



# Hampton Roads Bridge-Tunnel Expansion

## 2019 Virginia Concrete Conference

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# Project Scope

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





# Project Components

- **Tunnel crossing**
  - ~ 8000 ft. across Hampton Roads waterway
- **Island improvements**
- **Marine bridges**
  - ~ 9000 ft. across Hampton Roads waterway
  - ~ 5000 ft. across Willoughby Bay
- **Landside highway widening**
  - ~ 1 mile in Hampton
  - ~ 4 miles in Norfolk







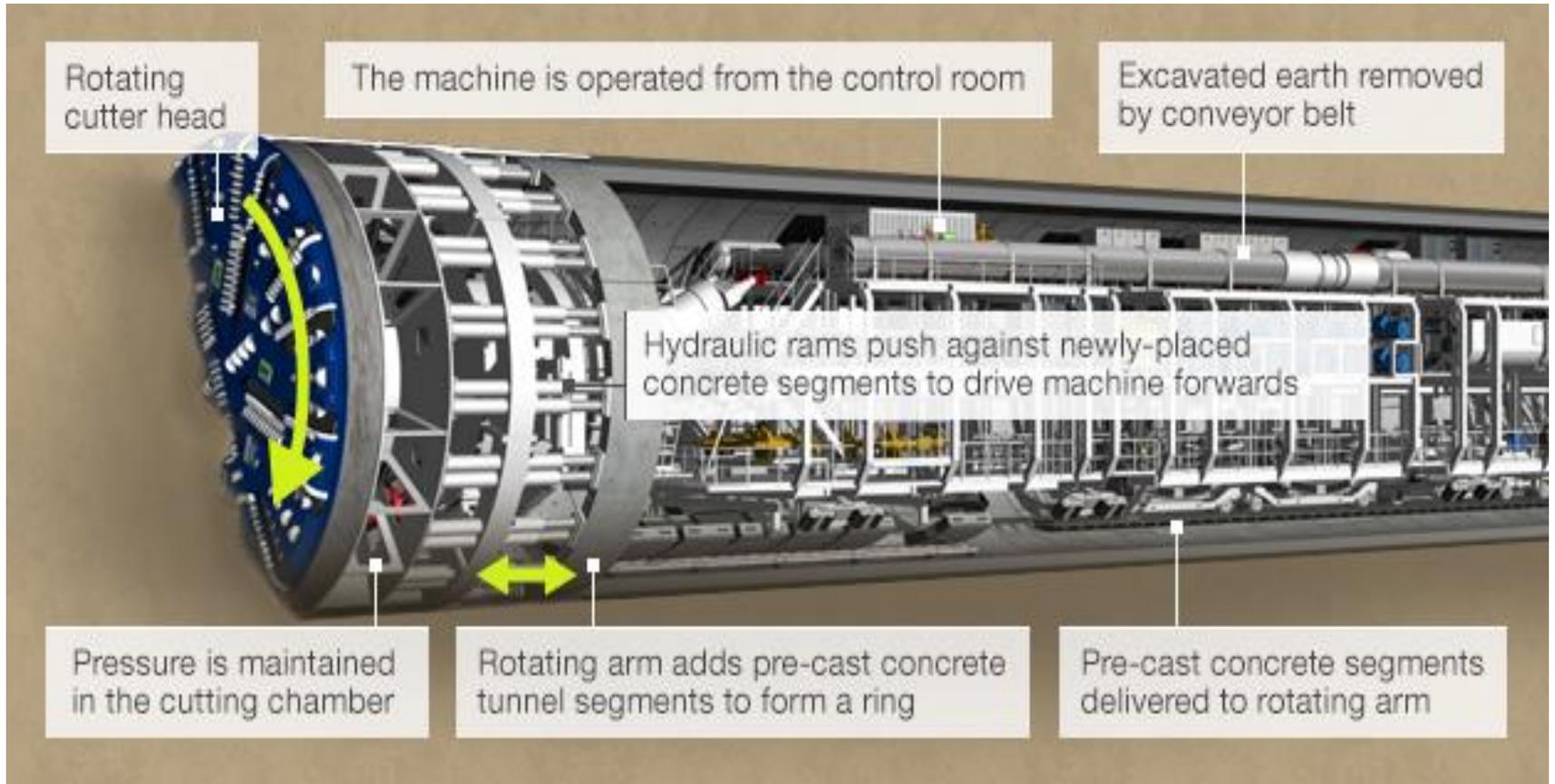
# HRBT Conceptual Quantity Estimate

- **Marine bridges**
  - 160,000 LF of precast girders
  - 175,000 LF of precast piles
  - 85,000 CY of CIP concrete
  
- **Landside bridges and structures**
  - 70,000 LF of precast girders
  - 180,000 LF of precast piles
  - 25,000 CY of CIP concrete
  - 75,000 LF of parapet and median barrier
  - ...in addition to precast pipe, temporary barriers, sound walls
  
