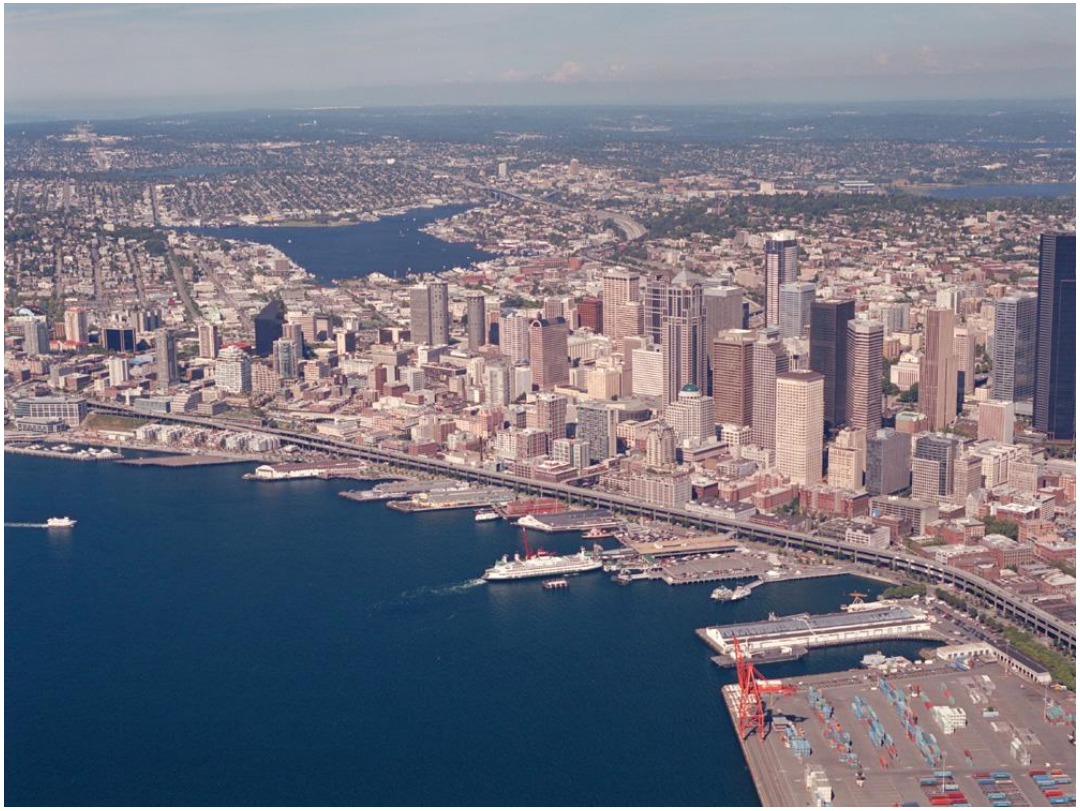
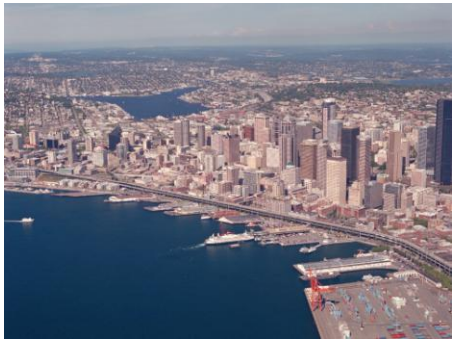
Alaskan Way Viaduct
North Portal and Freight Connections



Port of Seattle Commission
March 10, 2009

Bored-Tunnel Hybrid Current Status



SB 5768

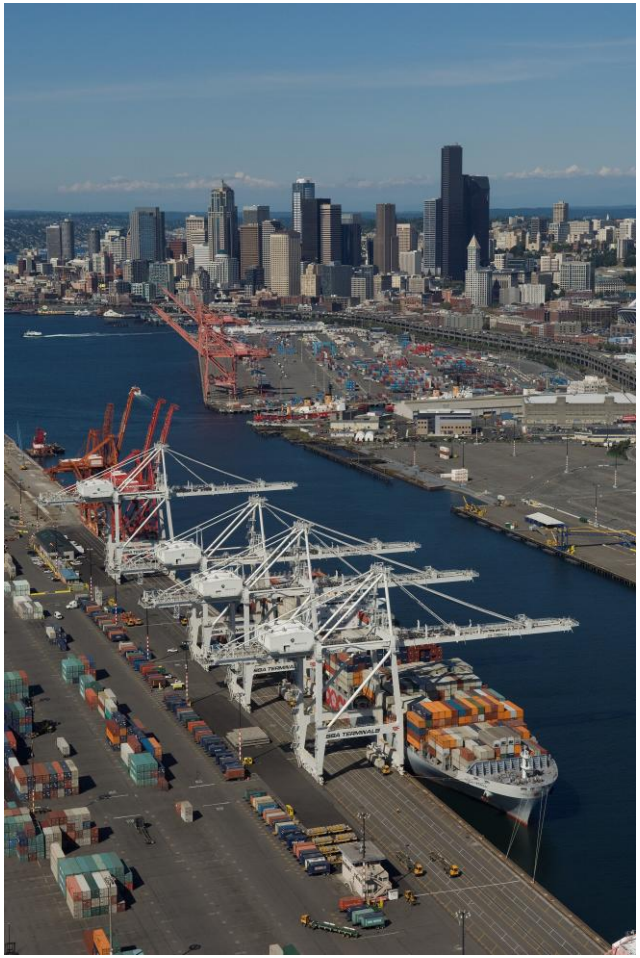
- Approved by State Senate March 4 by vote of 43-6
- State commitment of $2.4 billion for cost of tunnel, additional $400 million through tolling
- Tunnel features 4 lanes under First Avenue, extending from sports stadiums to approximately Harrison Street near Aurora Ave. N
- State responsible for tunnel and portals; City of Seattle responsible for utility relocation, seawall and waterfront improvements; King County responsible for transit

Port of Seattle relies on an efficient transportation system

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



Priority questions

Designs for the other essential street network connections

- Efficient surface connection for NW Seattle, freight mobility, Terminal 91 access
- Connectivity between north and south industrial areas
- Traffic flow on Alaskan Way surface street
- Portal connections to the street network

