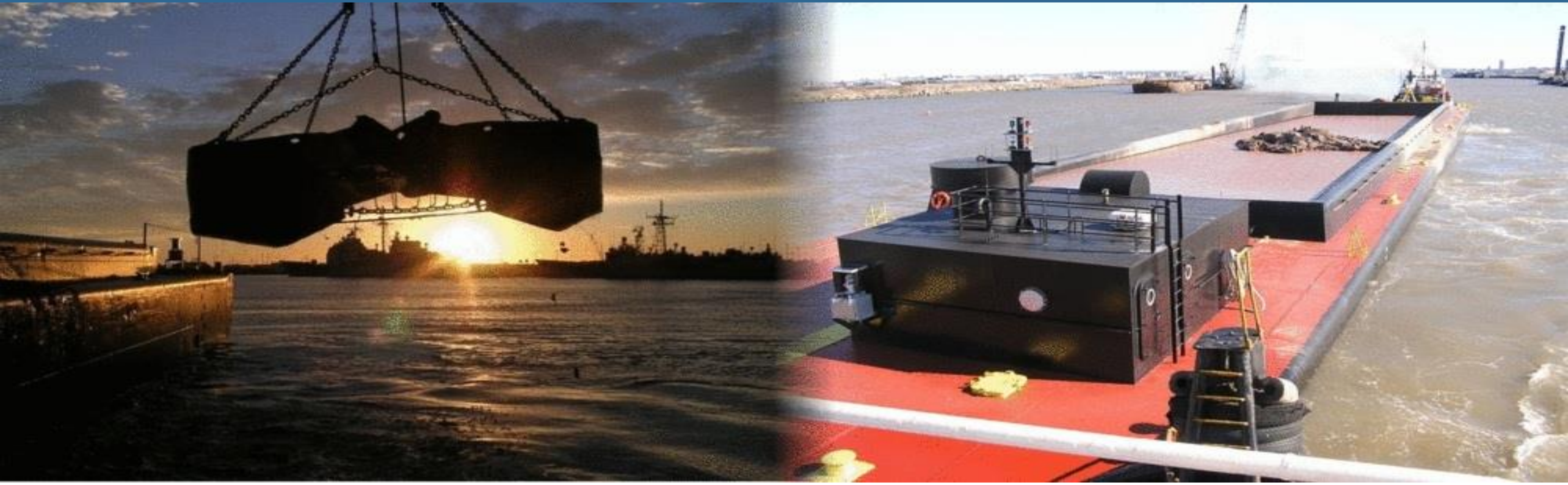
The Midtown Tunnel Project

Portsmouth – Norfolk, Virginia

By Hank Kelly &
Bryan Ellis



Tunnel Trench Dredging

WEDA Eastern Chapter Meeting

October 15, 2013

VDOT Virginia Department of Transportation

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Presentation Goal

Goal is to Promote awareness among the Regulatory Agencies that the Permitting Process and the Procurement Method must line up

Introduction

- Project Overview
- Immersed Tube Tunnels
- Public Private Partnership
- Regulatory Challenges/ Construction Risk
- Dredging Overview
- Logistical Challenges

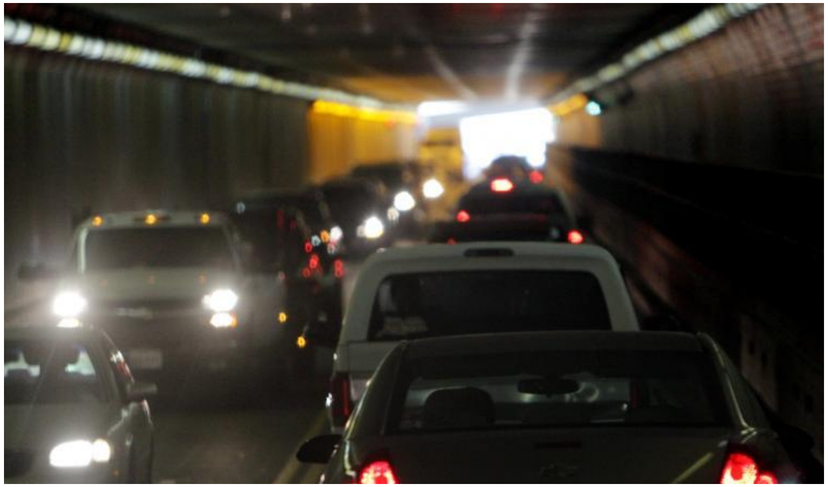
Overview - Why are we building a new tunnel?

What is the Most Heavily Travelled 2 Lane Road East of the Mississippi?

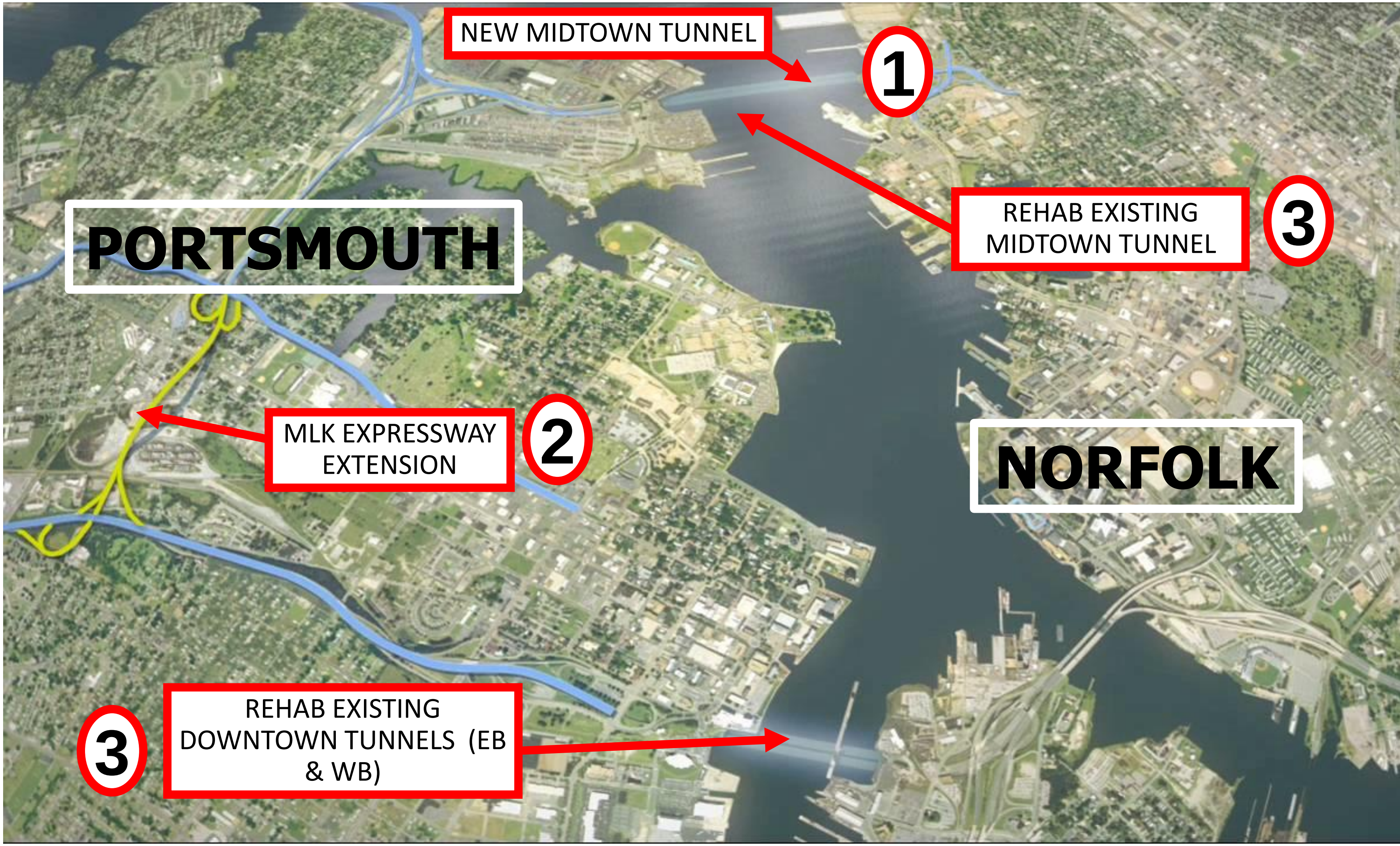
Carrying over 1 million vehicles per month!

Overview - Why are we building a new tunnel?

ANSWER - Midtown Tunnel Between Norfolk/Portsmouth, Virginia



Project Overview - What are we building?



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Project Overview – What are we building?

Immersed Tube Tunnel

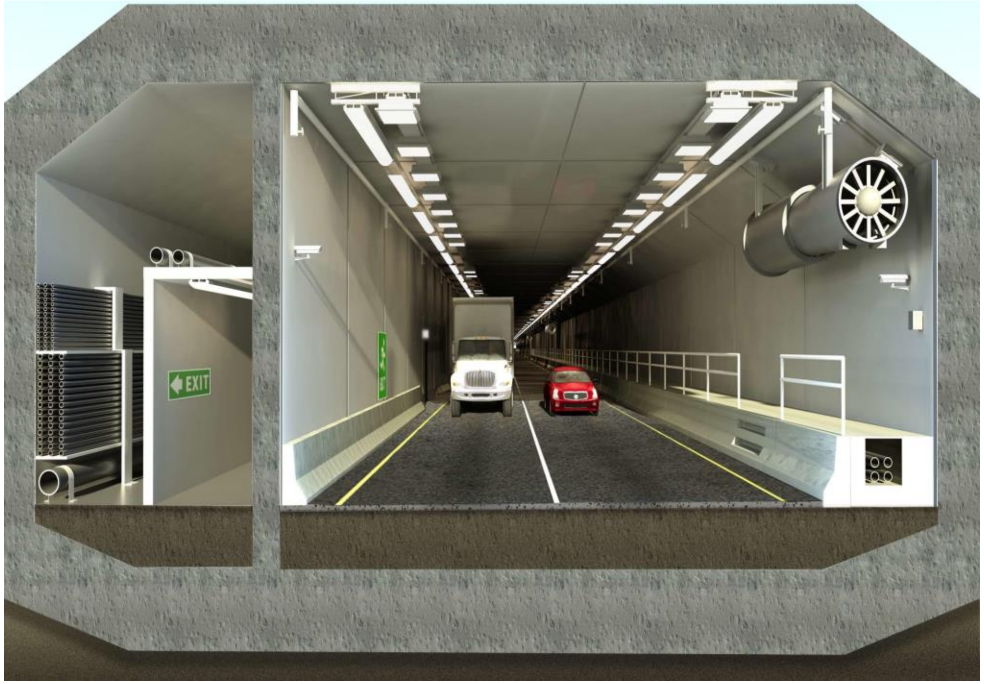
1. 4,200 feet portal to portal plus two each 700 foot “boat” sections

