Hampton Roads Bridge-Tunnel Expansion

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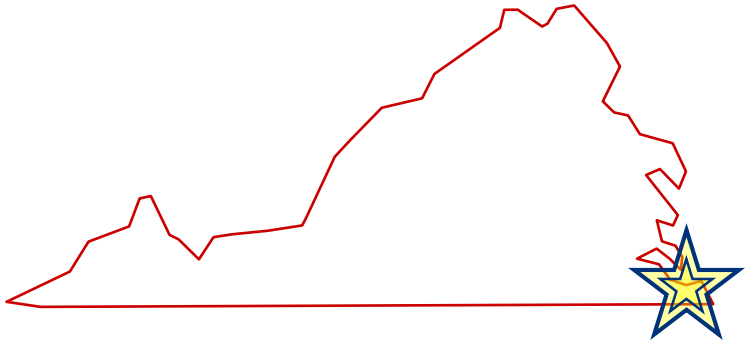
HRBT Project Director

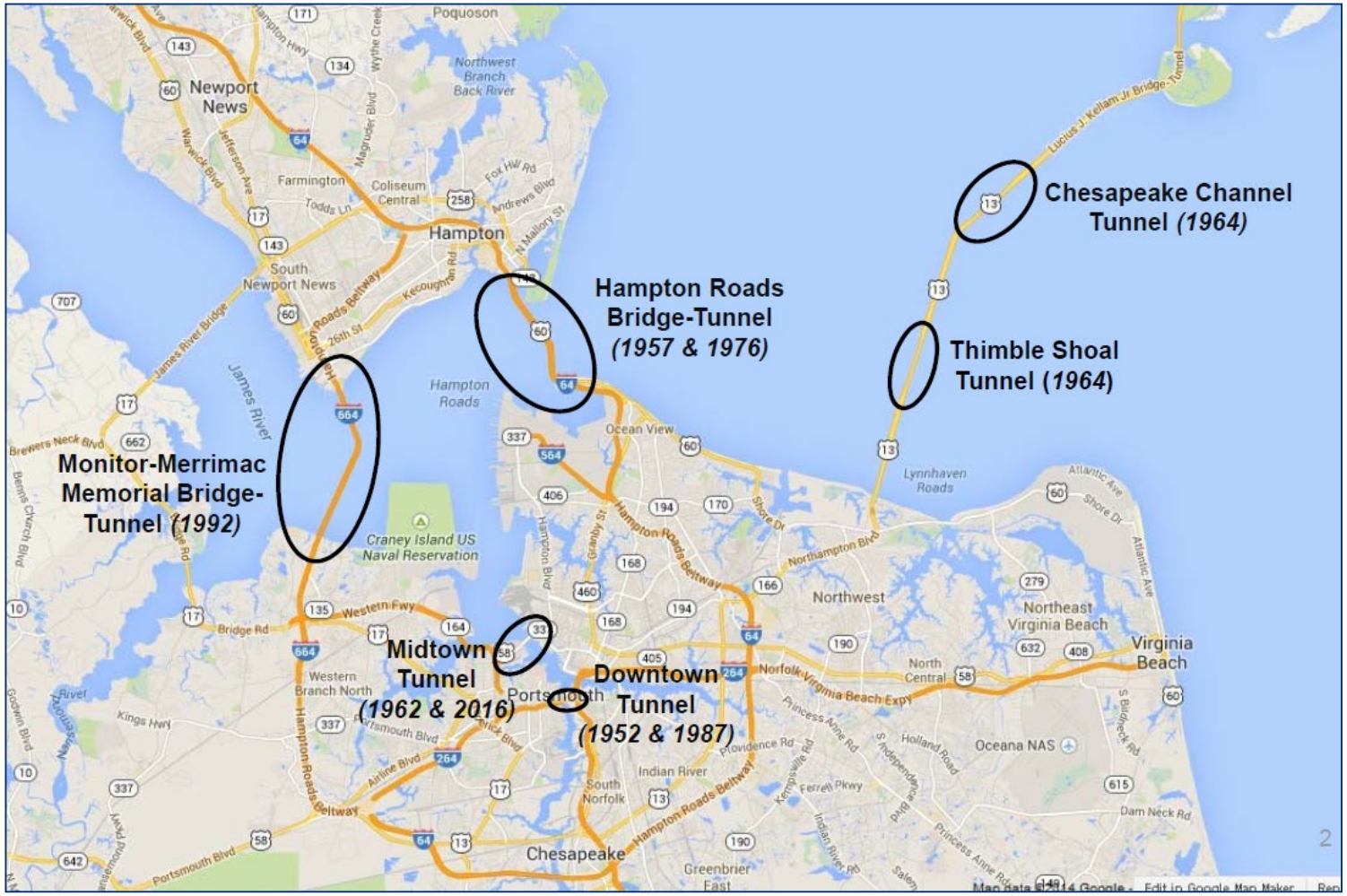
February 11, 2020

Project Overview

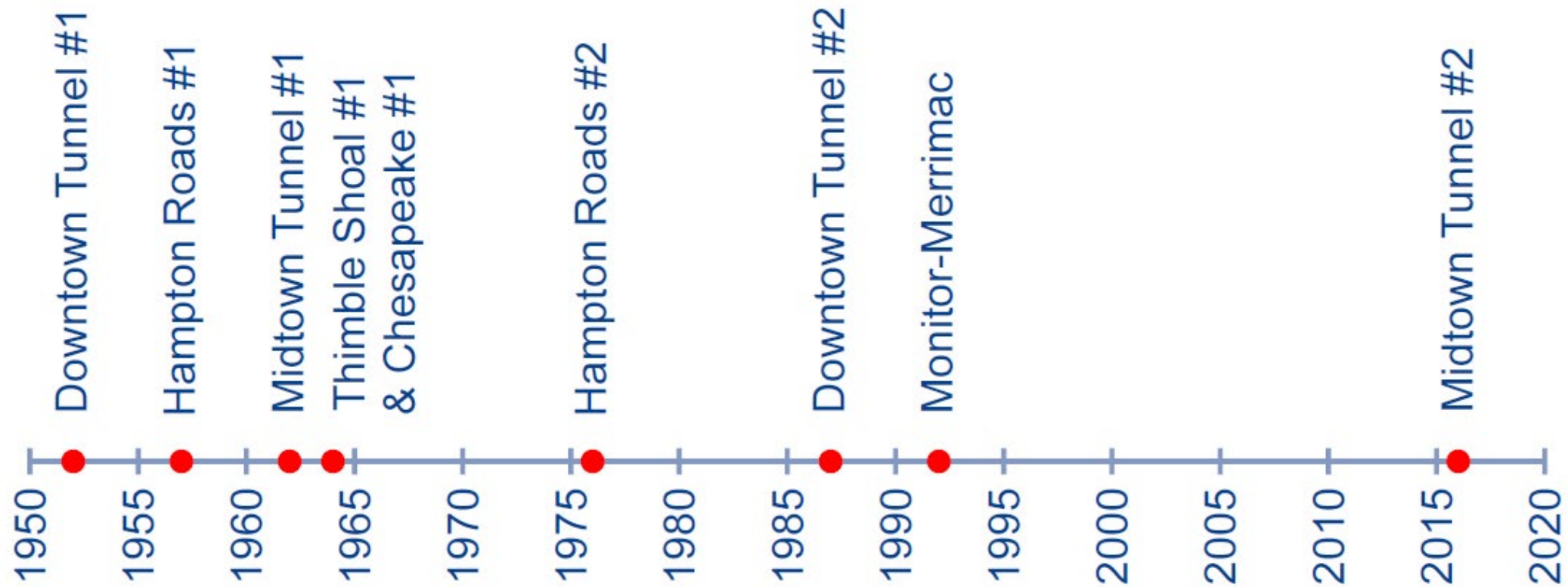
Ten Immersed Tubes in Hampton Roads



- Virginia's second-largest metropolitan area
- World's largest Navy Base
- Port of Virginia
- Heavy traffic congestion



65 Years of Tunneling in Hampton Roads



- 9 tunnels are steel-shell immersed tubes
- 1 tunnel is concrete-box immersed tube
- Future tunnel #11 at Thimble Shoal will be bored tunnel

Considering Tunnel Construction Methods

- **Why immersed tubes in coastal Virginia?**
  - Soft marine soils
  - Tunnel-boring machine technology
  - Local contractor expertise
- **Determination on tunnel-construction method for HRBT Expansion**
  - Bored Tunnel method at CBBT Expansion
  - Decision on tunnel construction method left to the Proposers
  - Both Proposers chose to pursue bored-tunnel option

HRBT Expansion Scope

- **Settlers Landing in Hampton to I-564 Norfolk (10 Miles)**
