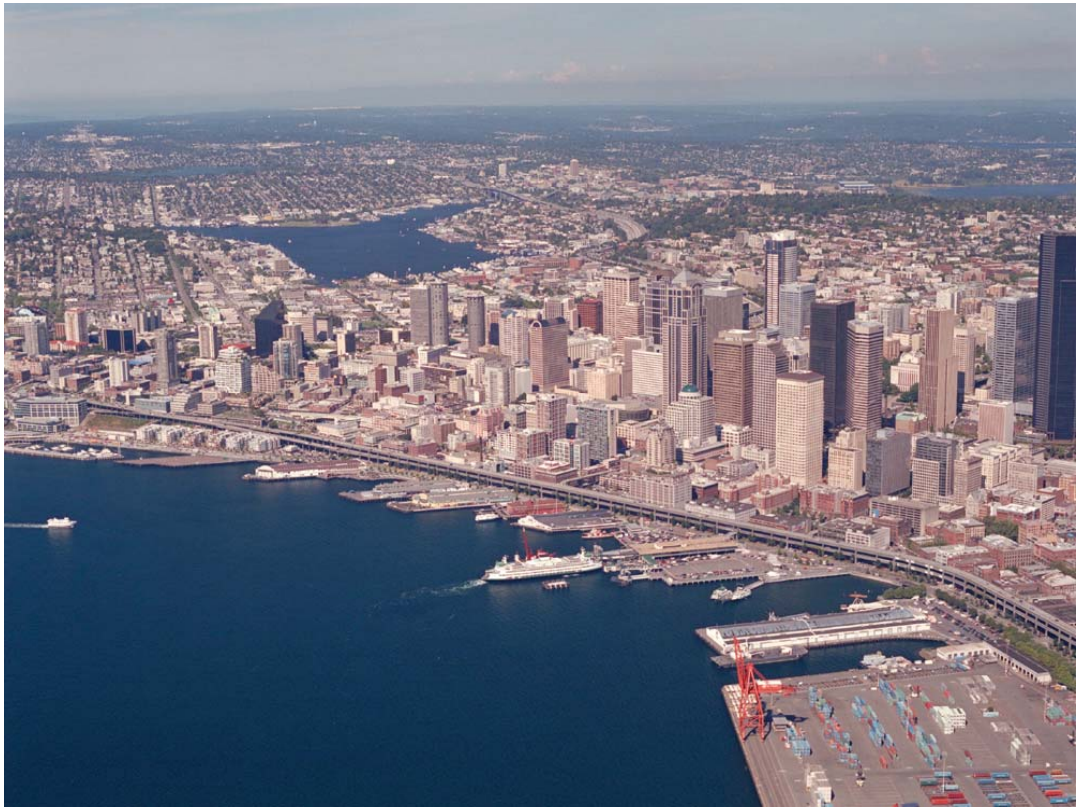
Item No. 6c_supp .
Meeting 1/27/09 .

Alaskan Way Viaduct / Seawall Replacement Program

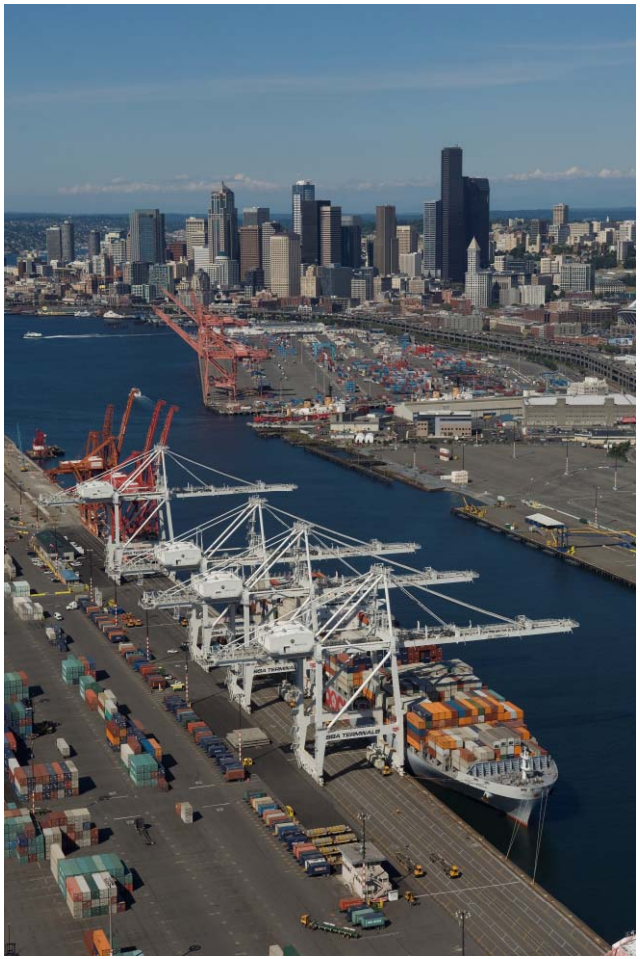


Port of Seattle Commission
January 27, 2009

Port of Seattle relies on an efficient transportation system

The Port of Seattle is an international gateway creating jobs and economic growth for the region in an environmentally responsible way.

