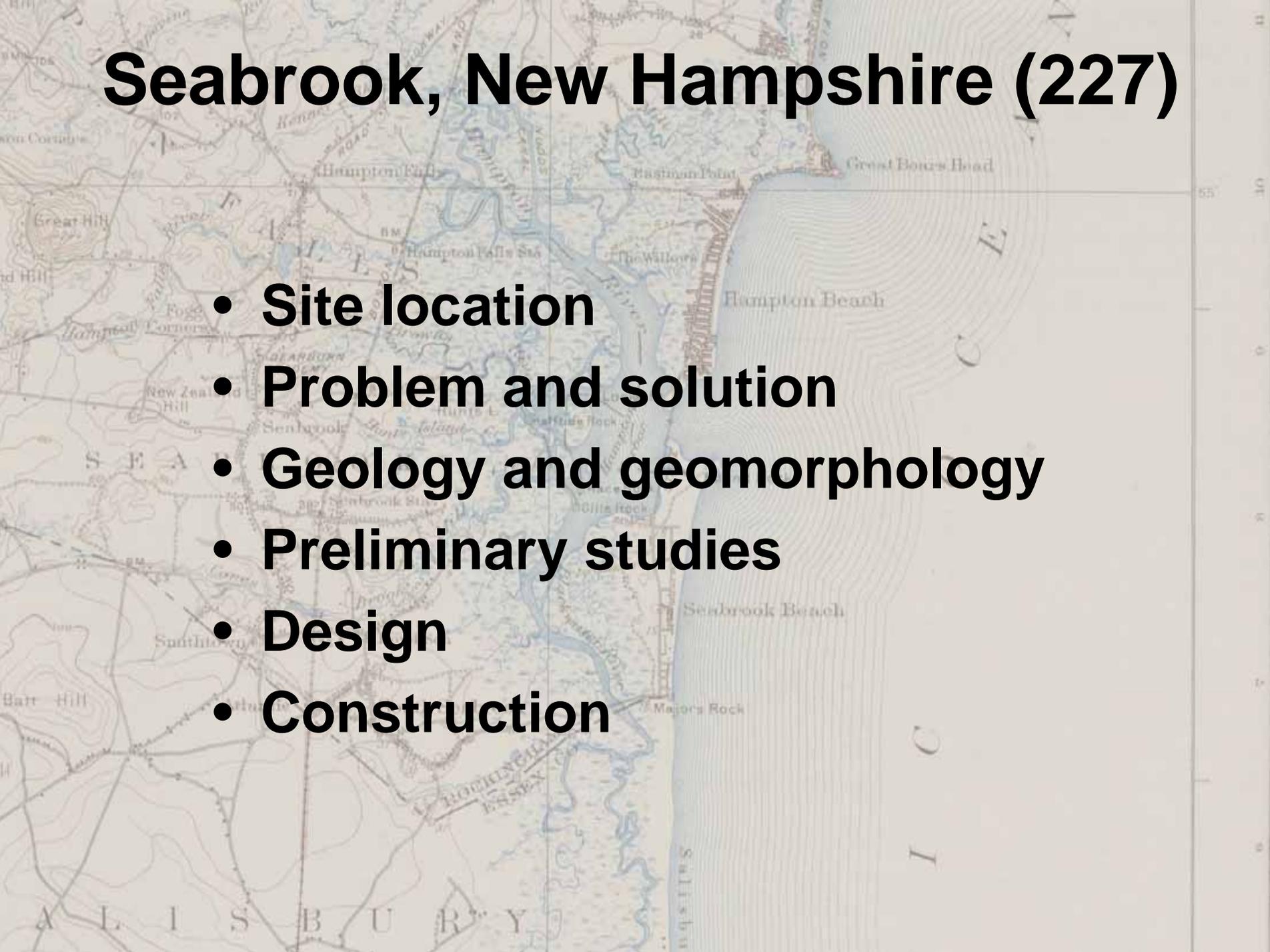
Kevin Knuuti, P.E. (ERDC)
John Winkelman (New England District)

A topographic map of Seabrook, New Hampshire, showing the coastline, roads, and various landmarks. The map is overlaid with a semi-transparent text box containing project information. The text is in black and blue colors. The background map shows contour lines, roads, and water bodies. The title 'Seabrook, New Hampshire (227)' is prominently displayed at the top in a large, bold, black font. Below the title is a bulleted list of project details, with the names of the organizations in blue text.

Seabrook, New Hampshire (227)

