

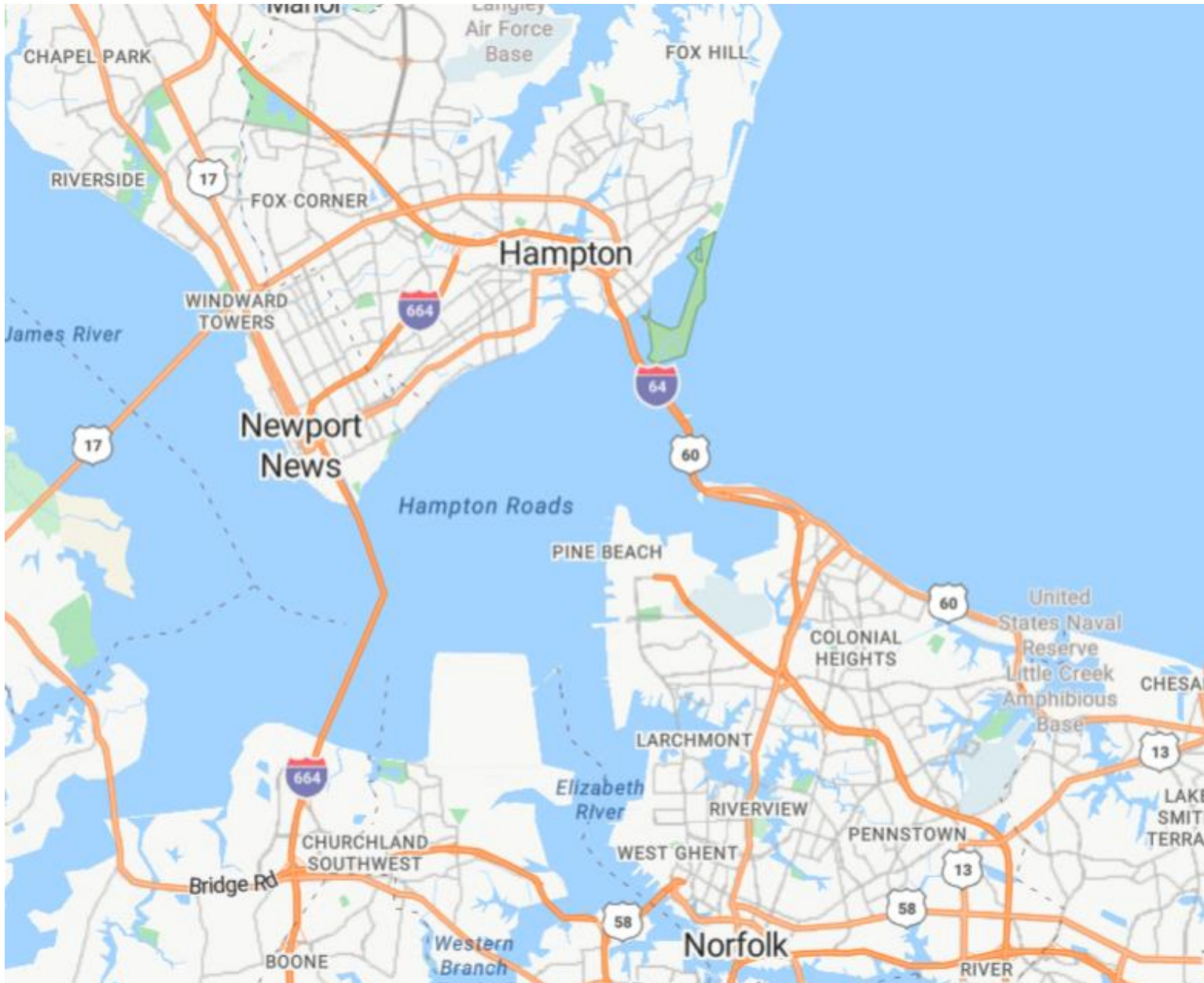


# Hampton Roads Bridge-Tunnel Expansion Project

NASA Langley Alumni Association

Tuesday, April 8, 2025





## Regional Landscape

- Home to the largest Naval Installation in the world
- Most modern container port on eastern seaboard
- 1.8 million residents

# Project Scope: More than Just a Tunnel



Increase Capacity | Ease Congestion | Enhance Travel Time Reliability





# Concept Video

**[HRBTExpansion.org](http://HRBTExpansion.org)**









# Project Overview



- Contract Award: April 2019
- Notice to Proceed: September 2020
- Cost: \$3.9 billion Design/Build Project
- Project Funding:
  - 92% - regional gas and sales tax
  - 8% - state and federal funds



