JACKSONVILLE HARBOR MILE POINT NAVIGATION STUDY

Duval County, Florida

Presented by:
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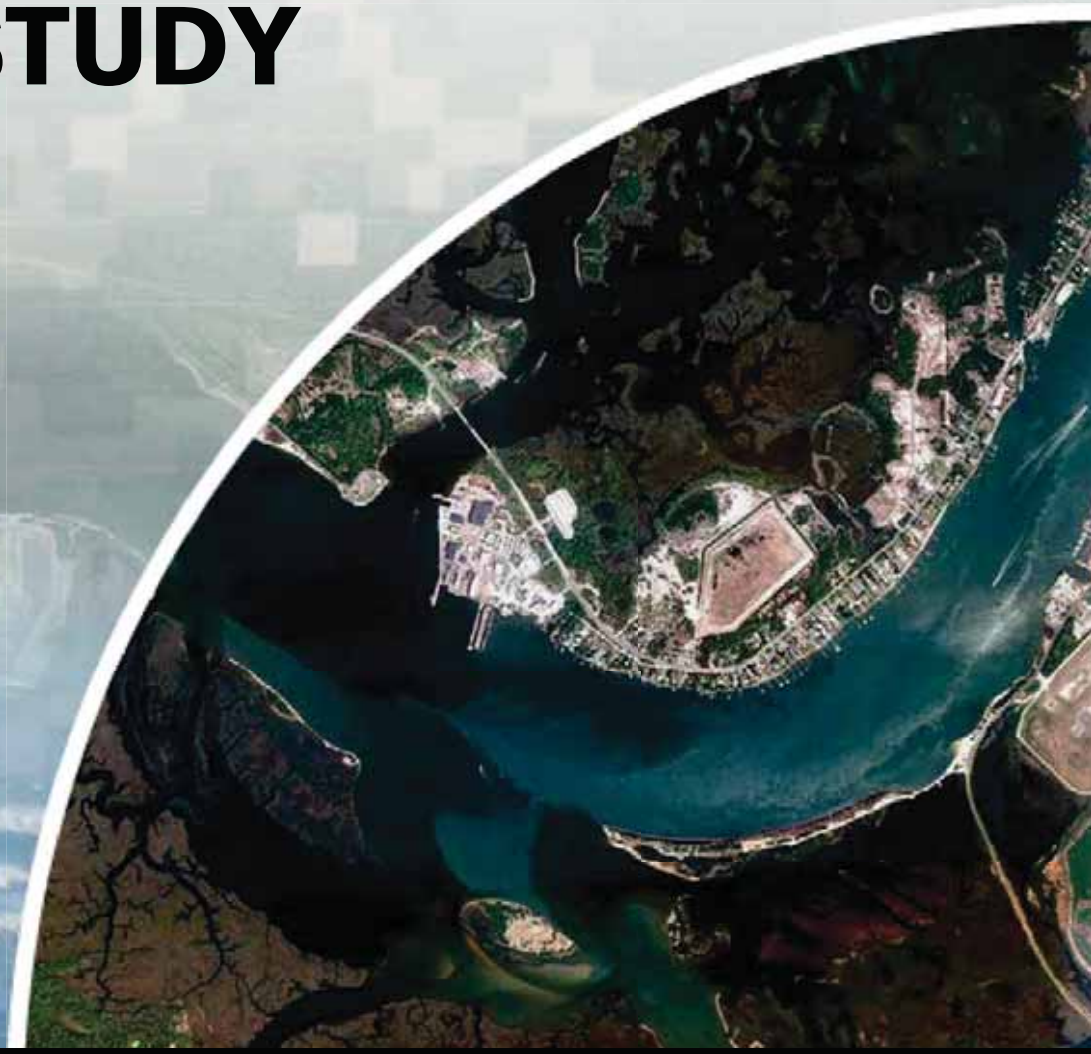
Jacksonville District

S.A.M.E
January 23, 2013



JACKSONVILLE HARBOR
SIGNIFICANCE

- **Florida: #7 in U.S. (Waterborne Traffic)**
- **Jacksonville Harbor:**
  - ▶ **#1 in Florida (Containers)**
  - ▶ **#3 in Florida (Tonnage)**
- **Transportation Nexus: Vessel – Highway – Rail**
- **Emerging global trade**

JACKSONVILLE HARBOR

MILE POINT

Atlantic Ocean

JACKSONVILLE HARBOR
St. Johns River

MILE POINT: THE BOTTOM LINE

Difficult Crosscurrents At Ebb Tide

=

Navigation Restrictions

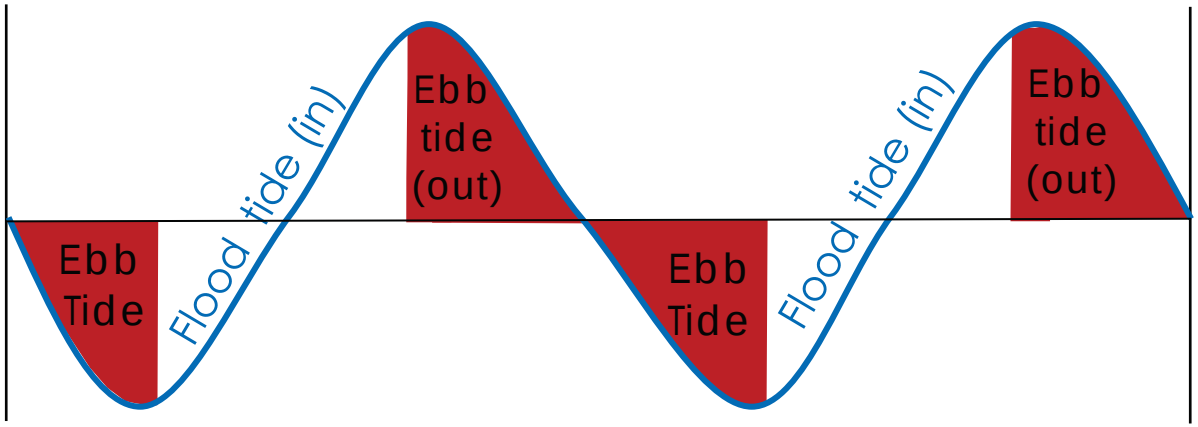
=

Economic Costs
(tidal delays to reach terminals)

AUTHORIZATION **"…. in the interest of navigation and related purposes, with particular reference to erosion of the Mile Point shoreline."**