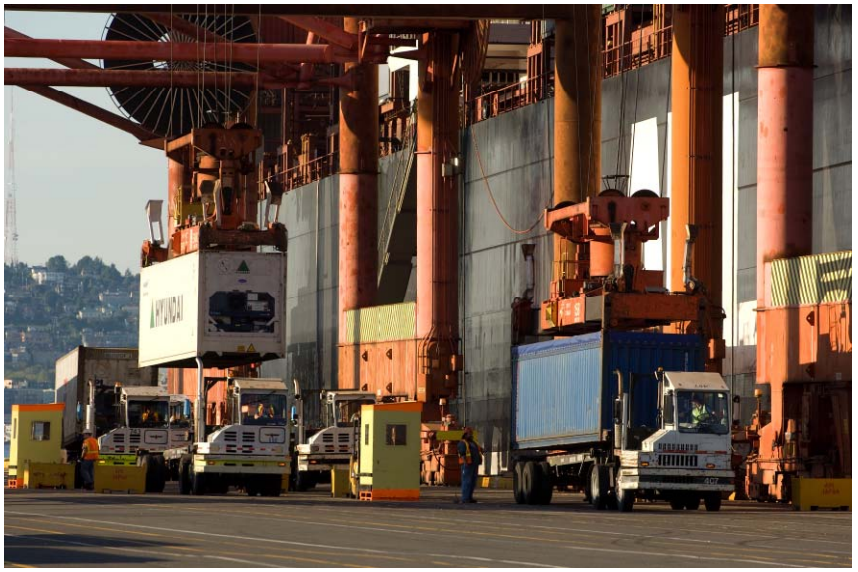
We must have a transportation system that moves people and cargo quickly and efficiently.



Port of Seattle relies on an efficient transportation system

Our priorities for a viaduct replacement:

- provides sufficient capacity to move freight traffic efficiently
- grants easy access to our cargo, commercial fishing and cruise facilities and Sea-Tac Airport
- minimizes construction disruption



Port of Seattle relies on an efficient transportation system

Without the capacity and connections we need, cargo – and the jobs associated with it – will go away, and the thousands of businesses dependent on maritime, trade and passenger activities will be in jeopardy.

Bored Tunnel Hybrid Alternative

On Jan. 13, 2009, Governor Gregoire, King County Executive Sims and Mayor Nickels announced that the bored tunnel hybrid alternative was their preferred solution to replace the central waterfront portion of the viaduct.

State, City and County Guiding Principles

The three executives agreed that any solution for the Alaskan Way Viaduct needed to be grounded in a commitment and integration across six guiding principles:

- Improve public safety.
- Provide efficient movement of people and goods now and in the future.
- Maintain or improve downtown Seattle, regional, the port and state economies.
- Enhance Seattle's waterfront, downtown and adjacent neighborhoods as a place for people.
- Create solutions that are fiscally responsible.
- Improve the health of the environment.

Funding Strategy for Bored Tunnel

	Proposed Project Implementation Responsibility				Costs
	State	King County MVET	City of Seattle	Port of Seattle ***	
Moving Forward and Prior Expenditures	$600 million			$300 million	$900 million*
SR 99 Bored Tunnel	$1.9 billion**				$1.9 billion
Alaskan Way Surface Street and Promenade	$290 million		$100 million		$390 million
Central Seawall			$255 million		$255 million
Utility Relocation			$250 million		$250 million
City Streets and Transit Pathways		$25 million	$190 million		$215 million
Transit Infrastructure and Services		$115 million	$135 million		$250 million
Construction Transit Service	$30 million	$50 million			$80 million
Total	**$2.82 billion**	**$190 million**	**$930 million**	**$300 million**	**$4.24 billion**
Transit Operations Annual Cost		$15 million			$15 million