- **I-64 improvements include 6 lanes of highway plus drivable shoulder lane and construction of 4 lane bridge/tunnel facility**
- **New HRBT tunnels will serve Eastbound traffic**
- **2 existing HRBT tunnels will serve Westbound traffic**

HRBT Project Milestones to Date

ACTIVITY	DATE
RFQ Issued	December 15, 2017
Shortlist Announced	April 26, 2018
Draft RFP Issued	May 22, 2018
Selection of Tunnel Construction Method	July 31, 2018
Final RFP Issued	September 27, 2018
Technical Proposal Submission	January 15, 2019
Price Proposal Submission	February 8, 2019
Contract Award	April 3, 2019
Limited Notice to Proceed (LNTP) 1	April 12, 2019
LNTP 2 & LNTP 3	September 25, 2019

A World-Class Team

Project Scope: Tunnel and Major Structures

Project Scope: Tunnels, Islands, Bridges, Roadway

Tunnels

- Length (Each) 8,000 ft
- Inner Diam. 41.5 ft
- Excavation 956,000 CY
- Segmental Lining 119,000 CY
- Ground Improv. 494,000 CY

Structures

- Bridges to Demo 5
- Bridges to Build 4
- Bridges to Widen 23
- Total Length 38,800 ft
- Total Surface 2,086,000 SF