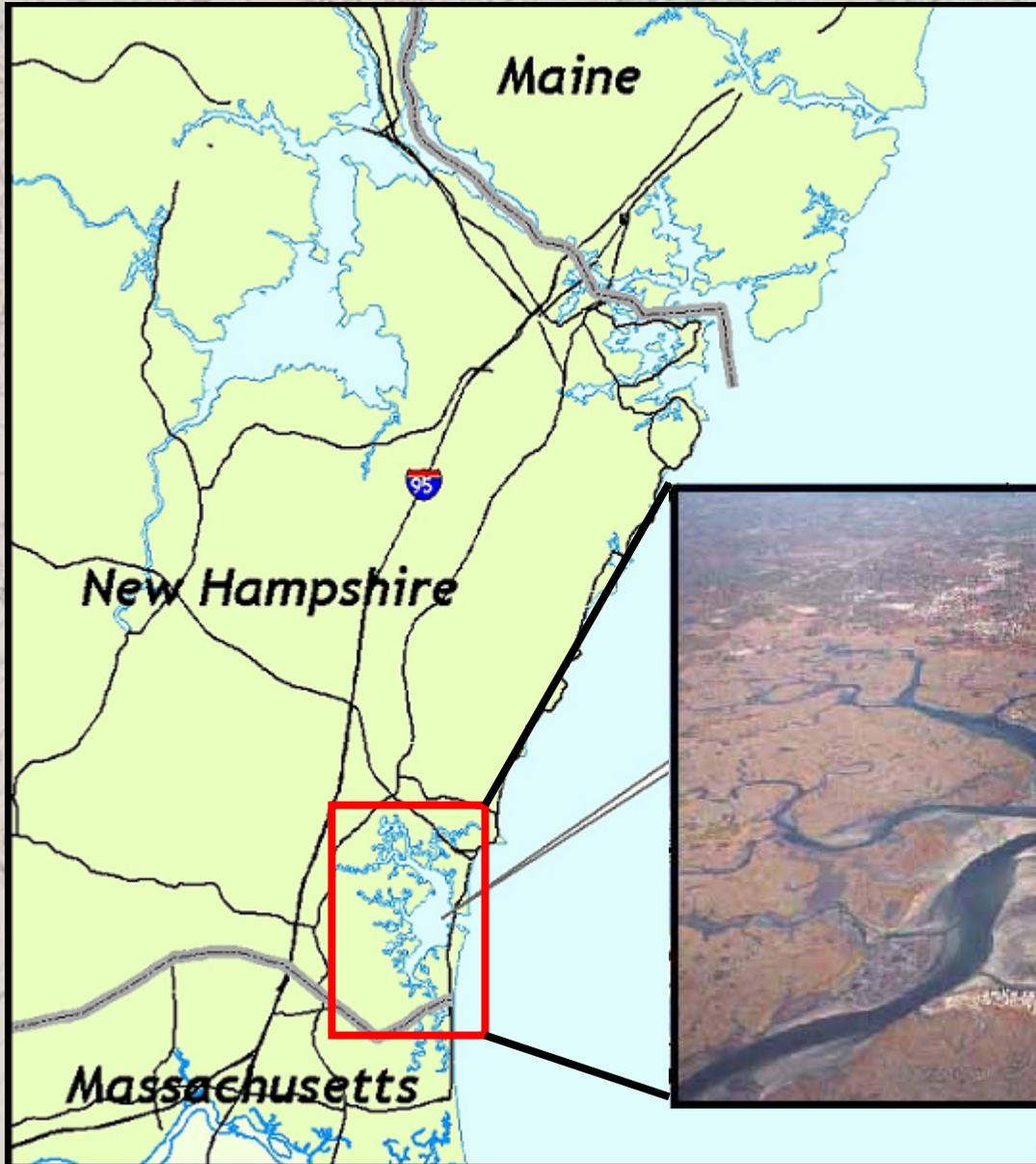
- Sponsor: **New Hampshire**
- Management/Oversight: **ERDC**
- Design: **New England District**
- Construction: **Reed & Reed, Inc., Maine**
- Composite Sheeting: **CMI, Inc.**
- Geogrid Marine Mattresses: **Triton**
- Instrumentation: **Geokon, Inc.**
- Monitoring: **University of New Hampshire**

Seabrook, New Hampshire (227)

A topographic map of the Seabrook, New Hampshire area. The map shows the coastline of the Atlantic Ocean, with labels for 'Great Boies Head', 'Hampton Beach', and 'Seabrook Beach'. Inland features include 'Hampton Falls', 'The Willows', and 'Seabrook Station'. The map also shows various roads, railroads, and geographical features like 'Hampden Falls' and 'Seabrook Island'. The text 'I C E' and 'A L I S B U R Y' are visible on the map, likely representing 'ICE' and 'ALISBURY'.

- **Site location**
- **Problem and solution**
- **Geology and geomorphology**
- **Preliminary studies**
- **Design**
- **Construction**

Project Location Seabrook, NH



Problems and Solution

Goals:

- Prevent shoreline erosion
- Stop shoaling in harbor
- Continued access to clam flat

Solution:

- Construct bulkheads at each end of River Street cut
- Dredge new channel
- Fill River Street cut with material from dredged channel