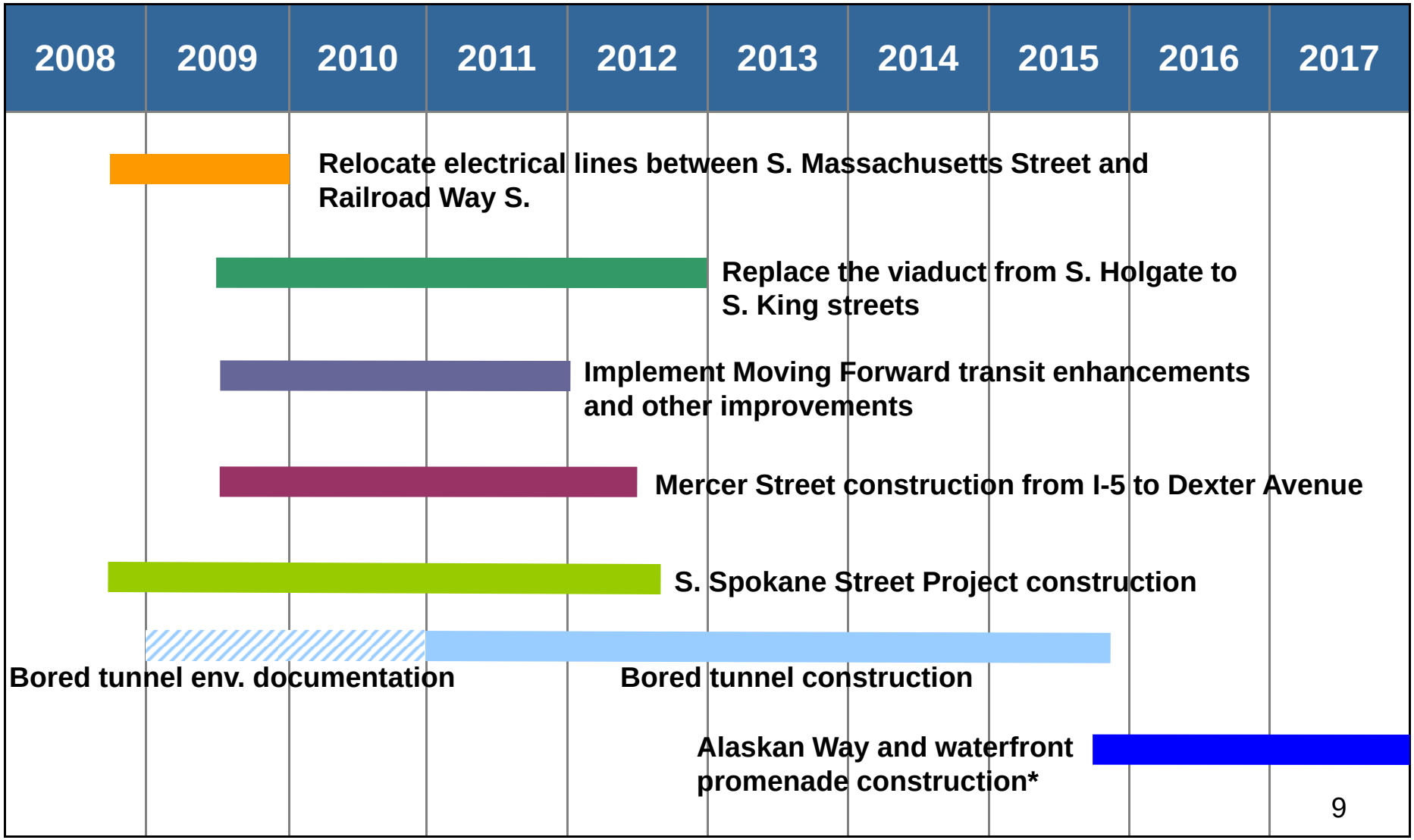
*Reflects cost savings from Moving Forward program realized by not repairing the viaduct from Lenora to Battery Street Tunnel and not completing the second phase of fire and life safety upgrades to the Battery Street Tunnel.
**Reflects the most likely cost based on a conceptual design. The potential cost range is between $1.2 billion and $2.2 billion.
***Agreement in concept for up to $300 million subject to Port of Seattle Commission review and approval.

Next Steps

Before the bored tunnel can be designed and built, the WSDOT team needs to:

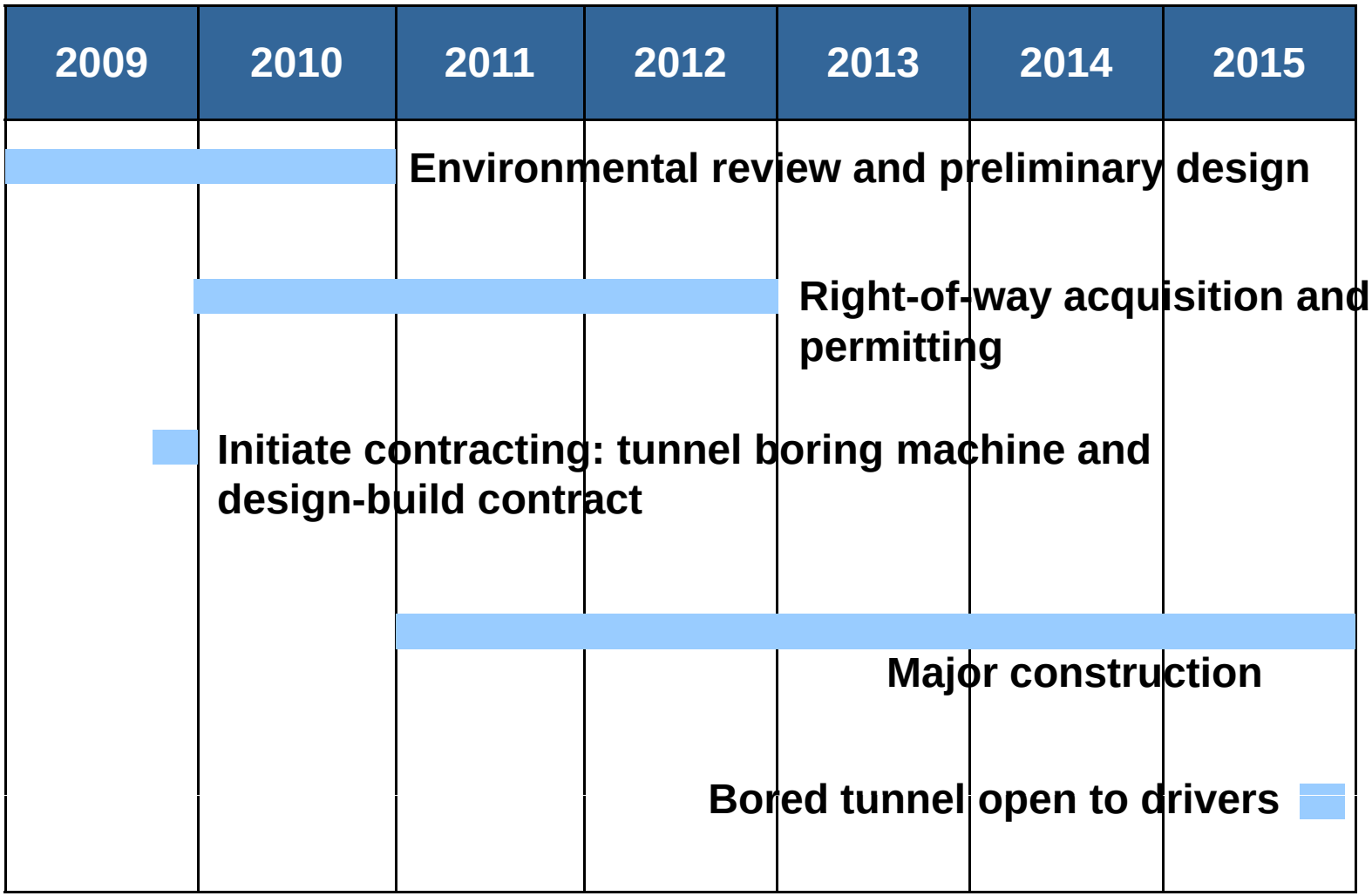
- Get legislative approval for necessary funding.
- Work with the city, county and port to coordinate project implementation.
- Complete environmental review process.
- Develop additional preliminary engineering and soils exploration.
- Meet with community groups and businesses to finalize design.

Program Timeline



*Seawall construction will take place before Alaskan Way and promenade construction

Bored Tunnel Timeline



Port Project Needs

December 2008 Letter

The choice for the replacement of the Alaskan Way Viaduct should achieve the best balance of:

- job retention and creation
- sustainable regional economic vitality
- environmental benefits

1. Maximize jobs and economic benefits in weighing total, life-cycle costs
2. Ensure efficient access to the working waterfront for a growing economy
3. Enhance the waterfront environment for people & goods
4. Replace capacity for long-term regional growth
5. Support seawall improvements

Replace capacity for long-term regional growth

The bored tunnel alternative:

- Maintains capacity in the SR 99 corridor.
  - The tunnel will carry 85,000 vehicles through downtown Seattle each day at year of opening (with room to grow).
  - Surface Alaskan Way will carry about 25,000 vehicles daily.
  - Today's Viaduct carries approximately 110,000 vehicles daily.

- Accommodates in-city trips through new investments in local streets and transit.
  - New bus service will carry approximately 17,000 additional daily riders, primarily serving northwest and southwest Seattle.
  - Reduces congestion and single occupant vehicle idling.

- Preserves Interstate 5 for state and regional through trips with expanded north-south vehicle capacity and improved travel times.