The Alaskan Way Viaduct & Seawall Replacement Program

Central Waterfront

Port of Seattle Commissioners

March 10, 2009

U.S. Department of Transportation Federal Highway Administration

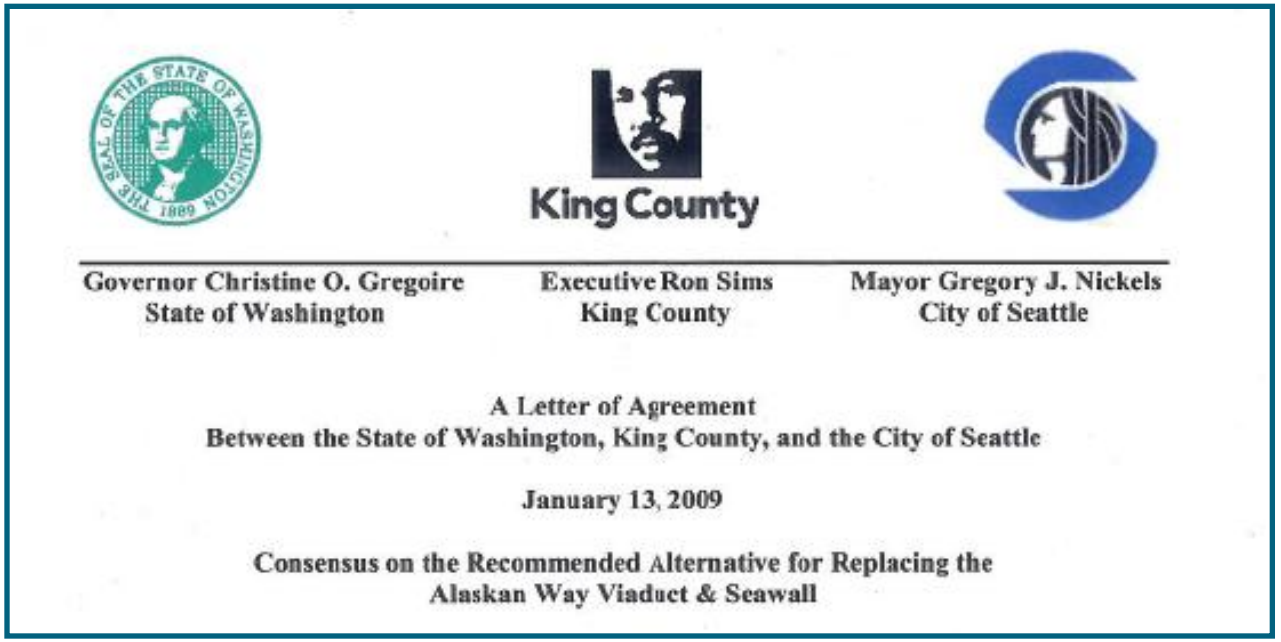
WSDOT

King County

City of Seattle

Letter of Agreement

On Jan. 13, 2009, Governor Gregoire, King County Executive Sims and Mayor Nickels signed a letter of agreement signifying their support of the bored tunnel hybrid alternative.



King County

Governor Christine O. Gregoire
State of Washington

Executive Ron Sims
King County

Mayor Gregory J. Nickels
City of Seattle

A Letter of Agreement
Between the State of Washington, King County, and the City of Seattle

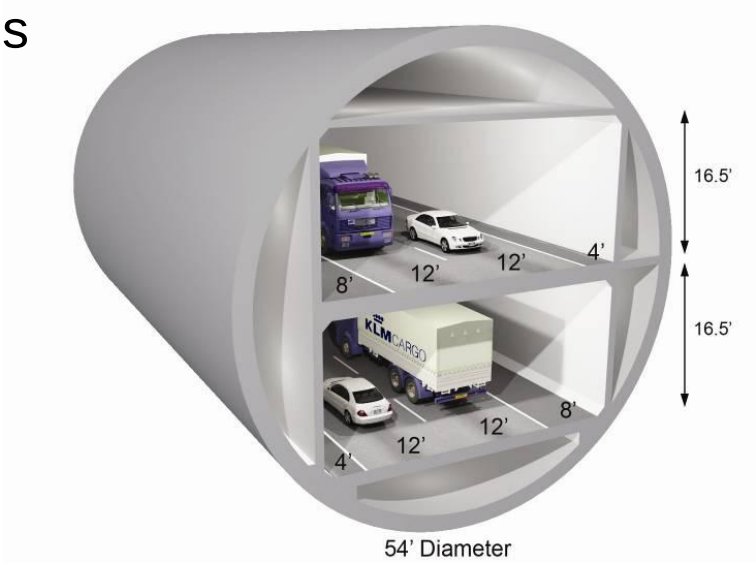
January 13, 2009

Consensus on the Recommended Alternative for Replacing the
Alaskan Way Viaduct & Seawall

Bored Tunnel

A bored tunnel under First Avenue is the new SR 99. Some features include:

- Least traffic and business disruptions during construction.
- Two lanes of traffic, with shoulders, in each direction.
- Approximately two miles long.
- Between 30 and 200 feet underground.