2. Two lane highway tunnel

3. 11 tubes each 340’ long by 54’ wide by 28’ high

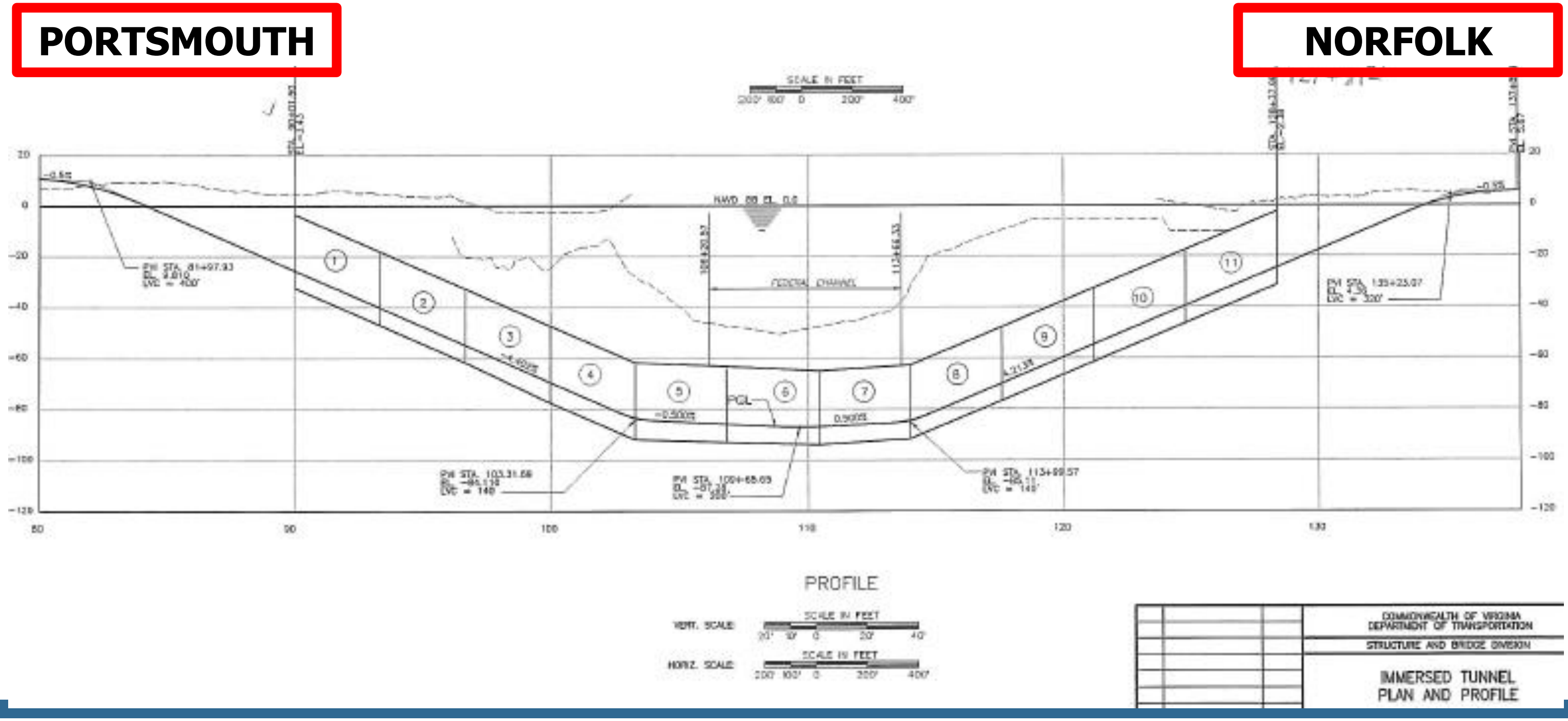
4. weight of 16,000 tons per tube

5. Reinforced Concrete tube (second in USA)



What are we building?

There are 11 Immersed Tubes ….
Average 340’ long, 55’ wide and 28’ high



Overview - What are we building?

Reinforced Concrete Tubes (below)

Steel Shelled Tubes (above)

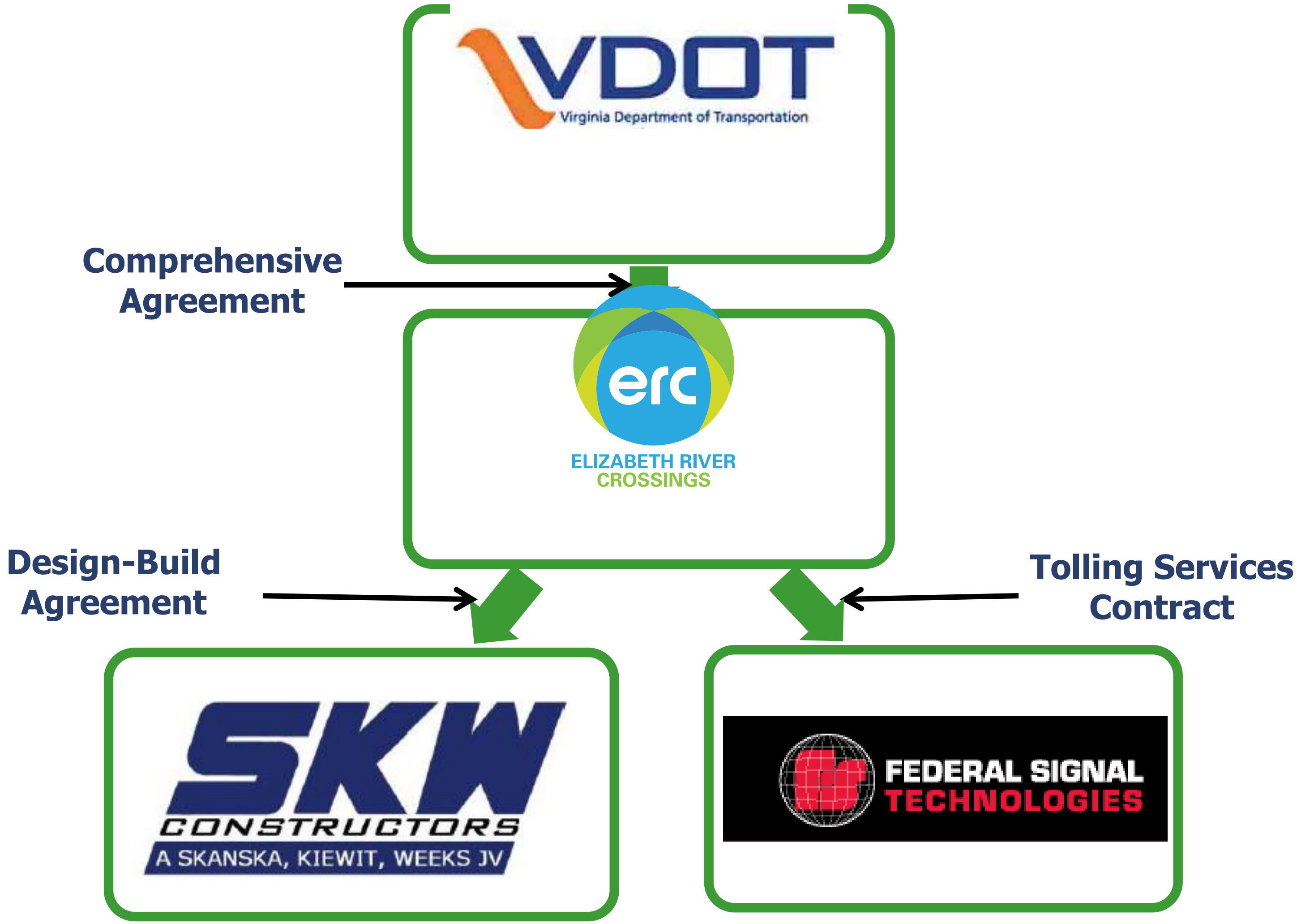
Why are we building it?

The Project is a key part of the Area's transportation solution – "tunnel redundancy"

Current State of the network

ERC's Vision

Who is building the Project?



Project Construction and Design Team

When are we building the Project?

- Started the process April 2008
- Conceptual proposal submitted September 2008

  PRICE @ $1.253B
- Signed Interim Agreement January 2010
- Submitted Design\Build LS Price June 2011

  (based on 30% design)

When are we building the Project?

- Signed Comprehensive Agreement and Design/Build Agreement in December 2011
- Financial Close occurred April 13, 2012
- **PRICE @ $1.468B**
- Complete New Tunnel and MLK Expressway – 5 years from Financial Close
- Rehab existing Midtown Tunnel in the 6th year

When are we building the Project?

- Estimated Project Completion 2018
    - Includes Estimated Duration of Marine Work – Approx 3 ½ years
    - Estimated Duration of Dredging – 14 months (3 Phases)

How are we building the Project?

Public Private Partnership (P3)

vs

Design - Bid - Build

Public – Private – Partnership (P3)

- VDOT solicits the Private Business Sector to Develop, Finance, Design, Build, Operate and Maintain
- ERC – Developer & Concessionaire Collects Tolls for a concession period of 58 years
- ERC contracts with Design/Build Contractor - SKW

Public – Private – Partnership (P3) Key Benefits

- Delivering major transportation improvements and new travel choices
- Leverages private investment to bolster state funding to build major projects
- Supporting thousands of jobs and pumping billions into Virginia's economy
- Shift key risk to private sector – protecting Virginia taxpayers
- Helps promote a better quality of life by reducing travel times

Regulatory Challenges

PPP Design Build Process vs. Permitting Process

= Contractors Risk

Regulatory Challenges \ Risk

Cost Impact Analysis For Dredging Permits

Major Factors

1. 1.5 Million CY Does Not Pass Criteria for Ocean Placement
2. Time-of-Year Restrictions
3. Permitting Delays
4. Contaminated or Hazardous Dredge Material

Regulatory Challenges \ Risk

1. 1.5 Million CY Does Not Pass Criteria for Ocean Placement – Assumption Material Rehandled and Disposed of Upland (140 mile tow). Dredge Production controlled by unloading operation.

   Potential Direct Cost Impact = $180 Million

   Potential Delay Cost Impact =2 Months $ 15.2 Million

2. Time-of-Year Restrictions – Assumption 4 Months =

   Potential Direct Cost Impact = $3 Million

   Potential Delay Cost Impact = 4 Month Delays $18.2 Million

Regulatory Challenges \ Risk

3. Permitting Delays – Assumption 3 Months =

   Potential Delay Cost Impact $11.4 Million

4. Contaminated or Hazardous Dredge Material – Assumption 30,000 CY of Contaminated/Hazardous Material Requiring Special Handling and Disposal =

   Potential Direct Cost Impact = $6 Million

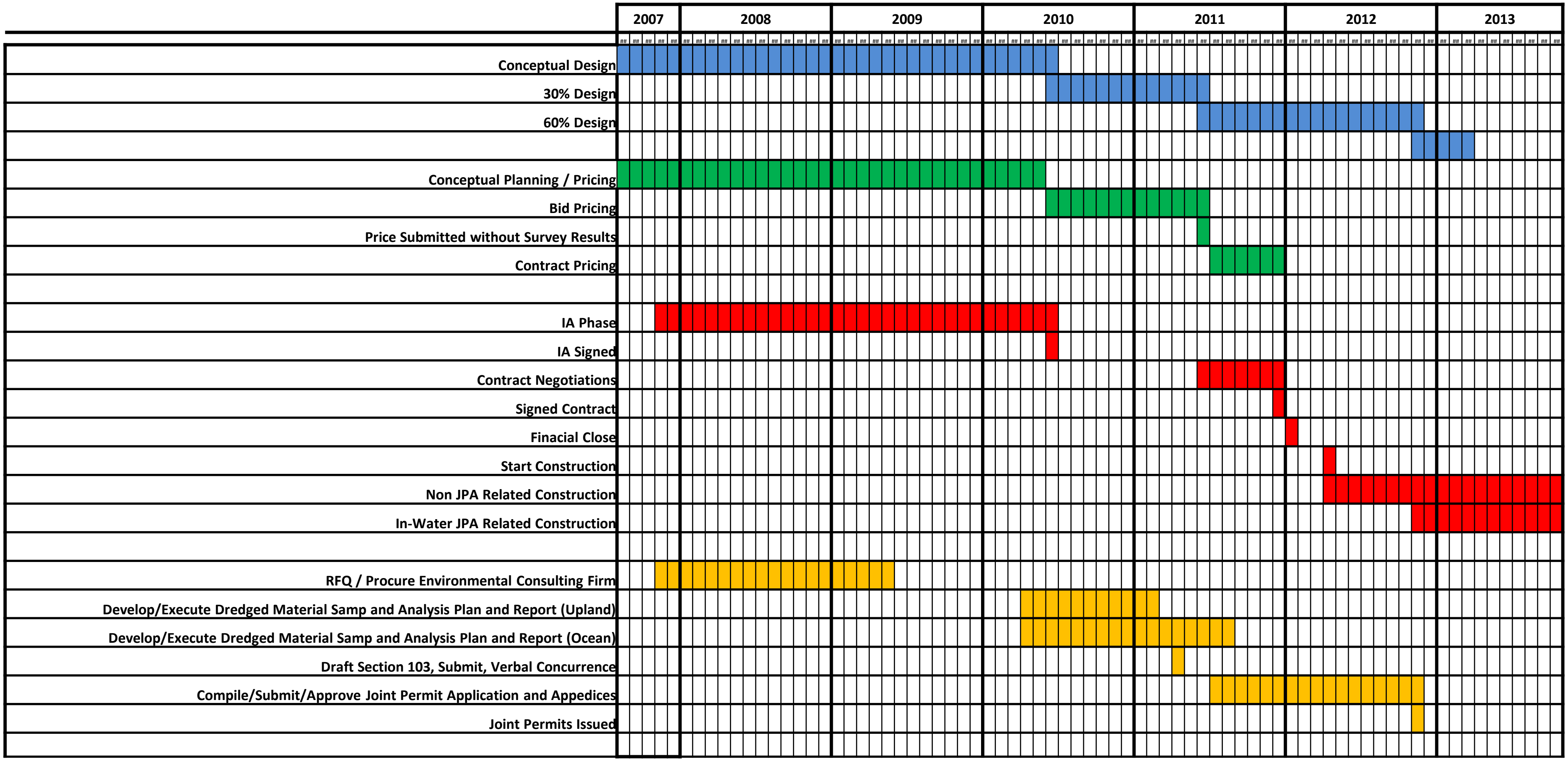
   Potential Delay Cost Impact $3.8 Million

Total Potential Cost Impacts

Direct Cost Impact = $189 Million

Delay Cost Impact = $37.2 Million

Regulatory Challenges \ Risk



Regulatory Challenges \ Risk

How can we work as a TEAM to limit that risk?

