



Interstate  
**BRIDGE**  
*Replacement Program*

# Immersed Tube Tunnel

Conceptual Assessment

July 2021



# Immersed Tube Tunnel Conceptual Assessment

## What it is:

- Fact-based assessment of a conceptual ITT for IBR program
- Initial overview of IBR program site suitability for ITT

## What it's not:

- Comparative study with other bridge replacement alternatives
- Corridor study
- Part of the alternatives development or environmental review process

# High Level Findings

- This is a conceptual assessment of the viability of an immersed tube tunnel as a river crossing replacement for the I-5 Bridge.
- While an ITT is technically feasible, it does not meet the purpose and need for this program due to environmental, archaeological, cost, operational, and design considerations.

# Design Considerations

## Immersed Tube Tunnel

# Design Considerations

## Site Constraints:

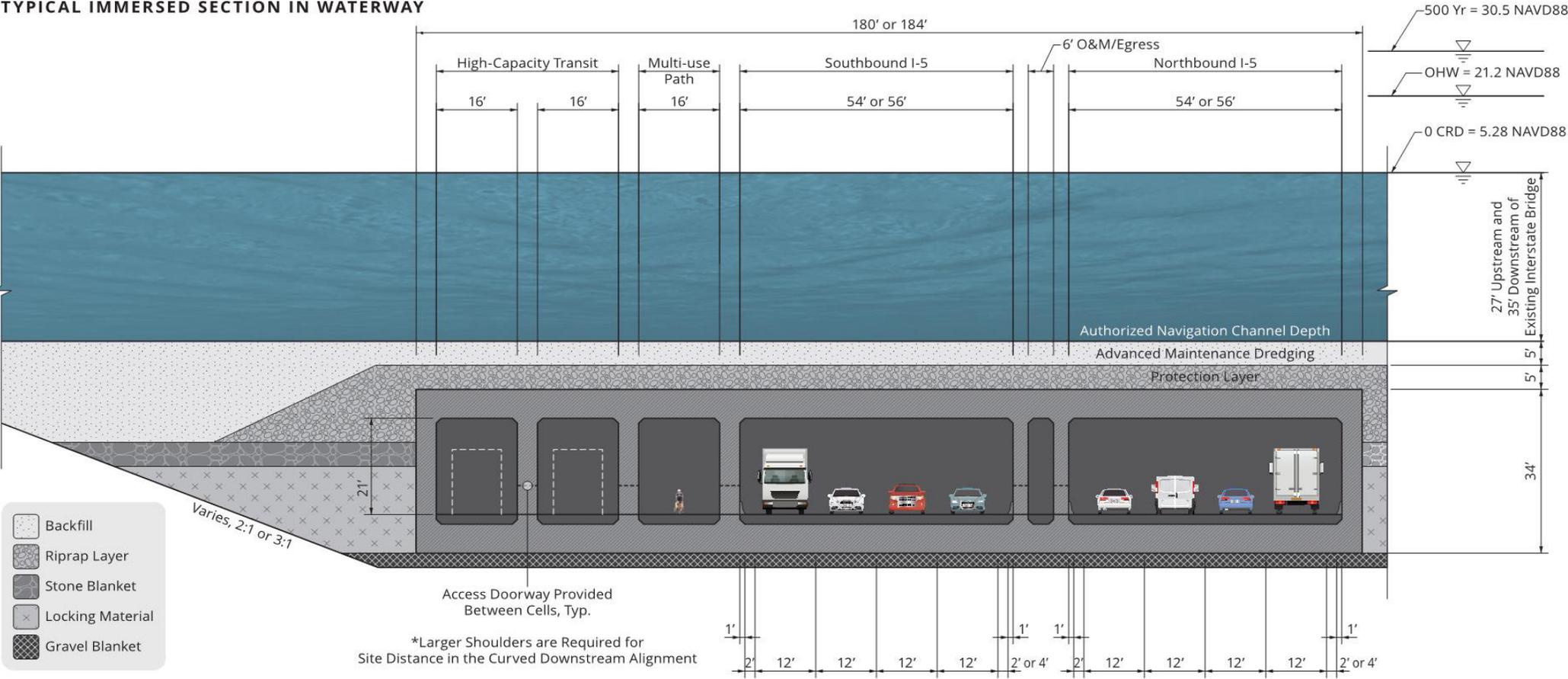
- Existing bridge location
- Columbia River navigation channel requirements
- Geotechnical conditions
- Portal locations