Maximize economic benefits in weighing total cost

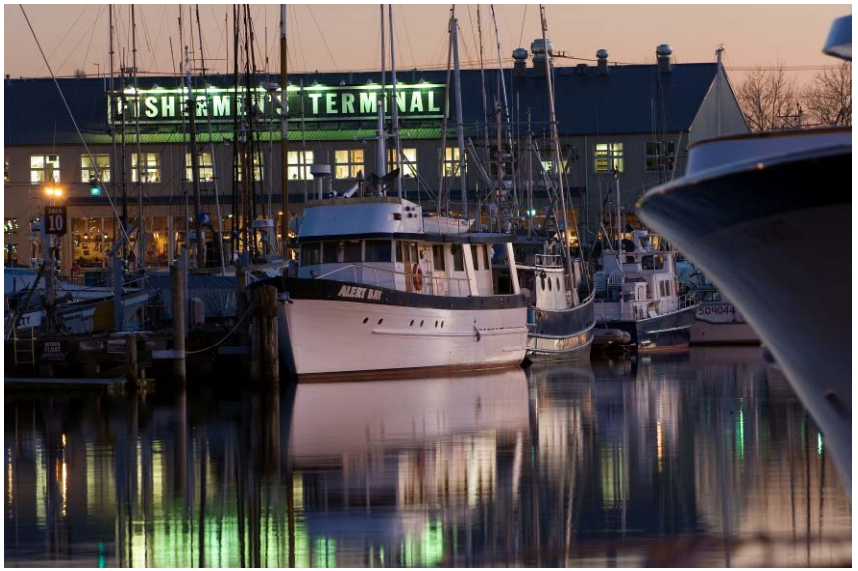
The bored tunnel alternative:

- Enables continued growth in Port operations.
- Maintains today's travel times for trips through downtown.
- Minimizes construction disruption.
- Improves design for lane and shoulder widths and modernizes fire, life and safety standards.
- Structural engineers agree that tunnels are one of the safest places to be during an earthquake.
- Maintains and creates 10,000 jobs each year over the course of the project.

Ensure efficient access to the working waterfront for a growing economy

The bored tunnel alternative:

- Minimizes construction impacts to waterfront businesses and the local community.
- Provides room for freight and port traffic to grow.
- Surface street improvements include key east-west arteries: Spokane St, SR519, Mercer Corridor, and East Marginal Way.



Enhance the waterfront environment for people and goods
and
Support seawall improvements

The bored tunnel alternative:

- Creates a new system to improve and handle storm water runoff.
- Moves SR 99 underground and eliminates existing viaduct noise, shadowing and view blockage.
- Creates new transit, bike and pedestrian connections.
- Reconnects downtown with the natural environment in Elliott Bay.
- Creates a memorable place for people to live, work and play.

Key Port components

- South End Holgate to King
- Elliott/Western/15th Ave W connections
- Complementary street upgrades: Spokane Street Corridor, East Marginal Way, SR 519, Duwamish ITS, Mercer Corridor
- Transit investments for commuter trips
- Construction/Business impact mitigation
- Seawall replacement
- Viaduct risk mitigation

On-going Port questions

What is the design for the other essential street network connections?

- What is the most efficient surface connection for NW Seattle and freight mobility?
- How will other components surface street be improved?
- How does the tunnel connect to the street network, particularly at the South End?

What are the risks for the funding plan?

- How will other agencies' contributions impact operating costs of our tenants and businesses?

What are the partnership risks as Tunnel Alternative requires further approvals?

How will the Port decide its participation?

Next Steps for Port of Seattle

In transitioning to a new partnership, we need to:

Work with the state, city and county as they proceed with central waterfront project implementation. Their initial tasks include:

- Resolve open design issues.
- Develop additional preliminary engineering and soils exploration.
- Complete environmental review and community involvement.
- Secure necessary legislative approvals.

Continue collaboration on Viaduct South End and other early projects.

Assess funding partnership opportunities for Port of Seattle.

Back Pocket

Presentation Agenda

1. Bored Tunnel Hybrid Alternative
2. Guiding Principles and Decision-Making Process
3. Tunneling Technology
4. SR 99 Bored Tunnel
5. Bored Tunnel vs. Cut-and-Cover Tunnel
6. Successful Delivery of Bored Tunnels
7. Bored Tunnel vs. Big Dig
8. Next Steps
9. Schedules