REDUCED USE OF EXISTING FEDERAL CHANNEL

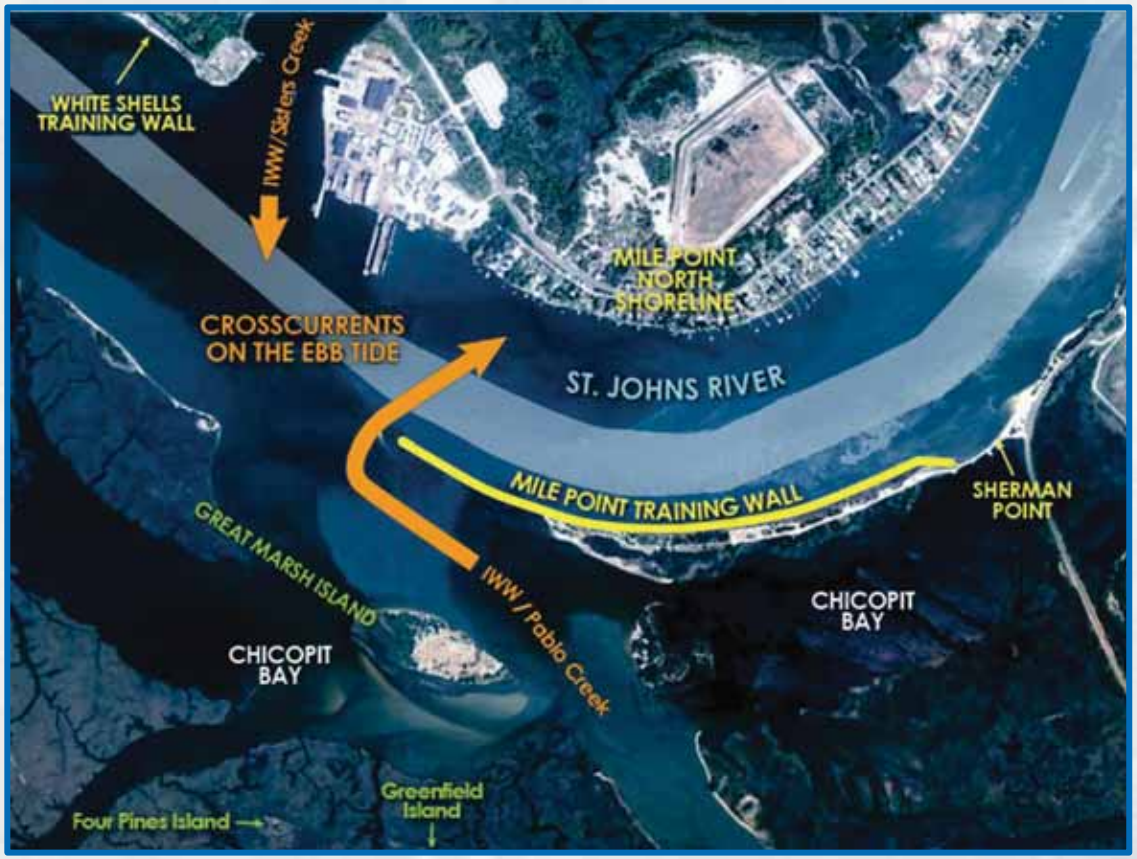
- **Authorized project depth: 40 feet**
- **Fully operational only 45% of the time**
- **Average Delay Per Vessel: ~ 4 hours depending on draft**



TIDAL FLOWS ON VESSEL MOVEMENT (24-HR PERIOD)

PROBLEMS/OPPORTUNITIES

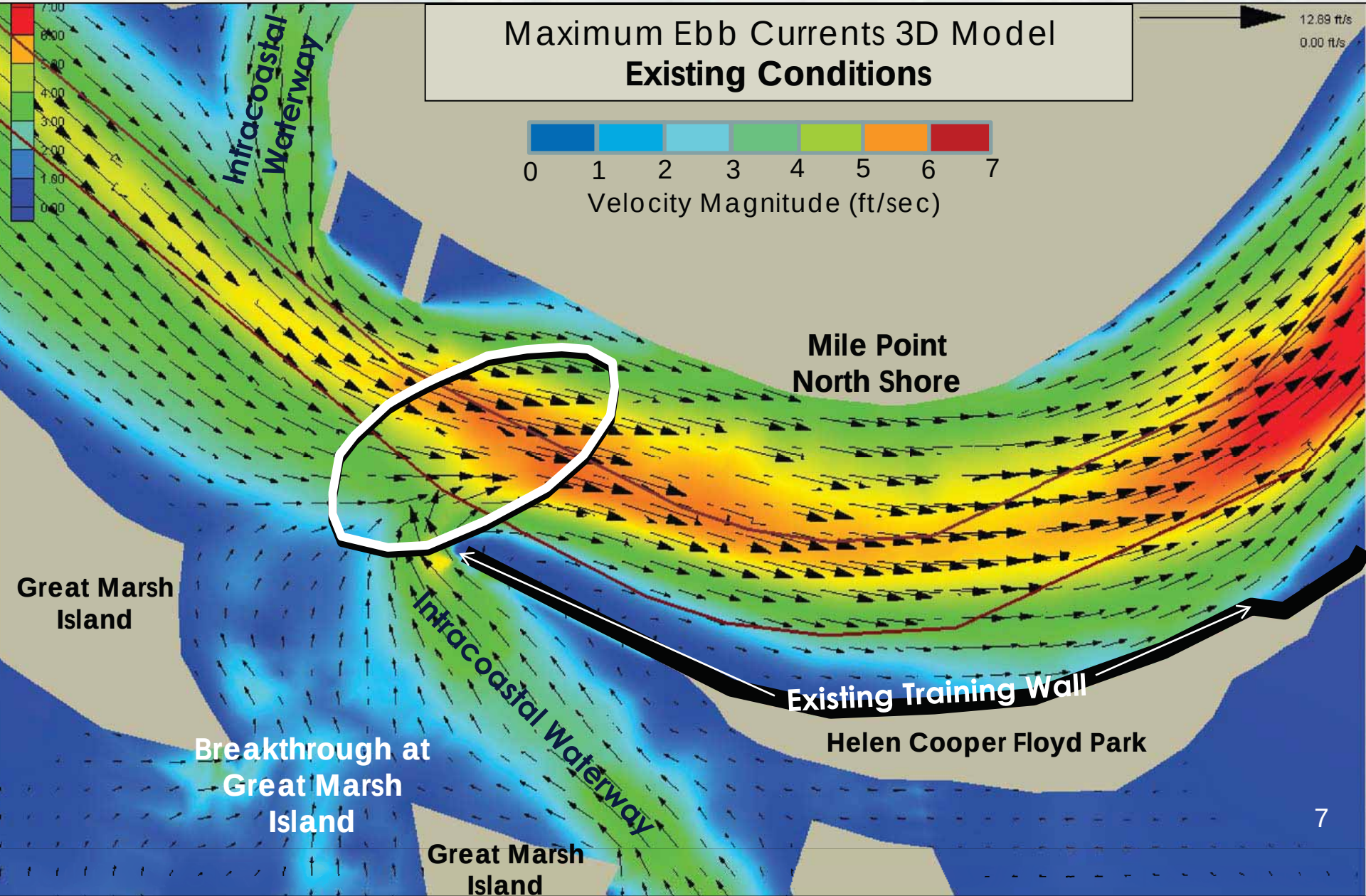
- **Difficult crosscurrents at the confluence of the IWW and the St. Johns River during the ebb tide result in:**
  - **Navigation restrictions during the ebb tide (depending on transit drafts of >33 feet or 34 feet)**
  - **Concerns about erosion of the Mile Point north shoreline**



Note: Restrictions have been in place since 1991, but vessels continue to enlarge