## IBR Program Needs:

- Safe bridge replacement alternative
- Multi-use path
- High-capacity transit
- Vehicle lanes
- Operations & maintenance ingress and egress

# Immersed Tube Tunnel Cross-Section

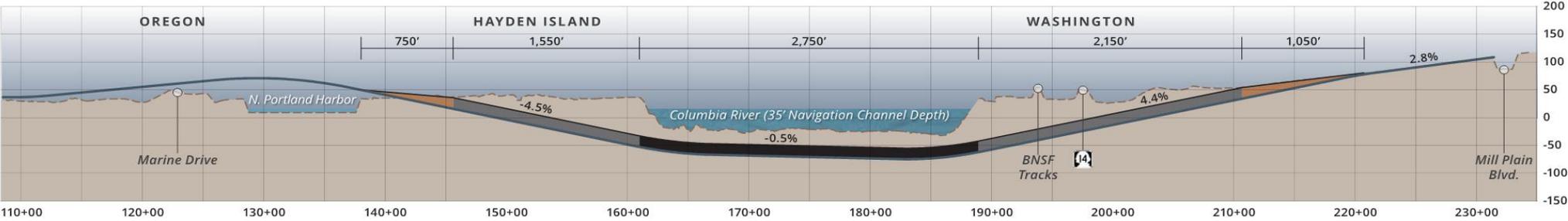
TYPICAL IMMERSED SECTION IN WATERWAY