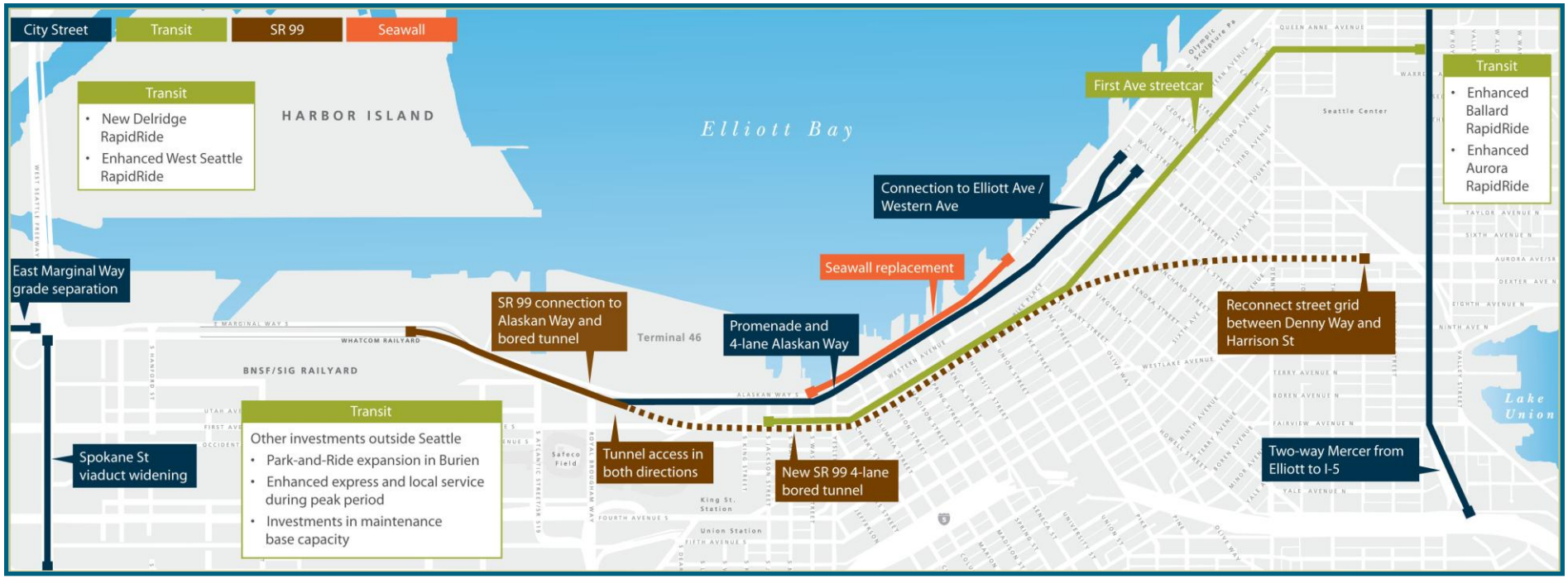


Bored Tunnel Hybrid

- Improves public safety.
- Encourages job creation and health of the regional economy.
- Maintains movement of people and goods for trips to and through downtown.
- Improves pedestrian access.
- Improves transit frequency and reliability.
- Minimizes construction and traffic impacts.
- Improves key east/west city street connections.
- Reconnects downtown and Elliott Bay, creating a world-class waterfront.



Bored Tunnel Hybrid Alternative



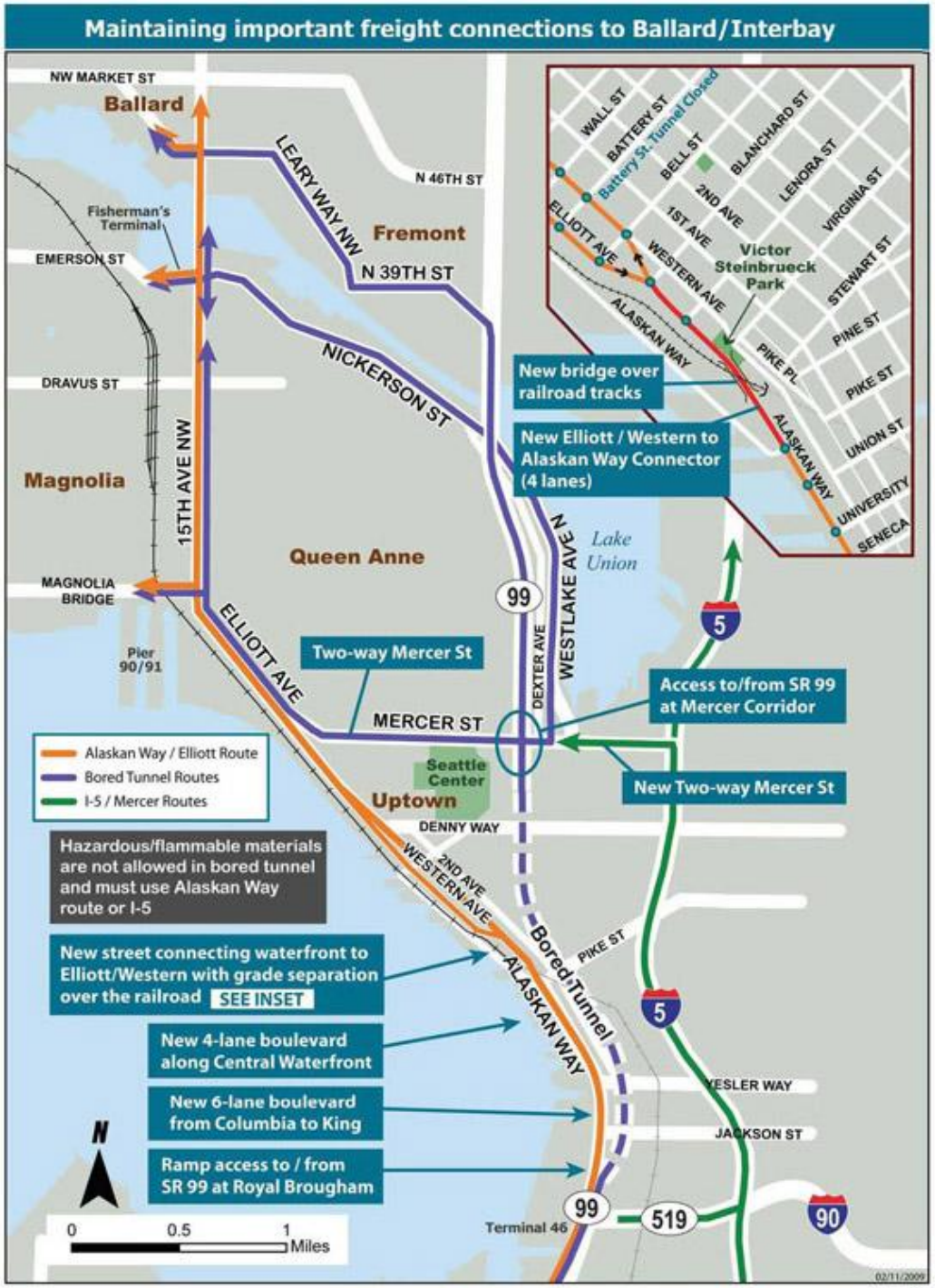
Mobility


How Northwest Seattle will access the Bored Tunnel
NW MARKET ST
Ballard
LEARY WAY NW
N 46TH ST
Fremont
N 39TH ST
EMERSON ST
NICKERSON ST
DRAVUS ST
15TH AVE NW
Magnolia
Queen Anne
MAGNOLIA BRIDGE
ELLIOTT AVE
Two-way Mercer St
99
WESTLAKE AVE N
DEXTER AVE
Access to/from SR 99 at Mercer Corridor
MERCER ST
Seattle Center
Uptown
New Two-way Mercer St
DENNY WAY
2ND AVE
WESTERN AVE
5TH AVE
PIKE ST
Bored Tunnel
ALASKAN WAY
YESLER WAY
JACKSON ST
99
519
90
5
5
Mercer / Elliott Route
Aurora Avenue North Routes
Westlake and Dexter Routes
02/11/2009

How Northwest Seattle will get to and through downtown using the new Alaskan Way

Connections to Elliott and Western avenues

- Road grades will be similar to what they are today with improved connections to the new Alaskan Way at Elliott and Western avenues.
  - Elliott Avenue connection to new Alaskan Way will be approximately 6 percent.
  - Viaduct's existing on-ramp at Elliott Avenue is 6.3 percent.
- Bored tunnel will have 5 percent grade.
- Tunnel ramps are expected to have grades between 5 and 7 percent.