# Project Partners



PROJECT OWNER



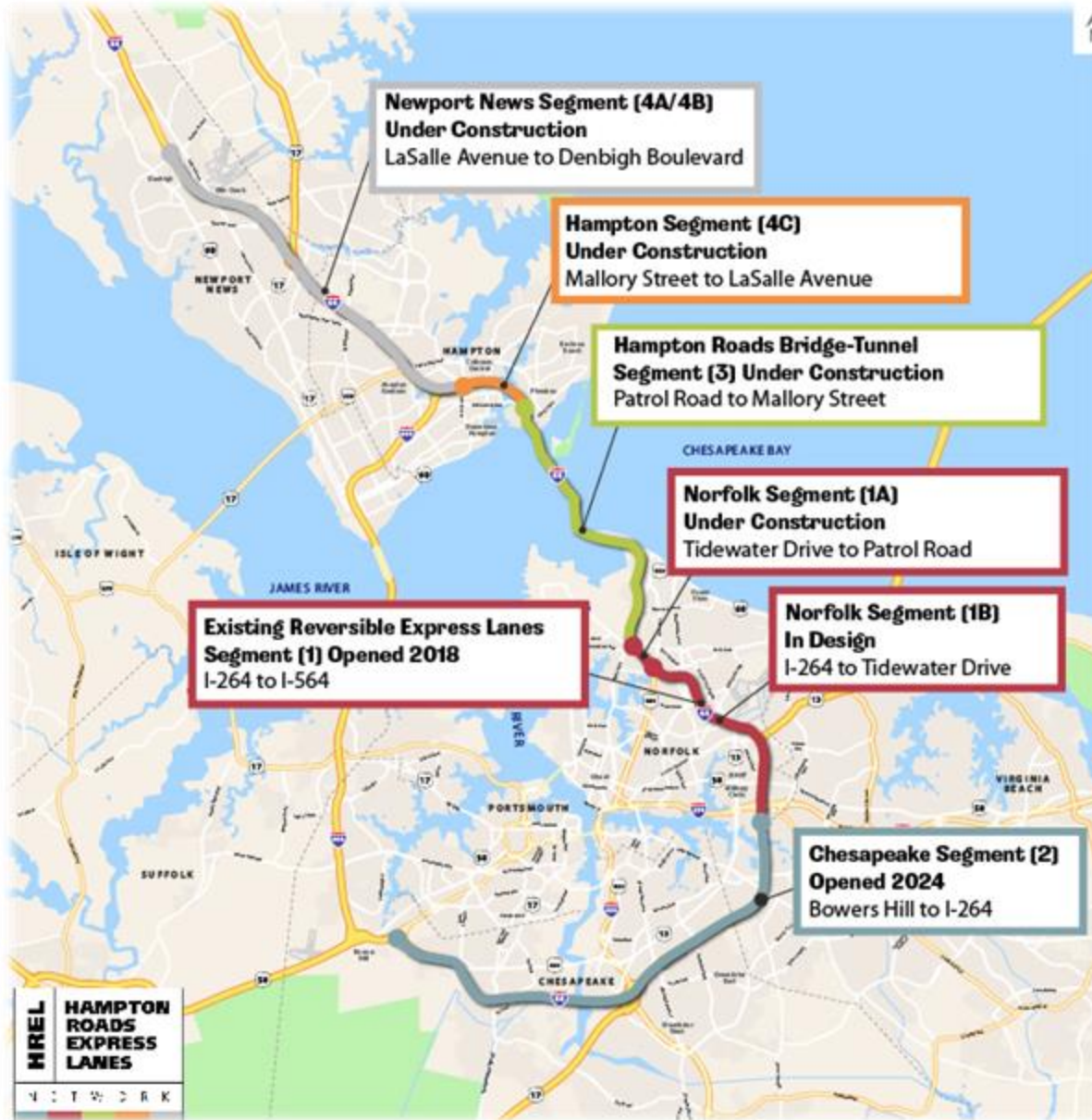
PROJECT FUNDING



PROJECT DESIGN/BUILDER



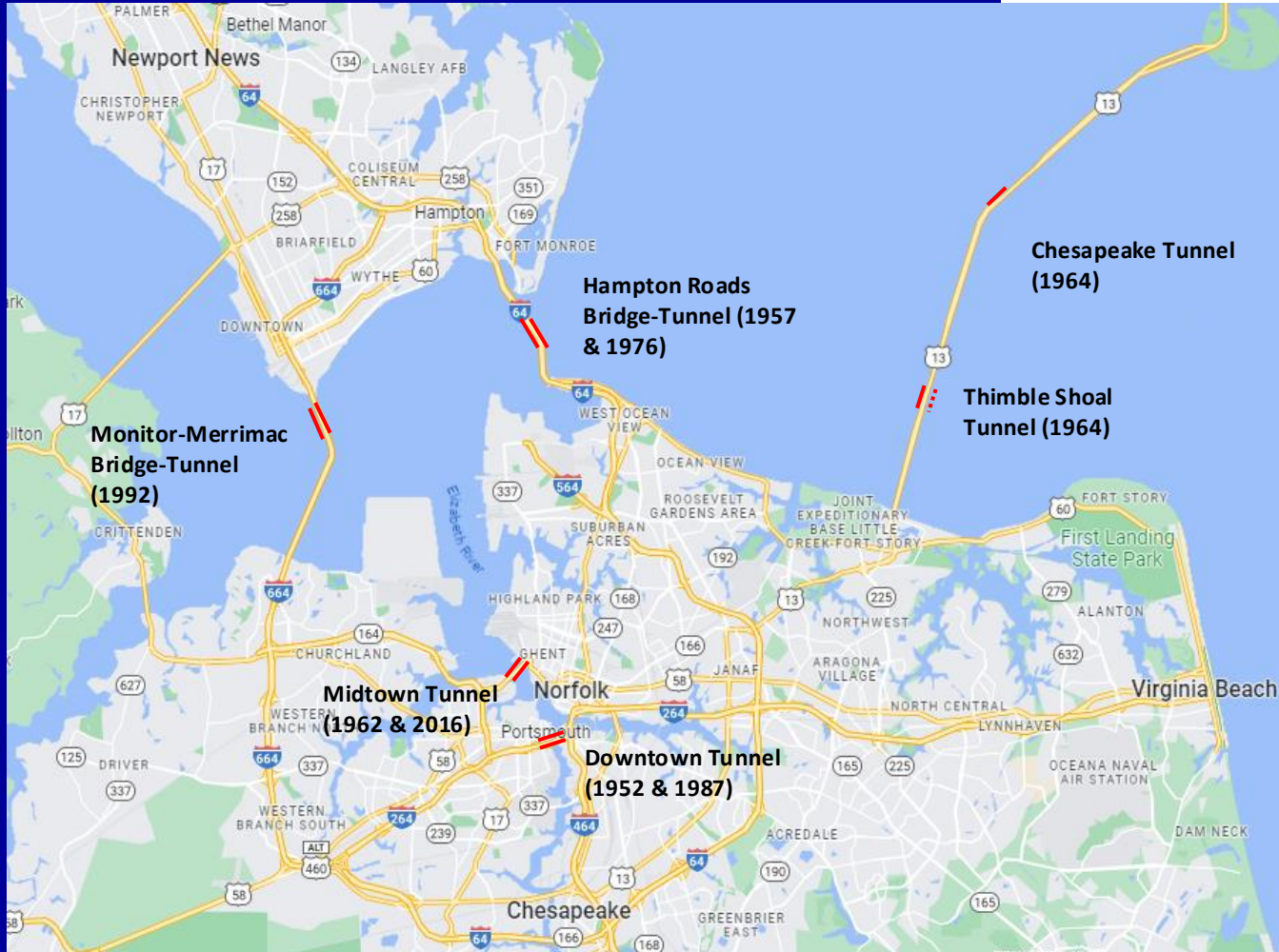
# Hampton Roads Express Lanes Network (HREL)