- Agencies Allowing Applicant to submit an “Incomplete” Permit and begin initial review and comments
- Allowing a Large Projects to break out smaller components and issue separate permits (i.e. Waterline Relocation)
- Developing a “Large Projects” Joint Permit Application and Supporting Regulatory Staff so adequate attention is given to projects involving State and Federal funds
- Use more of a NEPA approach to analyzing the overall environmental benefits and/or impacts

Water Quality Monitoring

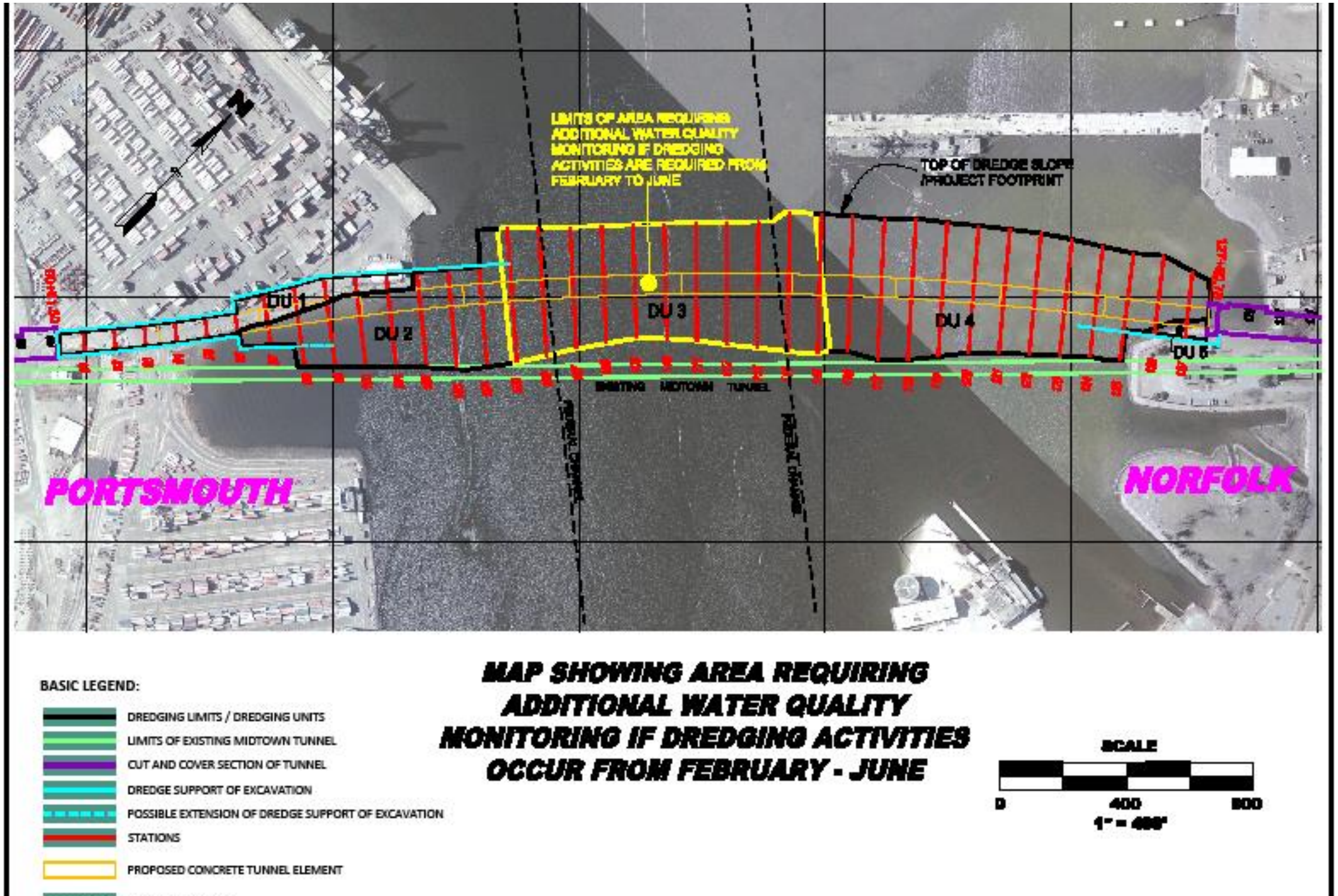
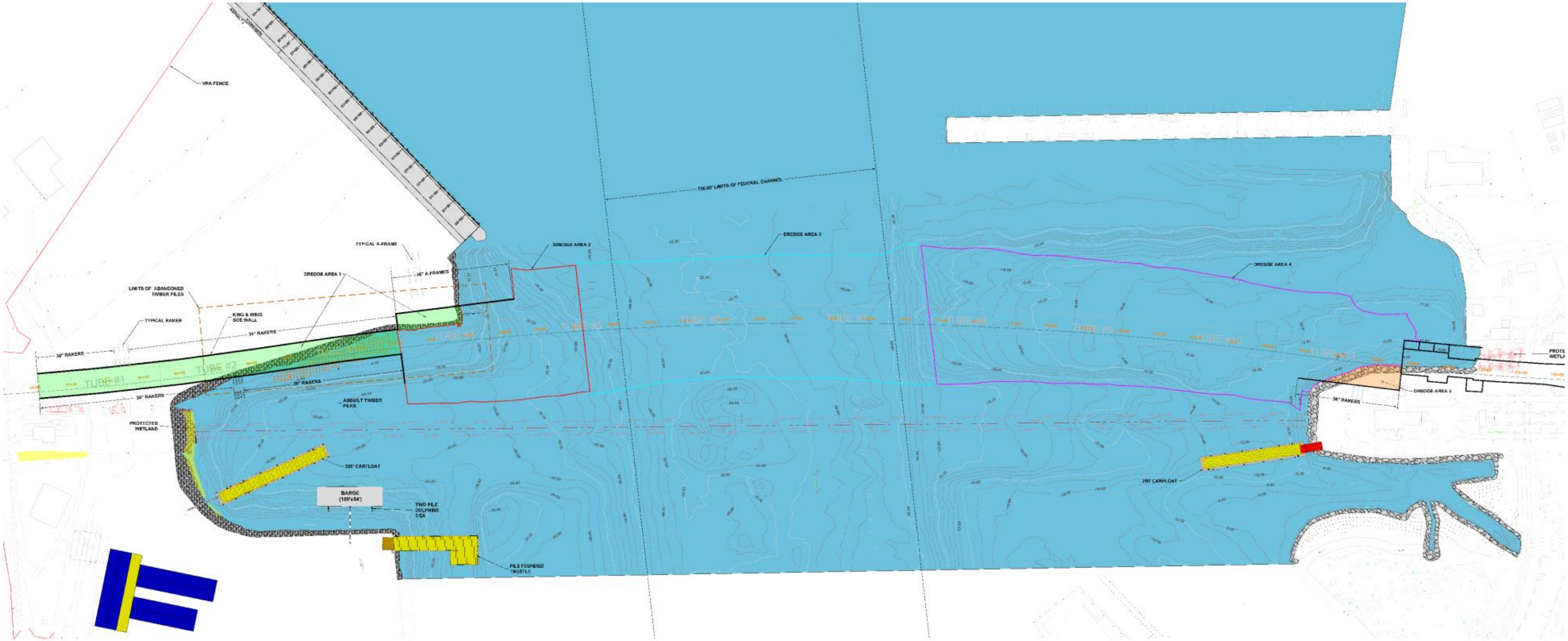


FIGURE 1-1 ADDITIONAL WATER QUALITY MONITORING REQUIRED

Project Site In-Water Components



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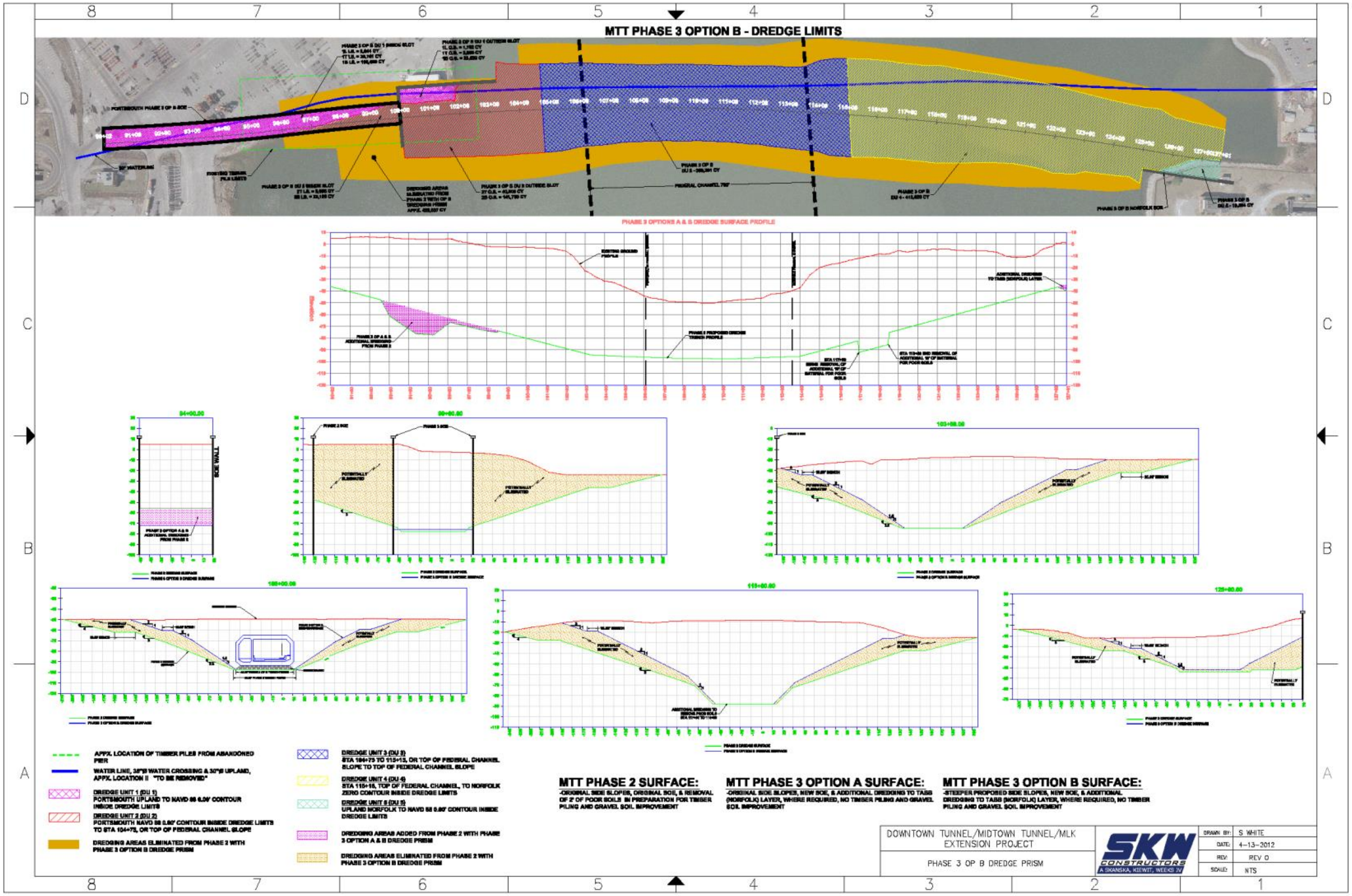
Tunnel Trench Design Overview