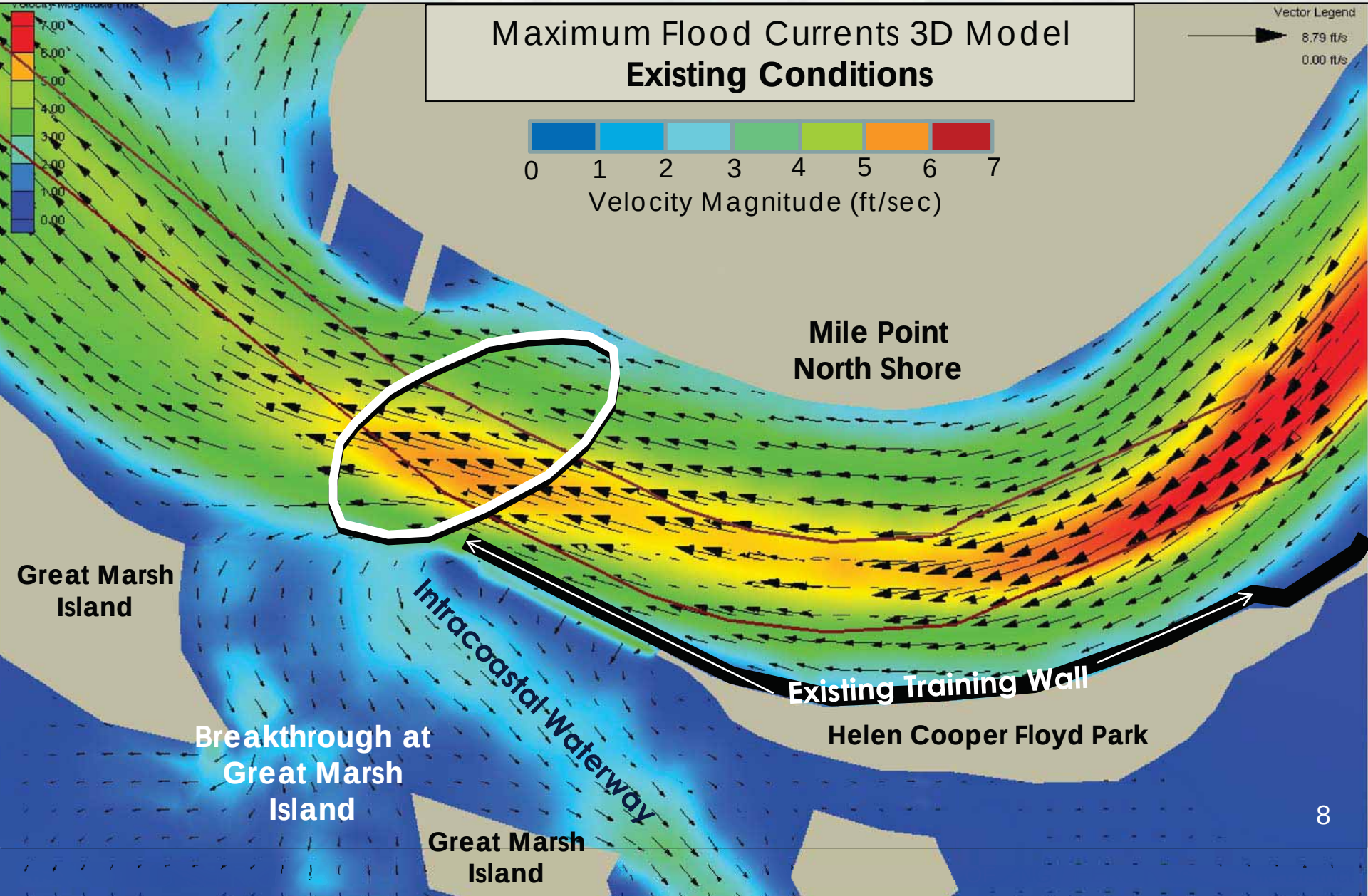
PROBLEMS/OPPORTUNITIES

EXISTING CONDITIONS - MAXIMUM EBB



PROBLEMS/OPPORTUNITIES

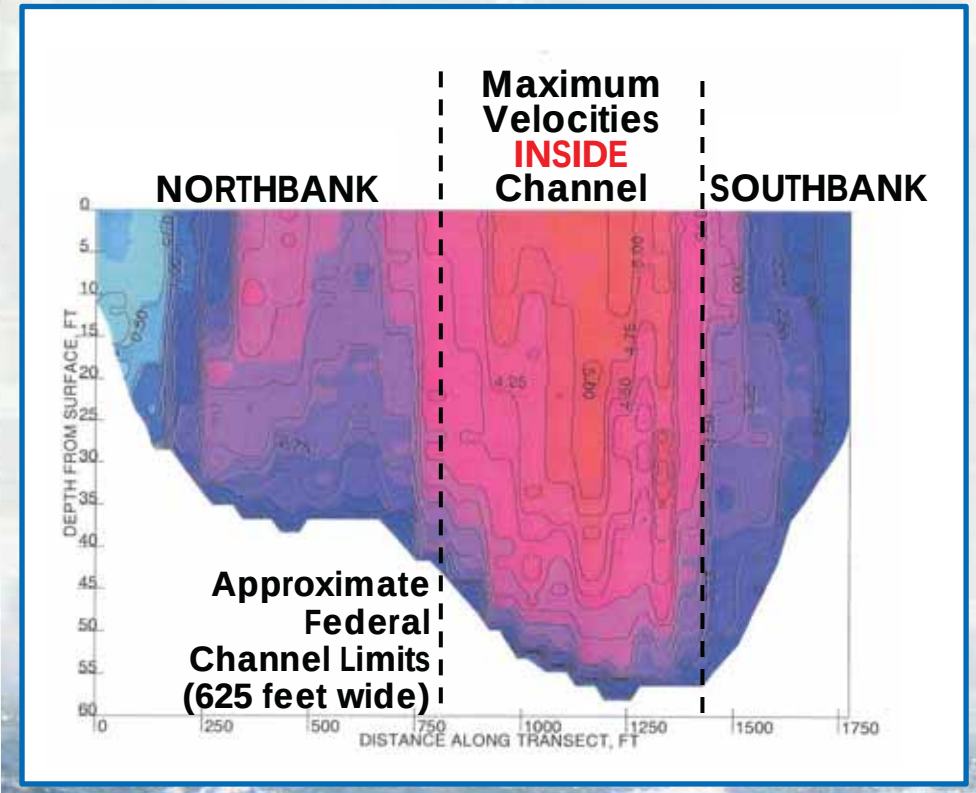
EXISTING CONDITIONS – MAXIMUM FLOOD



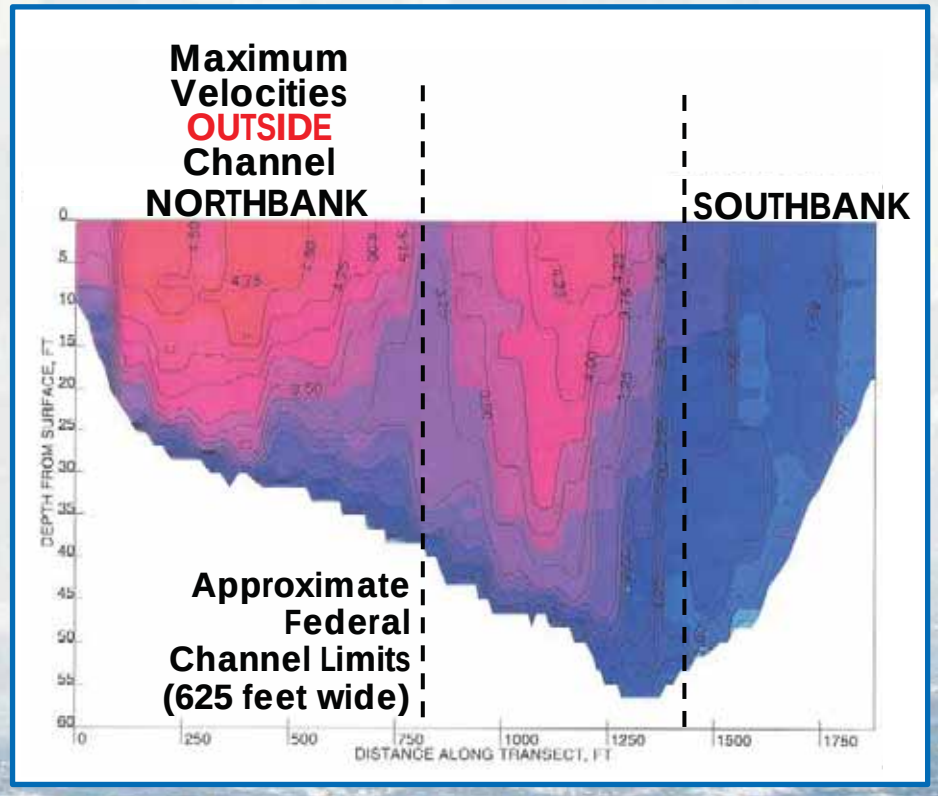
EXISTING CONDITIONS/PHYSICAL

ACOUSTIC DOPPLER CURRENT PROFILE (ADCP) DATA COLLECTION

Velocities at Maximum Flood Tide

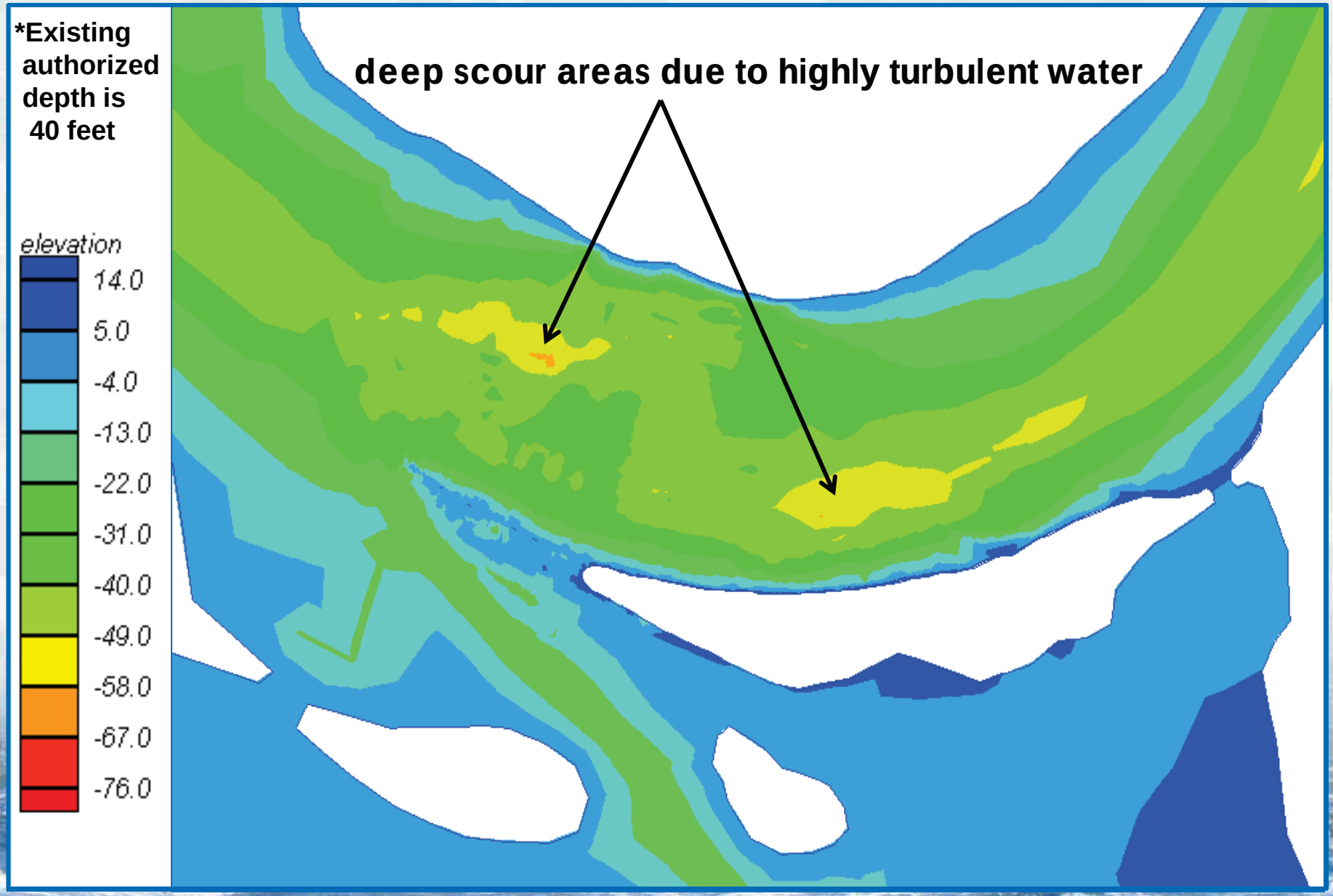


Velocities at Maximum Ebb Tide

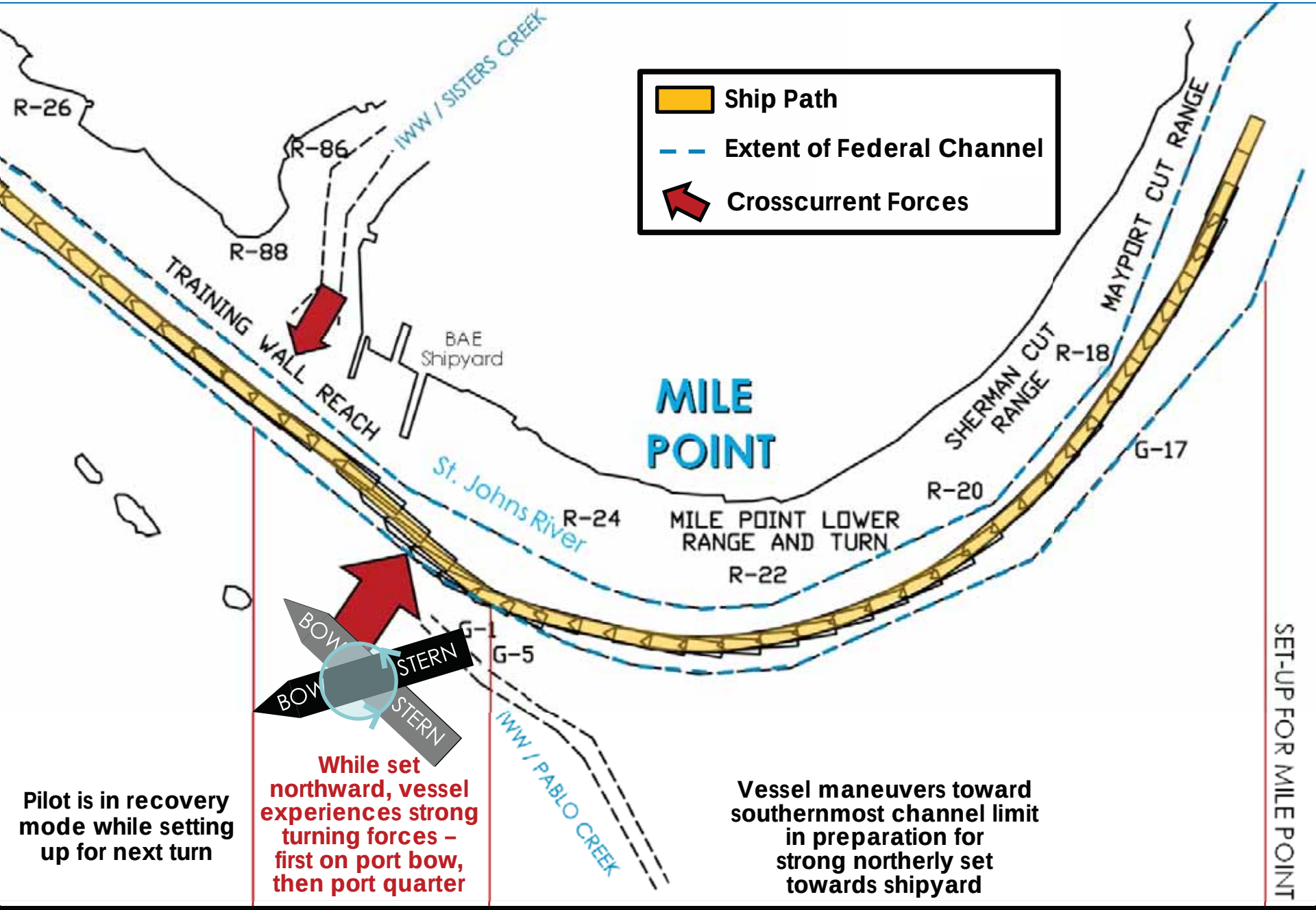


LOW — HIGH

BOTTOM ELEVATIONS FROM HYDROGRAPHIC SURVEY



ERDC SHIP SIMULATION RESULTS: NAVIGATING MILE POINT DURING EBB TIDE



EXISTING CONDITIONS/PHYSICAL
VELOCITIES OF THE CURRENTS