# Downstream and Upstream Alignments

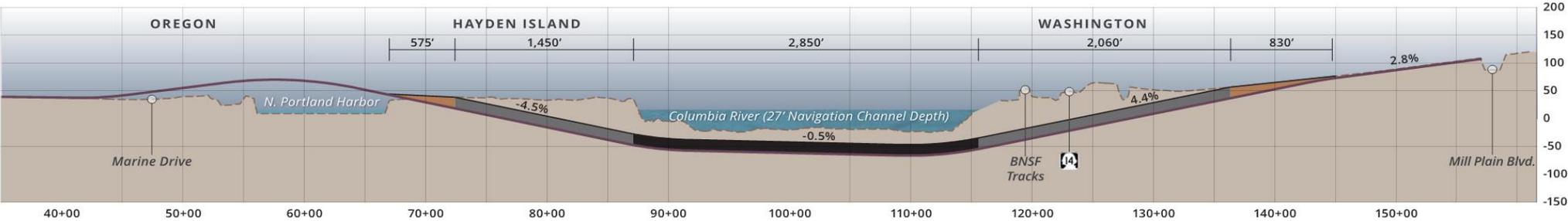


# Downstream and Upstream Profiles



PROFILE: DOWNSTREAM ALIGNMENT

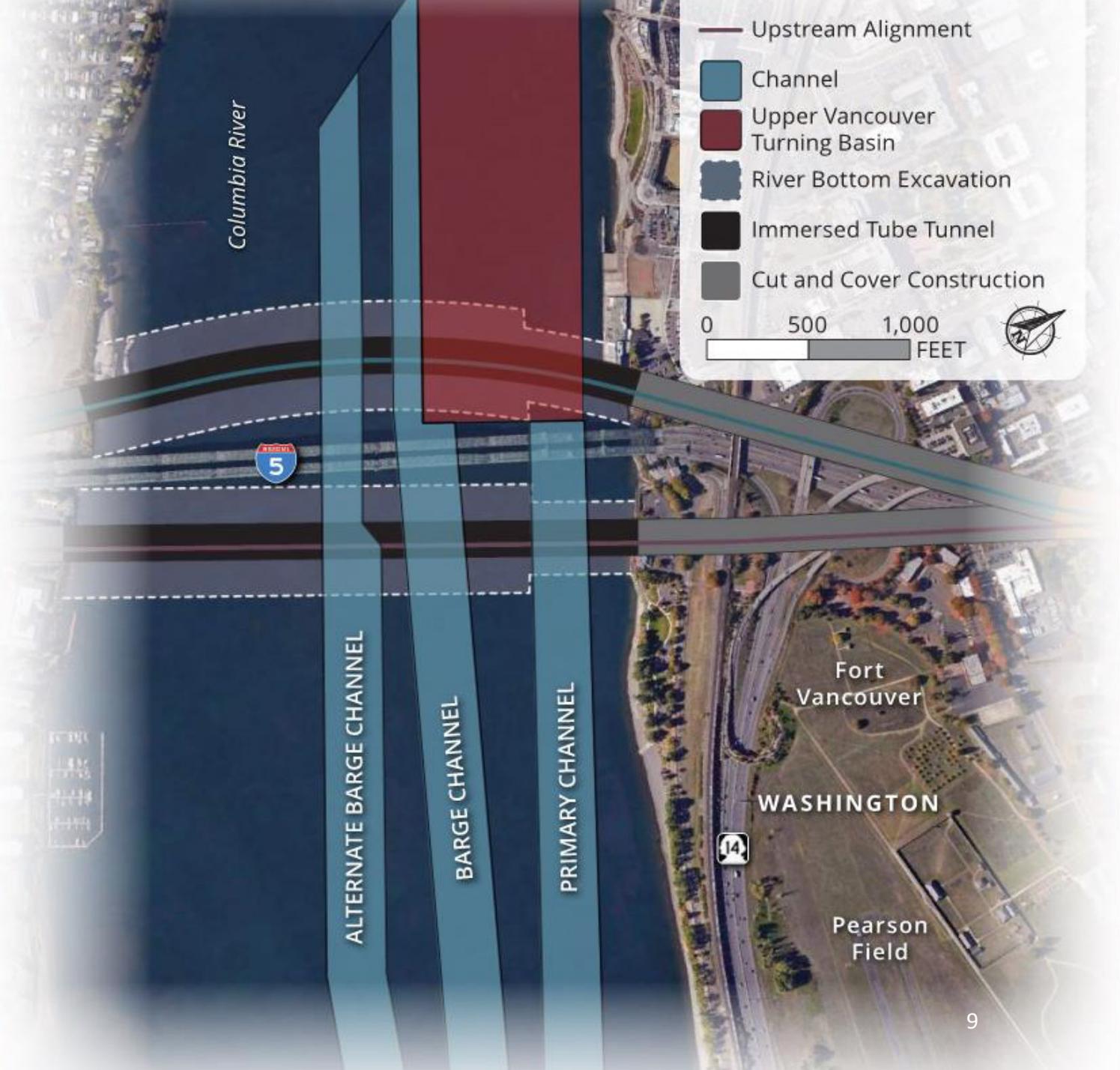
- Downstream Alignment
- Upstream Alignment
- River Bottom
- Immersed Tube Tunnel
- Cut and Cover Construction
- 20' Max. Retaining Walls
- 0 500 1,000 FEET
- 