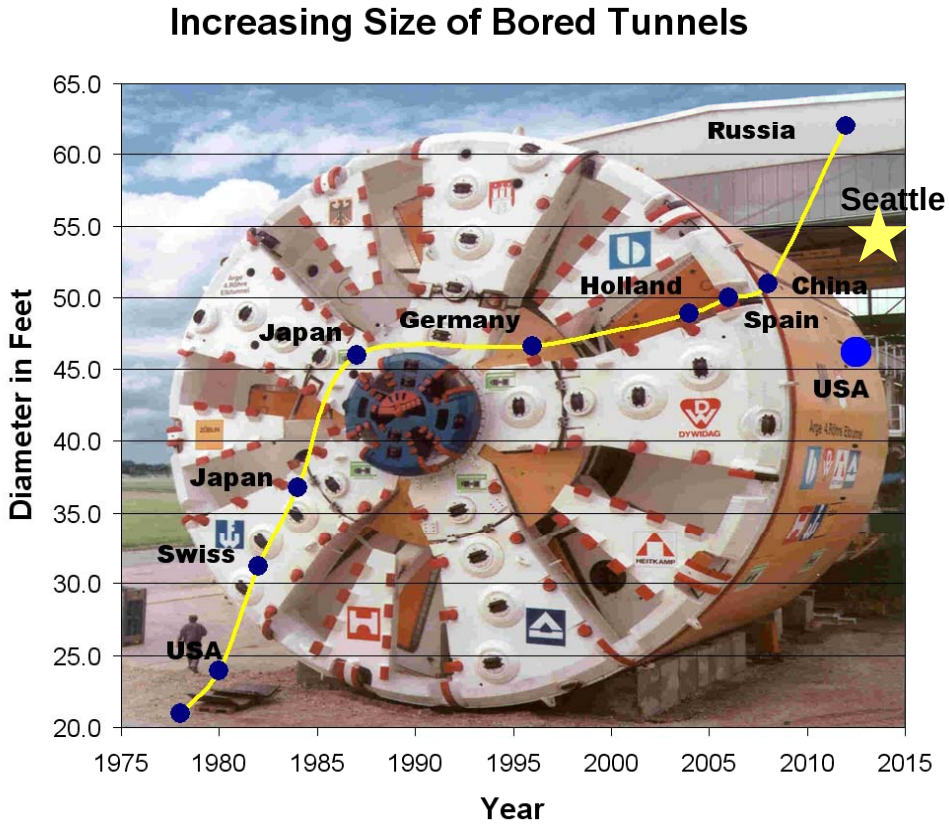
Decision-Making Process

Along the way, three groups met regularly to review technical analysis and weigh-in on the options considered for replacing the central waterfront. Those groups were:

- Stakeholder Advisory Committee:
  - 29 individuals representing communities, economic interests and cause-driven organizations.
  - Met 16 times over a 13-month period to review and provide comment to program staff.
- Interagency Working Group:
  - 14 agencies reviewed and provided input on the technical details of waterfront replacement options.
- Executive Oversight Committee:
  - Included the Governor, King County Executive, Mayor, State Senate Transportation Chair, State House Transportation Chair, King County Council Transportation Chair and Seattle City Council Transportation Chair.
  - Reviewed options an analysis throughout the 13-month period.

Tunneling Technology

- Tunneling technology is rapidly advancing, with tunnel boring machines as large as 62 feet in diameter on order.
- Successful tunnel boring machine projects:
  - Sound Transit Beacon Hill: 21 feet in diameter
  - Hamburg and Moscow: 46.6 feet in diameter
  - Madrid: 50 feet in diameter
  - Shanghai: 50.6 feet in diameter



Tunneling in Seattle Soils

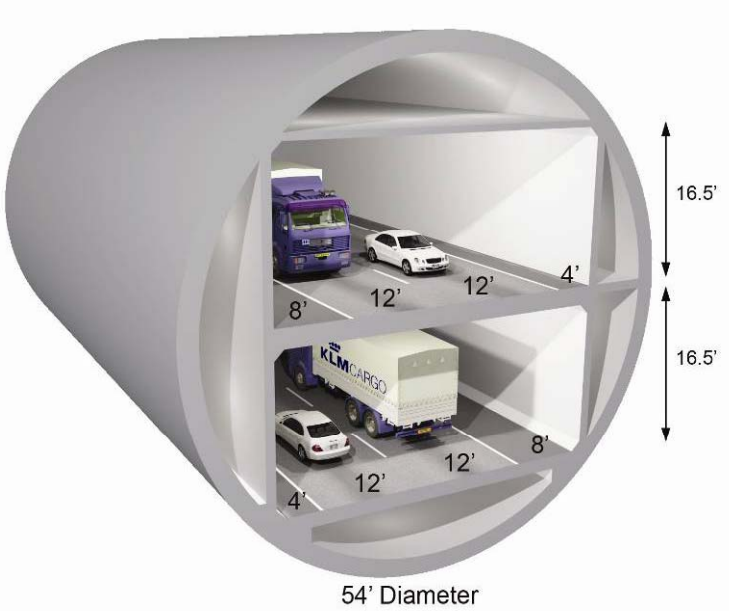
Numerous tunnel machines, including several in Seattle, have successfully excavated ground conditions similar to those anticipated. Over 150 tunnels have been constructed in Seattle since 1890, mostly in glacial soils. Examples include:

- Sound Transit Beacon Hill:
  - Glacial sand, silt, clay and till up to 160-ft depth.
  - Soils were similar to the hard/dense soils along most of proposed alignment.
- Denny Way CSO:
  - Glacial sand, silt, clay and till up to 160-ft depth.
  - Soils were similar to hard/dense soils along most of proposed alignment.

Bored Tunnel Hybrid Alternative

SR 99 Tunnel:

- 54’ diameter, single bore tunnel.
- Two lanes of traffic in each direction.
- Approximately 1.7 miles long.
- Between 30 and 200 feet underground.
- Carries approximately 85,000 vehicles each day through downtown Seattle.
- Construction is expected to begin in 2011 and be open to drivers in 2015.