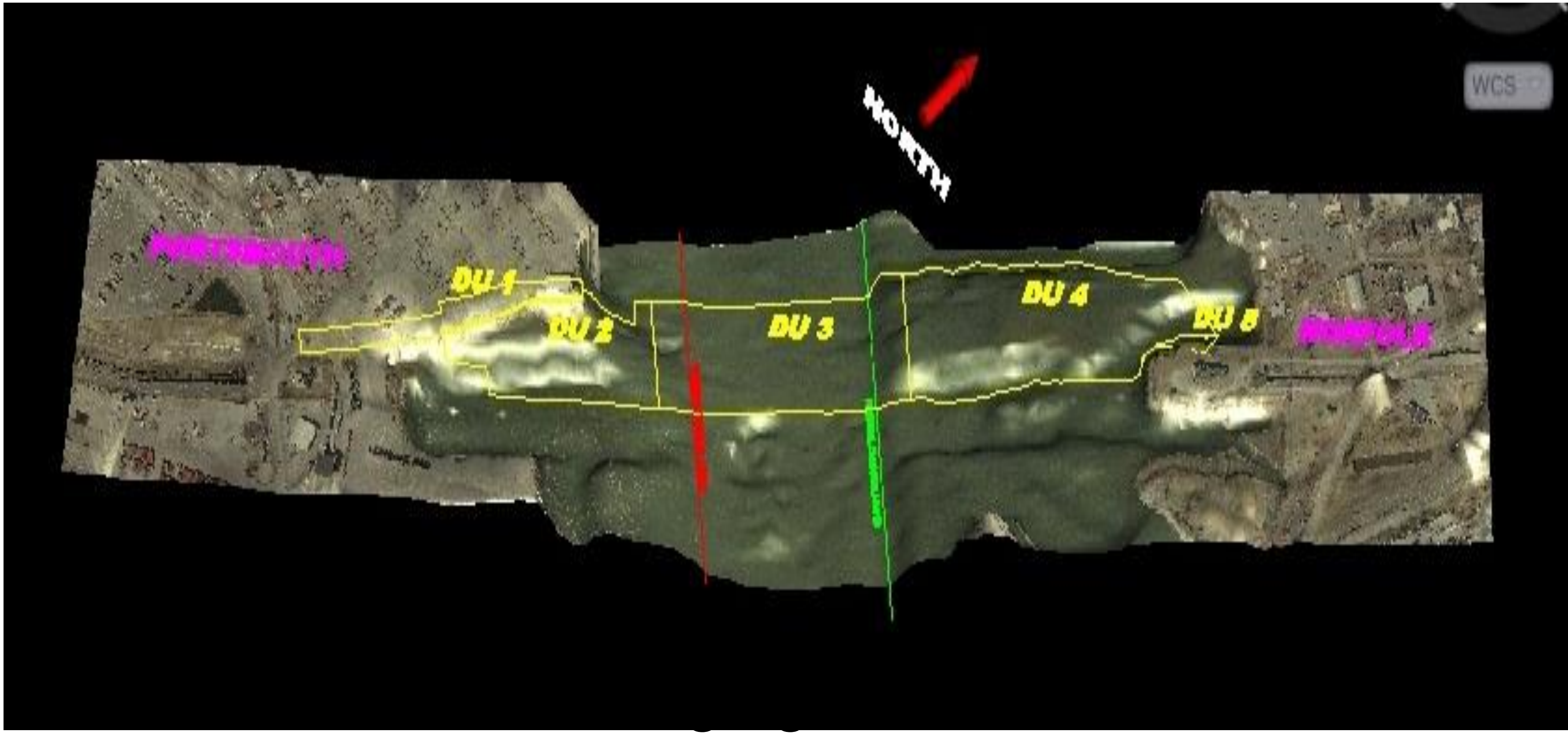
Dredging Overview

- 1.3 Million CY
- 110,000 CY Requiring Upland Disposal
- 56,000 CY of Contaminated Sediments
- 1.2 Million CY Approved For Ocean Placement
- Tunnel Trench 3700 ft Ranges in Depth From 36–100 ft.
- 5 Geological Formations
- Directly Adjacent to 50+ year old Midtown Tunnel
- Dredging Within a Large Support of Excavation Structure
- 84 Nautical Mile Round Trip to ODMDS

Dredging Overview

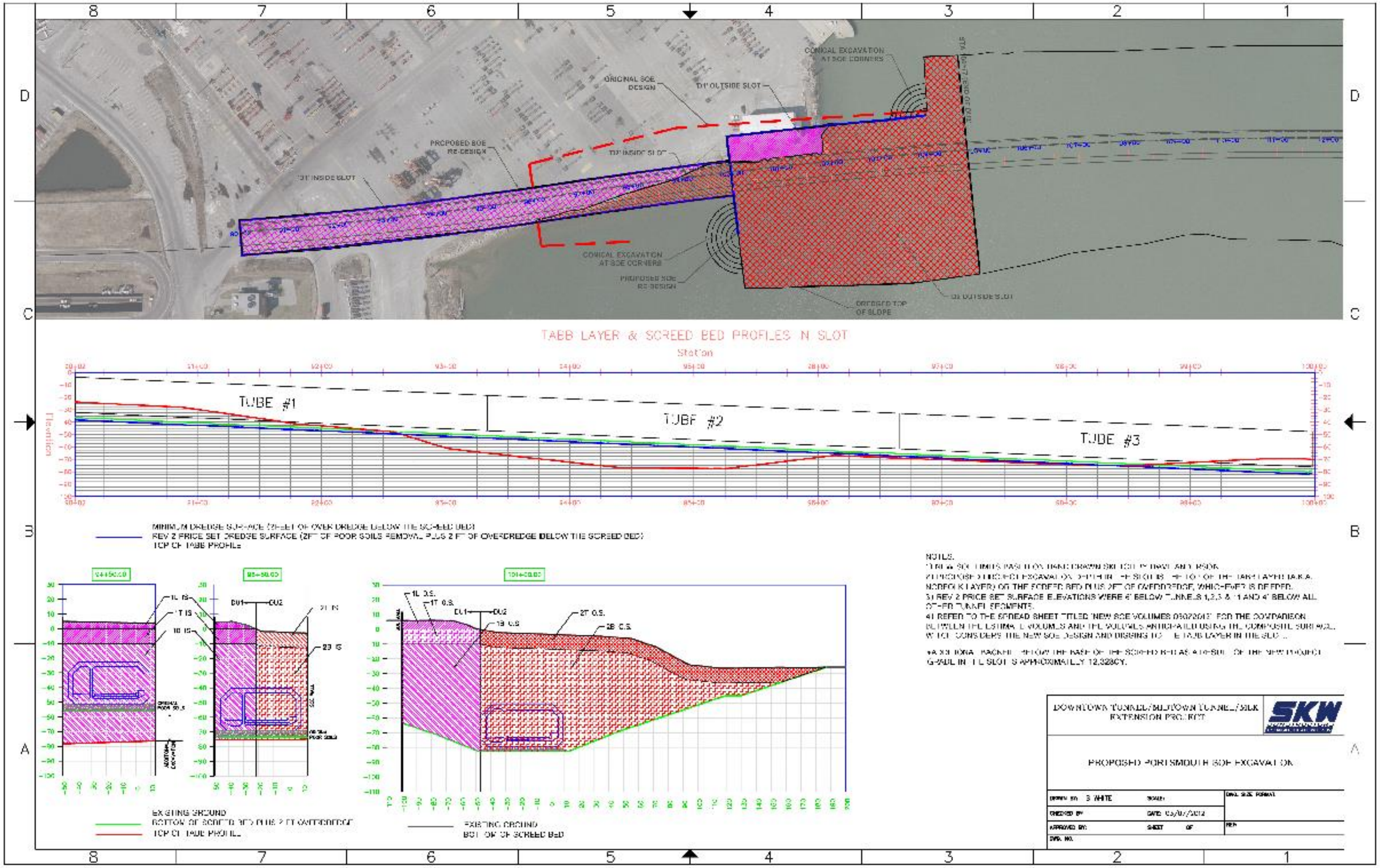
- Clamshell Dredging Required due to lack of Upland Disposal Sites in Proximity to the Project
- 42" HRSD Force Main below the dredge template
- Removal of 2000+ Treated and Untreated Abandoned Timber Piling
- Removal of Abandoned 30" Cast Iron Waterline
- Detailed Sequence Required to Insure Sequential Operations remain on Schedule and GeoTech limits are not exceeded
- Removal of Unsuitable Soils in-between cross braces 18′ apart down to a variable depth up to 70′
- Tight Tolerances to insure backfill quantities to not exceed proposed dredge template
- Close Proximity to Oyster Reefs

Dredging Overview – Sampling and Analysis



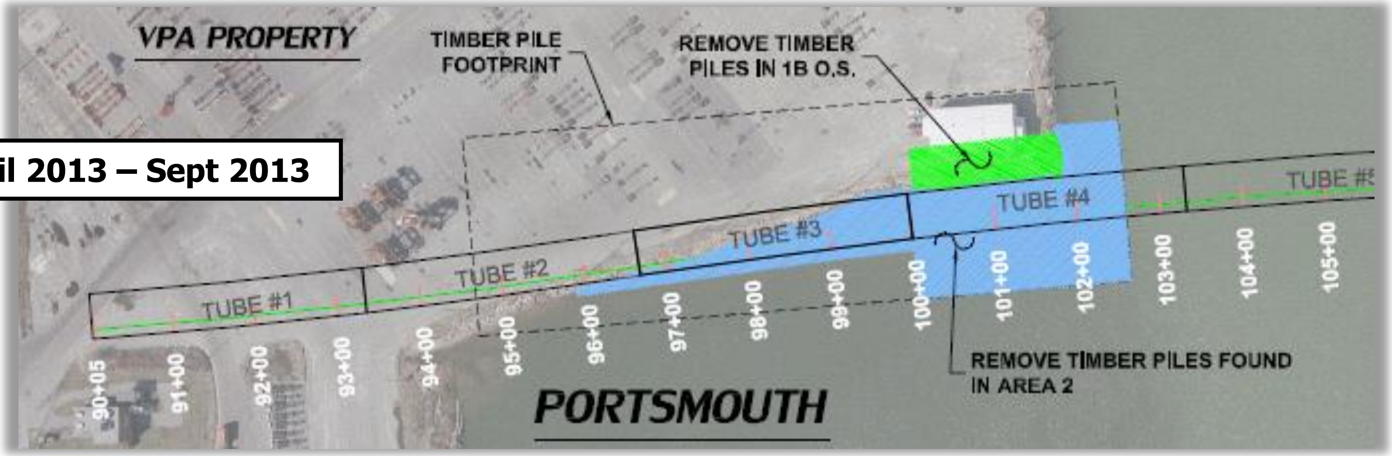
5 units horizontally – 2 vertical per unit – 2 units consisting of existing land above EL 0’

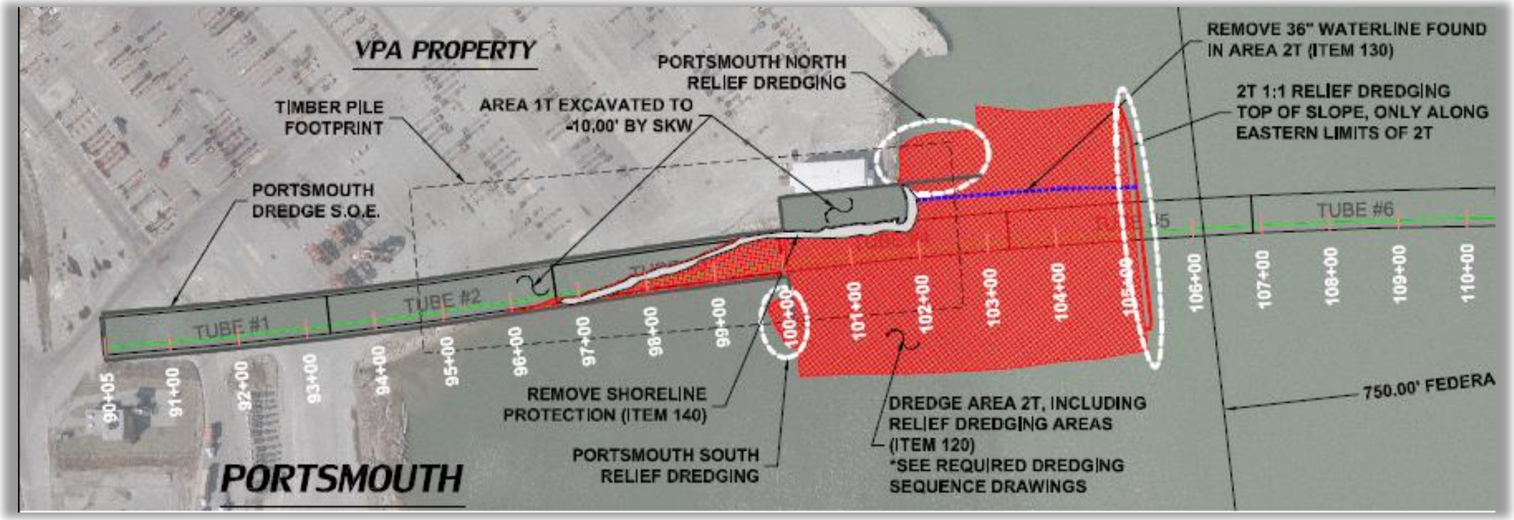
Dredging Overview - Not Tested or Not Approved