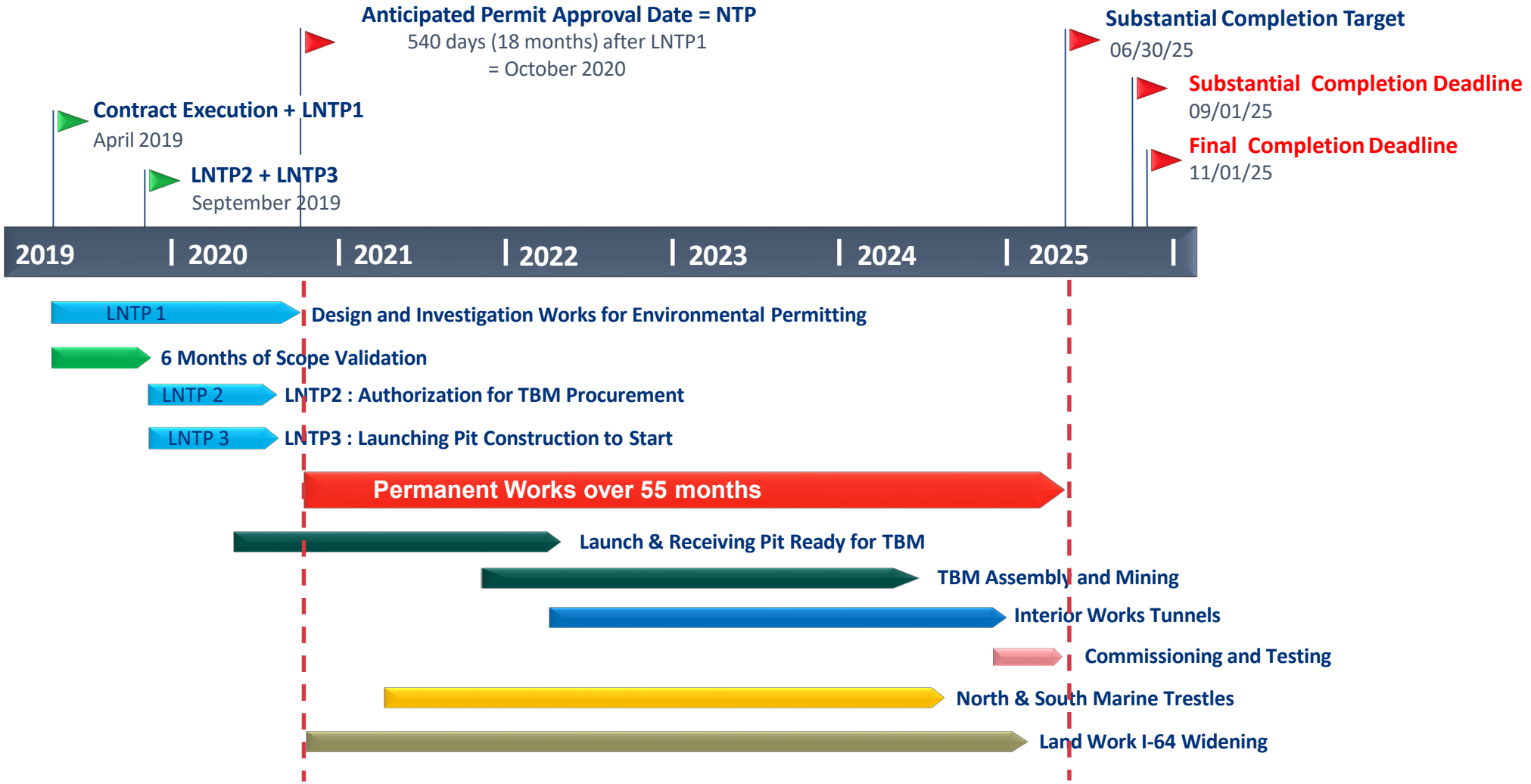
Roadway

- Excavation 127,000 CY
- Embankment 91,000 CY
- Noise Walls 727,000 SF
- Retaining Walls 101,000 SF

Islands Expansion

- Footprint 860,000 SF
- Fill 169,000 CY
- Dike 188,000 CY
- Armor Stone 351,000 Tons
- Splash Wall 6,000 CY