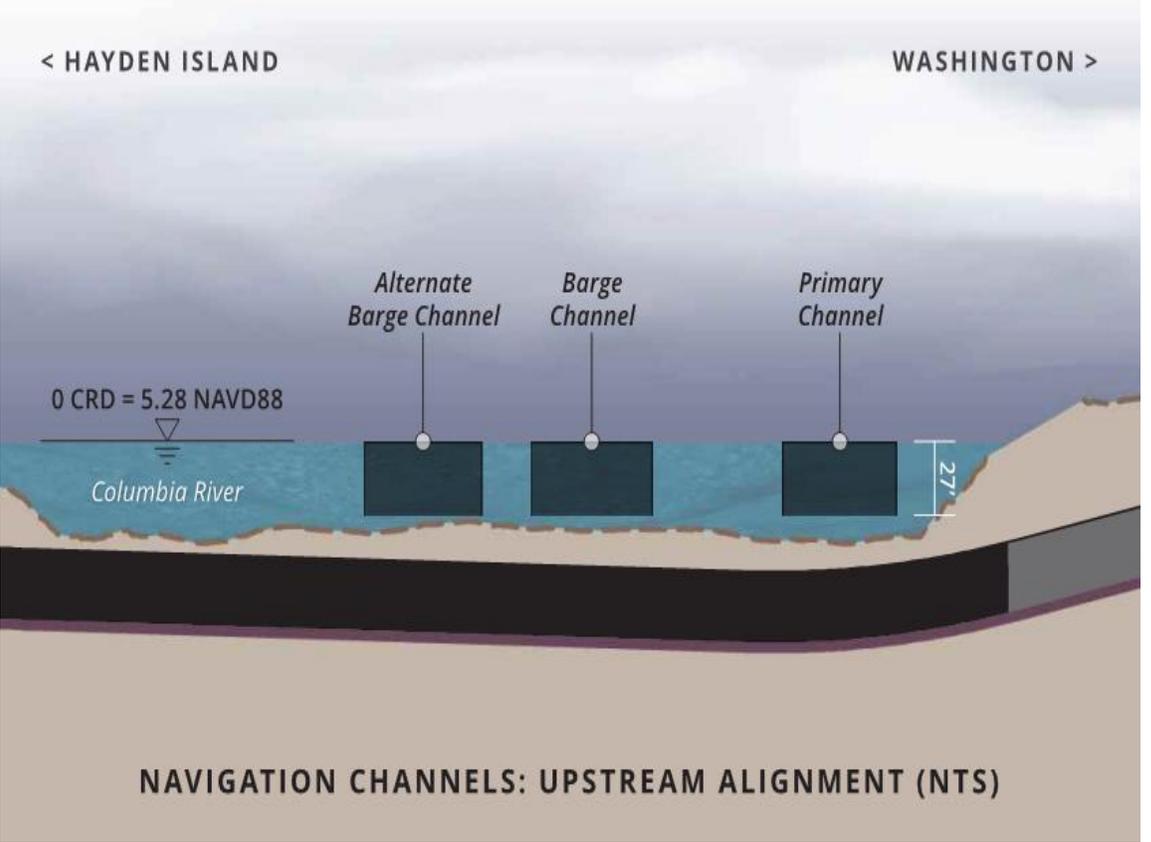
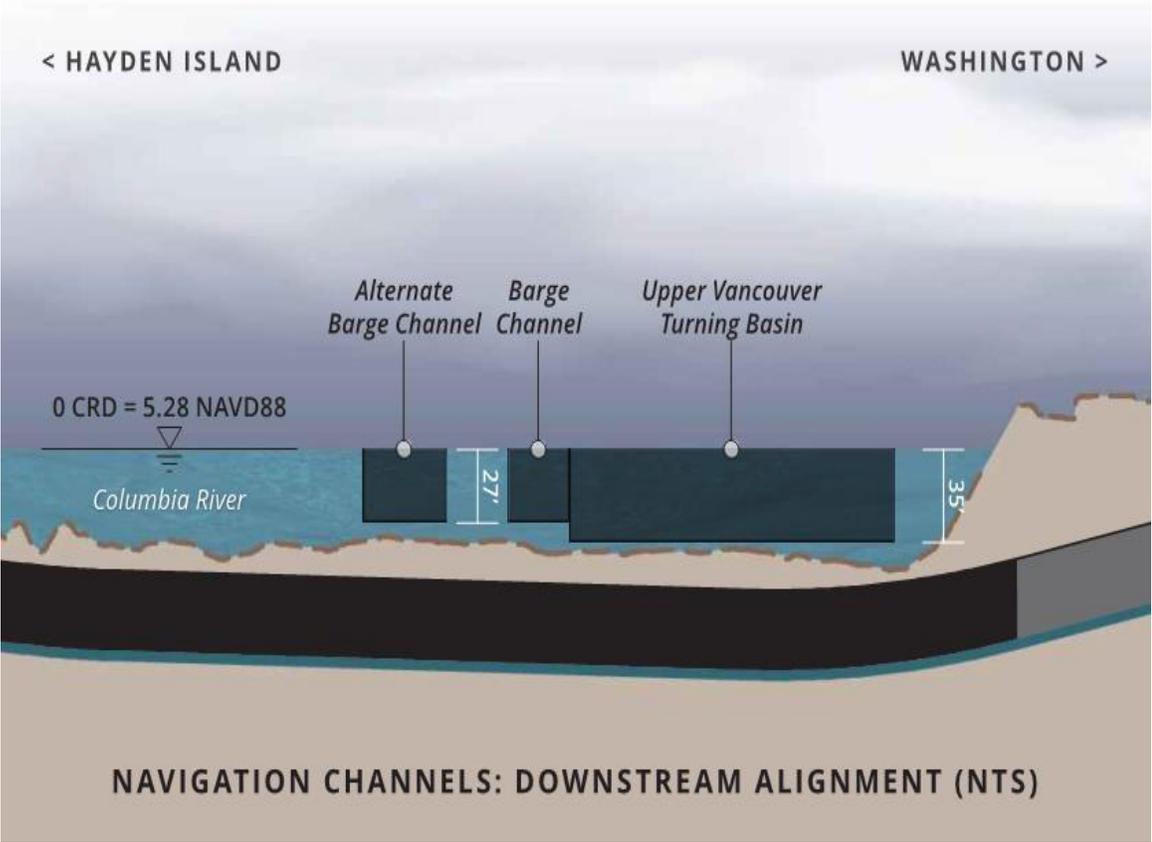
PROFILE: UPSTREAM ALIGNMENT