- 45-Mile Continuous Network
- High Occupancy Toll (HOT-2)
- Dynamic Tolling System



# Tunneling in Hampton Roads



- Largest collection of immersed tube tunnels in the world
  - 10 immersed tube tunnels in the region
  - Oldest: Downtown Tunnel (1952)
  - Newest: Midtown Tunnel (2016)
- World's first tunnel between man-made islands
  - HRBT (1957)

# Tunneling in Hampton Roads



- Immersed Tube Tunnel Challenges
  - Space for casting
  - Maritime traffic considerations
  - Subject to tides & weather





# **“Mary” the TBM**



- “Mary” the Tunnel Boring Machine
- Colors on TBM cutterhead represent Hampton Roads regional flag
- Length: 430 feet
- Weight: 4,700 tons (9.8 million pounds)
- Diameter: 46 feet
  - 2nd largest TBM in North America





# What Makes HRBT Unique

- First bored tunnel for VDOT
  - 2<sup>nd</sup> largest TBM in North America
  - 3<sup>rd</sup> bored vehicular tunnel in the US
- No impacts to Navigable Waterways
  - New tunnel will be 173 FT below water surface
- Minimal Impacts to Traveling Public
  - Segments shipped by barge
  - Spoils hauled by water
- Continuous Operation
  - Not subject to adverse weather
  - Able to continue 24/7 without interruption

Photo Credit: Herrenknecht

# What's in a Name?

- TBM was named “Mary” by local schoolchildren in honor of **Mary Jackson**
- Pioneering NASA engineer and Hampton Roads native
- NASA’s first black female engineer in 1958
- Famously memorialized in the 2016 movie *Hidden Figures*



# Slurry Treatment Plant



- Manufactured in France
- Stands 3 stories tall
- Separates soil from slurry
- Spoils pumped to surface through 22-inch steel pipe
- Operates 24 hours a day
- Largest STP in North America

# Katherine & Mary; Working Together Again



The HRBT Expansion Project team honors the legacy of **Katherine Johnson**, lending her namesake to our Slurry Treatment Plant (STP).

- First black female engineering student at West Virginia University
- Entered NASA's West Area Computing section in 1953
- Famously, calculated John Glenn's re-entry calculations for Friendship 7 mission





# Tunnel Segments

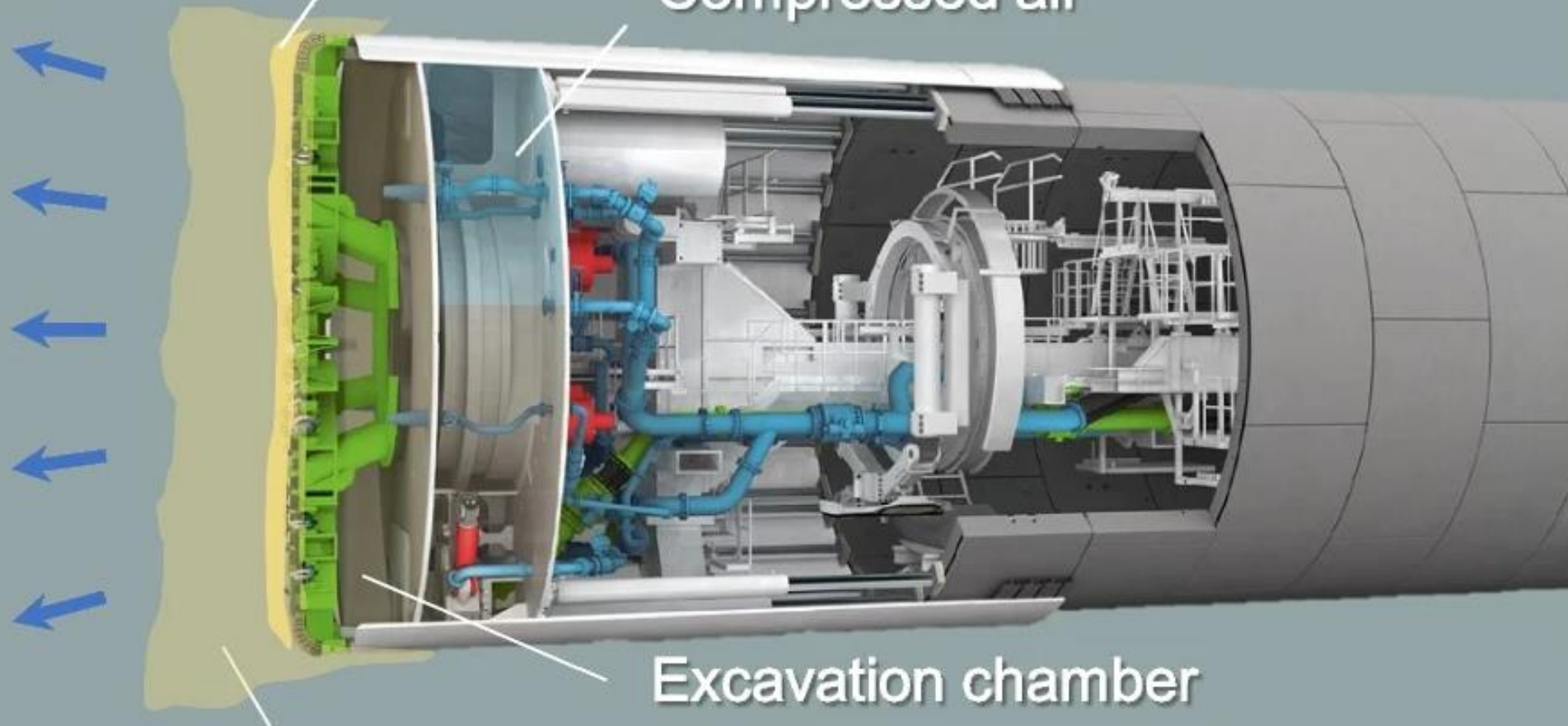
- Fabricated in Cape Charles, VA
- 9 segments = 1 ring
- Average Dimensions = 16' x 6'-6" x 18"
- Each segment weighs roughly 10 tons
- 2,388 rings will be needed to complete both tubes