Extent of erosion in the Blackwater River Cut

This erosion began in 1993

This photo was taken in 1998



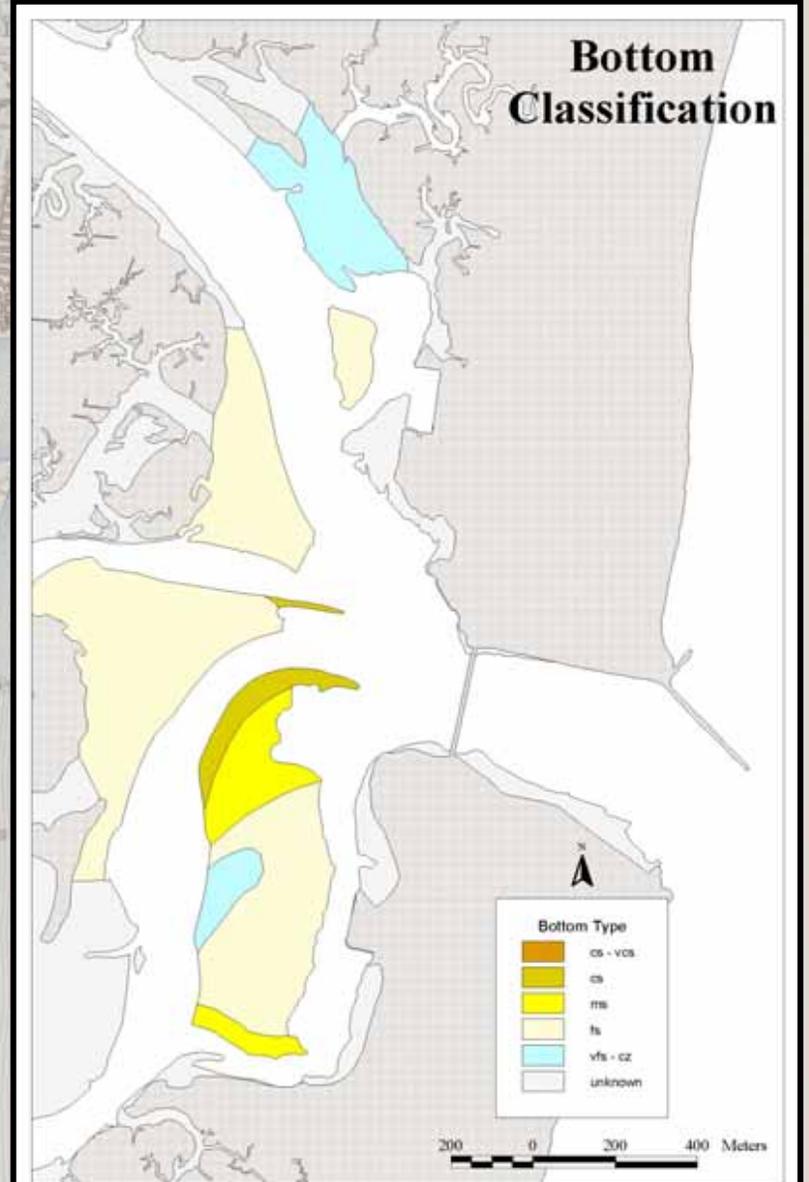
Erosion

Deposition

Passenger Cruise Boat Piers

NH DOT Shoreline Rip Rap to protect homeowners

Geology and Geomorphology



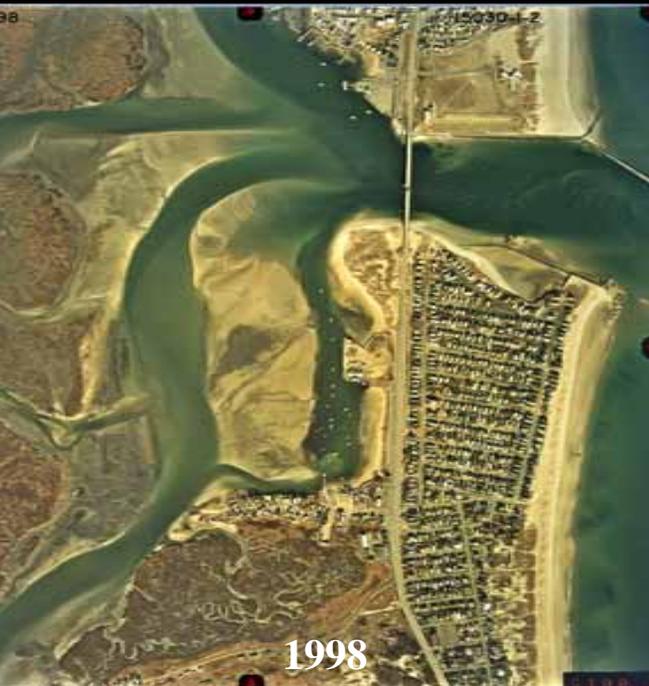
Bottom Sediment

- **System is Dominated by Sand**
- **Inlet is Coarse-grained**
 - Composed of Gravelly Sands
- **Tidal Channels are Dominated by**
 - Hampton River – Medium to Coarse Sand
 - Middle Ground Channel – Fine Sand
 - Blackwater River - ?
- **Flood Tidal Delta is Dominated by**
 - Fine Sand; Medium Sand by Channels
- **Middle Ground Shoal is Dominated by**
 - Fine to Medium Sand; Coarse Sand by Channel;
Very Fine Sand in Bivalve Areas

Geology and Geomorphology



Geology and Geomorphology



- **Blackwater River and middle ground migrated north**
- **River Street Breach developed**
- **Middle ground separated from the main land**