# Columbia River Navigation Channels



# Downstream and Upstream Alignments: Navigation Channels



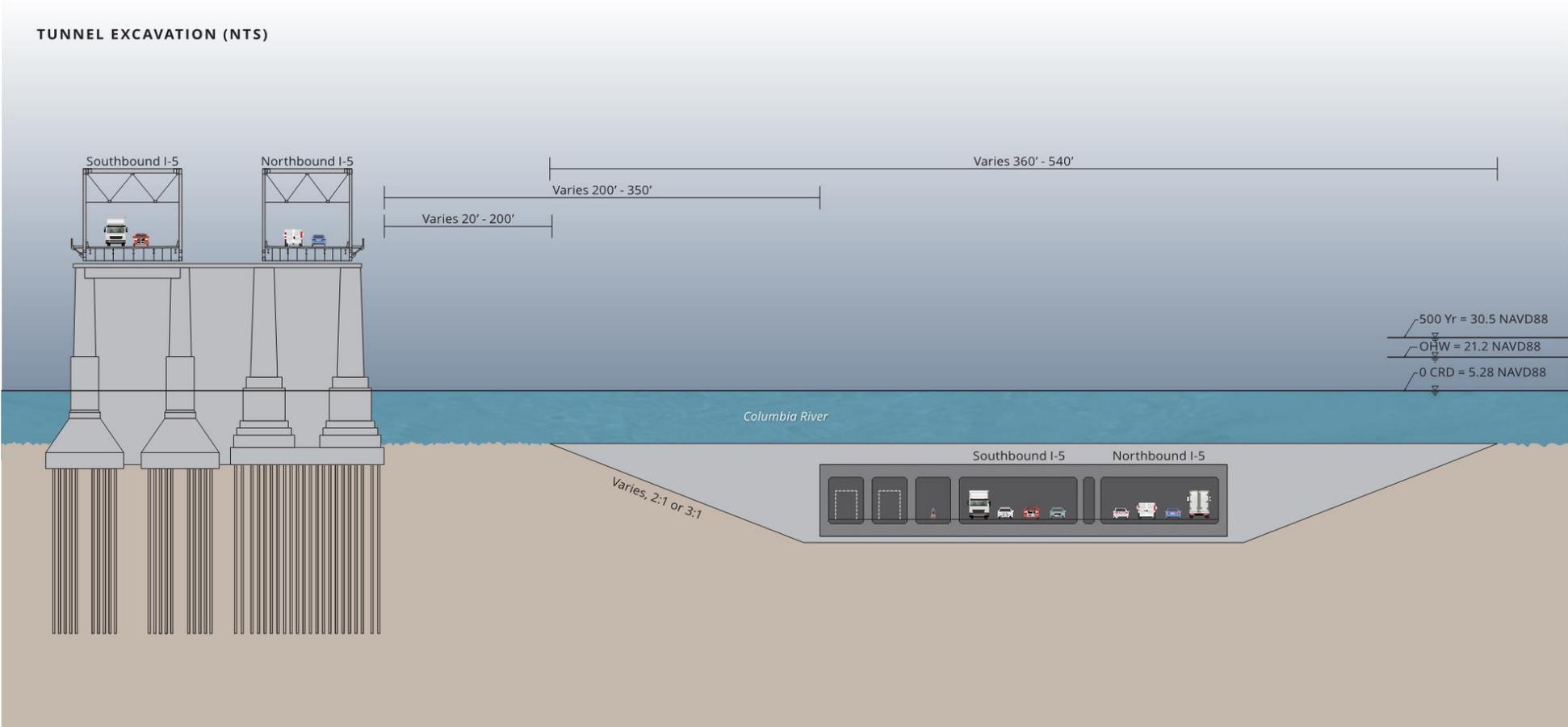
# Construction Considerations

## Immersed Tube Tunnel

# Downstream and Upstream Construction



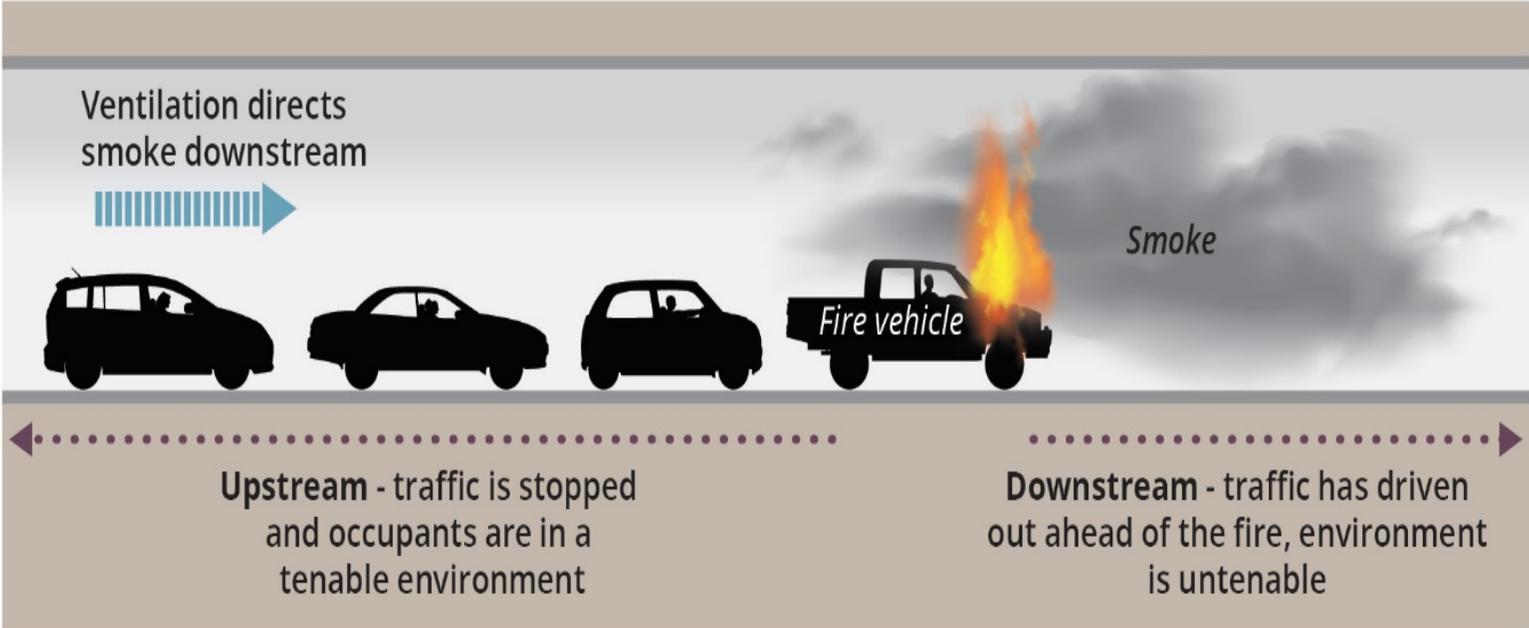
# Dredging



# Operational Considerations

## Immersed Tube Tunnel

# Fire and Life Safety



# Operational Considerations

## Systems Requirements:

- Fixed fire fighting systems
- Mechanical ventilation systems (jet fans)
- Standpipe system
- Tunnel thermal protection systems
- Drainage systems
- Traffic monitoring systems
- Security systems

# Environmental Considerations

## Immersed Tube Tunnel

# Environmental Considerations

- Biological (threatened or endangered species)
- Hazardous material (e.g., dredge spoils)
- Historic and archaeological
- Land use
- Permitting
- Safety and emergency response (MUP)
- Storm water management

# Conceptual Costs

## Immersed Tube Tunnel

# Rough Order-of-Magnitude Cost

- Construction Costs Only\*
- No allowance for the following:
  - Design
  - Construction Management
  - Right-of-Way
  - Contingency
  - Operations & Maintenance
  - Environmental Mitigation

Description	Conceptual Cost
ITT*	\$970,000,000
Cut-and-cover	\$1,725,000,000
Open Cut	\$235,000,000
Ancillary Facilities	\$150,000,000
<b>ROM Cost**</b>	<b>\$3,080,000,000</b>

\*A nominal allowance based on experience was incorporated as a placeholder for ground improvements (stone columns) and for a casting basin.

\*\*Costs shown for the ITT are approximately two times higher than cost estimates for a replacement bridge and approaches. This estimate does not include other highway, interchange, or high capacity transit improvements that would be necessary.



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# Questions

Contact

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