Project Schedule



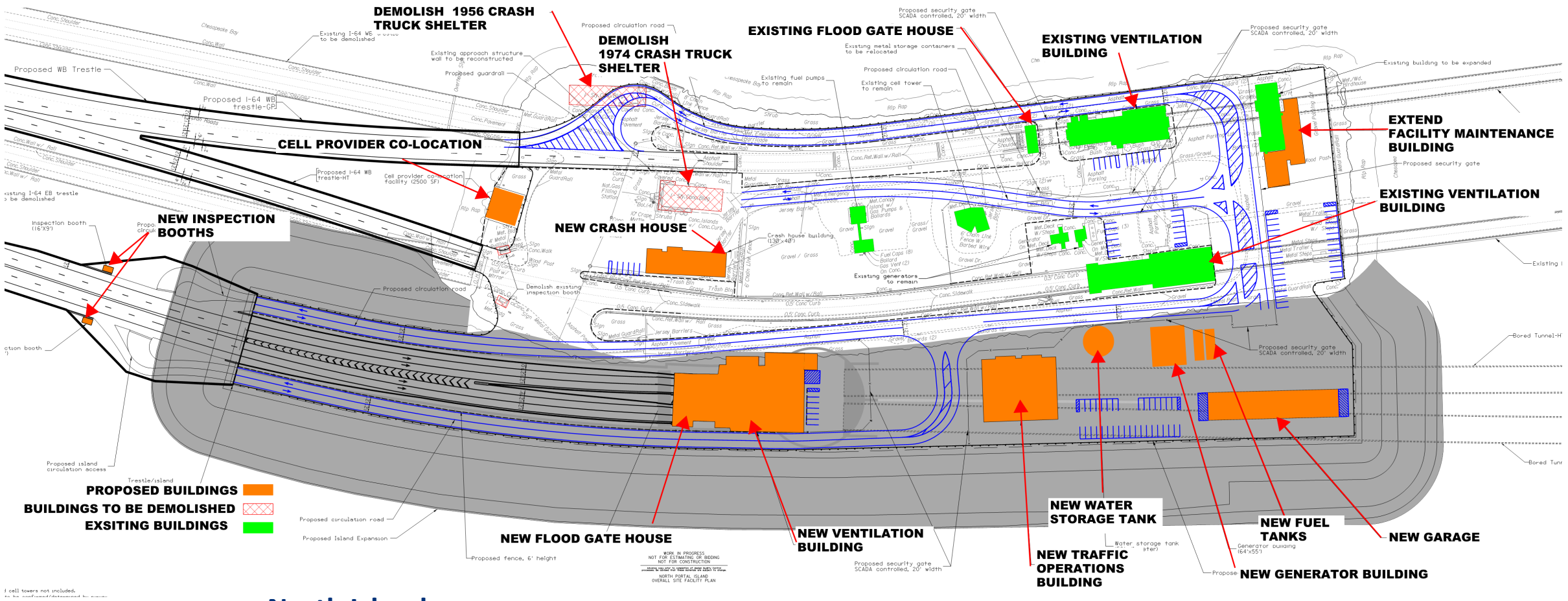
Man-Made Islands and Soft Soils: Construction of 1957 and 1976 Tunnels