Alaskan Way surface street:

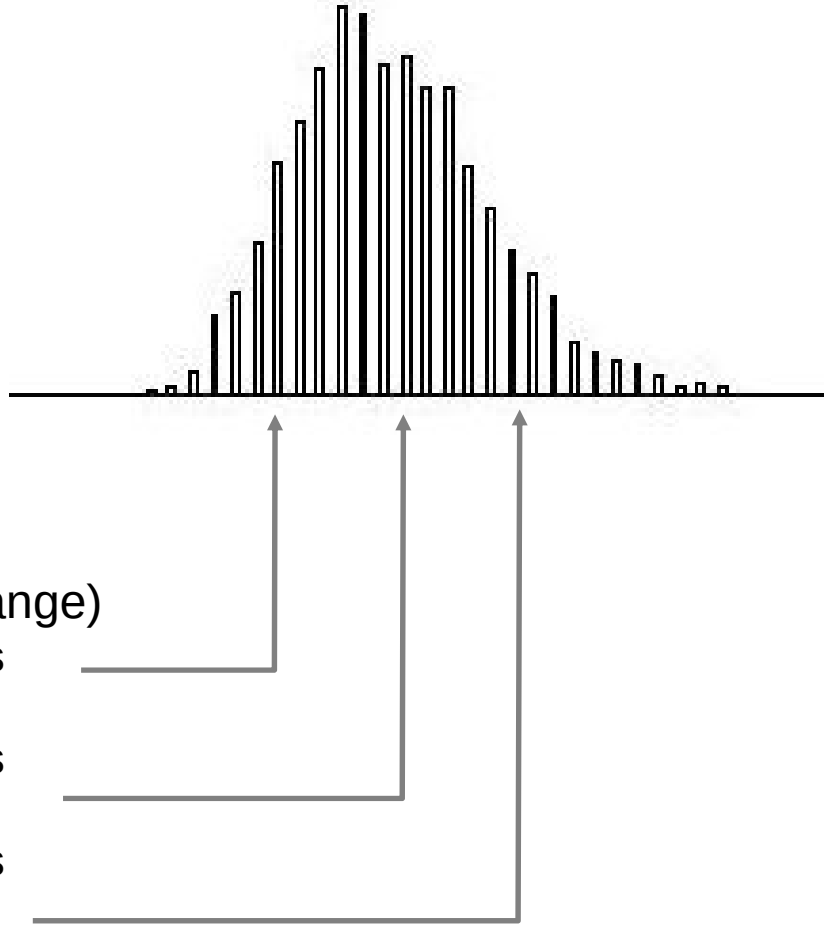
- Four-lane roadway with two lanes in each direction.
- Carries approximately 25,000 vehicles per day.

SR 99 Bored Tunnel Cost

Risk-based estimating nationally recognized as a best practice or mega-projects

	Cost (Millions)
Construction Estimate (bored tunnel only)	$944
Construction Management and Administration	$118
Preliminary and Final Design	$118
Contingency	$150
Risk	$268
Escalation (per Global Insight)	$166
Right-of-Way Costs	$149
TOTAL	**$1,913**

CEVP-Type Cost Range



Most Probable Cost (Range)

- **20%** chance the cost is less than **$1.2 billion**
- **60%** chance the cost is less than **$1.9 billion**
- **80%** chance the cost is less than **$2.2 billion**

Bored Tunnel vs. Previous Cut-and-Cover Tunnel Alternative

Bored Tunnel Hybrid Alternative	Previous Cut-and-Cover Tunnel Alternative
• Stacked with two lanes in each direction. • Constructed under First Avenue. • Top of tunnel is 30 to 200 feet below the surface. • Viaduct can stay open to traffic while the tunnel is being built. • Construction is estimated to take 4.5 years. • Limits impacts to waterfront businesses.	• Stacked with three lanes in each direction. • Constructed along the waterfront. • Top of tunnel is 10 feet below the surface. • Viaduct would have been closed for 3.5 years under the “short” construction plan. • Construction was estimated to take 7 years under the “short” construction plan. • Would cause major impacts to waterfront businesses.

Successful Delivery of Bored Tunnel Projects

Examples of Tunnel Excavation in Urban Areas

1. 4th Elbe River, Hamburg: Successfully excavated 1.6 miles at 46.6-ft-diameter.

2. Lefortovo Tunnel, Moscow: Rebuilt Elbe TBM successfully excavated 2 bores each 1.4 miles long at 46.6-ft-diameter. Same machine refurbished for another 2 tunnels in Moscow.