Groundwater  
flow

Filter cake

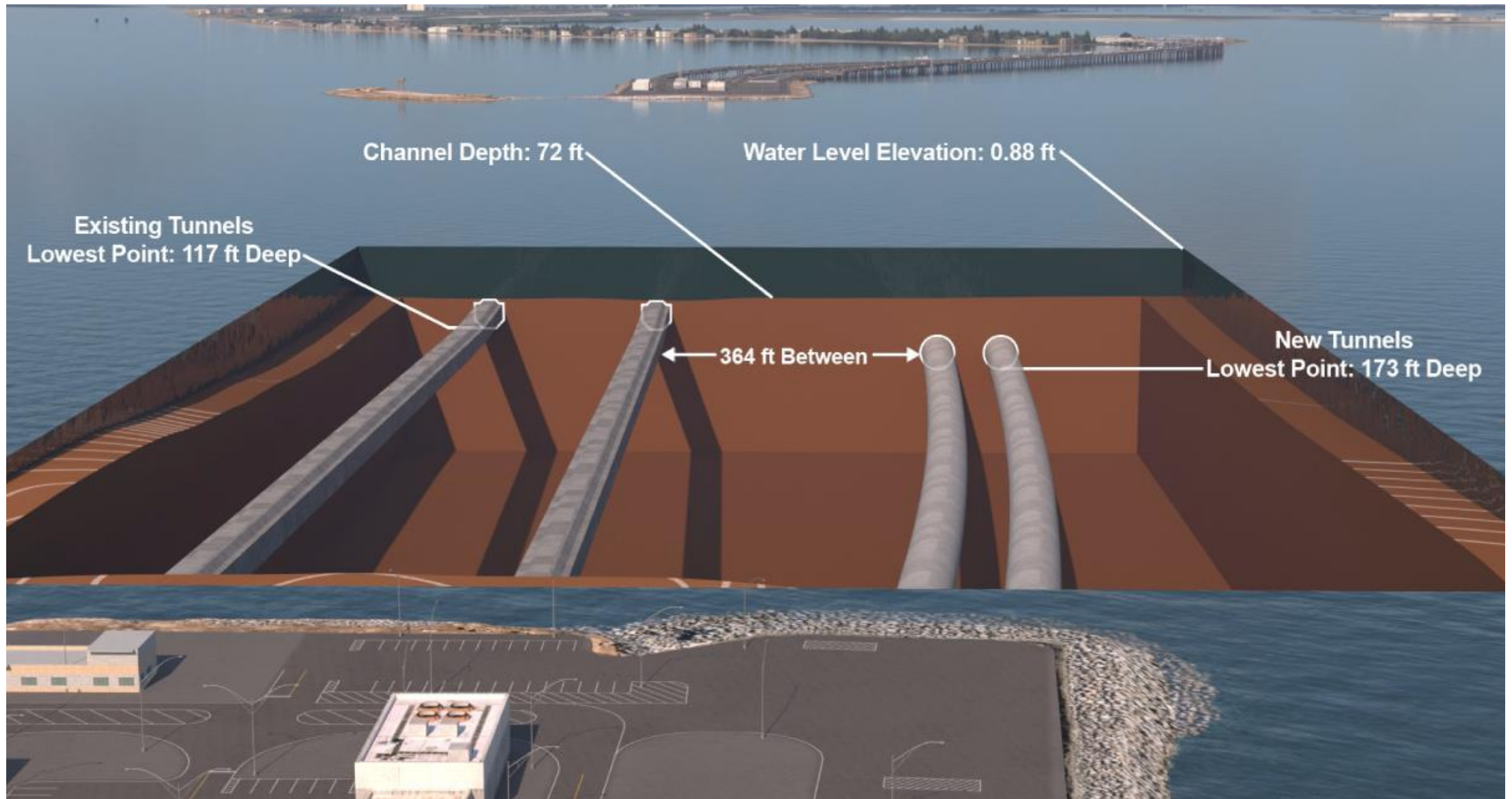
Compressed air



Infiltration zone

Excavation chamber  
(filled with bentonite slurry)