Maintaining important freight connections to Ballard/Interbay
NW MARKET ST
Ballard
LEARY WAY NW
N 46TH ST
Fisherman's Terminal
EMERSON ST
Fremont
N 39TH ST
NICKERSON ST
DRAVUS ST
15TH AVE NW
Magnolia
MAGNOLIA BRIDGE
Queen Anne
Lake Union
99
WESTLAKE AVE N
DEXTER AVE
ELLIOTT AVE
Pier 90/91
Two-way Mercer St
MERCER ST
Seattle Center
Uptown
DENNY WAY
2ND AVE
WESTERN AVE
PIKE ST
Bored Tunnel
ALASKAN WAY
YESLER WAY
JACKSON ST
Terminal 46
519
90
5
WALL ST
BATTERY ST
Battery St. Tunnel Closed
BELL ST
BLANCHARD ST
LENORA ST
VIRGINIA ST
1ST AVE
Victor Steinbrueck Park
STEWART ST
PINE ST
PIKE PL
UNION ST
UNIVERSITY
SENECA
New bridge over railroad tracks
New Elliott / Western to Alaskan Way Connector (4 lanes)
Access to/from SR 99 at Mercer Corridor
New Two-way Mercer St
Alaskan Way / Elliott Route
Bored Tunnel Routes
I-5 / Mercer Routes
Hazardous/flammable materials are not allowed in bored tunnel and must use Alaskan Way route or I-5
New street connecting waterfront to Elliott/Western with grade separation over the railroad SEE INSET
New 4-lane boulevard along Central Waterfront
New 6-lane boulevard from Columbia to King
Ramp access to / from SR 99 at Royal Brougham
N
0
0.5
1
Miles
02/11/2009

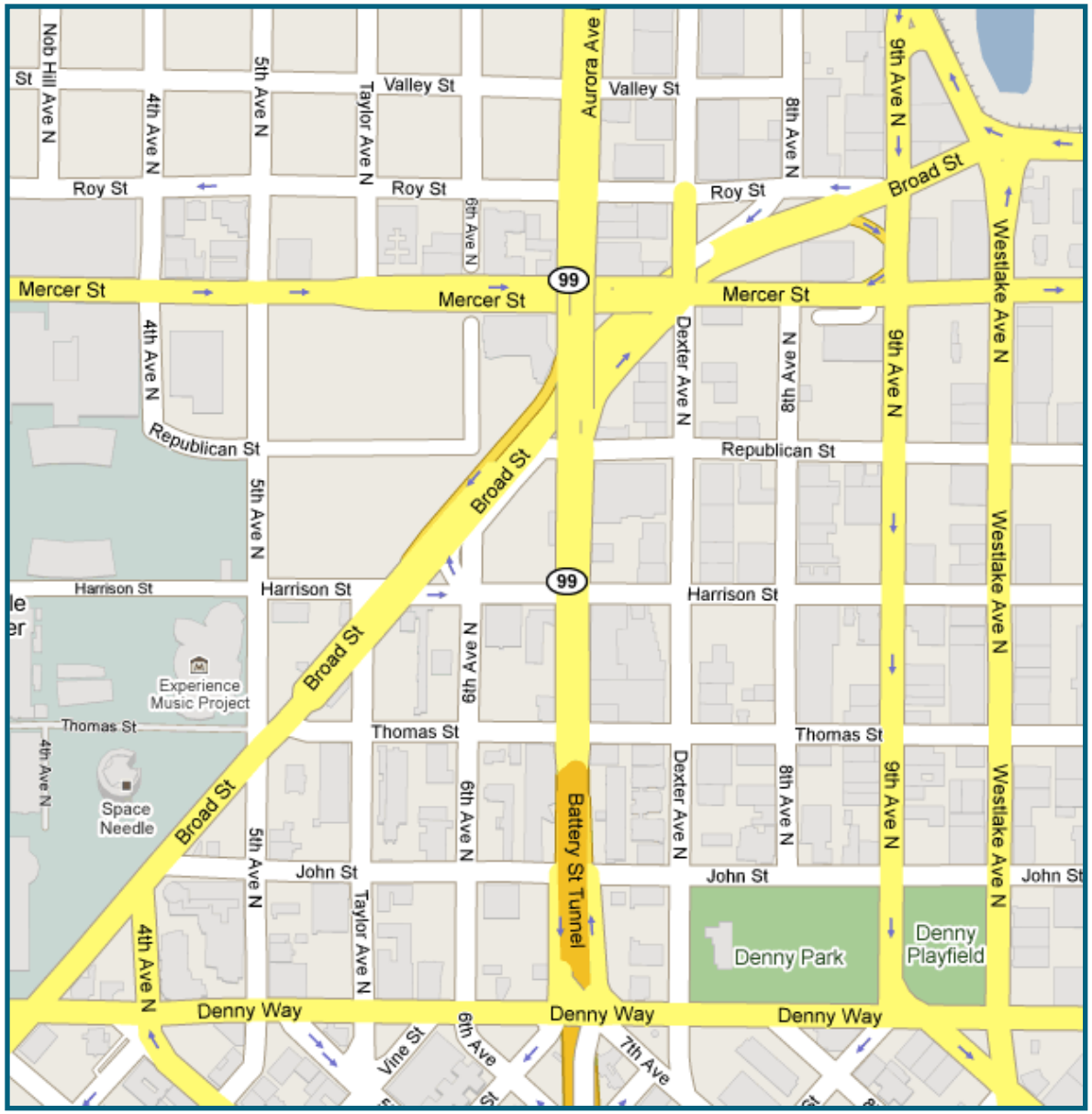

AQUARIUM
PIER 59

North portal

Central Waterfront

SR 99 bored tunnel

North portal will connect to Aurora Avenue N.



