Hampton Roads Bridge Tunnel Expansion Project Update to Commonwealth Transportation Board June 19, 2018

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Overview

- **Background on HRBT Expansion**
  - Tunneling in Hampton Roads
  - Overview of HRBT Expansion Project

- **HRBT Tunnel Construction Considerations**
  - Immersed Tube Tunnel
  - Bored Tunnel

- **Landside Construction Considerations**
  - Hampton
  - Norfolk

- **Procurement Schedule**
Ten Tunnels of Hampton Roads

- Thimble Shoal Tunnel (1964)
- Chesapeake Channel Tunnel (1964)
- Monitor-Merrimac Memorial Bridge-Tunnel (1992)
- Hampton Roads Bridge-Tunnel (1957 & 1976)
- Midtown Tunnel (1962 & 2016)
- Downtown Tunnel (1952 & 1987)
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
Settlers Landing in Hampton to I-564 Norfolk (9.5 Miles)

I-64 improvements include 6 lanes of highway and construction of 4 lane bridge/tunnel

New 4 lane HRBT tunnel will serve Eastbound traffic

2 existing HRBT tunnels will serve Westbound traffic

Project Estimate: $3.66B
Scope Options Included:

- Three scope options included in Draft RFP:
  - Direct connect ramps from I-64 HOT to I-564
  - Increase height clearance at the existing WB Tunnel
  - Replace existing marine approach bridges
Proposed Lane Configuration for Tunnel and Approach Bridges

- **2+1+1 concept in each direction:**
  - 2 free General Purpose lanes
  - 1 full-time HOT lane
  - 1 peak-hour HOT lane on left shoulder
Proposed Bridge and Tunnel Alignment (Hampton Side)
Proposed Bridge and Tunnel Alignment (Federal Channel)
Proposed Bridge and Tunnel Alignment (Norfolk Side)
Landside Construction Considerations

- Landside work is broken into two parts - Hampton and Norfolk
- Environmental, Right of Way and Maintenance of Traffic provide biggest challenges for construction in both Cities

- Hampton
  • I-64 Interchange at Mallory Street to be reconstructed
  • Construction of roadway to approach bridges will require phasing
  • Cultural Resources include Federal Cemetery, Hampton University and Phoebus

- Norfolk
  • Constraints at Bayville Interchange and Willoughby Bay Bridges
  • Four interchanges impacted (Bayville, 4th View, Bay Ave, New Gate)
  • Naval Air Station borders western side I-64 (vertical & horizontal)
Marine Construction Considerations

- Marine bridges have risks but are largely conventional

- Tunnel work is less conventional and will generate greatest risks from cost and schedule standpoint

- This is a rare location where both immersed-tube and bored-tunnel construction methods are feasible
  
  • All ten Hampton Roads tunnels to date have been immersed tubes
  • Until recently, bored tunnels were not feasible in soft soils
  • But recent advances in technology now make bored tunnels possible in soft soils

- Both tunnel methods were directly compared in the nearby CBBT - Thimble Shoal Tunnel procurement in 2015
  
  • Received Bored Tunnel proposals only
Immersed-Tube Tunnel Considerations

- **Concept design:**
  - Approx. 7,500 ft. long
  - Approx. 3.5 million cubic yards dredged material
  - Dredged trench approx. 90 ft. wide with 3:1 side slopes

- **Navigational considerations at channel:**
  - Trench dredging
  - Placement & screeding of gravel bedding
  - Immersion of tunnel elements
  - Placement of cover fill

- **Other navigational considerations:**
  - Barge transport of dredged material for ocean disposal
  - Island expansion (fill & armor stone)
  - Limited additional geotechnical investigation is anticipated
Immersed-Tube Elements
Immersed-Tube Tunneling (ITT)
Conceptual Tunnel Section (Immersed)
Bored Tunnel Considerations