Problems and Solution



Pilot channel to reclaim original hydraulic flow

Hydraulic Pipeline Dredge

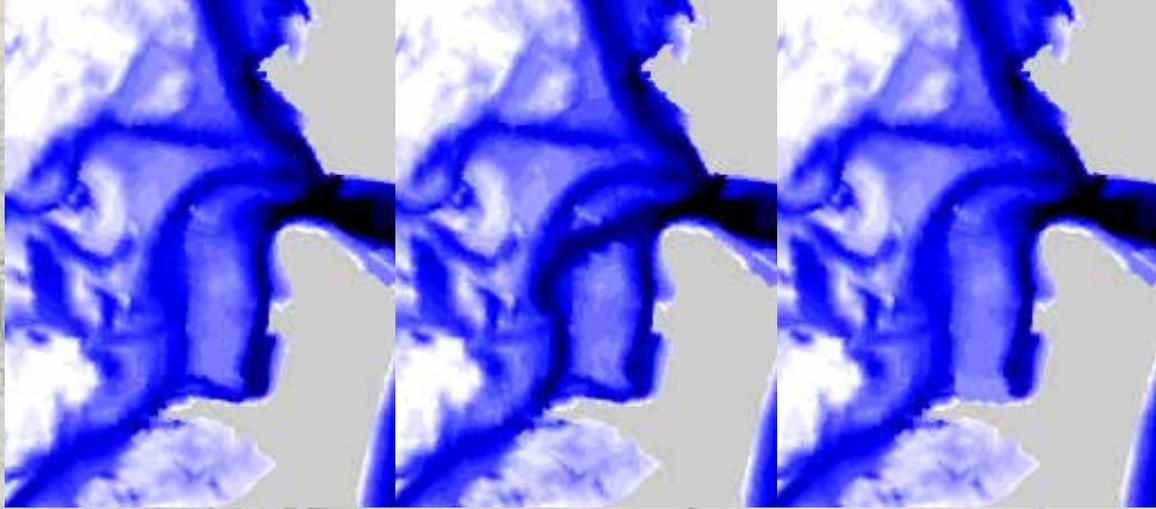
Sheet Pile Walls

~80,000 cy

Preliminary Studies



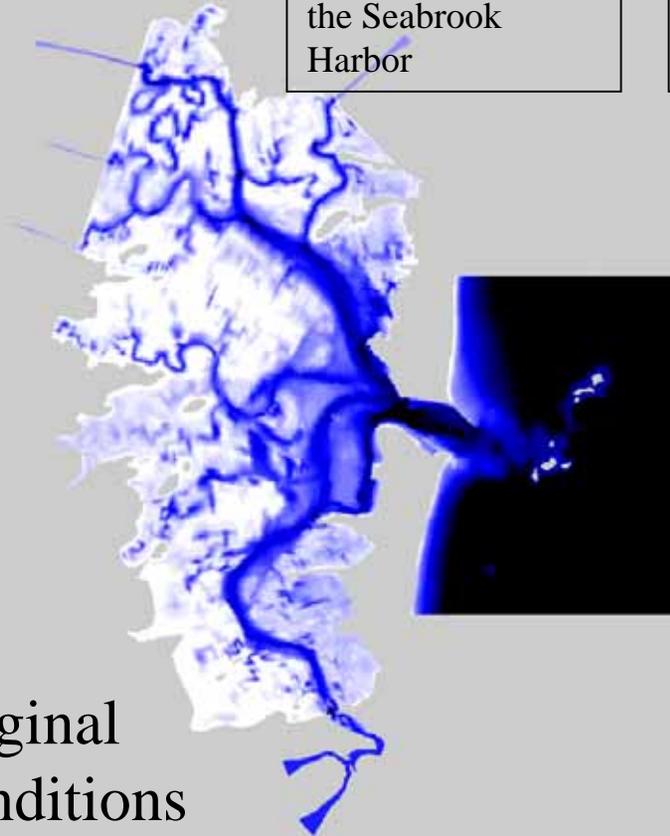
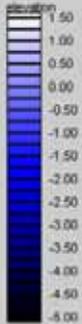
Preliminary Studies



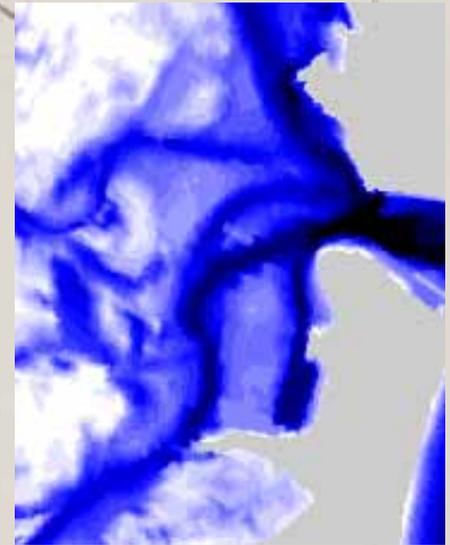
Case 1: Dredging the Seabrook Harbor

Case 2: Dredging the Blackwater River

Case 3: Filling up the *River Street Breach*.