- 16'-6" Clearance
- Egress corridor
- Jet fan ventilation
- 15,000 truckloads of base material
- More than 1 million square feet of tile

### Typical Cross Section



# Project Progress





# North Marine Trestles

- Construction began in 2021
  - First phase opened May 3, 2024
- First new trestle at the HRBT in more than 50 years

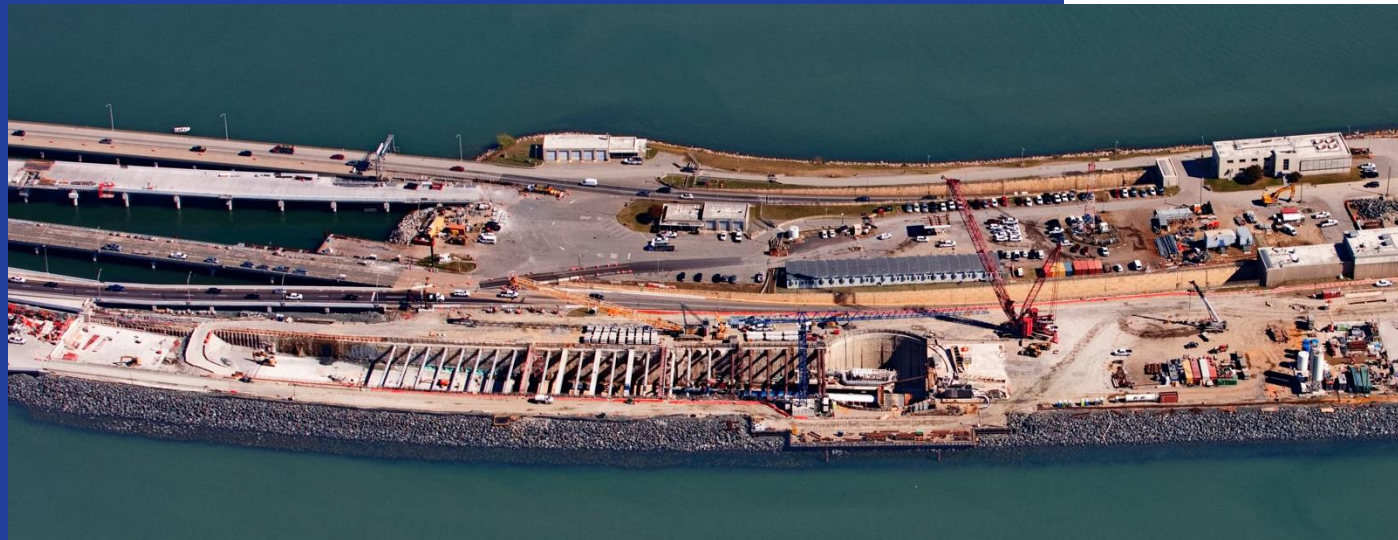




Summer 2021



October 2024



## North Island Progress

- 15-acre island expansion completed
- Slurry walls installed
- Receiving pit excavated to depth of -65 FT
- Concrete base slab poured
- Approach excavation underway



# VDOT's Largest-Ever Continuous Concrete Placement



## North Island Receiving Pit Base Slab

- November 17<sup>th</sup>, 2023
  - Placement time: 31 hours
  - Pour volume: 5,480 CYD
- 
- 176 cubic yards per hour
  - Fully loaded concrete truck every 3 minutes