- **Ebb Tide Conditions**
  - ► **Pablo Creek:**
    - **Flows: Measured in excess of 55,000 cubic feet per second**
    - **Can exceed 25% of total flow in St. Johns River**
  - ► **Confluence IWW (Pablo Creek) and St. Johns River more than 130 degrees**
  - ► **High Flows and Extreme Confluence angle = deflection of main channel toward the northeast**

EXISTING CONDITIONS: ECONOMICS

Physical Conditions: Difficult Crosscurrents

Navigation Restrictions

Transportation Costs

EXISTING CONDITIONS
ECONOMICS

- **Mile Point Constrained Vessels**
  - Inbound > 33 feet
  - Outbound >36 feet
  - 40-foot Existing Project
  - Constrained vessels transit on the flood tide only
- **Major Vessels Delayed**
  - Dry Bulk – inbound
  - Liquid Bulk – inbound
  - General Cargo – inbound/outbound
  - Container – inbound/outbound

Economics Assumptions

- Mile Point Average Vessel Delays

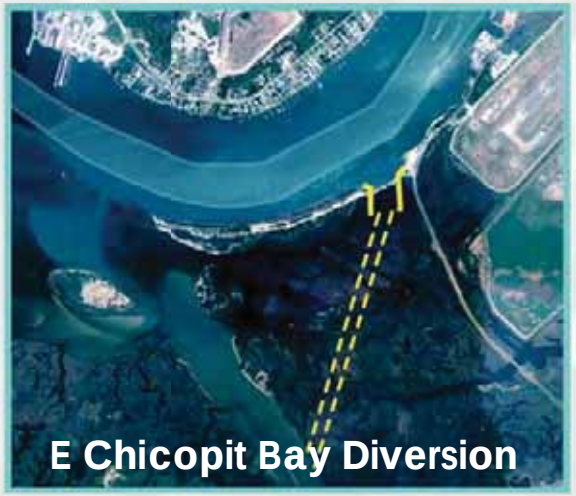
(Average Tide Cycle – 12.42 hrs)

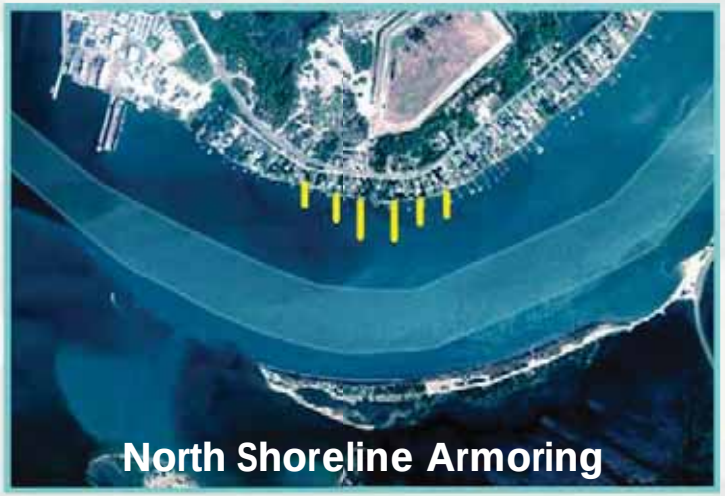
  - 33 – 36 feet: 3.73 hrs
  - 37 ft: 4.1 hrs
  - 38 ft: 4.3 hrs

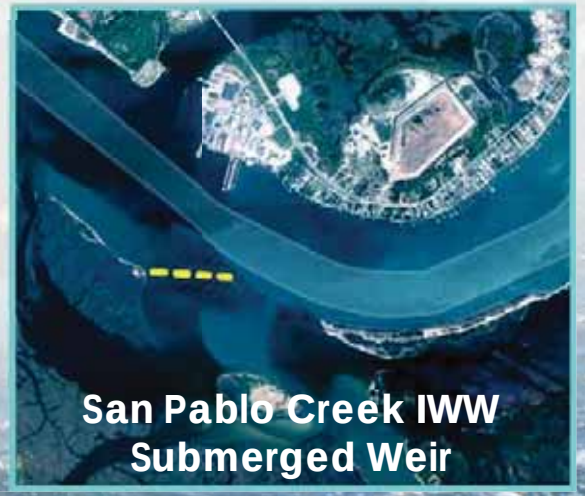
- Vessel Average Total Hourly Costs
  - Inbound: $1,244 Outbound: $842

PLAN FORMULATION: MILE POINT ALTERNATIVES CONSIDERED

Variations of these alternatives were also evaluated, as well as non-structural (light-loading, use of tide, additional tugs) and a no action