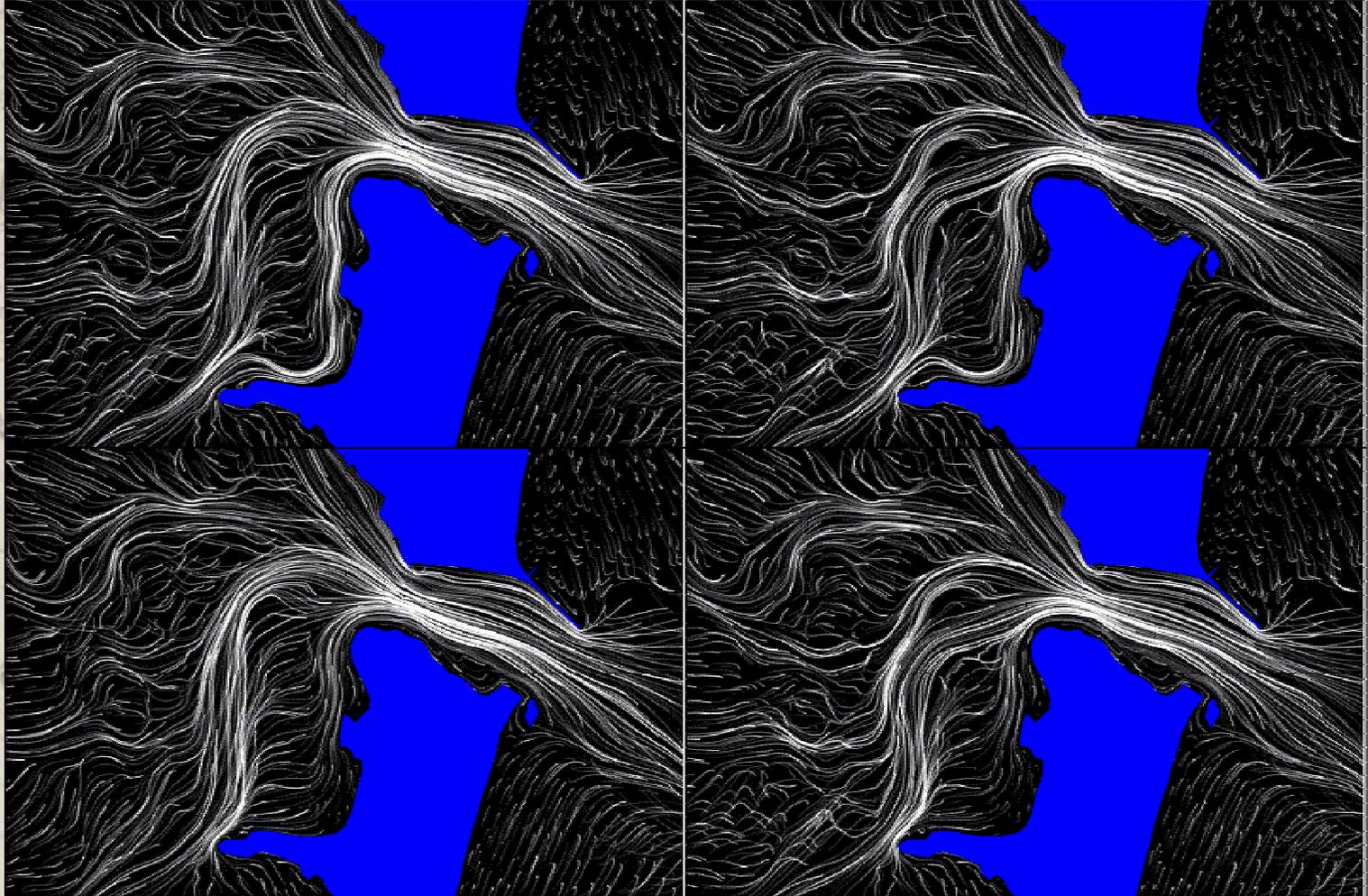
Original Conditions



Case 4: Combination of Case 1, 2 and 3

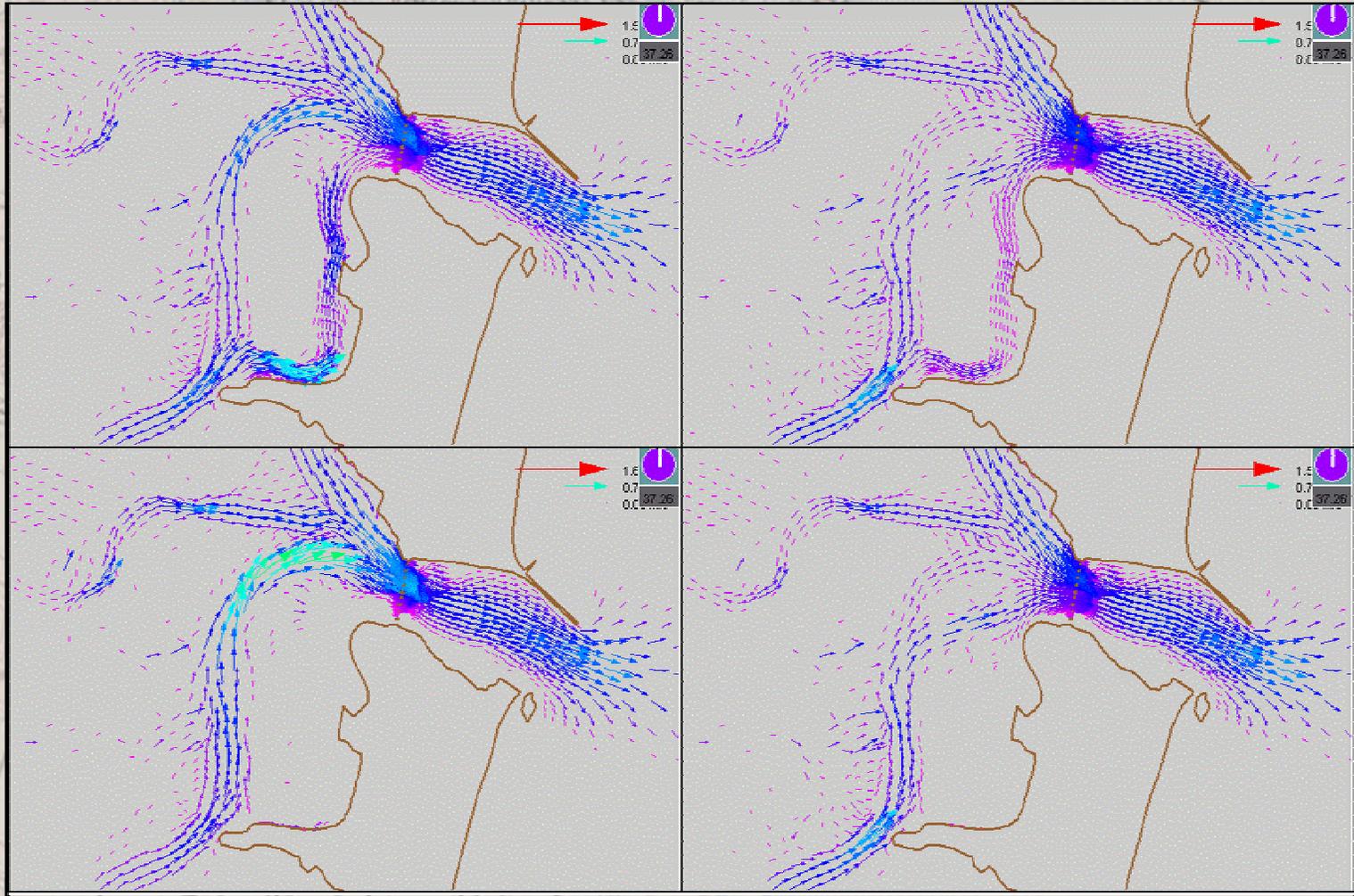
Preliminary Studies

Flow Patterns



Preliminary Studies

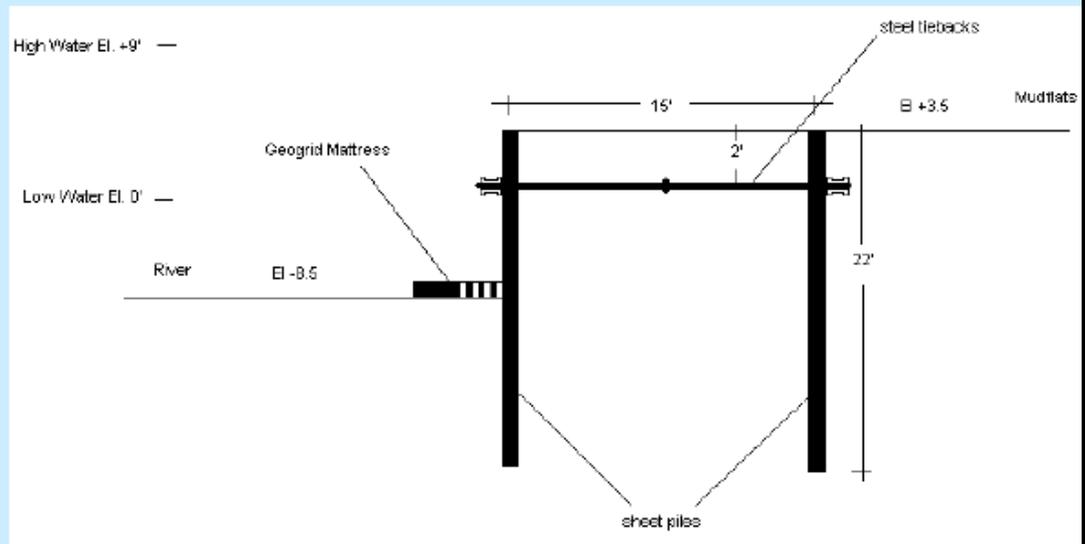
Velocities



Design

- **Design**