1950s First Stage of the Crossing

1970s Expansion of the Islands and Roadway

The Islands Today

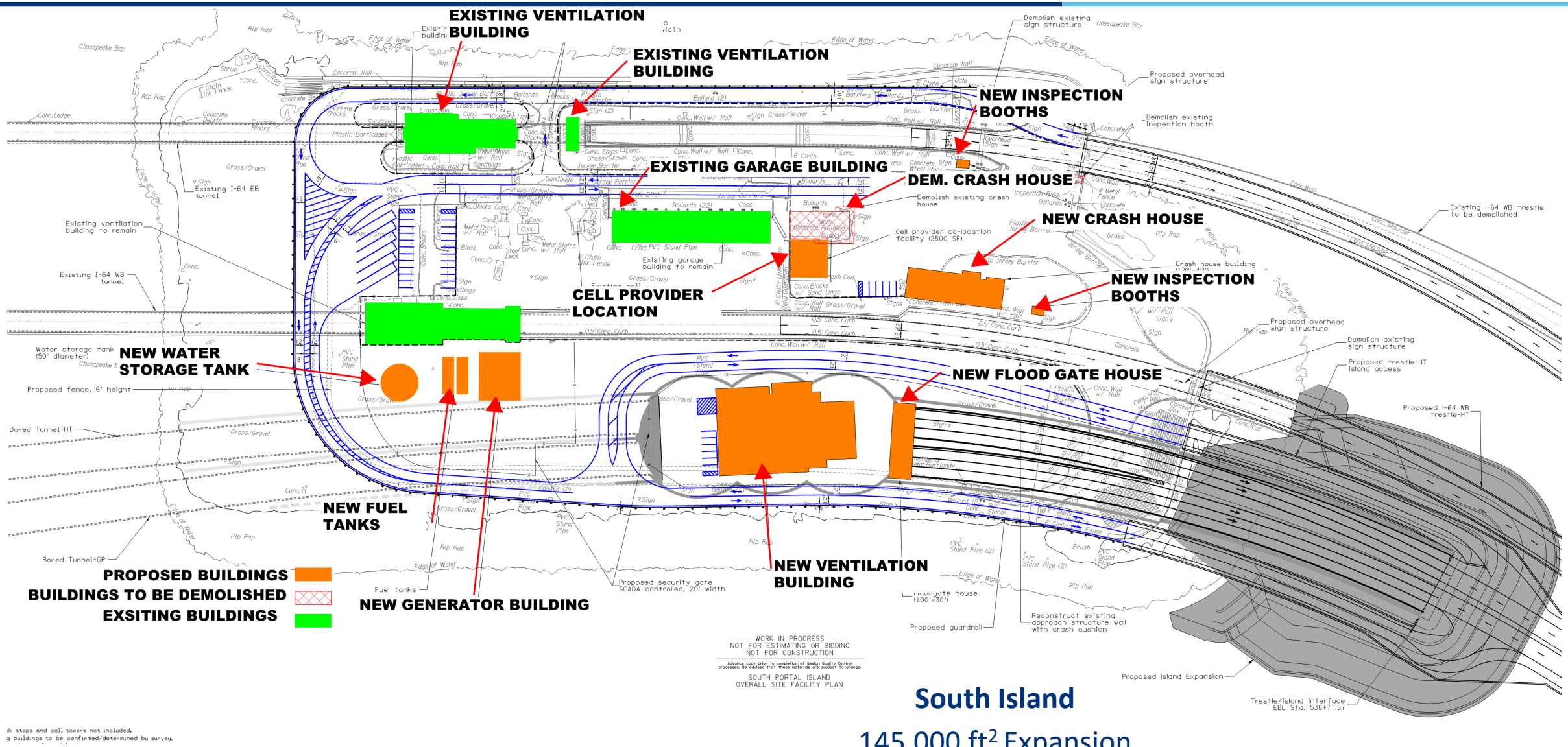
North Island



North Island

715,000 ft^2 Expansion

South Island

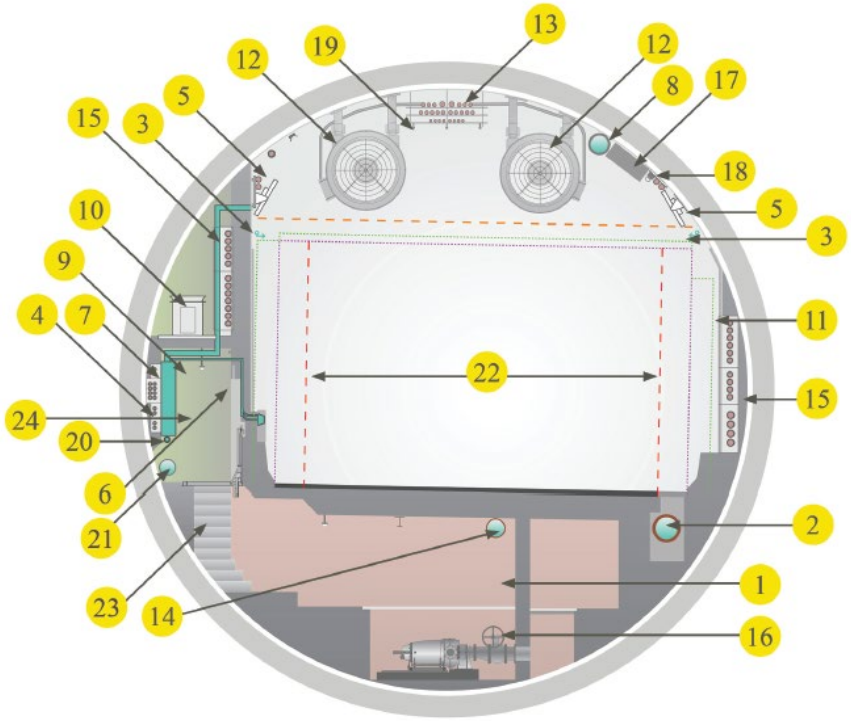


South Island

145,000 ft^2 Expansion

Prescriptive or Performance Specifications? Context and Examples

Tunnel Diameter: Prescriptive or Performance-Based?



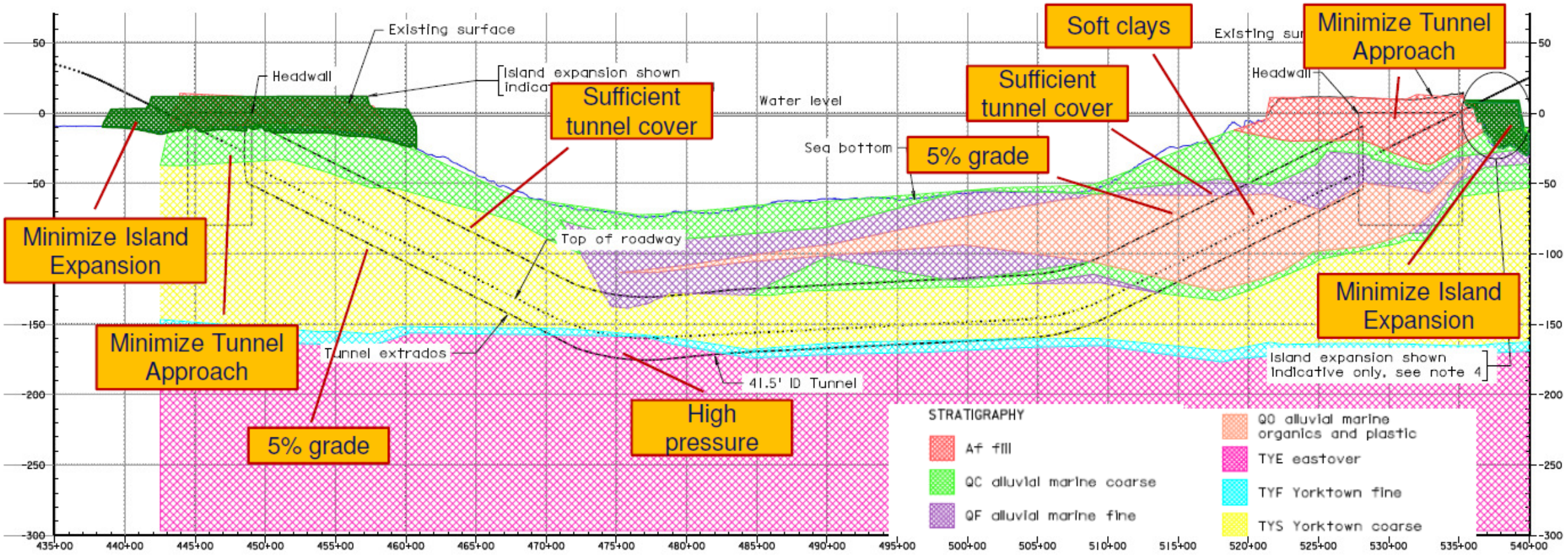
Internal Diameter: 41'-6"