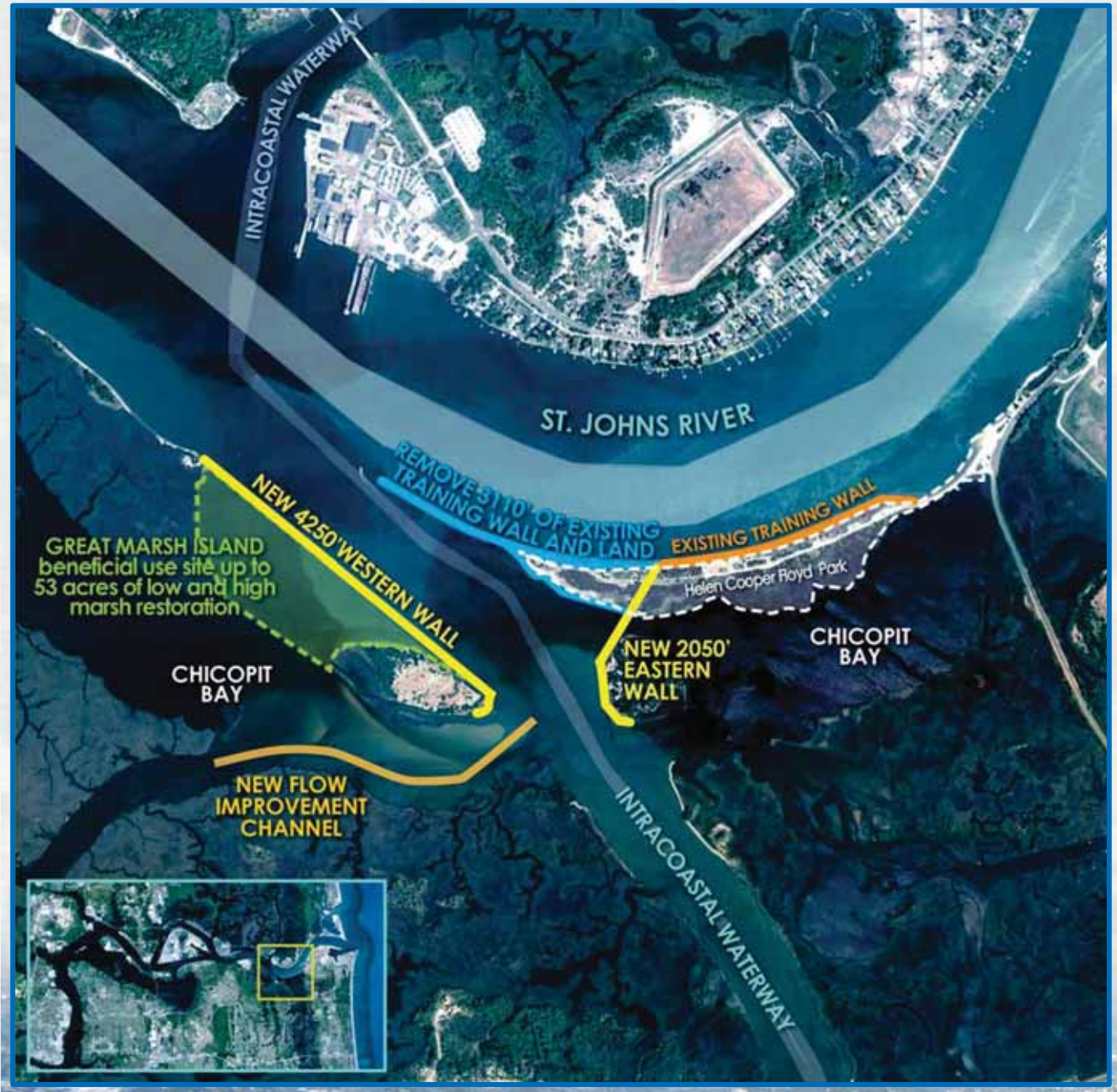




PLAN FORMULATION
SCREENING ALTERNATIVES

1. **Hydrodynamic modeling**
   (resulting vectors used as inputs into ship simulation studies)
2. **Ship simulation testing**

Alternatives that reduced crosscurrents were maintained



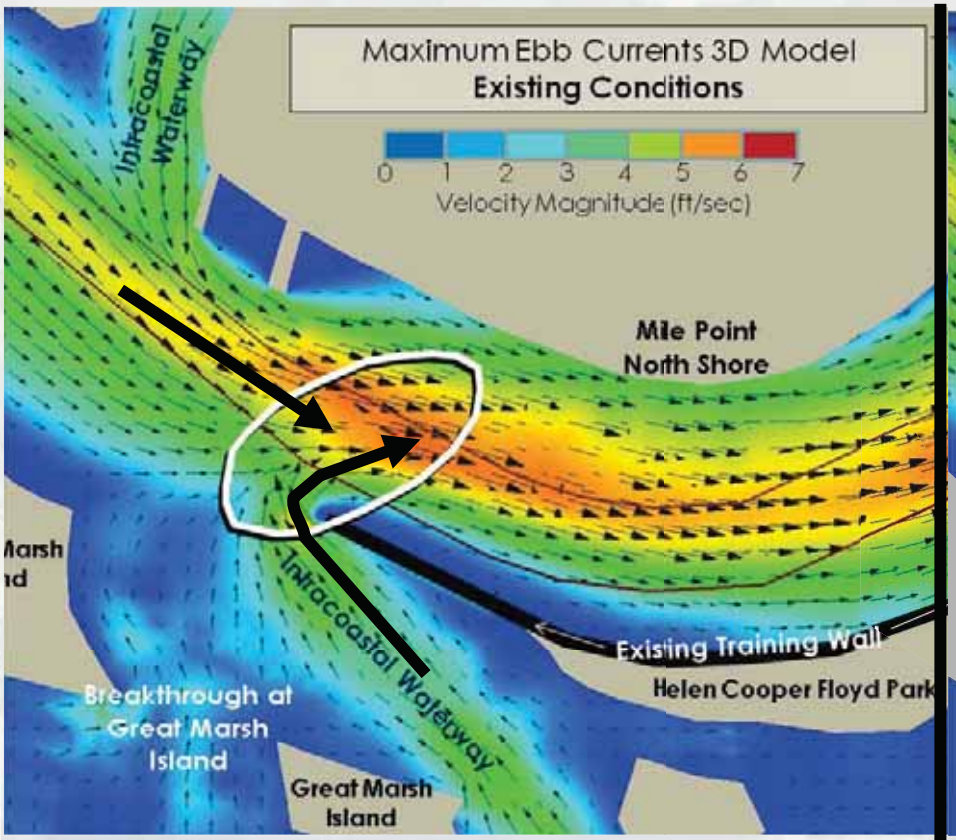
RECOMMENDED PLAN

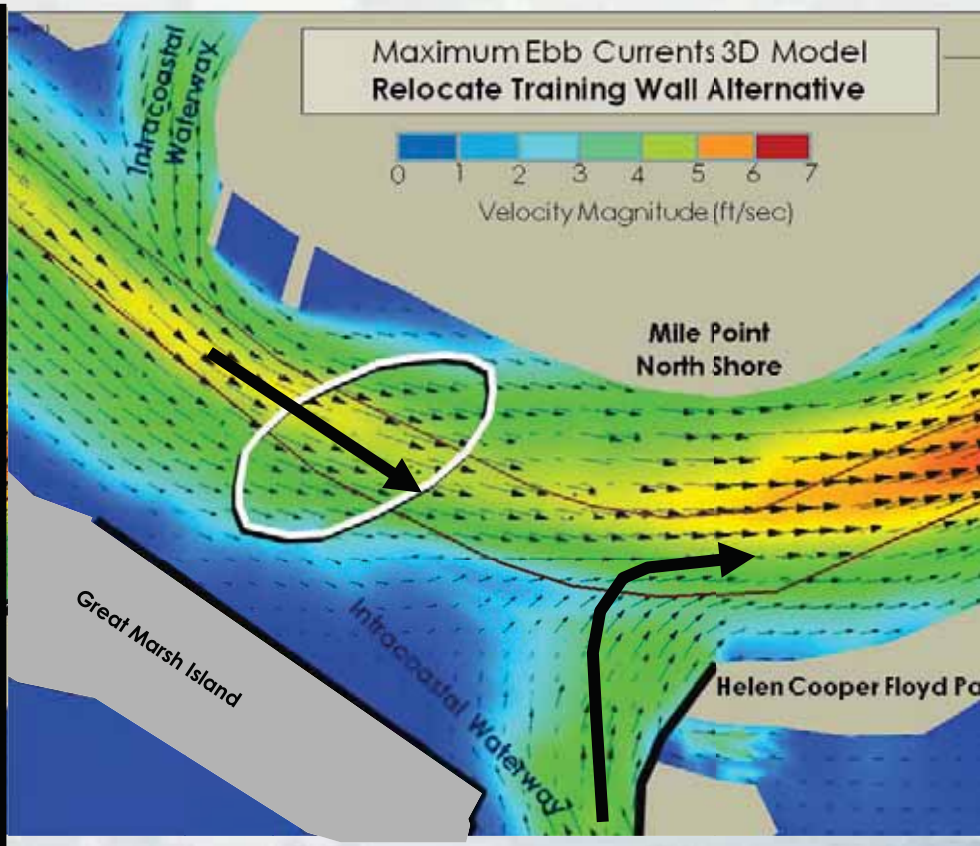
Relocation / Reconfiguration of the Mile Point Training Wall

- **Existing Training Wall** (~3000 feet)
- **Training Wall Removal** (western ~3110 feet)
- **New Training Wall** (western leg ~4250 feet; relocated eastern leg ~2050 feet)
- **Great Marsh Island Restoration** (beneficial use of dredged material)
- **Flow Improvement Channel** (~80 feet wide, ~6 feet deep, ~3623 feet length)