SR 99 bored tunnel – North portal objectives

1. Create two connections (on- and off-ramps in both directions) from SR 99 to local streets:
   - One north of Mercer Street (possibly at Roy Street).
   - One south of Mercer Street (between Thomas and Republican streets).
2. Continue to have access to downtown from Aurora Avenue:
   - Currently, this access is via ramps at Denny Way.
   - Downtown access may or may not remain at Denny Way.
3. Create three crossings over Aurora Avenue for local connections:
   - Crossings would be at John, Thomas and Harrison streets.
   - Dependent on connections on and off Aurora Avenue.

New Two-way Mercer Corridor

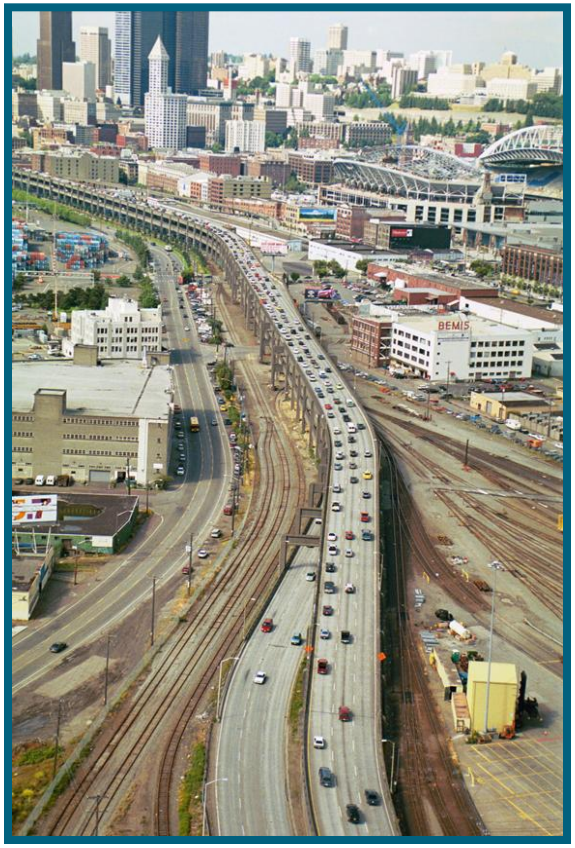
SR 99 bored tunnel

North portal design issues

- Construction impacts
- Cost
- Need for additional right-of-way
- Grade on Aurora Avenue crossings
- Weaving movements

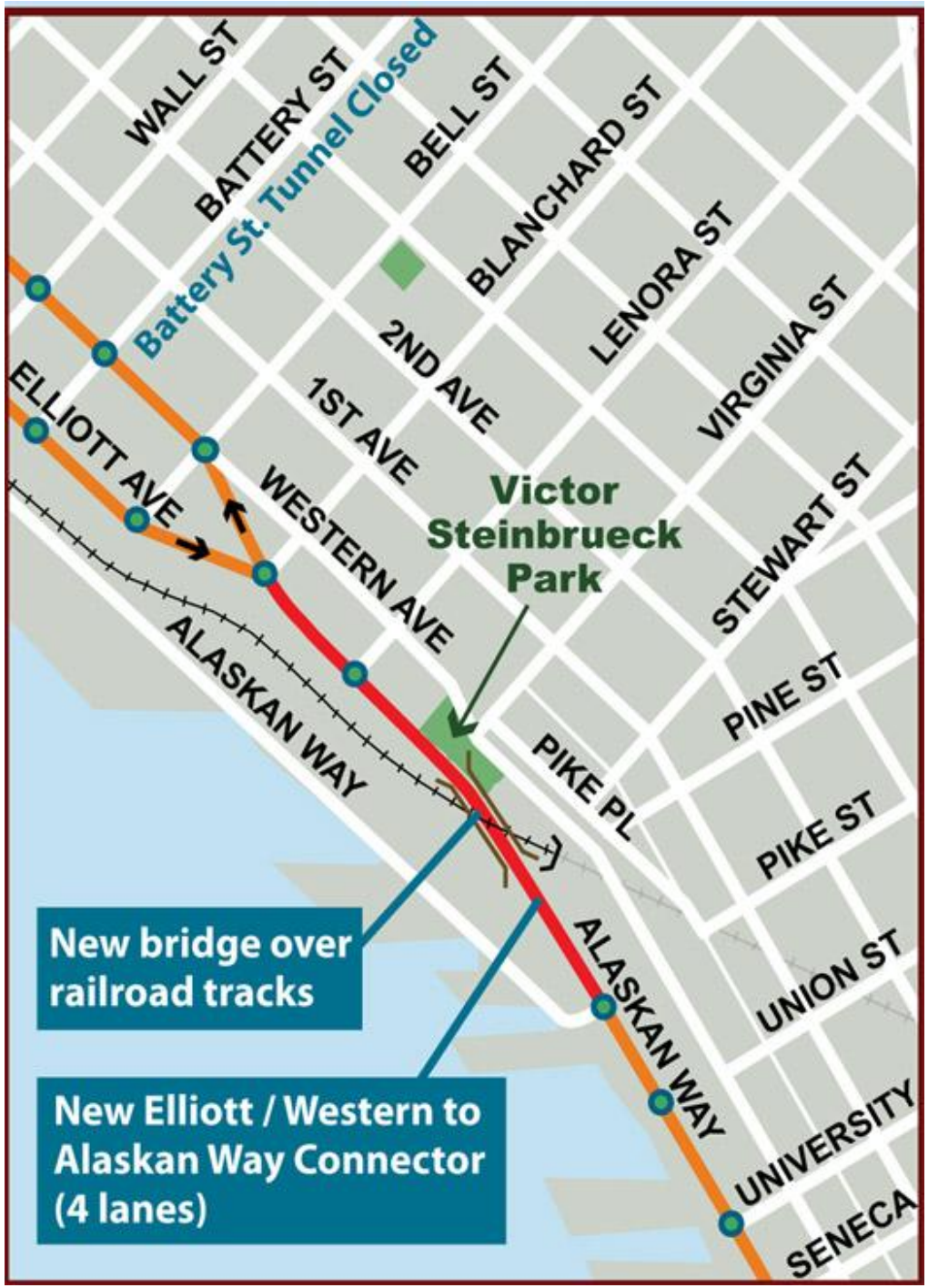
Questions?