- **Bored tunnel**
  - 120,000 CY of precast liner segments
  - 75,000 CY of walls and slabs on islands
  - 20,000 CY of CIP walls and walkways in tunnel
  - ...in addition to tunnel ballast and operations buildings

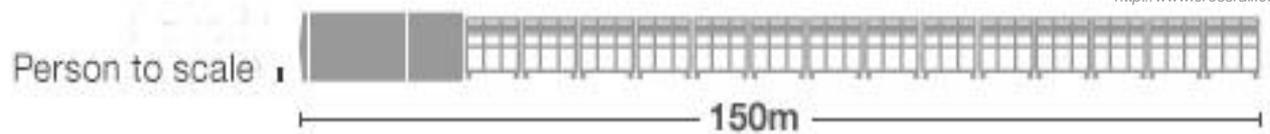
## HRBT Bored Tunnel Concept Design

- **Two parallel 2-lane tunnels, each ~ 8,000 ft. long**
- **Interior diameter 41'-6"**
- **Deeper than immersed tube tunnel because more cover is needed for buoyancy control – therefore tunnel is longer**
- **5% roadway grades require island expansion lengthwise**
- **Over 1 million cubic yards excavated tunnel material**
- **Ground improvement at islands to support weight of tunnel boring machine**

# Tunnel Boring Machine (TBM)



<http://www.crossrail.co.uk>



# Steel Forms for Precast Liners



# Assembly-Line Production



# Steam Curing



# Stripping

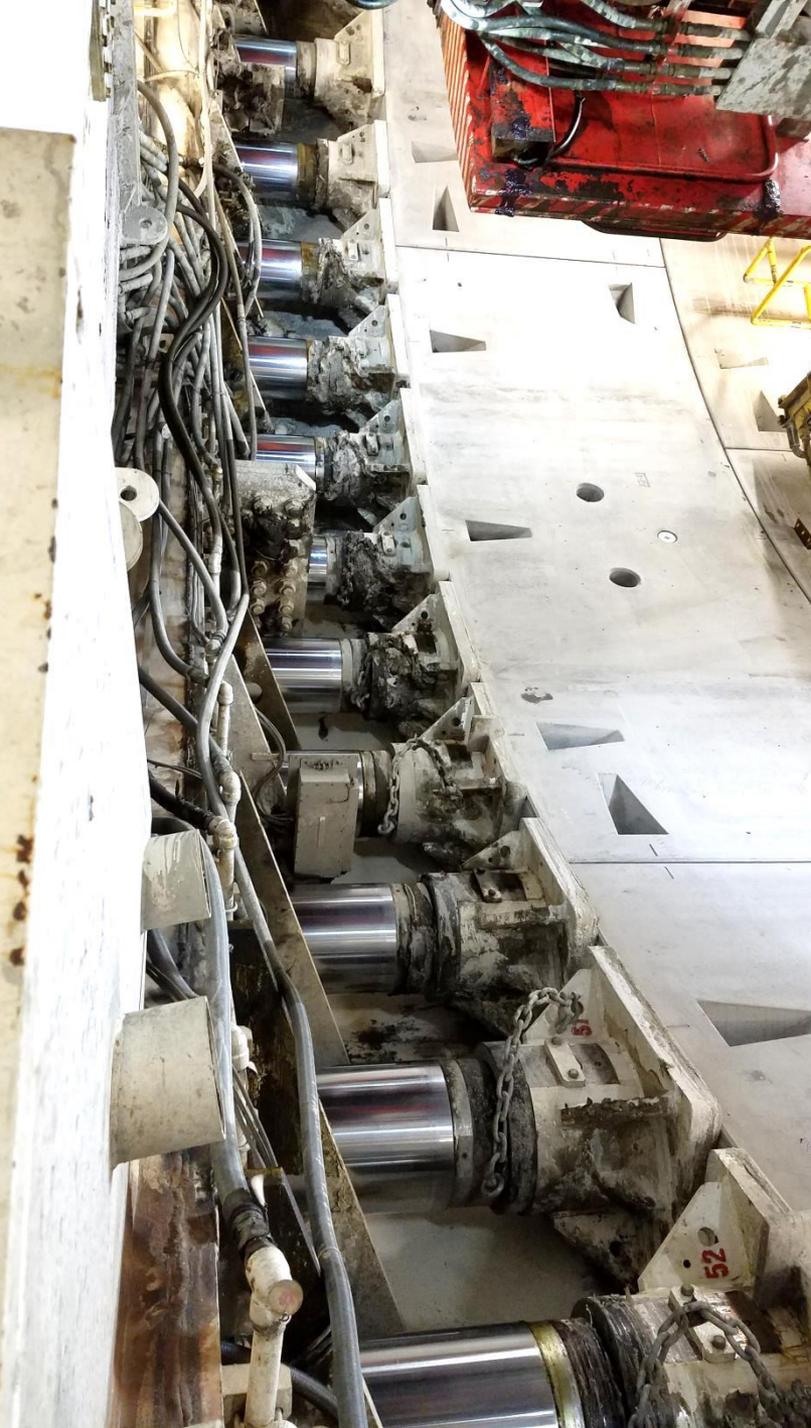