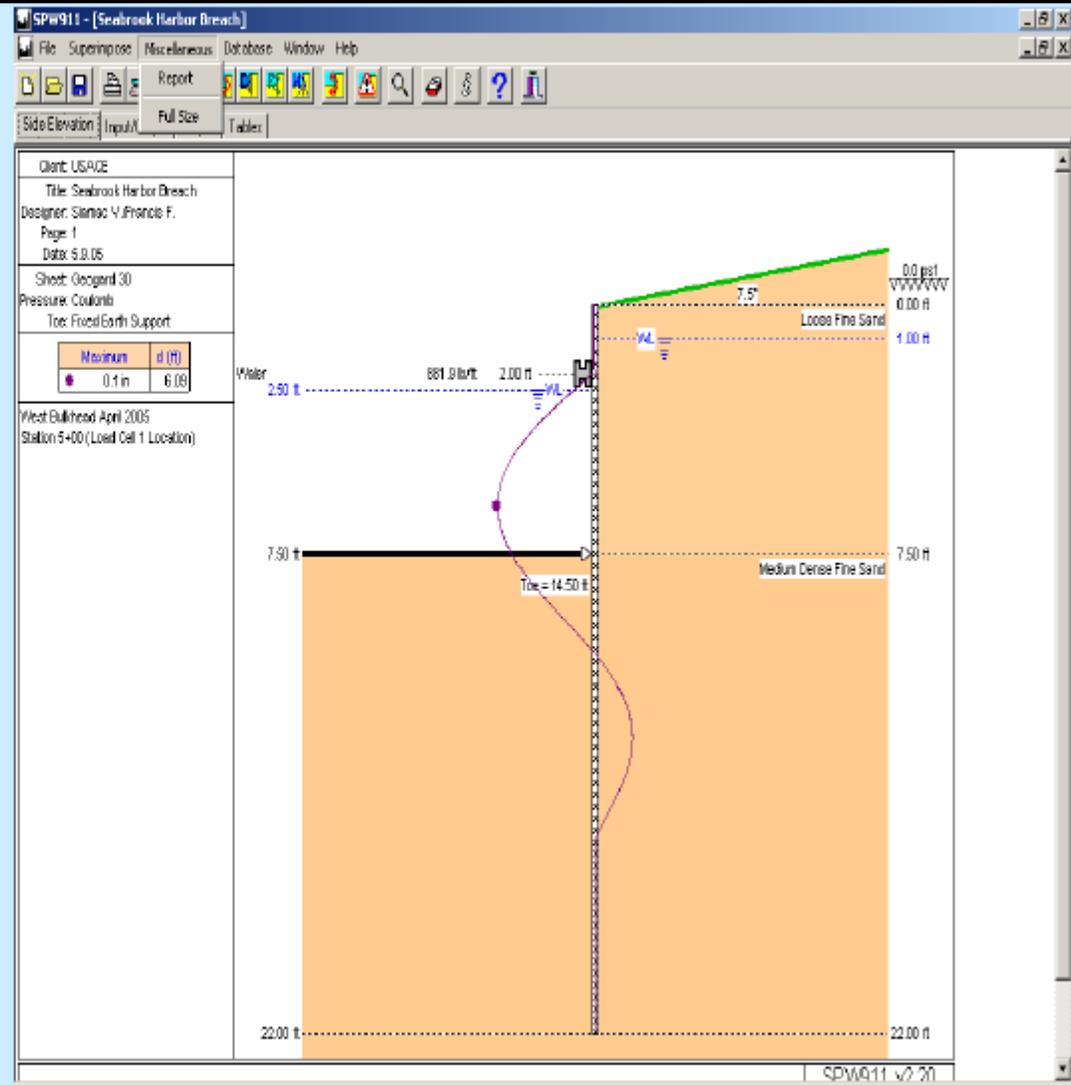
- **Synthetic sheeting:**
Corrosion, Cost
- **Galvanized steel tiebacks and wale:**
Reliability
- **Double Rows of sheets:**
No cantilever
- **Single Wale: No diving**
(winter)
- **Scour protection:**
Protect toe
- **Drainage: Reduce loads**