Alaskan Way Viaduct and Seawall Replacement Program



Follow our progress: www.alaskanwayviaduct.org

- Back Pocket


WALL ST
BATTERY ST
Battery St. Tunnel Closed
BELL ST
BLANCHARD ST
LENORA ST
VIRGINIA ST
2ND AVE
1ST AVE
ELLIOTT AVE
WESTERN AVE
Victor Steinbrueck Park
STEWART ST
PINE ST
ALASKAN WAY
PIKE PL
PIKE ST
UNION ST
ALASKAN WAY
UNIVERSITY
SENECA
New bridge over railroad tracks
New Elliott / Western to Alaskan Way Connector (4 lanes)

New Transit Connections to Downtown from Northwest Seattle


Access from West Seattle to areas north of Downtown
Two-way Mercer St
Access to/from SR 99 at Mercer Corridor
New Two-way Mercer St
New street connecting waterfront to Elliott/Western with grade separation over the railroad
SEE INSET
New 4-lane boulevard along Central Waterfront
New 6-lane boulevard from Columbia to King
Ramp access to / from SR 99 at Royal Brougham
New bridge over railroad tracks
New Elliott / Western to Alaskan Way Connector (4 lanes)
New off-ramp to Fourth Avenue S.
ELLIOTT AVE
MERCER ST
Elliott Bay
Lake Union
Seattle Center
Uptown
DENNY WAY
Belltown
WESTERN AVE
BROAD ST
Bored Tunnel
PIKE ST
Downtown
ALASKAN WAY
Pioneer Square
YESLER WAY
S JACKSON ST
QWEST Field
Safeco Field
519
90
99
5
1ST AVE
4TH AVE
WEST SEATTLE BRIDGE
SPOKANE VIADUCT
ADMIRAL WAY
FAUNTLEROY WAY
DELRIDGE WAY
Battery St. Tunnel Closed
WALL ST
BATTERY ST
BELL ST
BLANCHARD ST
LENORA ST
VIRGINIA ST
2ND AVE
1ST AVE
Victor Steinbrueck Park
STEWART ST
PINE ST
PIKE PL
PIKE ST
UNION ST
UNIVERSITY
SENECA
Freeway / Limited Access
Surface Arterial Street
0
0.5
1
Miles
N

Access from West Seattle to Downtown

Systems Solution

Upon evaluation of the new project area and with a clear direction to consider the entire system of streets, the three executives recommended that investments be made in:

- Improved city streets
- Enhanced transit service
- New bored tunnel

Improves City Streets

The improvement of City streets throughout Seattle will be important to the success of this solution. Projects underway include:

Mercer Street Project:

- Creates enhanced east-west connections.
- Improves connections from I-5 and the bored tunnel to Ballard/Magnolia/Interbay.
- Enhances connections between high density neighborhoods as well as the Seattle Center.

Spokane Street Project:

- Provides critical connections between the Port, West Seattle, I-5, I-90 and SR 99.
- Improves westbound traffic flow and safety.
- Minimizes conflicts between freight, rail, commuters and ferry traffic.

Enhances Transit Service

Transit enhancements will provide important mobility during and after construction and are critical to the success of the bored tunnel solution.

- Enhanced service to accommodate demand
  - Additional bus service
  - First Avenue streetcar
- Access to downtown
- Construction mitigation
- Environment

Maintains Capacity through Downtown

The bored tunnel alternative:

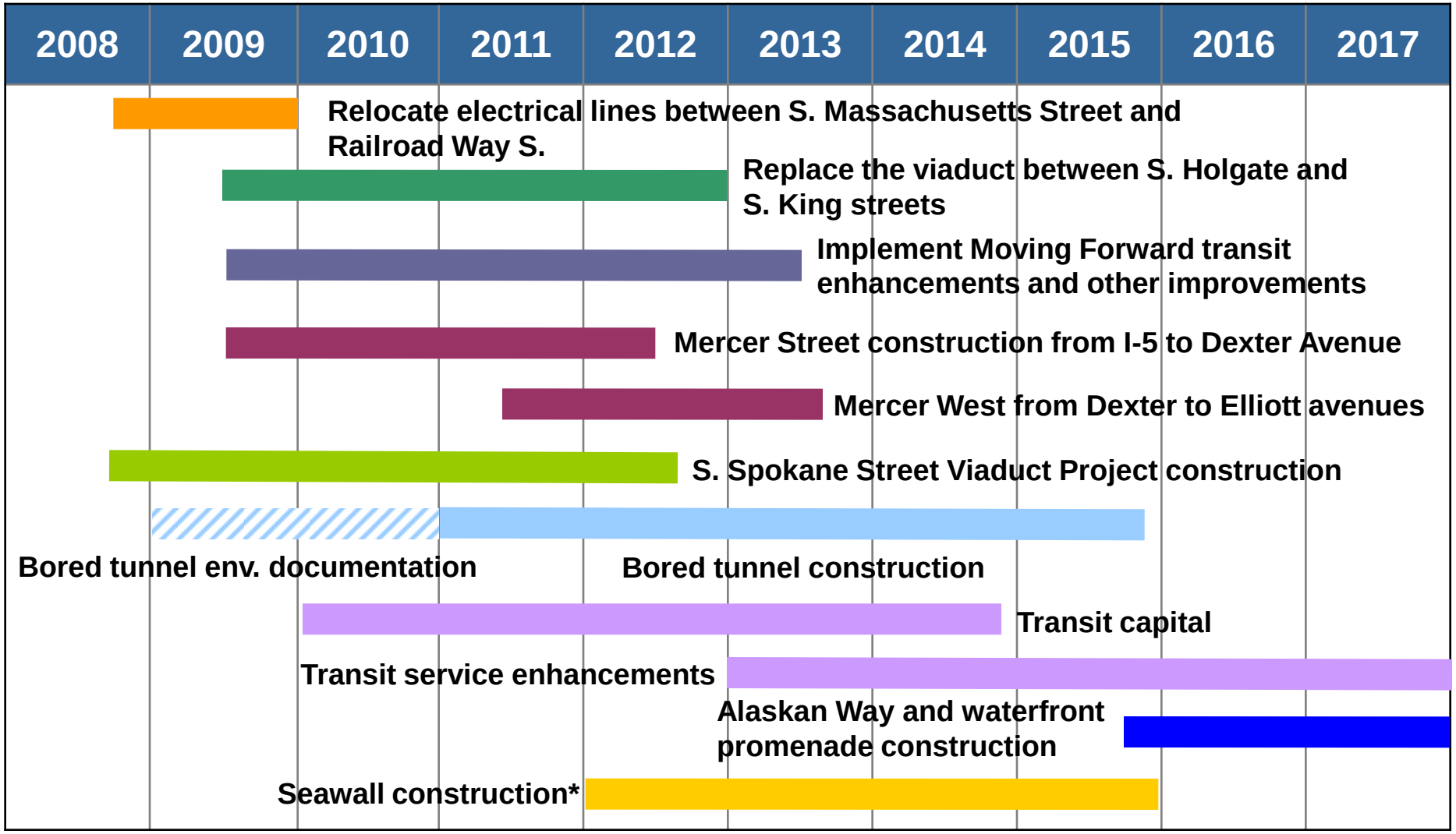
- The tunnel will carry 85,000 vehicles through downtown Seattle each day at year of opening (with room to grow). Surface Alaskan Way will carry about 25,000 vehicles per day.
- Maintains today's travel times for trips through downtown.
- Accommodates in-city trips through new investments in local streets and transit.
    - New bus service will carry approximately 17,000 additional daily riders, primarily serving northwest and southwest Seattle.
- Improvements to I-5 further expand north-south vehicle capacity and provide improvements in travel times.