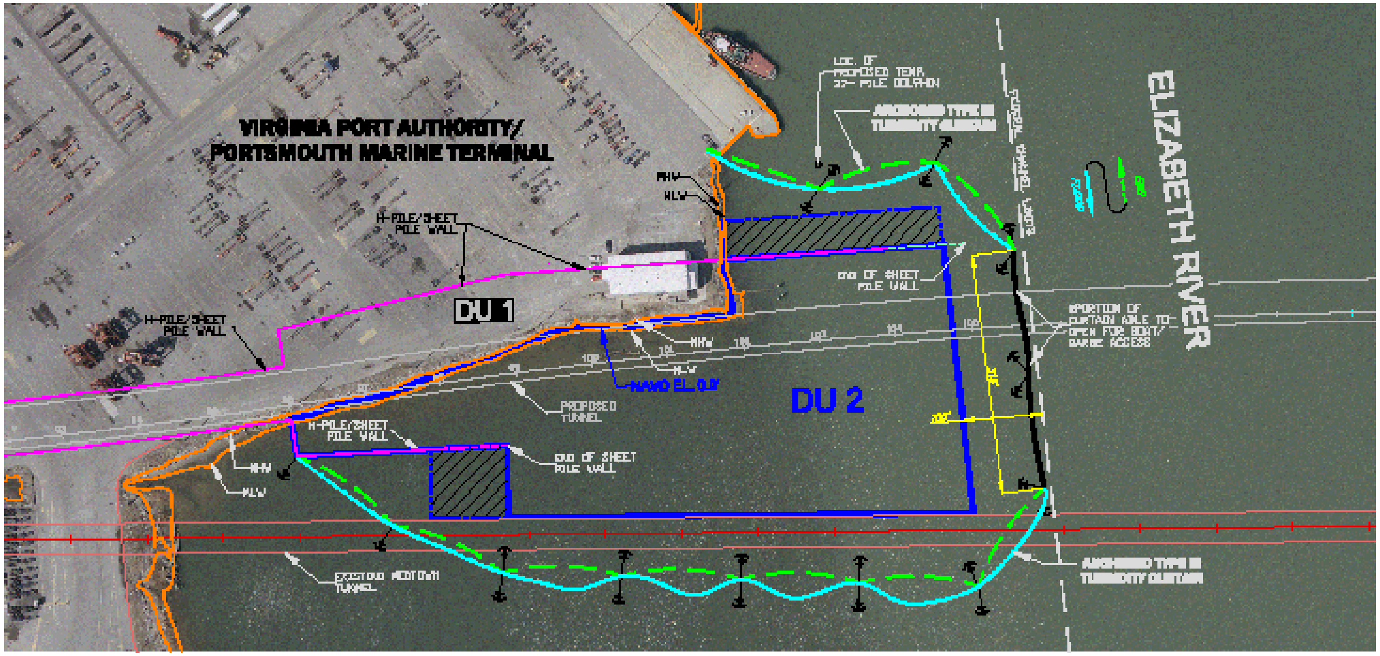
Dredging Overview - Obstructions

Phase I: April 2013 – Sept 2013





Dredging Overview – BMP’s



PRELIMINARY SILT CURTAIN CONFIGURATION FOR DREDGING UNIT 2T

BASIC LEGEND:

- LIMITS OF DREDGING UNIT 2
- LIMITS OF DREDGING UNIT 2 THAT MAY NOT REQUIRE DREDGING PENDING FINAL DESIGN
- APPROXIMATE LIMITS OF TURBIDITY CURTAIN - FLOOD TIDE
- APPROXIMATE LIMITS OF TURBIDITY CURTAIN - EBB TIDE
- LIMITS OF EXISTING MIDTOWN TUNNEL
- FEDERAL CHANNEL

NOTES:

1. REFERENCE MAP SHOWS THE PROPOSED SILT CURTAIN LAYOUT DURING DREDGING OPERATIONS IN DU 2T.
2. DU 2T - DU = DREDGING UNIT - 2T IS DEFINED AS THE TOP INTERVAL (EL. 0.0' TO -10 FT BELOW THE EXISTING SEDIMENT SURFACE).
3. DU 2T CONTAINS A TOTAL OF 61,000 CY OF DREDGE MATERIAL.
4. DEPTH VARIES.

SCALE

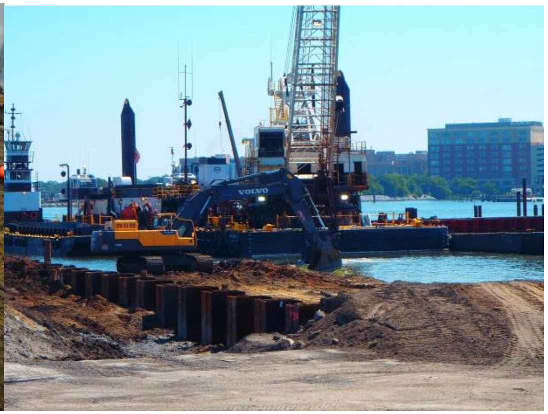
200 0 200 400

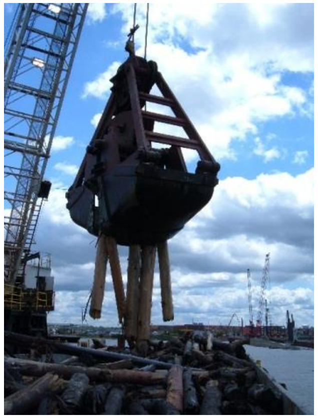
1" = 200'

FIGURE 2-2 PRELIMINARY SILT CURTAIN CONFIGURATION FOR DREDGING UNIT 2T

Dredging Overview – Current Operation





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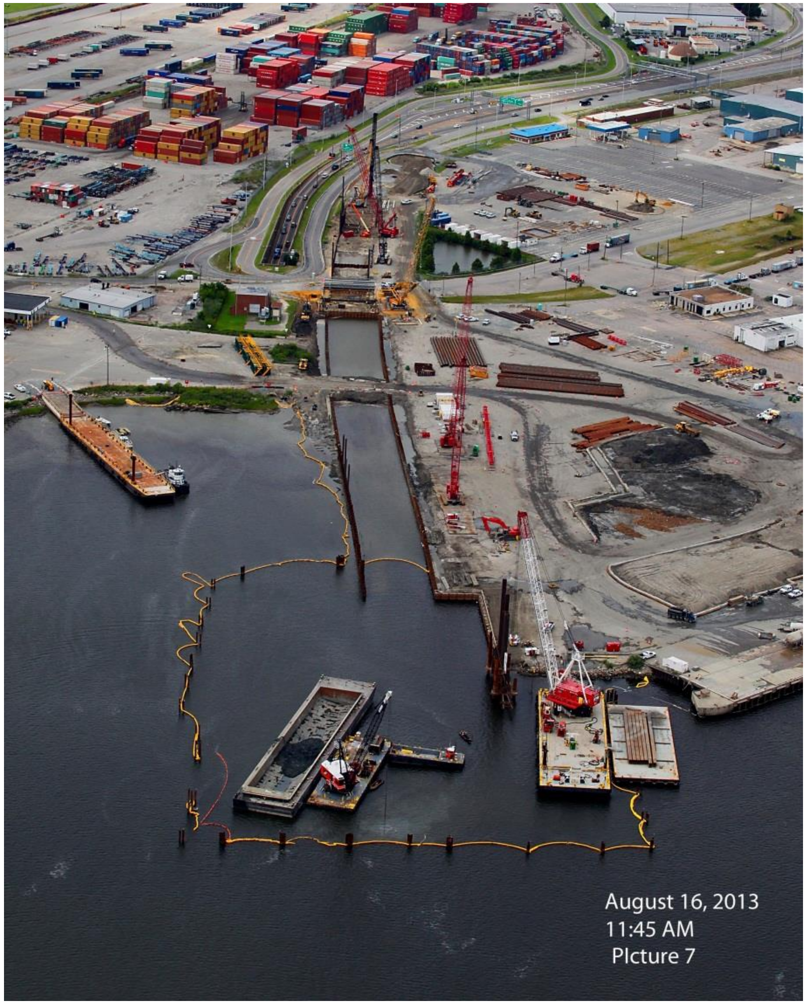
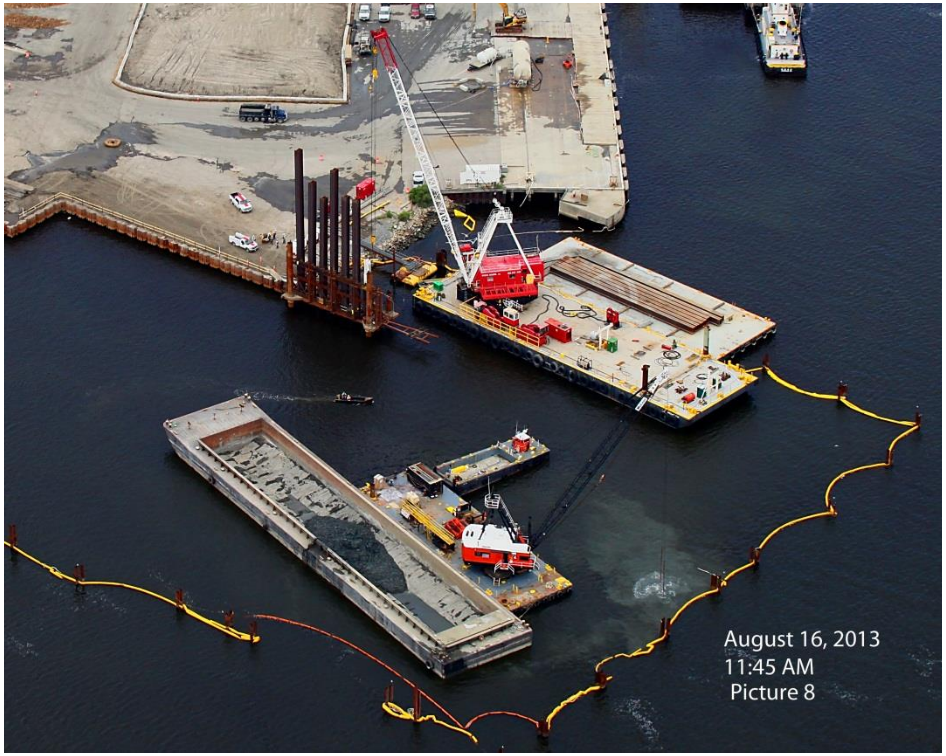
Environmental Dredging





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Dredging Overview – Environmental Dredging

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Dredging Overview – Material Treatment and Rehandling