RECOMMENDED PLAN

COMPARING RELOCATE/RECONFIGURE TRAINING WALL ALTERNATIVE TO EXISTING CONDITIONS - EBB TIDE

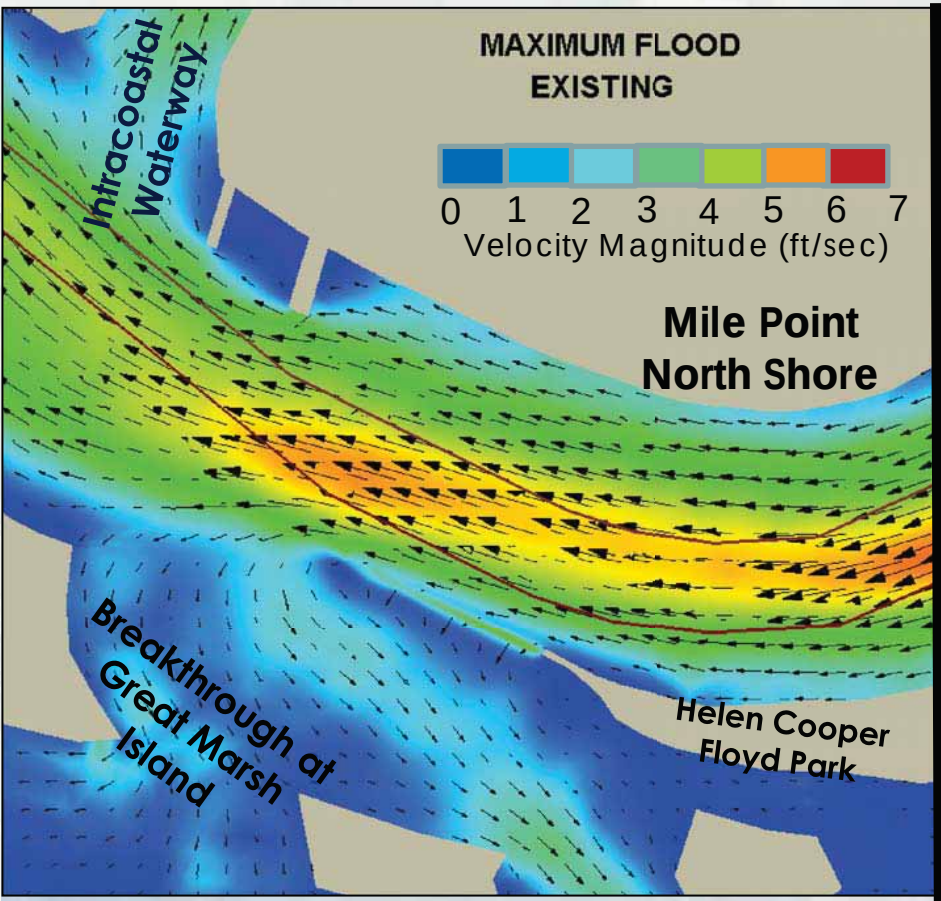




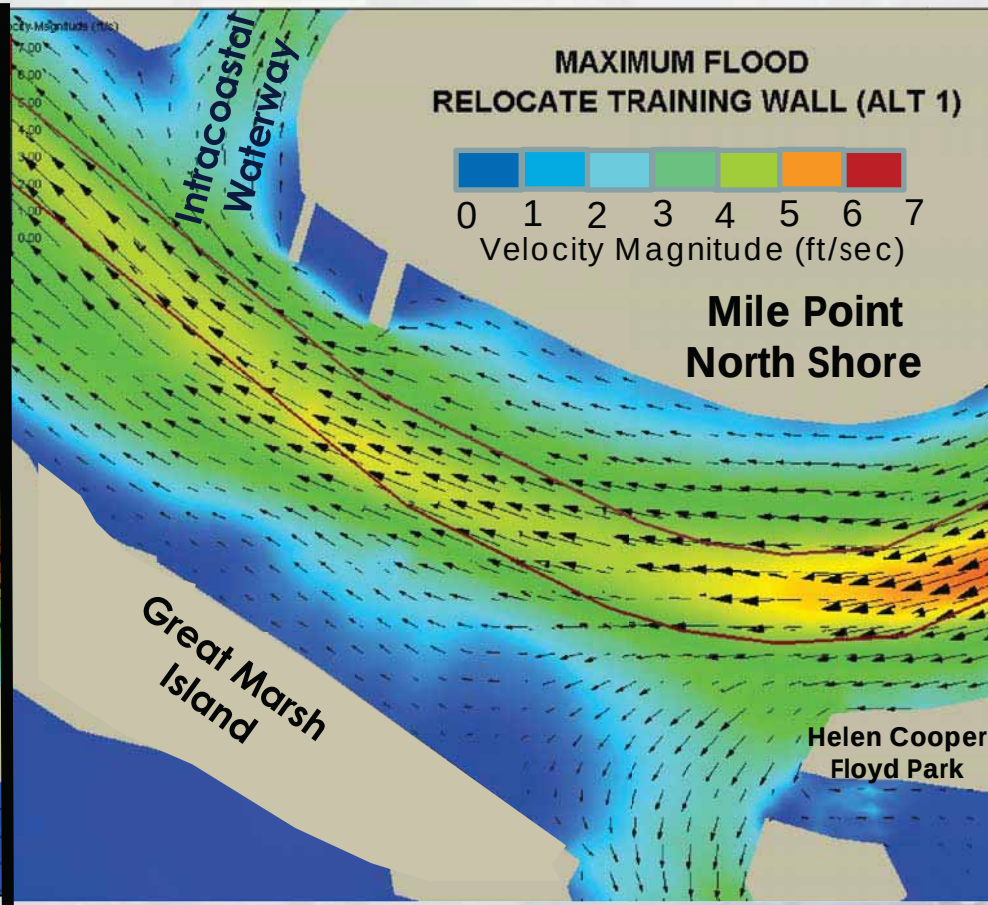
EXISTING CONDITIONS | RECOMMENDED PLAN

RECOMMENDED PLAN

COMPARING RELOCATE/RECONFIGURE TRAINING WALL ALTERNATIVE TO EXISTING CONDITIONS - FLOOD TIDE



EXISTING CONDITIONS



RECOMMENDED PLAN

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VALUE ENGINEERING (VE) STUDIES

- **Relocate/Reconfigure Mile Point Training Wall Alternative refined via two VE studies (2008 and 2011)**
- **Total Savings: > $40 million**

2008: $21,290,000 Total Savings

- **Improved training wall sections and scour stone deleted ($12,234,000 savings)**
- **Dredge disposal via salt marsh restoration at Great Marsh Island versus Buck Island disposal ($9,056,000 savings)**
  - **Beneficial use of dredged material/least cost disposal site**

2011: $20,120,000 Total Savings

- **Use of the Concrete Structural Unit (CSU) system or selected commercial training wall structure versus stone**

SEA LEVEL RISE (SLR)

(EC 1165-2-211)