- Spaceproofing for roadway tunnel requires fire suppression, ventilation, egress corridor, lighting, drainage, communications, and other utilities
- Challenge = lock in tunnel diameter to fit all these required items in smallest possible space before design is fully complete?
- Solution = specify minimum diameter rather than promote “race to the smallest diameter”

Extensive Site Geotechnical Investigations

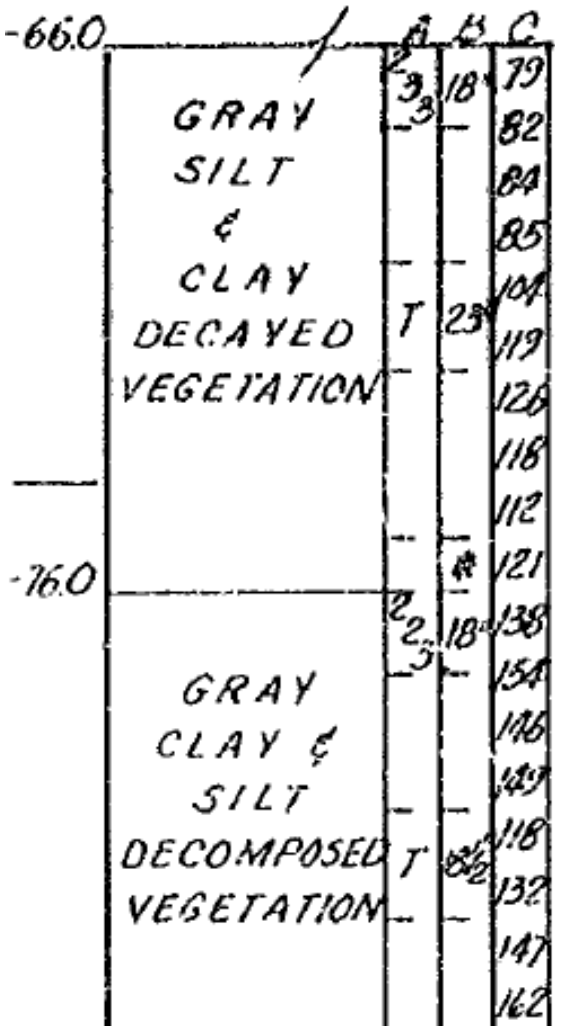
- Complete:
  - 1953 data for westbound tunnel
  - 1969 data for eastbound tunnel
  - 1960's data for Willoughby Bay bridges
  - 2017 data at north and south HRBT islands
  - 2017/18 data along potential project alignments
- In process:
  - Additional geotechnical investigations by design-builder