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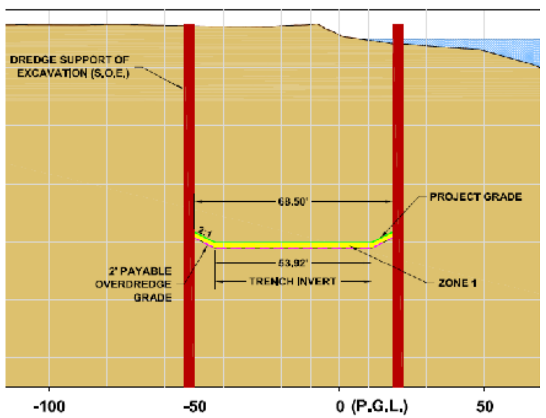
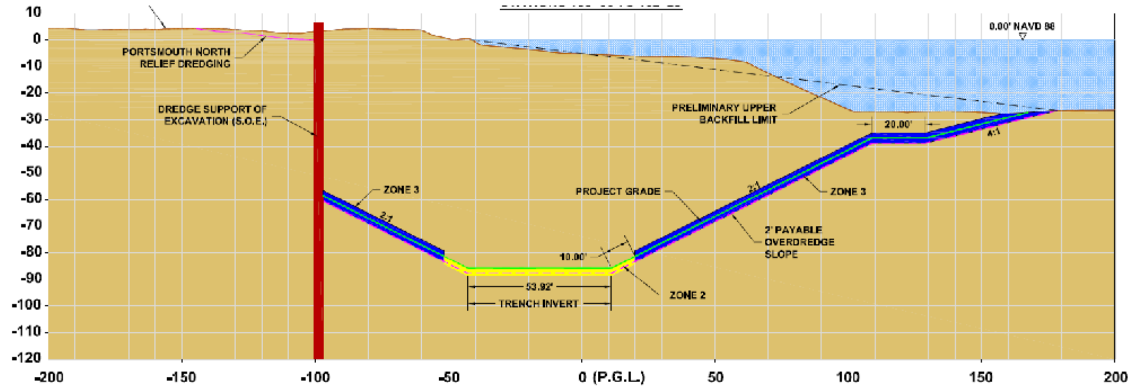
Tunnel Trench Design Overview

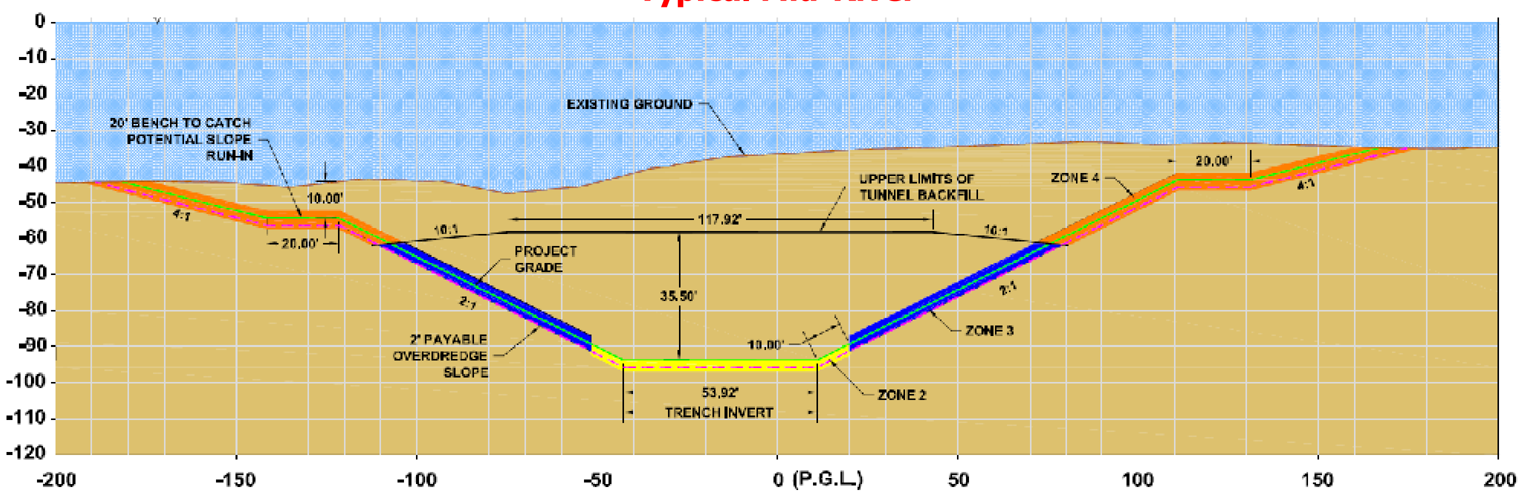
In the "SLOT"



SOE Wall Portsmouth and Norfolk



Typical Mid-River



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Geotech Investigations and Trench Design

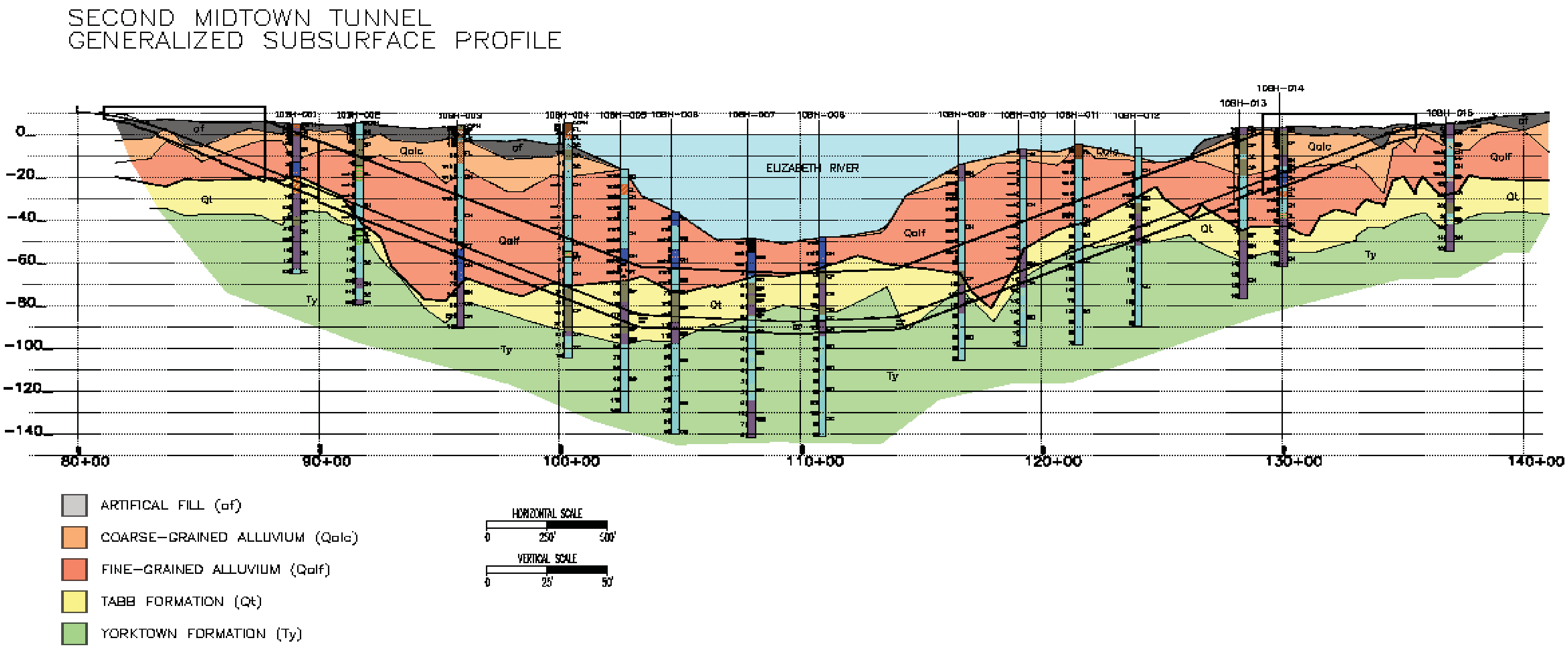

Figure 1

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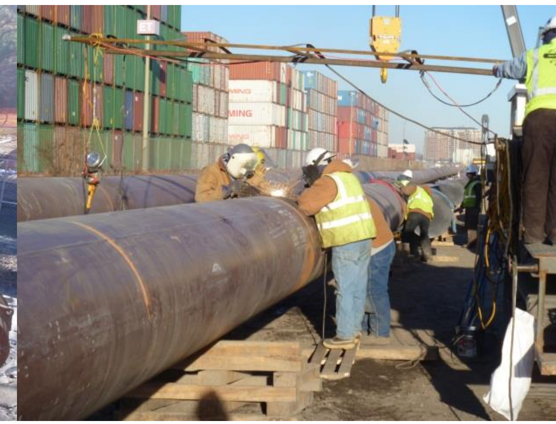
Logistical Challenges
Norfolk Waterline Relocation



Logical Challenges
Ocean Disposal Site

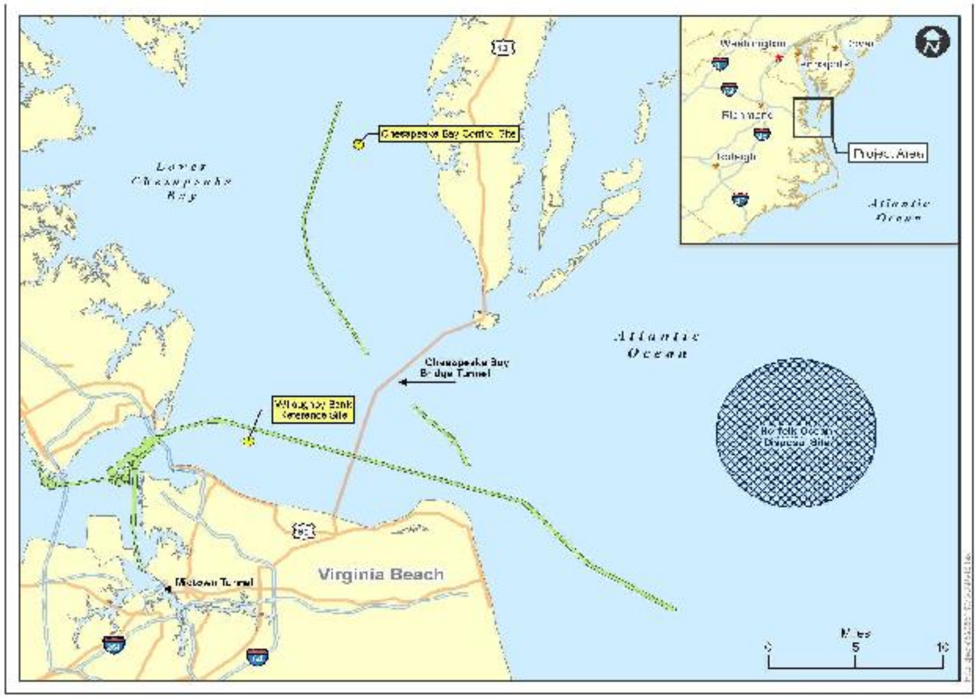
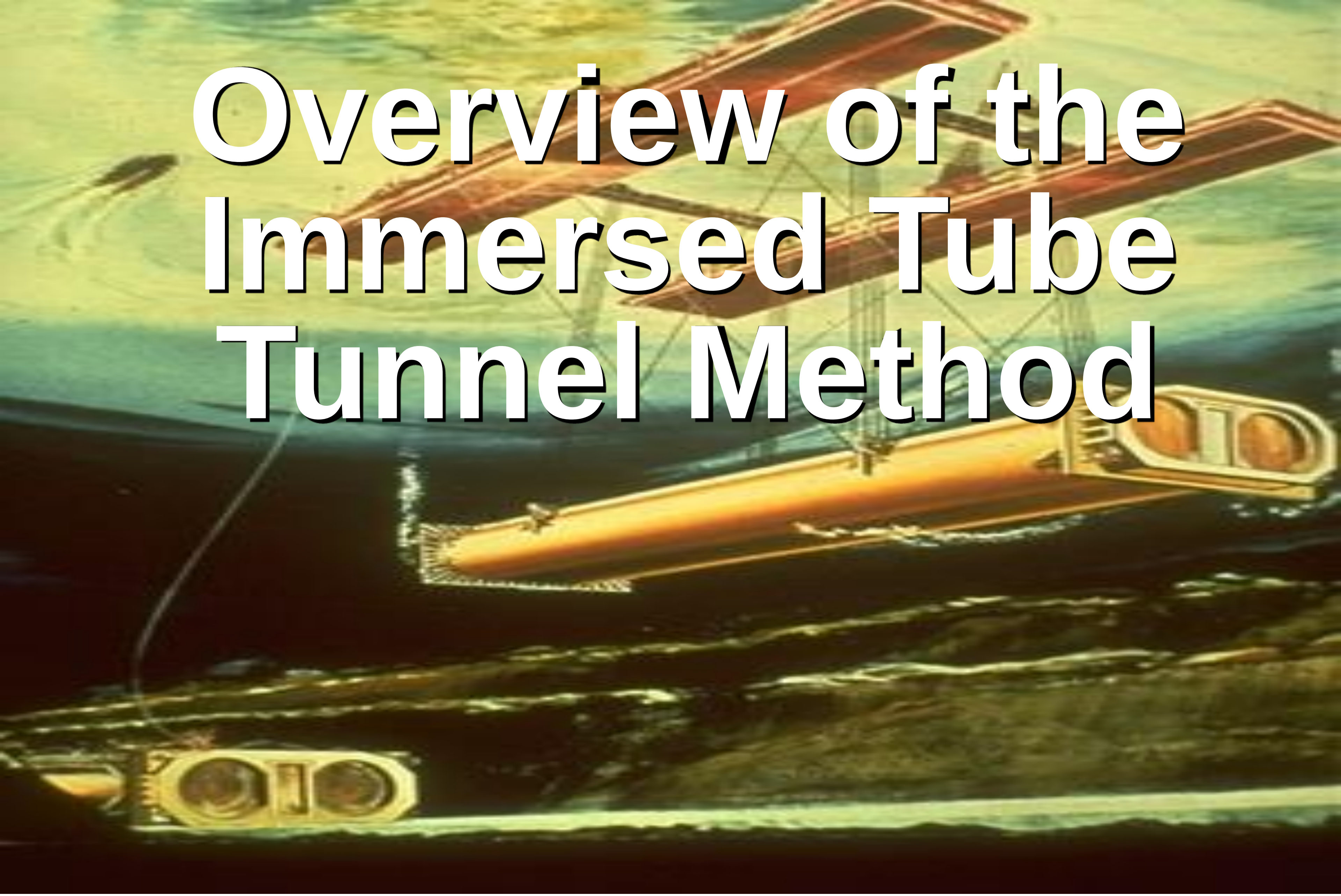