Design

Design Parameters

- 50-year low tide
- 50% drainage in fill
- 12' depth to mudline
- 2 tons horizontal Load per linear foot
- Tiebacks 6' spacing
- 200 psf surcharge



Design

Other Components

- **Wale: 2X 10” galvanized steel Channels on the outside**
- **Tiebacks: 18’ long, 2.25” galvanized steel tiebacks with turnbuckle, Oversized to allow for corrosion**
- **Drains: 2 x 2” dia holes with wire mesh/geotextile backing, located under water to prevent freezing**



Construction

- **October 2004 – April 2005**
(within the November- March dredging window)
- **hydraulic dredge**
- **two barges, three cranes, clam shell, dozer, supply boats**
- **hydraulic vibratory hammer**
- **sheetpile was initially coated with a polyurethane resin; delivery and QC problems resulted in switch to different manufacturer and polyester resin**
- **geogrid marine mattresses**

Construction



Construction



Construction

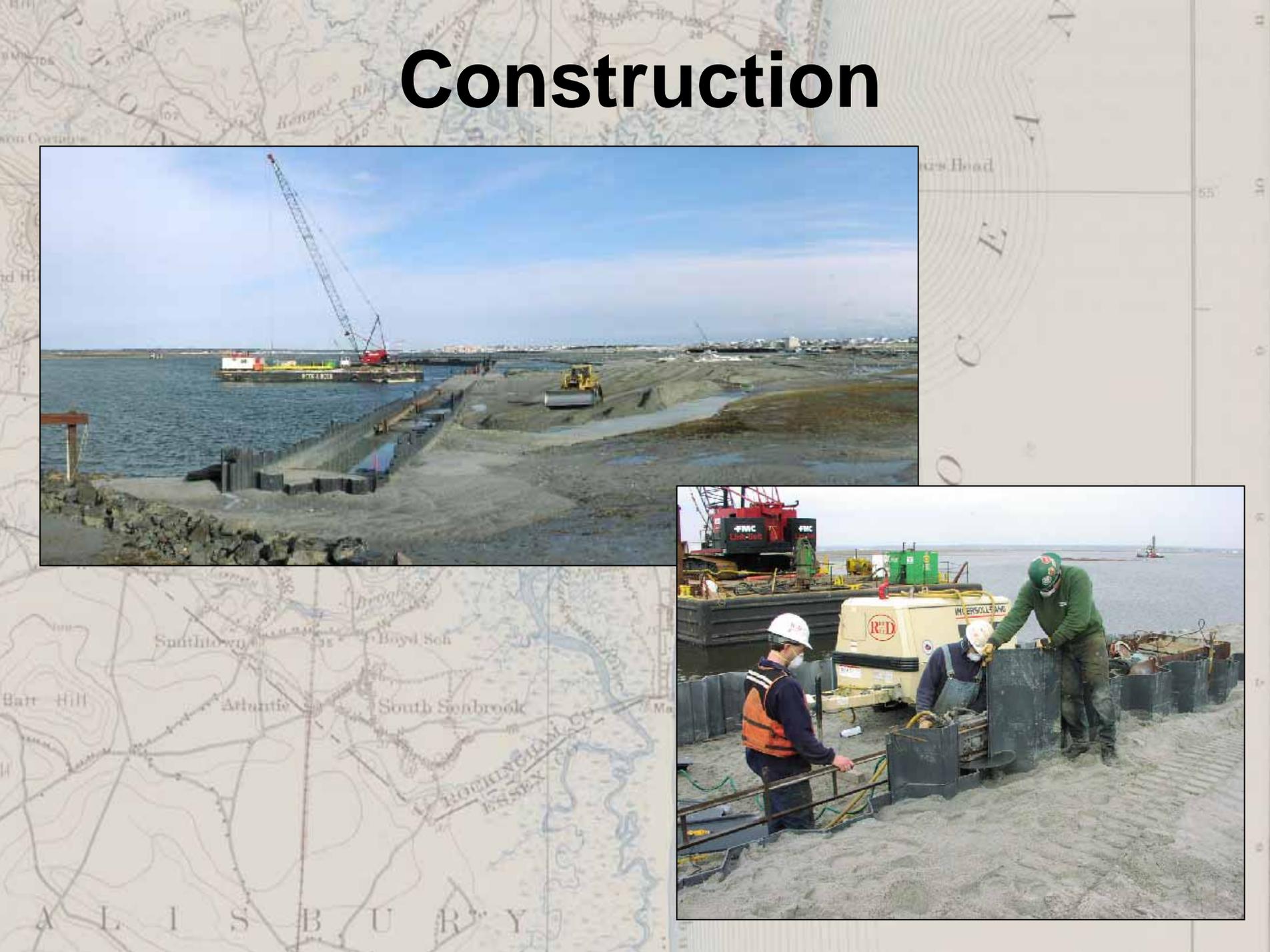


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Construction



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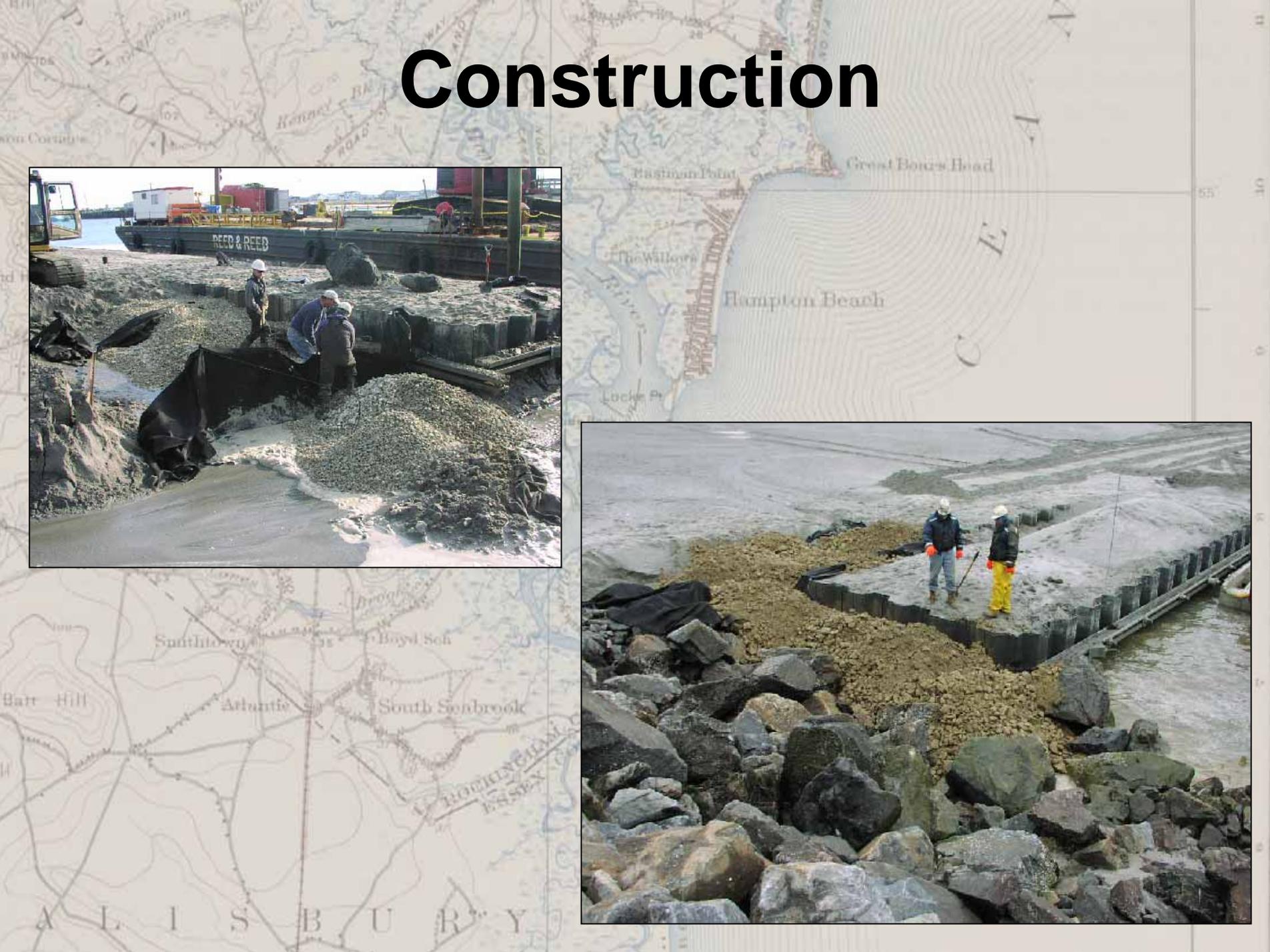
Construction



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Construction



Seabrook, New Hampshire (227)



October 2004



April 2005