Fiscal Responsibility

	Proposed Project Implementation Responsibility				Costs
	State	King County	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

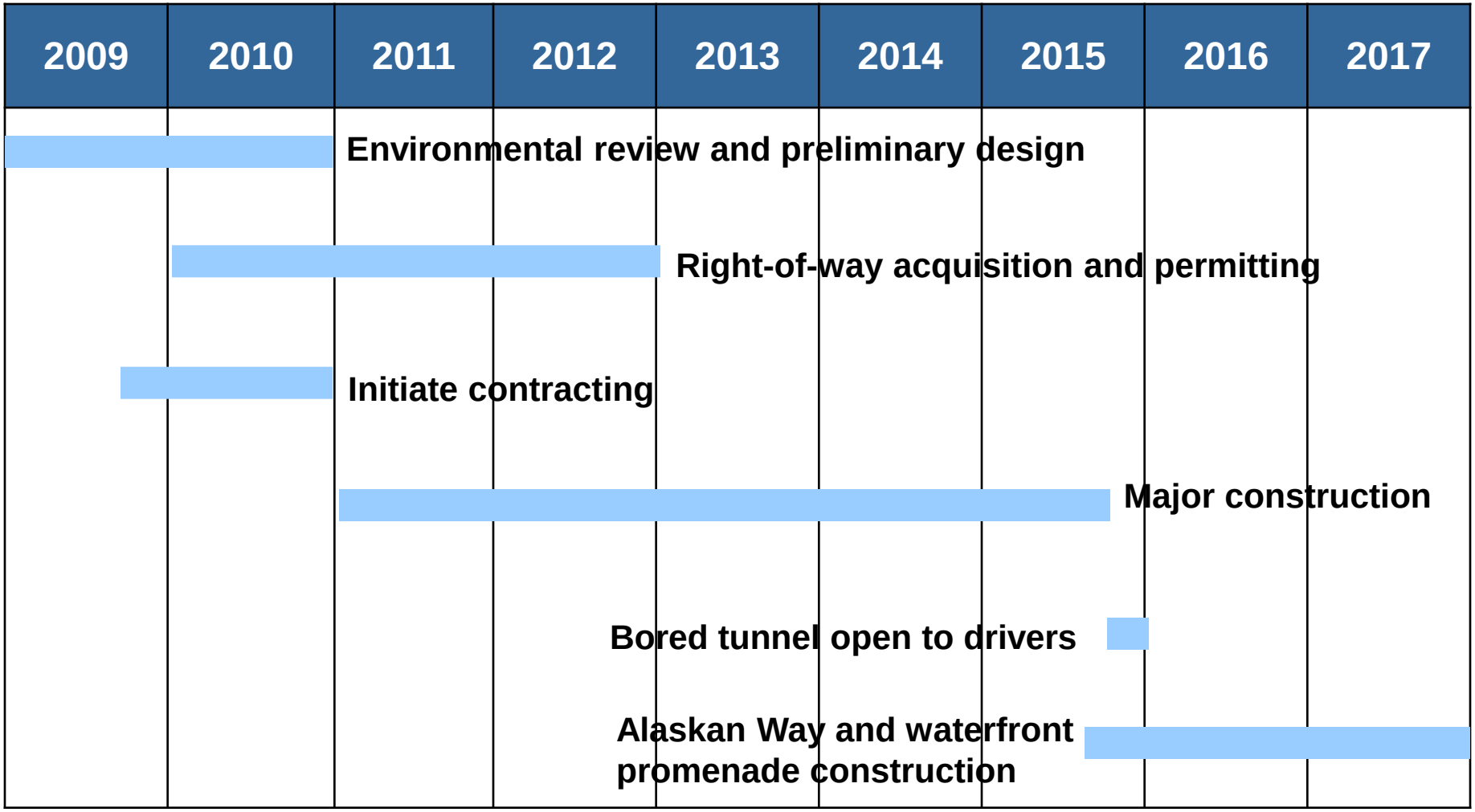
*Reflects cost savings from Moving Forward program realized by not repairing the viaduct from Lenora to Battery Street Tunnel and not completing the second phase of fire and life safety upgrades to the Battery Street Tunnel.
**Reflects the most likely cost based on a conceptual design. The potential 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.