# South Island





# South Island Progress

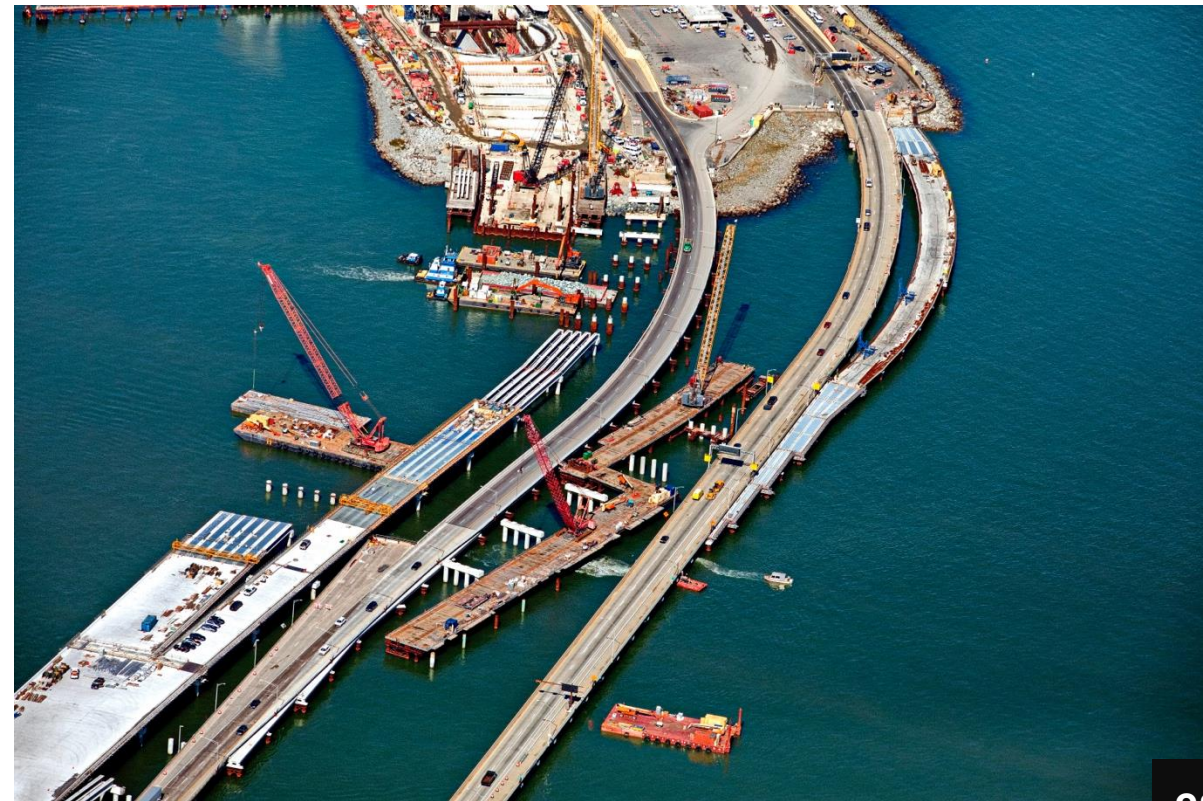


- Support of mining operations
- Interior wall and roadway slab construction ongoing



# South Marine Trestles

- Construction began in 2021
- First phase scheduled to open Spring 2025

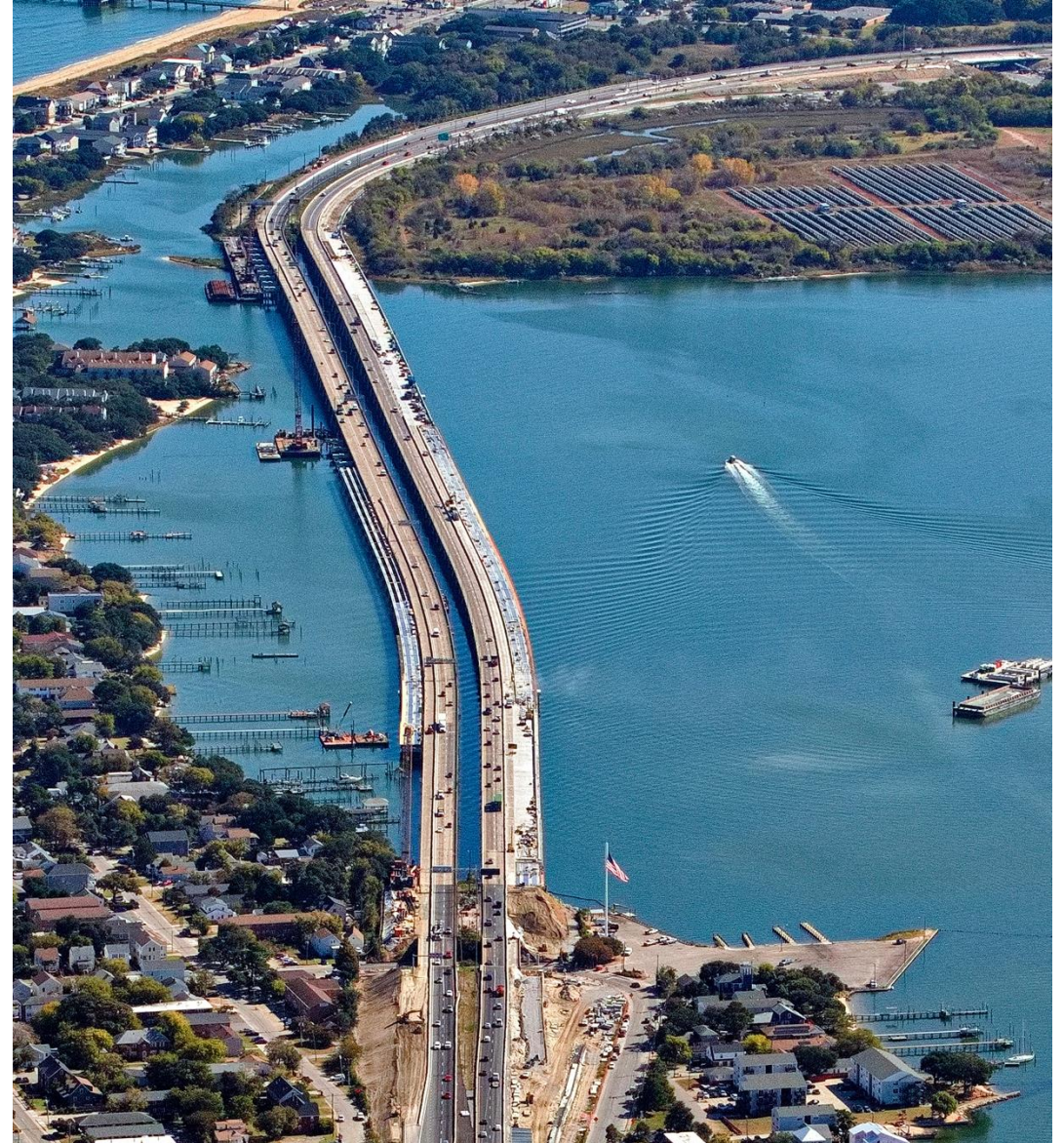




# Landside South Progress



- Interstate widening & bridge rehabilitation
- Stormwater control improvements
- Sound walls under construction