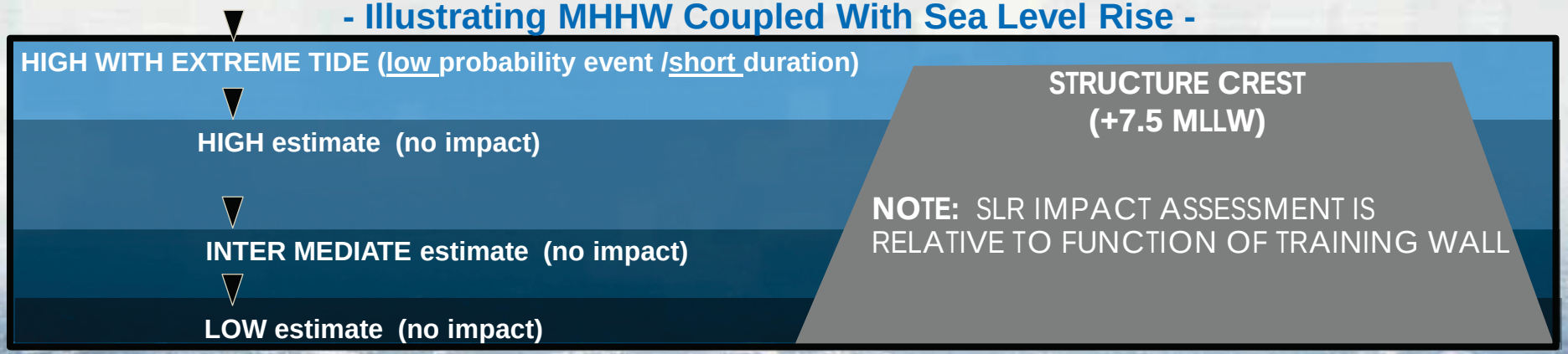
- **Three estimates required by EC guidance**
  - **Baseline (low estimate)** minimum expected sea level change
  - **Intermediate and high estimates** maximum expected sea level change

- **50-year period of analysis**
  - **Low** .12 meters (.39 feet)
  - **Intermediate** .25 meters (.81 feet)
  - **High** .66 meters (2.17 feet)

- **Impact Assessment**
  - **Low and Intermediate** inconsequential to structure performance
  - **High** no impact at MHHW, low probability of events exceeding MHHW level by more than .38 feet – however, structure will perform as intended (train the currents in the river)

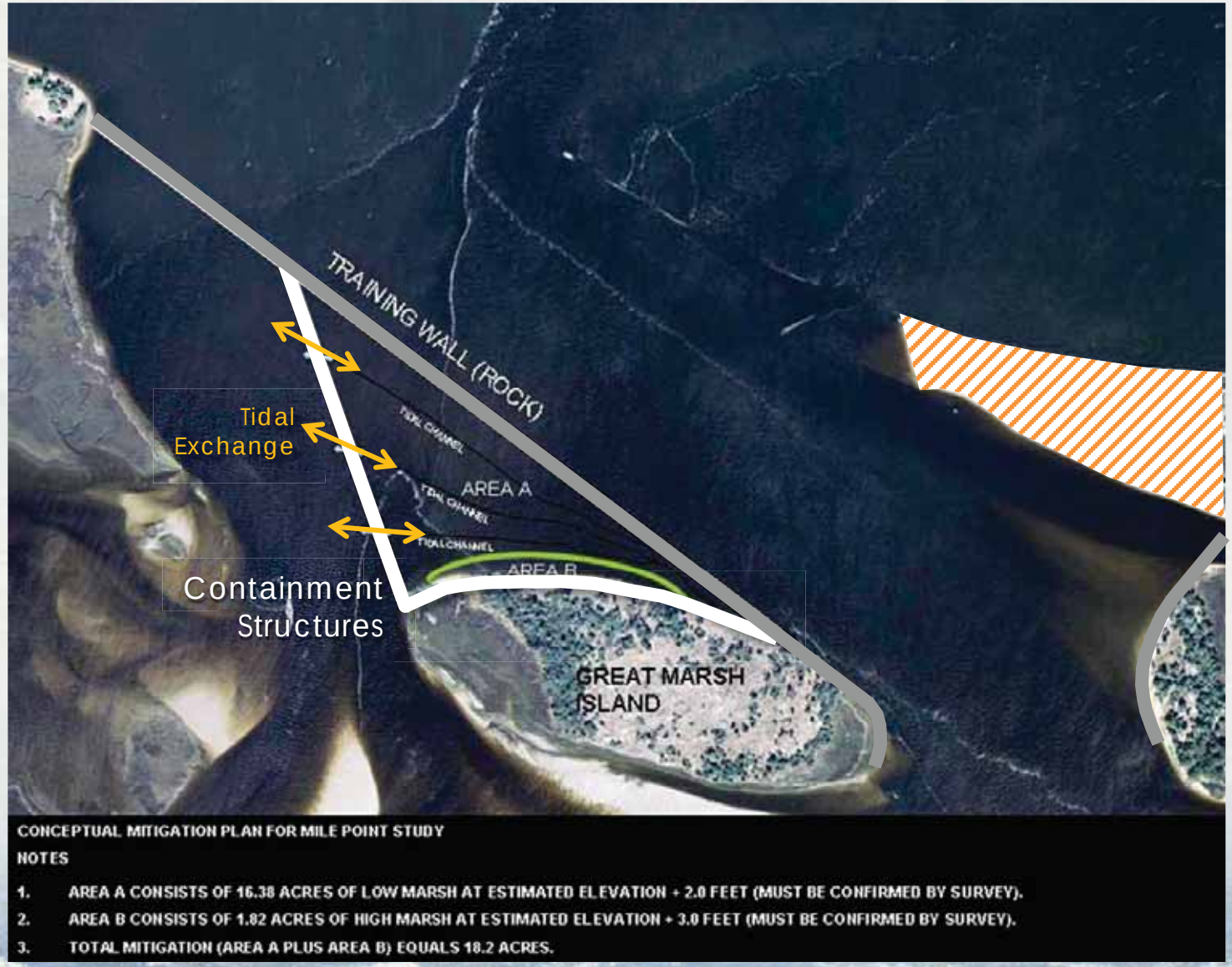
SEA LEVEL RISE IMPACT ASSESSMENT

- Illustrating MHHW Coupled With Sea Level Rise -



PURPOSE OF STRUCTURE IS TO "TRAIN" THE RIVER CURRENTS

Mitigation Plan Initial Concept



Beneficial Use Optimal Concept

Marsh Development with Geotube Containment

Typical Covered and Planted Section

Geotube Filling Operation

Mitigation Containment Alternatives
Aqua-Dam Water Containment Applications

Restoration Implementation Plan

- **Phase I – Site Preparation**
  - **Survey –**
    - **Surrounding Marsh**
    - **High Marsh - +3 MLLW**
    - **Low Marsh - +2 MLLW**
    - **Existing elevations in the placement area**
  - **Structures –**
    - **West Training Wall Leg – Concrete Structural Units**
    - **Southern geotube or waterdam**
  - **Dredge Material Placement**
  - **Chicopit Bay Flow Improvement Channel**
- **Phase II -**
  - **Approximately 34.16 acres restoration anticipated**
  - **Phased Construction**
  - **Adaptive Management**
  - **Monitoring Plan**

Beneficial Use/Mitigation Plan

- **Approximately 900,000 cubic yards of dredge material requiring disposal**
- **Great Marsh Island disposal $9M cost saving**
- **Preserves capacity of upland disposal sites**
- **18.84 acres salt marsh mitigation required**
- **Approximately 34.16 acres restoration anticipated**
- **Phased Construction**
- **Adaptive Management**
- **Monitoring Plan**

Project Implementation

- Key Dates:
  - October 2011: Division Engineer Transmittal Letter, Initiate Design Phase
  - April 2012: Chief of Engineer's Report
  - June 2012: Transmittal to Congress
  - May 2013: Design and Permitting Complete
  - Begin Construction - Pending Authorization and Appropriations
- Construction Duration: 465 Days*
  - 375 days: Construction of Relocated Training Wall (Phase I)
  - 90 days: Great Marsh Island Final Grading (Phase II)

*Does not include 365 day material consolidation period between completion of Phase I and Phase II