Program Timeline



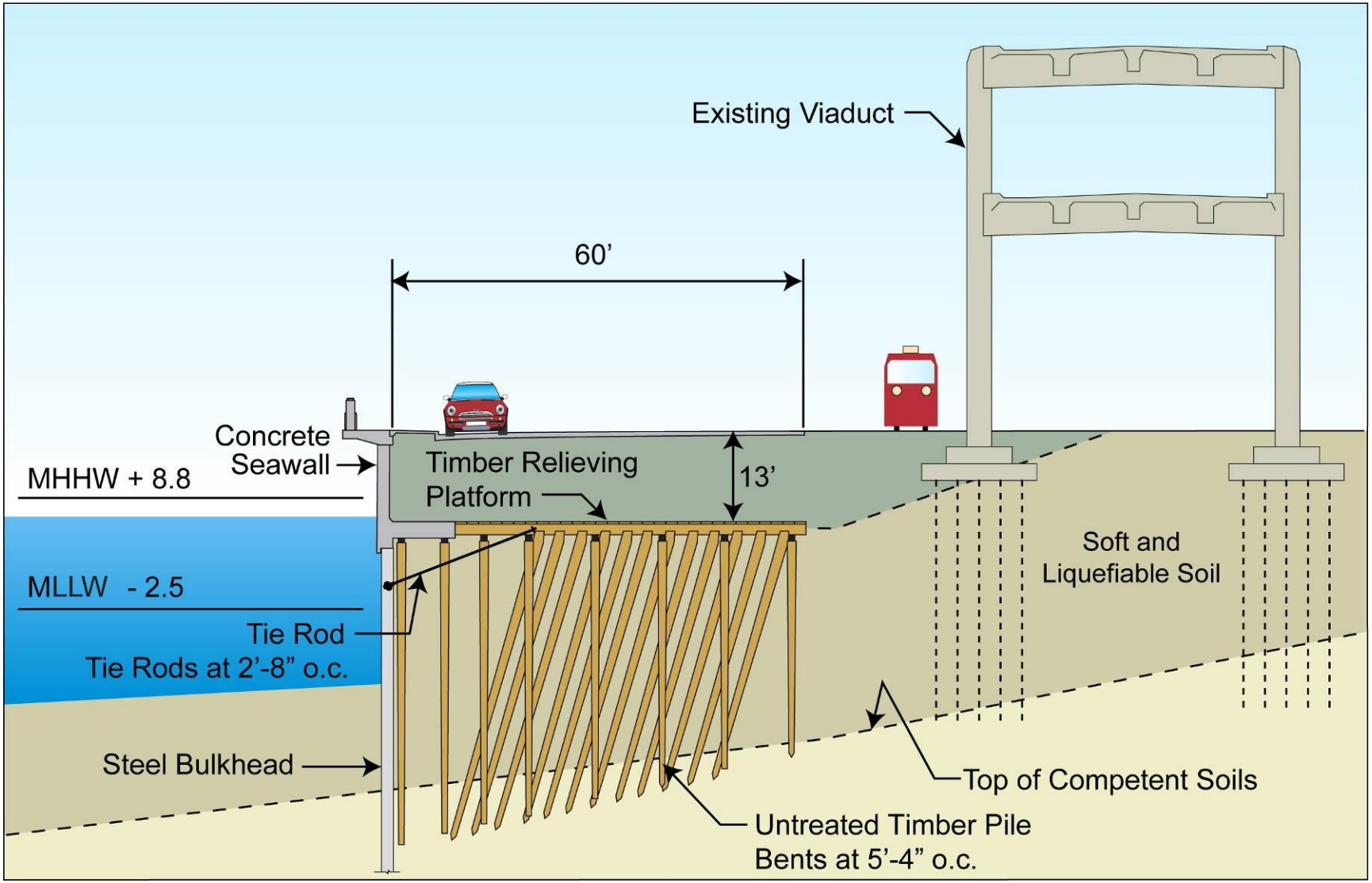
*Seawall construction will take two years, but will be done seasonally based on environmental and other factors

Bored Tunnel Project Timeline




Seattle
Seattle

Replacing the Seawall (Washington to Pine)



First Avenue Streetcar

- Connects to the First Hill Streetcar.
- Connects to Ballard and West Seattle RapidRide lines.
- Connects to Amtrak, Commuter Rail and Light Rail at King Street Station.
- Provides easy access to Colman Dock.
- Connects major activity centers: Seattle Center, Pike Place Market and the stadium area.

• How is the bored tunnel different from the cut-and-cover tunnel?

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.

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

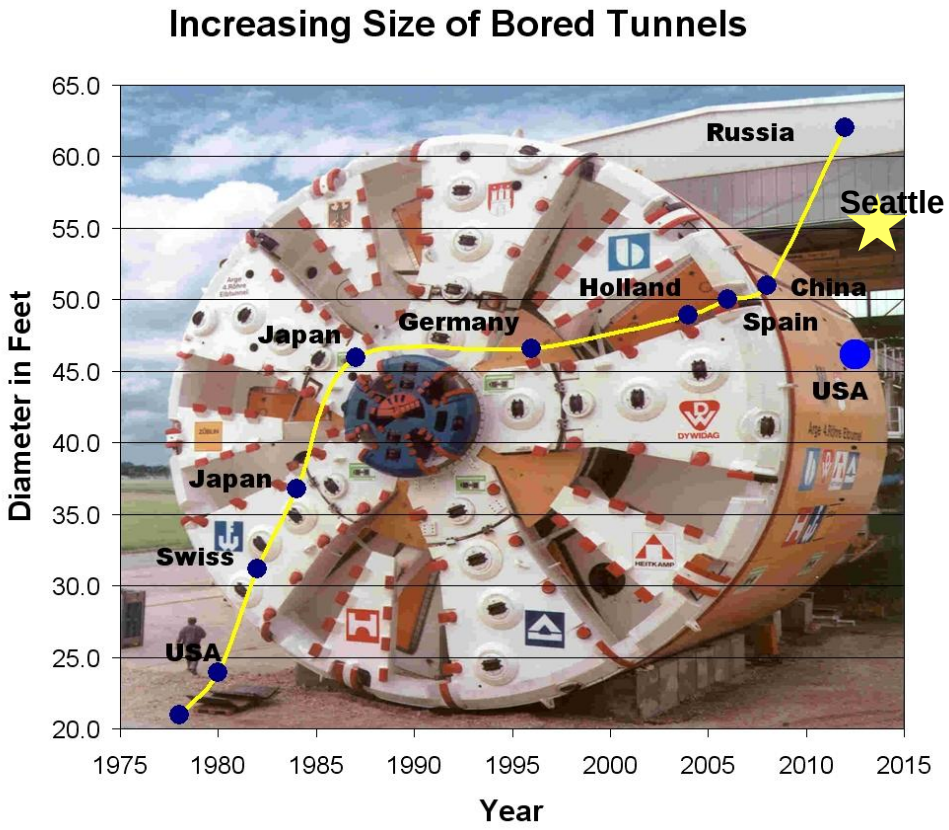
*Boston Big Dig tunnels included cut-and-cover, immersed tubes, jacked tunnel and other special tunneling methods.

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

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.

SR 99 Bored Tunnel Cost

Risk-based estimating nationally recognized as a best practice for 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**

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

Metro's Funding Gap