Figure 1-2. Sampling Locations: Chesapeake Bay Control Site, Norfolk Ocean Disposal Site, and the Willoughby Bank Reference Site.

Overview of the Immersed Tube Tunnel Method



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Overview of the Immersed Tube Tunnel Method

Construction steps:

1) Fabricate tubes in a drydock
2) Install bulkheads on ends of tubes
3) Tow tubes to job site
4) Dredge trench in river bottom
5) Place and Screed Gravel bed
6) Ballast tubes and lower to gravel bed
7) Connect tubes together
8) Backfill dredged trench over placed tubes to bottom of river channel

Overview of the Immersed Tube Tunnel Method

STEP 1 - Fabricate Concrete Tubes in Drydock
SPARROWS POINT, MD

Overview of the Immersed Tube Tunnel Method

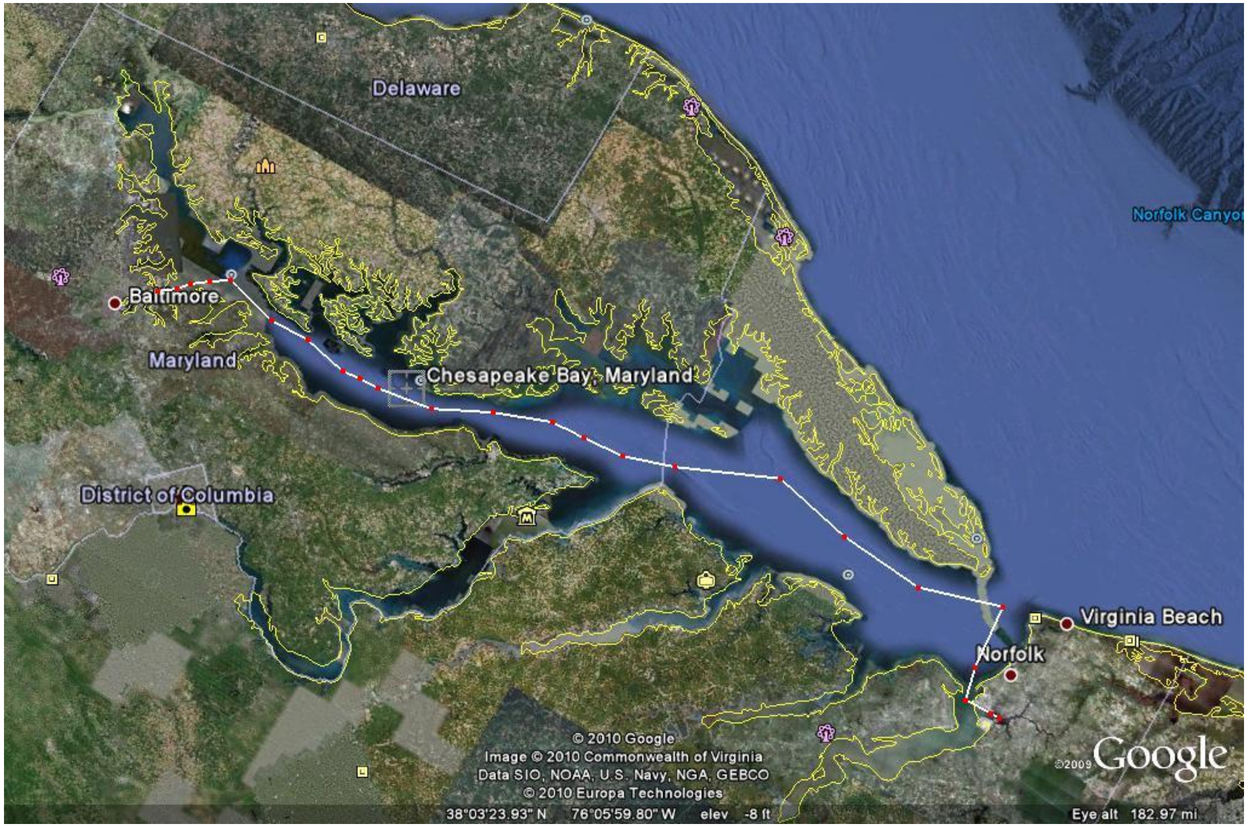
STEP 2 - Install End Bulkheads in Drydock

Overview of the Immersed Tube Tunnel Method

STEP 3 – Flood drydock, open drydock gate, Tow Tubes to Jobsite

Overview of the Immersed Tube Tunnel Method

Sparrows Point to Hampton Roads – 200 Miles



Overview of the Immersed Tube Tunnel Method

STEP 4 – Dredge Trench

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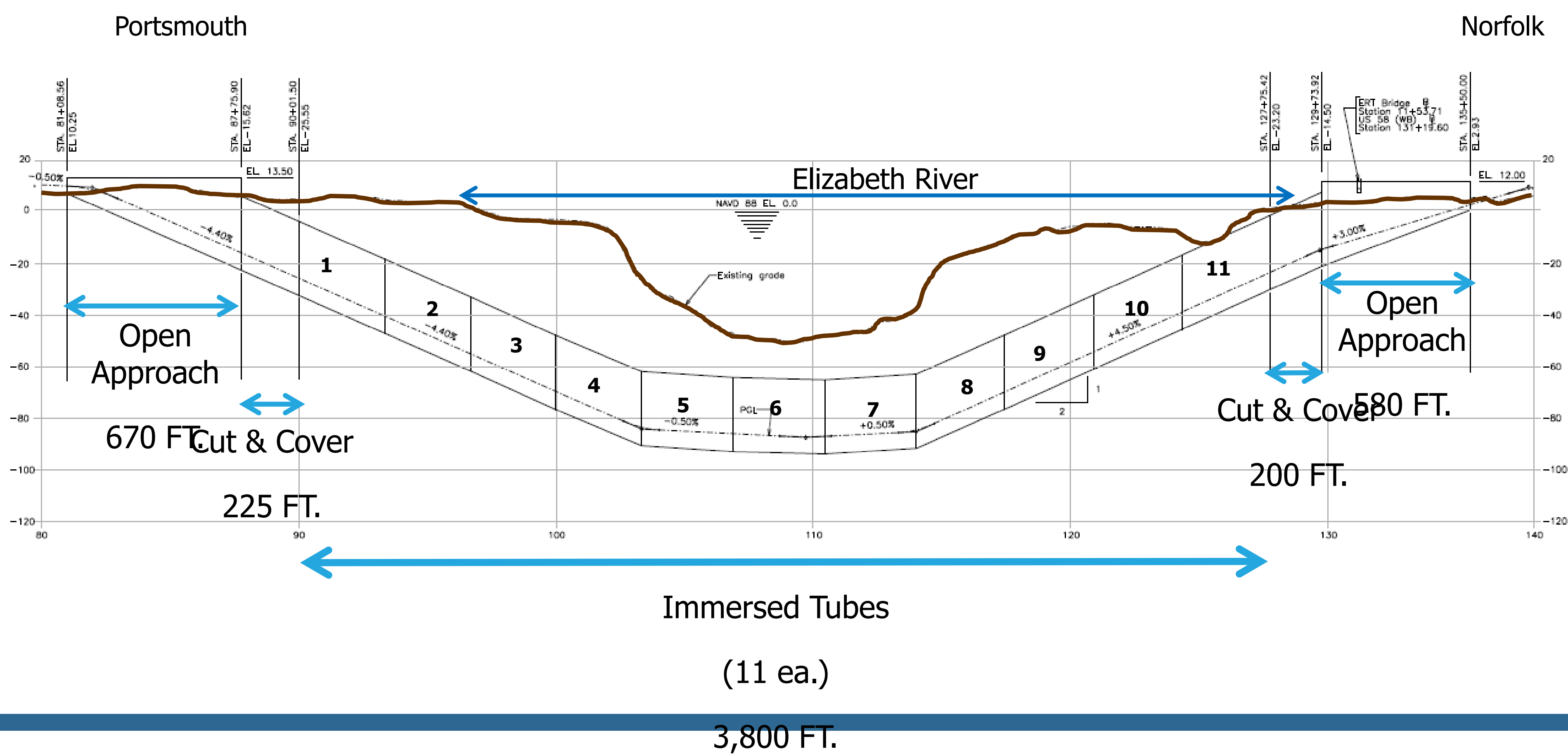
Overview of the Immersed Tube Tunnel Method

New Tunnel Profile



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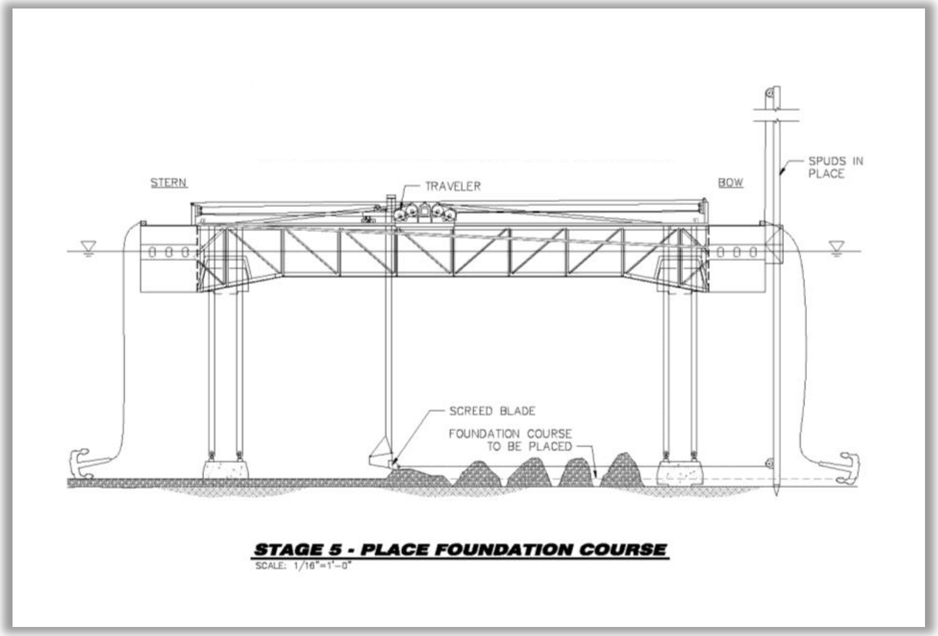
Overview of the Immersed Tube Tunnel Method