# Mock-Up of Rings for Testing



# Transport from Laydown Area to Shaft

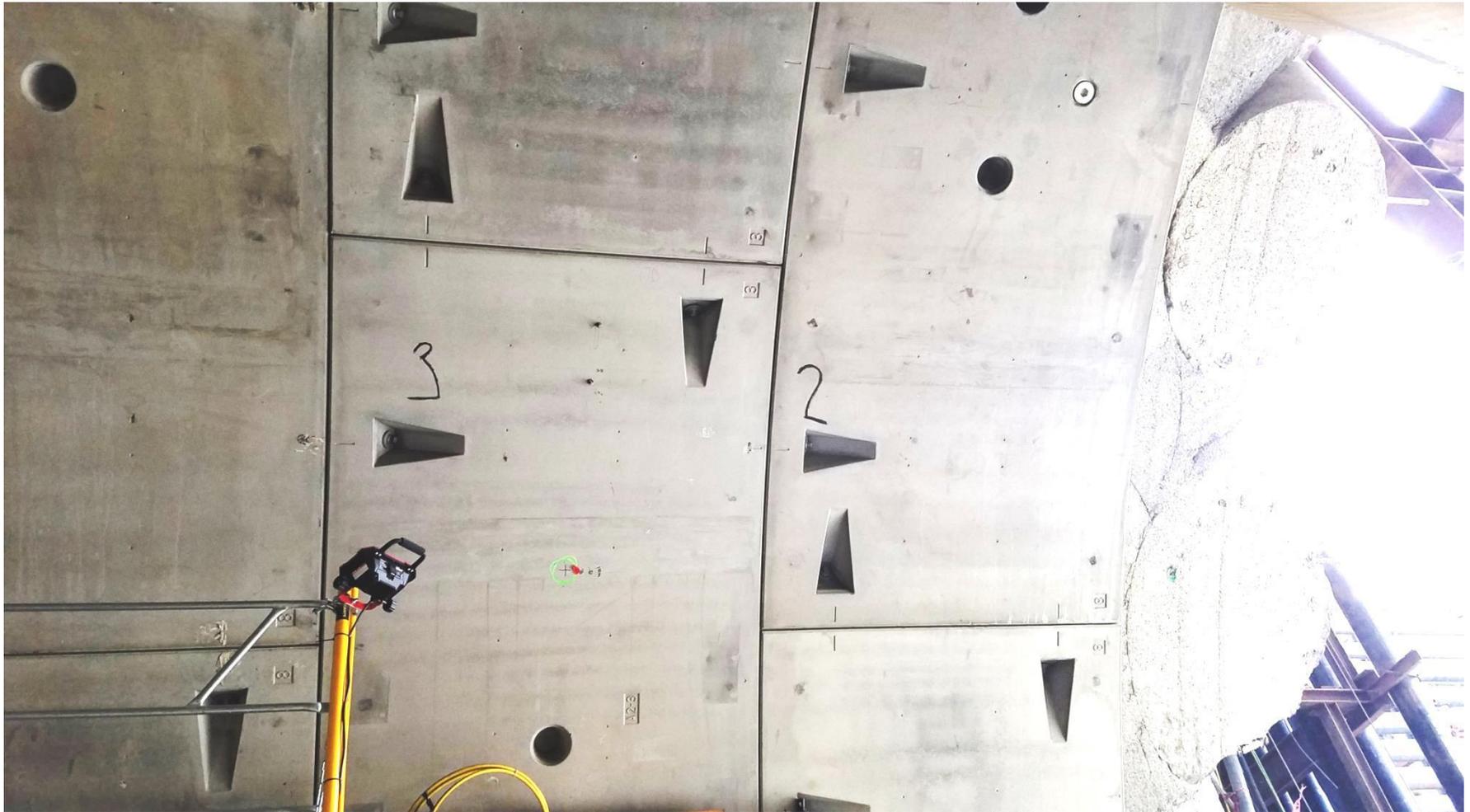




## Bored Tunnel Construction

- In this picture, TBM cutterhead is advancing toward left
- Thrust jacks are pushing against completed precast rings at right to propel TBM into ground to be excavated
- Precast ring segments typically use 7500 to 8000 psi concrete to resist construction stresses

# Segments in Place (Seattle Tunnel)



# Segments in Place (Seattle Tunnel)



# HRBT Procurement Milestones

Activity	Date
Request for Qualification (RFQ)	December 2017
Draft RFP Issued	May 2018
Final RFP Issued	September 2018
Technical Proposal Submission	January 15, 2019
Price Proposal Submission	February 8, 2019
Best Value Selection	February 2019
Contract Award	April 2019
Project Complete	November 2025