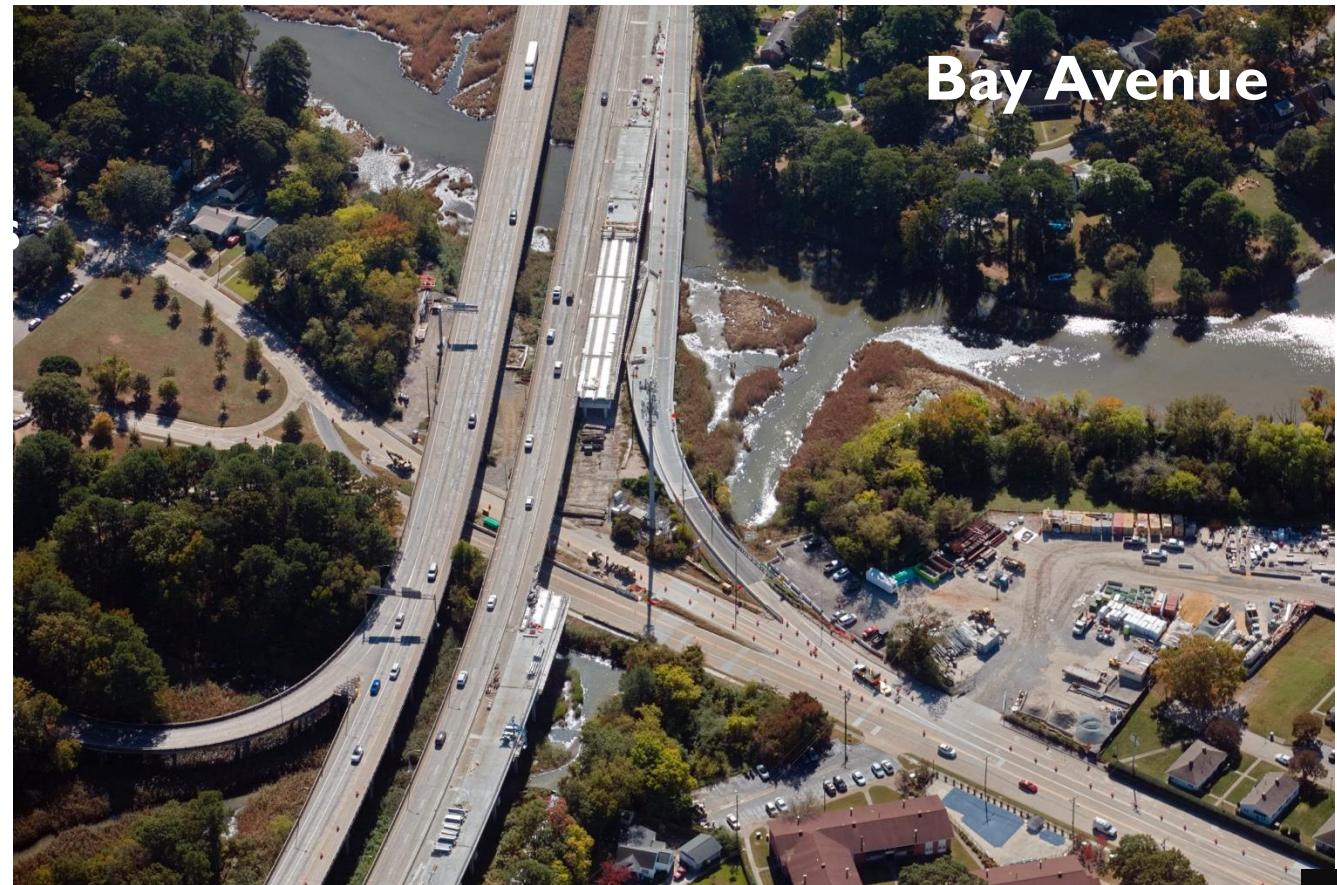




# Bridge and Surface Street Rehabilitation



- **Patrol Road**
- **West Evans Street**
- **1st View Street**
- **West Bay Ave**
- **Mason Creek Road**
- **13th View Overpass**





# Tunnel Work



- Mining commenced April 23, 2023
- Planned 1-year evolution



# Tunnel Work



## ■ Twin Tunnels

- 7,941 FT
- 1,191 rings

## Best Day

- 17 Rings
- 113.2 FT

## Best Week

- 50 rings
- 331.9 FT





# Virginia's First Bored Tunnel

➤ April 17, 2024





# Tunnel Work

## Rotation of Shield

- Heaviest (2,350 Tons) & Largest (46 FT) ever rotated
- Shatters previous record (2023) of 1,542 Tons and 39 FT