Step 5 - Placing and Screeding Gravel Bed

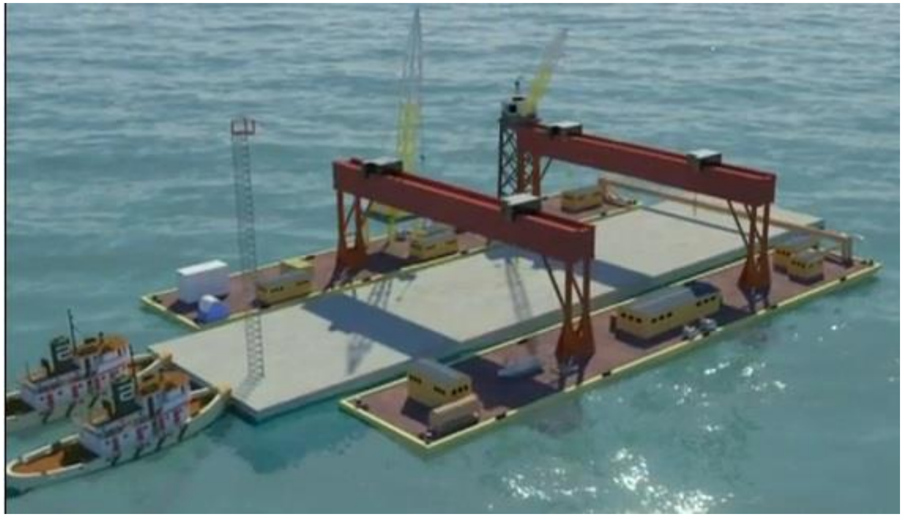


Conceptual Screed Barge Section View

Fort McHenry Screeding Equipment

Step 6 – Tunnel Placement

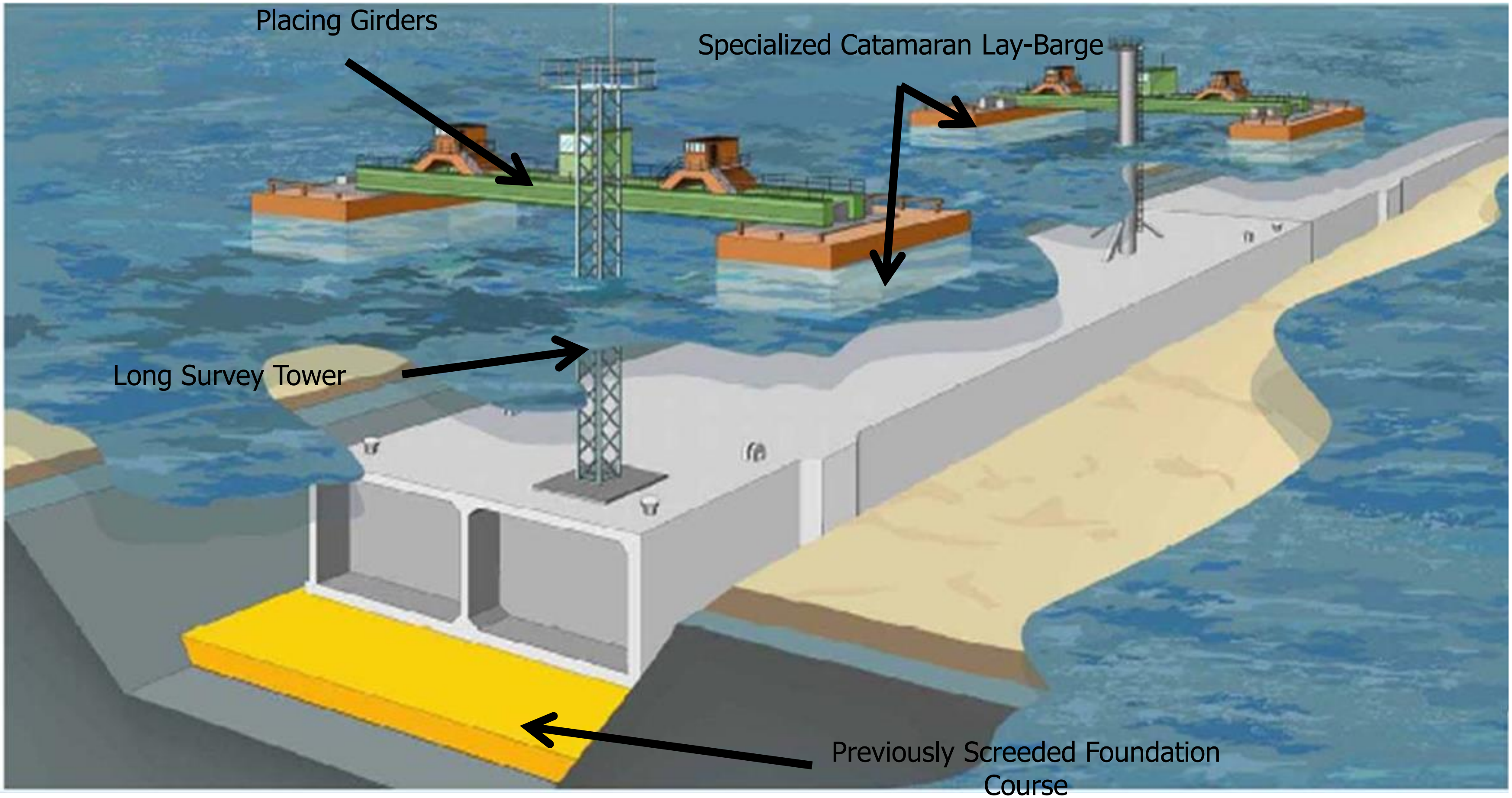
- Horizontal alignment
  - —Anchor winches on lay barge



- Vertical alignment
  - — Lowering falls between placing girders and tunnel element

Overview of the Immersed Tube Tunnel Method

Tunnel Placement – Lay Barge



Overview of the Immersed Tube Tunnel Method

STEP 6 – Ballast and Lower Tubes

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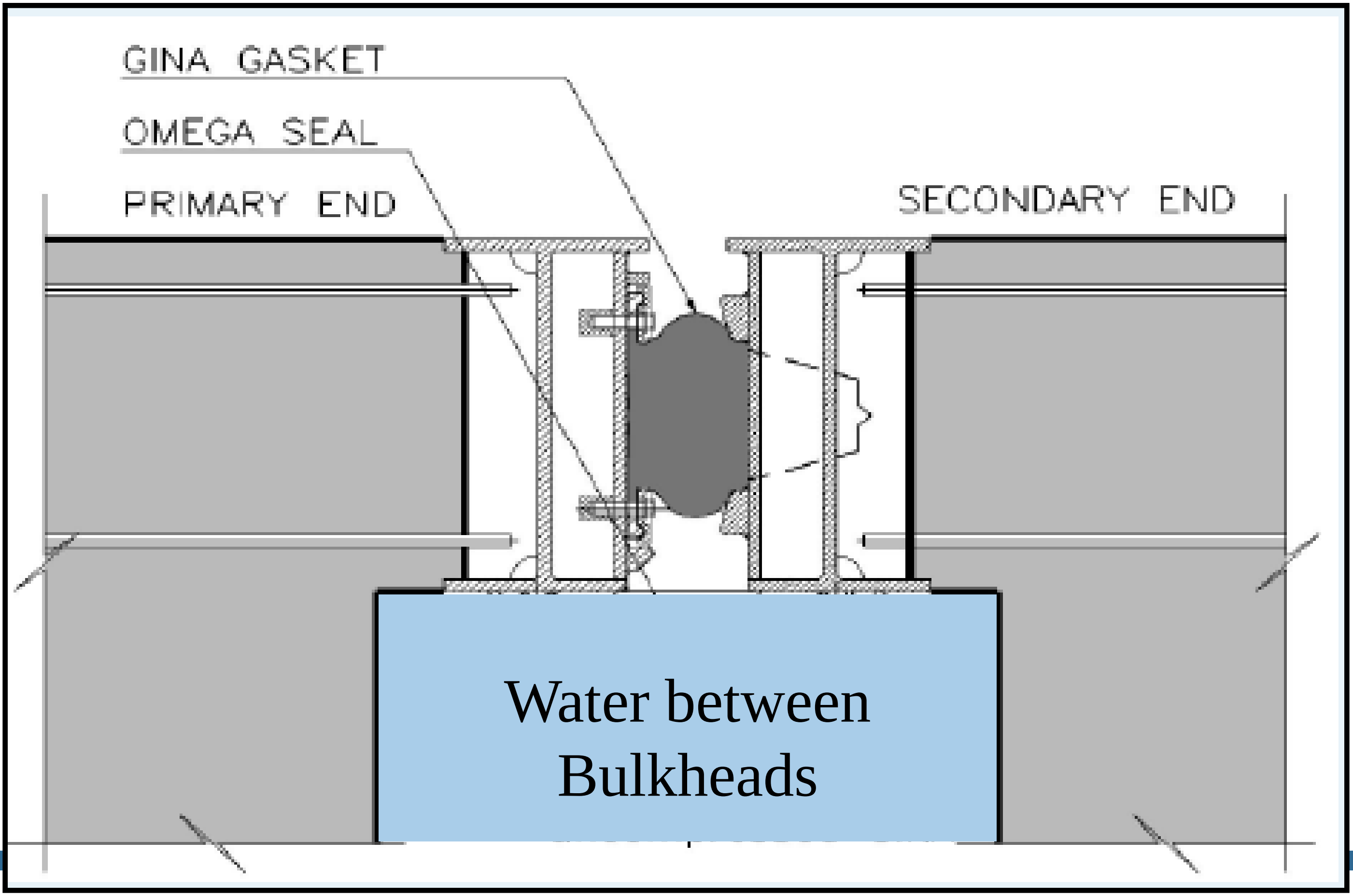
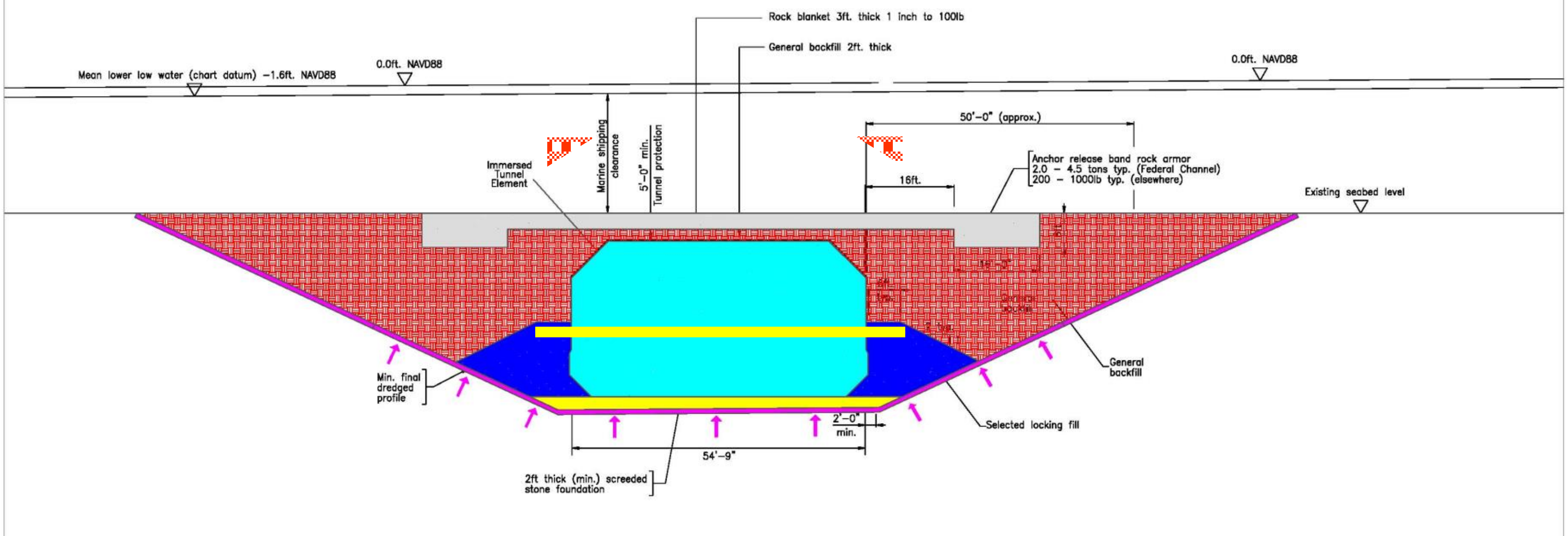
Overview of the Immersed Tube Tunnel Method

Step 7 - Tube Placement – Tube Connections



Overview of the Immersed Tube Tunnel Method

STEP 8 - Marine Operations Backfill



TYPICAL SECTION