- **Concept design:**
  - Approx. 7,800-8,300 ft. long
  - Deeper than immersed tube tunnel because more cover is needed for buoyancy control – therefore tunnel is longer
  - 4-5% roadway grades will require island expansion lengthwise
  - Approx. 1 million cubic yards excavated tunnel material
  - Ground improvement at islands to support weight of tunnel boring machine

- **Navigational considerations:**
  - Additional geotechnical investigations
  - Island expansion (fill & armor stone)
Tunnel Boring Machine (TBM)

- Rotating cutter head
- The machine is operated from the control room
- Excavated earth removed by conveyor belt
- Hydraulic rams push against newly-placed concrete segments to drive machine forwards
- Pressure is maintained in the cutting chamber
- Rotating arm adds pre-cast concrete tunnel segments to form a ring
- Pre-cast concrete segments delivered to rotating arm

Person to scale: 150m
Twin Bore with TBM
Conceptual Tunnel Section (Bored)
Key Differences between Bored and Immersed-Tube Tunneling

- **Alignment**
  - ITT alignment must be further away from existing tunnel (Hampton Roads rule of thumb → about 200 feet)
  - Bored tunnel can be much closer to existing facilities (general rule of thumb → about one diameter ≈ 50 feet)

- **Geotechnical**
  - ITT method has limited concern for soil properties, since soil along tunnel path is dredged out and removed
  - Bored method is specifically tailored to local soil properties

- **Environmental and Permitting**
  - Section 408 coordination with marine stakeholders / federal channel
  - Section 103 concurrence for offshore disposal of ITT spoils
  - JPA permit for disposal of bored-tunnel spoils
Marine Stakeholder Involvement

- Initial discussions held with a number of Stakeholders:
  - Maritime Security Council
  - Harbor Safety Committee
  - US Navy Staff Level
  - Virginia Maritime Association (including VPA)
  - USACE Section 408
  - USCG
  - US Navy Senior Level

- Concerns over Construction Impacts to Federal Channel
  - Commercial Vessels (size and number)
  - Coordination with Channel Widening
  - Naval Vessels (impeding transit could impact National Security)

- Contractor ability to access/work in Federal Channel
  - Project Cost/Schedule Risk
### Procurement Milestones

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>DATE</th>
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<tbody>
<tr>
<td>PPTA Steering Committee</td>
<td>Dec 12, 2017</td>
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<tr>
<td>RFQ Issued</td>
<td>Dec 15, 2017</td>
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<tr>
<td>Shortlist Announced</td>
<td>Apr 26, 2018</td>
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<td>PPTA Steering Committee</td>
<td>May 9, 2018</td>
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<td>Draft RFP Release</td>
<td>May 22, 2018</td>
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<td>Proprietary/ATC Meetings #1</td>
<td>Jun 11-12, 2018</td>
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<td>Proprietary/ATC Meetings #2</td>
<td>Jul 17-18, 2018</td>
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<td>Proprietary/ATC Meetings #3</td>
<td>Aug 7-8, 2018</td>
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<td>Proprietary/ATC Meetings #4</td>
<td>Sept 5-6, 2018</td>
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<td>Final RFP Release</td>
<td>Sept 10, 2018</td>
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<td>Proprietary/ATC Meetings #5 (if needed)</td>
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<tr>
<td>Addenda to Final RFP</td>
<td>Oct 26, 2018</td>
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<tr>
<td>Technical Proposal Submission</td>
<td>Nov 30, 2018 at 5:00 PM</td>
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<td>Price Proposal Submission</td>
<td>Jan 10, 2019 at 5:00 PM</td>
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<td>Selection of Best Value Proposal</td>
<td>Jan 18, 2019</td>
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<td>CTB Briefing</td>
<td>Feb 2019</td>
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<td>PPTA Statutory Audit</td>
<td>Feb 2019</td>
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<td>Execute Comprehensive Agreement</td>
<td>Mar 2019</td>
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<td>PPTA Steering Committee</td>
<td>NLT 60 days from execution of CA</td>
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<td>Contractor NTP</td>
<td>Mar 2019</td>
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<td>Construction Complete</td>
<td>Dec 2024</td>
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