# Tunnel Work



## Second Tunnel

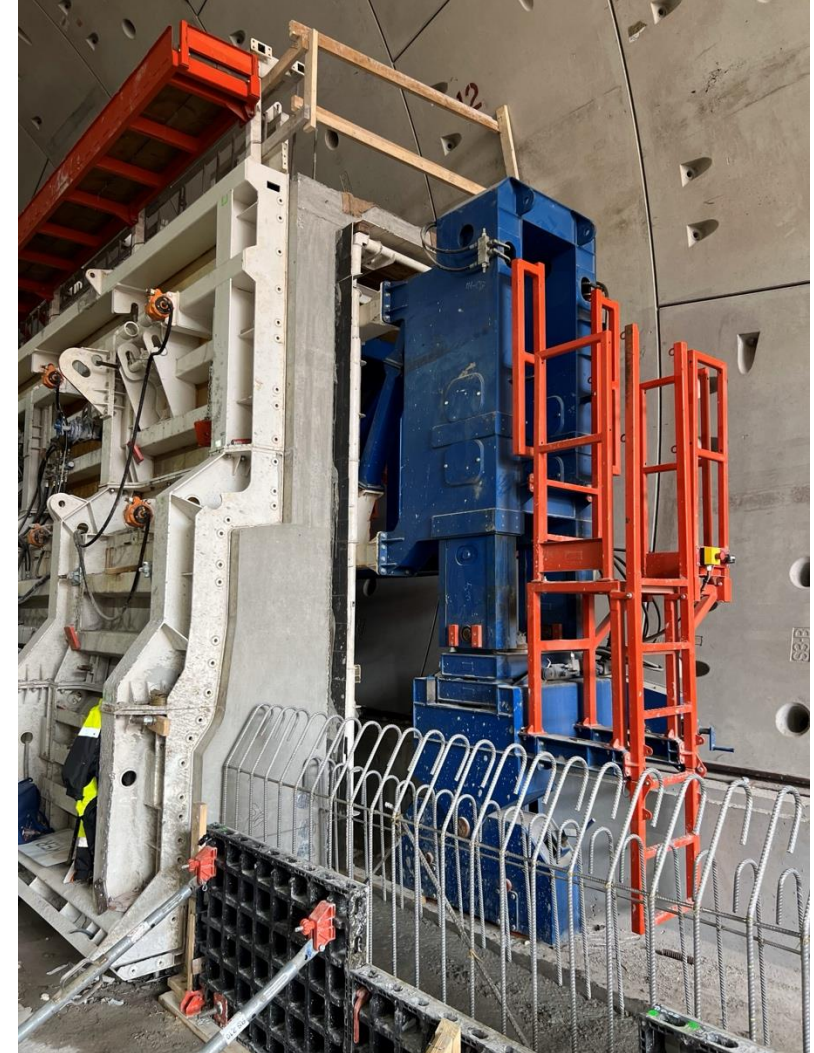
- Mining began October 17, 2024

## Current Status

- 3,046 FT mined (38%), 450 rings installed of 1,194



# Tunnel Work

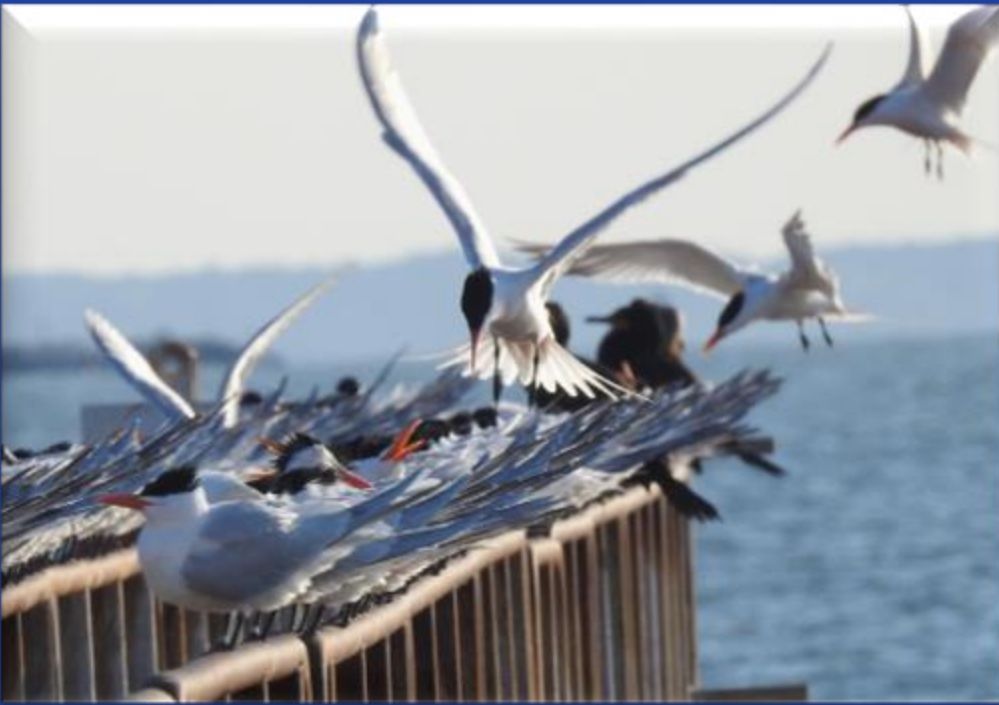




# Project Facts & Finds

An aerial photograph showing a large-scale bridge construction project. The bridge spans a wide body of water, with a section in the foreground showing active construction with cranes and temporary structures. The bridge has multiple lanes and curves along the coastline. In the background, a coastal town with many houses is visible on a peninsula. The sky is clear, and the water is a deep blue-green.





## Environmental Challenges

- Endangered/Protected Bird Species
  - ❖ *Migration and Nesting Season*
- Marine Noise Impacts
- Protected Species within Project Limits







# Historic Artifacts



**From the Battle of Hampton Roads between the USS Monitor and the CSS Virginia (formerly the USS Merrimack) in 1862.**



**Timber from ship delivering granite to Fort Monroe. Circa 1823.**



# PreHistoricArtifacts



- Mastodon
  - ❖ Approximately 50,000 years old
  - ❖ Fossils include partial
    - Tooth
    - Rib
    - Limb
    - Vertebra





# HRBT EXPANSION Magazine



Summer 2022

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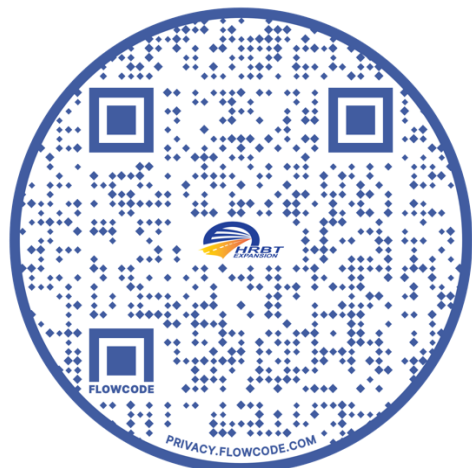


## Ongoing Outreach

- Social Media
- Local Presentations
- Project Website
- HRBT Monthly Newsletter
- HRBT Tunnel Talk Podcast

***“A Boring Podcast”***

- HRBT Magazine
- Community Engagement Events
- Weekly Lane Closure Report







# CONNECT

PROJECT PROGRESS, UPDATES, & MORE!



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**Q&A**