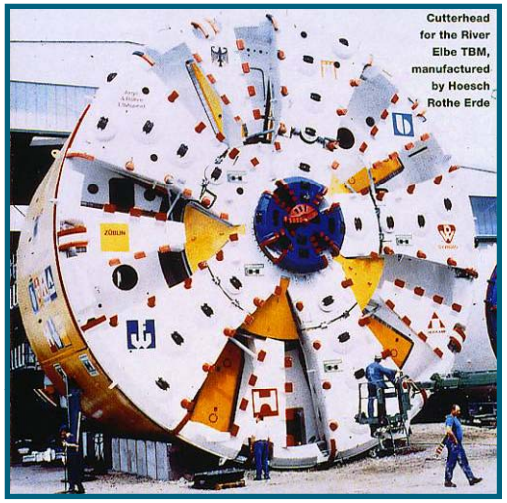
3. Madrid M30 EPB: Successfully excavated 2 bores each 1.3 miles long at 50-ft-diameter by 2 closed-face TBMs built by different manufacturers. M30 diameter was about 10 ft larger than previous TBMs (~50% greater face area).

4. Shanghai Yangtze River Mixshield: Successfully excavated 2 bores each 4.6 miles long at 50.6-ft-diameter. This TBM is the current record holder for diameter. Tunnel completed about a year ahead of original schedule.

Pending Record Holder

Moscow Road/Rail Tunnel: A 62-ft-diameter Mixshield has been ordered. This diameter is 11-ft larger than Shanghai TBM, the current record holder.

Elbe Tunnel Slurry Machine



Madrid Calle M30

Seven tunnel boring machines will be used in the Madrid Calle 30 project

Alaskan Way Bored Tunnel vs. Boston's Big Dig

More differences than similarities

Boston's Big Dig Central Artery/Tunnel
Substantially larger and more complex including:

1. Very disruptive cut-and-cover tunnel through the central city under the existing elevated roadway and 2 subway lines.
2. A signature cable-stayed bridge over the Charles River, cut-and-cover through South Boston.
3. Two sets of immersed tubes under the harbor to the airport and the complex interchange with very poor geotechnical conditions.

- Project was disruptive and required extensive traffic management and mitigation.
- The initial project cost number did not include added scope, mitigation and environmental requirements, inflation and appropriate allowance for risk and escalation.
- The Central Artery/Tunnel did not have a strong agency management or consistent leadership throughout the course of the project.
- As a result, the project was delivered grossly over budget and years behind schedule.

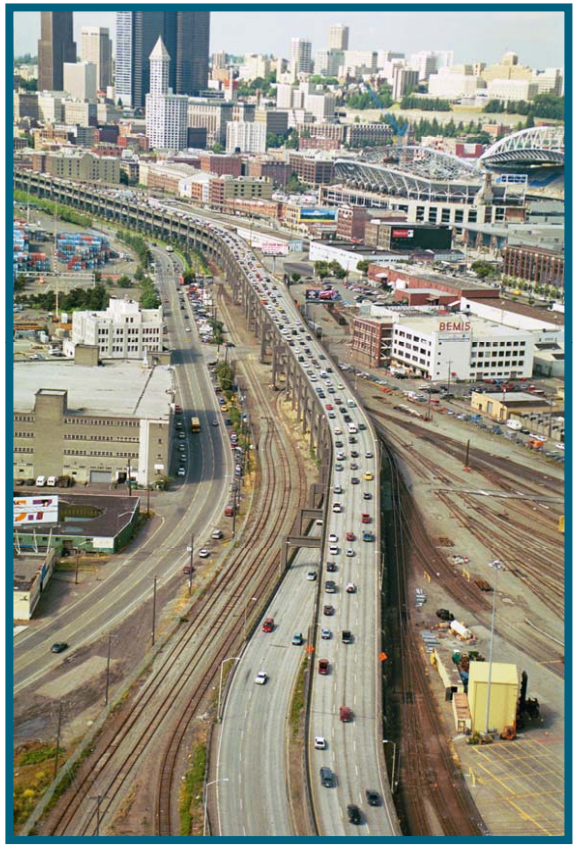
	Bored Tunnel & South End Project	Big Dig Projects
Total Project Length	2.8 miles	8 miles
Number of tunnels*	1	3
Length of tunnels*	2 miles	5 miles
Total lane miles	12.8 miles	>161 miles

*Boston Big Dig tunnels included cut-and-cover, immersed tubes, jacked tunnel and other special tunneling methods.

SR 99 Bored Tunnel

- Project will run 30-200 feet underground minimizing traffic disruption and impacts to the waterfront and downtown
- WSDOT uses the CEVP® process on all state projects over $100M to ensure costs are complete, reasonable, defendable and appropriately represent risk and uncertainties.
- WSDOT is a strong owner in policy, management and technical capability and Governor Gregoire is project authority
- WSDOT will maintain this strength over the life of the project, assisted by eminent private-sector engineers and contractors
  - Accountable to the public, Governor and Legislature

Alaskan Way Viaduct and Seawall Replacement Program



Follow our progress: www.alaskanwayviaduct.org