Geological Profile and Tunneling Constraints



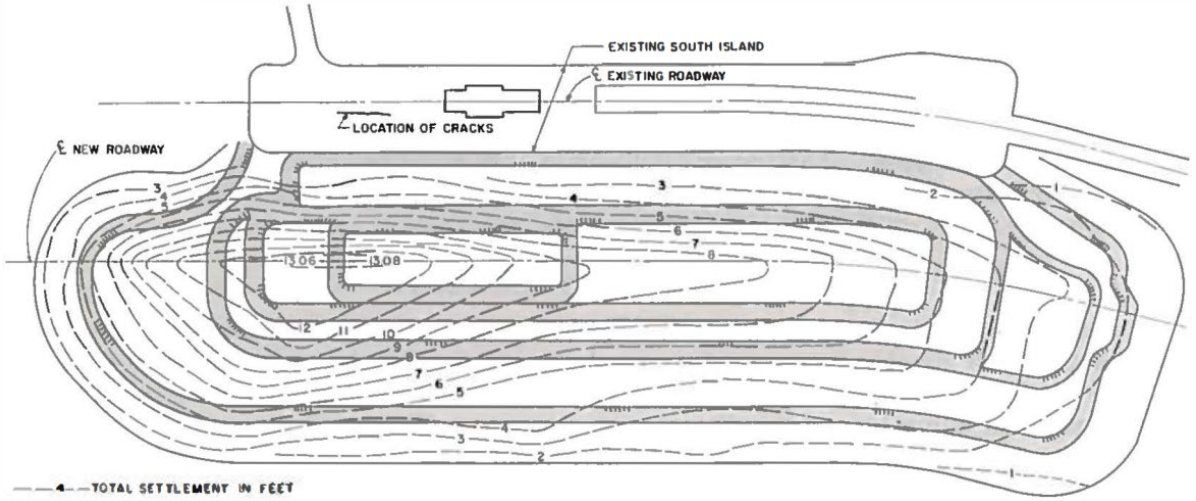
Geotechnical Considerations

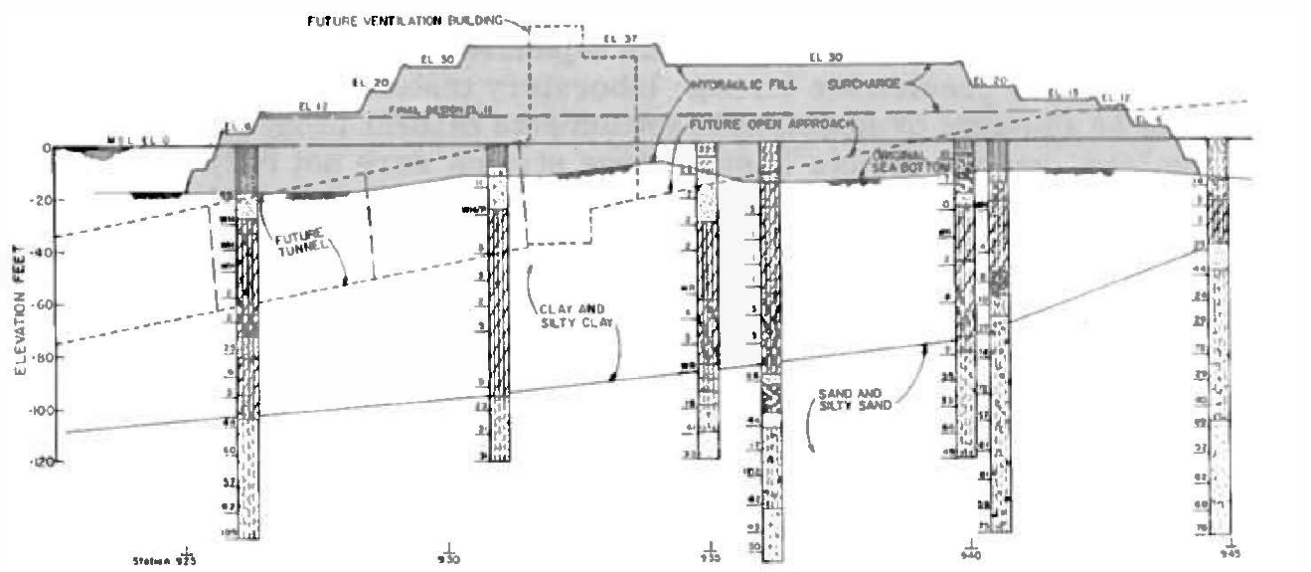
- Soil variations at north and south islands
  - HRBT has one “good island” and one “bad island”
- Mitigation of soft material at HRBT south island for each tunnel
  - 1957: material was excavated and replaced with sand fill
  - 1976: surcharge and sand drains were used to consolidate compressible layers
  - 2025: contract specifies ground improvement program



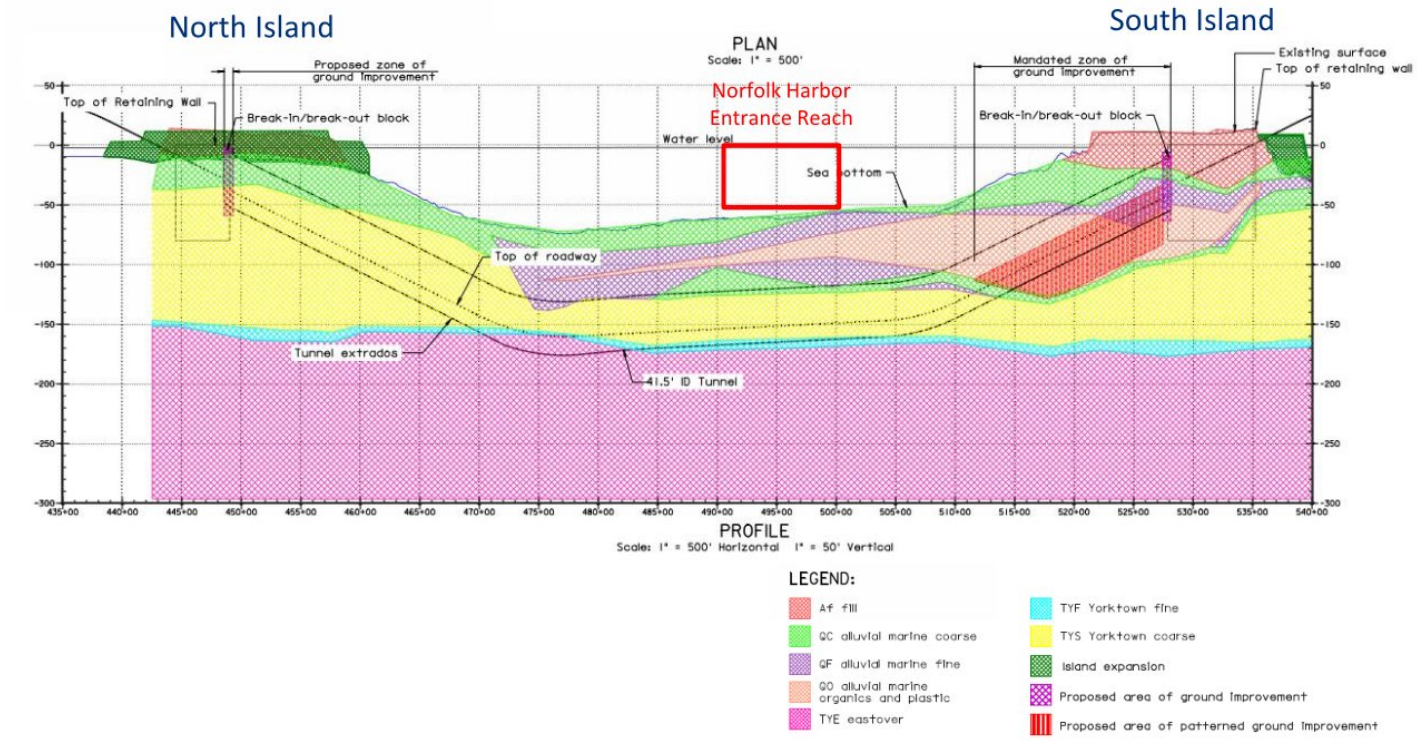
1976 Tunnel: Surcharge and Settlement at South Island

- Maximum surcharge: 26 feet (at future vent building) above island elevation
- Maximum settlement: 13 feet
- Total settlements achieved 15 months after fill reached final elevation





Prescriptive Solution: Ground Improvement



- Proposed alignment for the bored tunnel between existing North and South Islands

Hampton Roads Bridge-Tunnel

VDOT

Virginia Department of Transportation

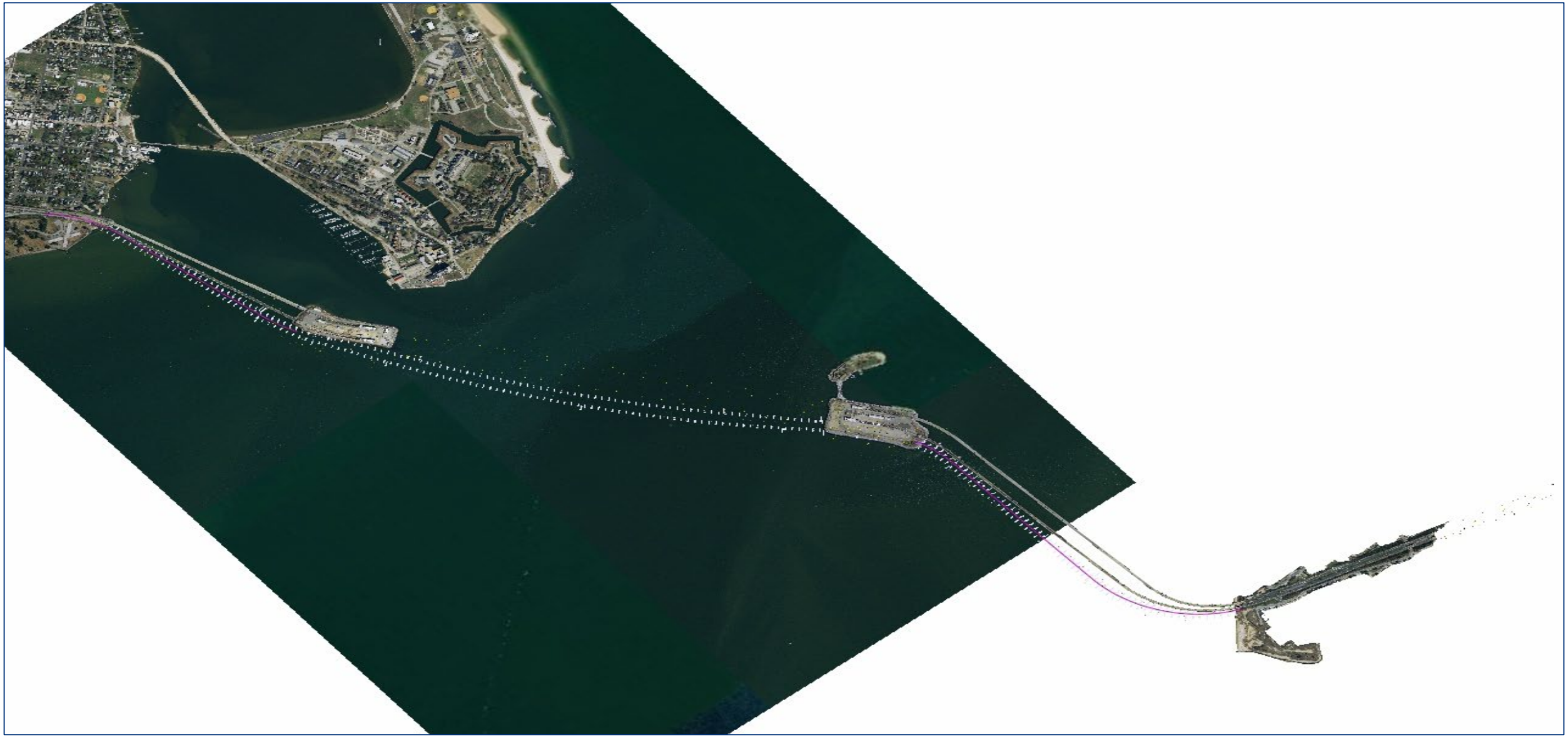
FINAL GEOTECHNICAL BASELINE REPORT

I-64 HAMPTON ROADS BRIDGE-TUNNEL EXPANSION PROJECT

UNDER THE
VIRGINIA PUBLIC-PRIVATE
TRANSPORTATION ACT OF 1995
(AS AMENDED)

STATE PROJECT NO. 0064-M06-032
FEDERAL PROJECT NO. [●]

ISSUANCE OF FINAL GBR:
NOVEMBER 28, 2018



Questions?