

What are air quality effects?

monitoring locations



the project...

- Is not expected to cause or contribute to any new violation of the National Ambient Air Quality Standards (NAAQS).
- Is expected to have a higher potential for mobile source air toxics (MSAT) emissions. Estimates of MSAT emissions along the SR 520 corridor are provided.
- Meets air quality conformity requirements.

air quality summary

- Air Quality in the region is affected by a complex set of anthropogenic and geographic factors of which transportation emissions is a major but not exclusive contributor.
- The preferred alternative addresses improvements in air quality through a number of direct and indirect features:
 - **Encouraging transit use through tolling.**
 - **Improving bicycle and pedestrian connections** to the existing regional and local bike-pedestrian system.
 - **Reducing vehicle miles traveled** by improving transit speed and reliability.
 - Improving flow and decreasing back-up on SR 520 to **keep traffic flowing at 45 to 60 mph.**

On average, **emissions are lowest for cars operating between 45-65 mph** because fuel is most completely and efficiently burned at these speeds.

Idling for more than 30 seconds and **multiple accelerations and decelerations** are the primary **causes of fuel inefficiency AND vehicle emissions.**

preferred alternative improvements

Burden Emissions Analysis Daily Project Emissions of Criteria Pollutants (tons per day)

(Update to 2009 Discipline Report)

Alternative	VMT	CO	CO % of SIP Budget	VOCs	NOx	PM ₁₀	PM _{2.5}
2008 Existing		222	9%	15.5	23.3	0.6	0.4
2008 Revised Existing	11,200,000	226	9%	15.1	23.5	0.6	0.4
2030 Revised No Build	13,100,000	166	7%	7.3	7.2	0.4	0.2
2030 Preferred Alternative	13,100,000	166	7%	7.2	7.1	0.4	0.2

Note: Emissions were calculated using the MOBILE6.2 emission factor for 30 miles per hour and the daily VMT from the Transportation Discipline Report (WSDOT 2009c). State Implementation Plan (SIP) inventory data are from 61 Federal Register (FR) 53323 (October 11, 1996), which was established through the year 2010. Pollutant emissions in ton/day should not be compared to NAAQS which are pollutant concentrations.



LINK TO FEIS Air Quality Discipline Report

typical emission sources

- Dust generated during construction unloading activities.
- **Dust generated during demolition** of structures and pavement.
- **Engine exhaust emissions** from construction vehicles, worker vehicles, and diesel-fueled construction equipment.
- **Increased motor vehicle emissions** associated with **increased traffic congestion** during construction and regular operations.
- Volatile organic compounds (VOCs) and odorous compounds emitted during **asphalt paving.**



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STATE ROUTE
520

What Fits?

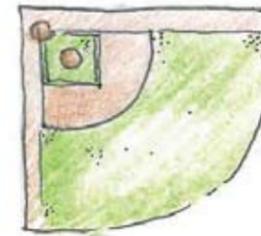
10th and Delmar lid



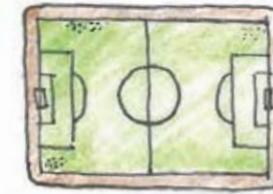
Montlake lid



Activity Examples to Scale



baseball diamond



soccer field



tennis court



skatepark (small)



skatepark (large)



amphitheatre (large)



amphitheatre (small)



dog park (large)



dog park (small)



fountain



fountain and reservoir



kiddie pool



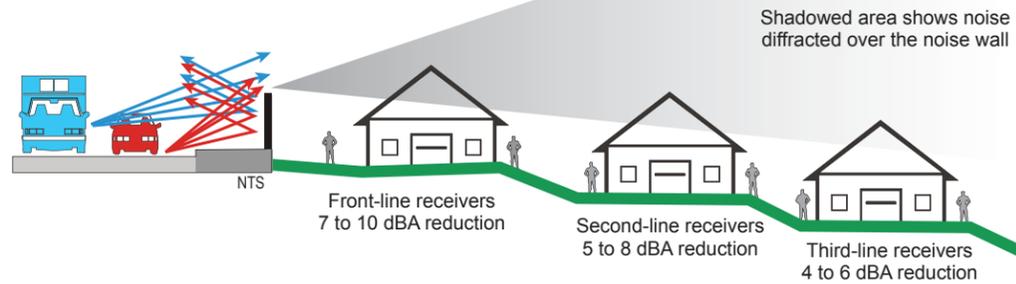
pool



P-patch (small)

Typical Noise Reduction

Below-grade receiver

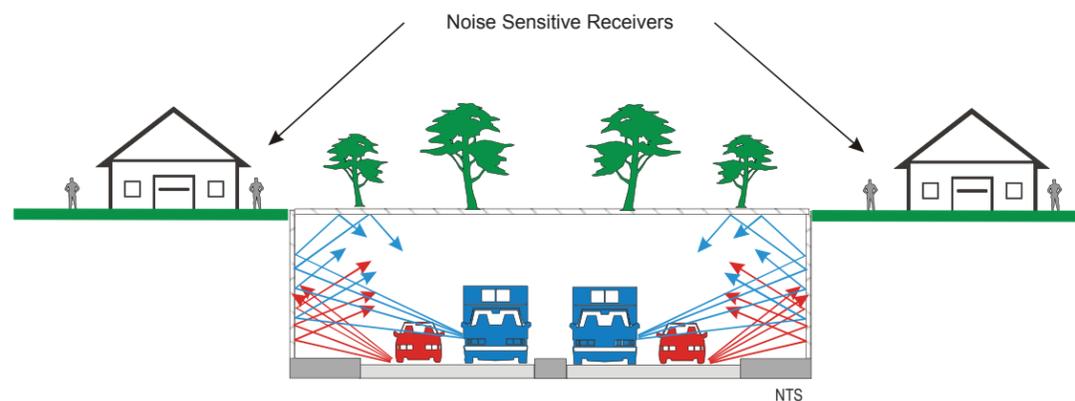


LOCATIONS: Shelby/Hamlin and Portage Bay neighborhoods

Typical sound wall heights for below-grade residences:

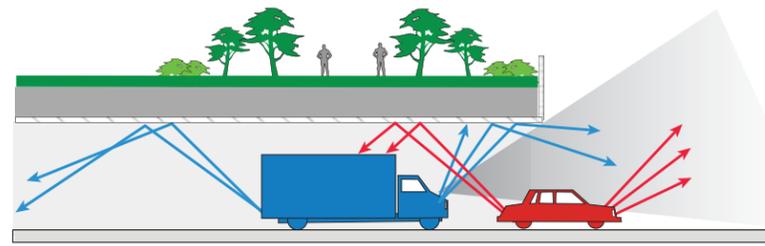
- 6 to 8 feet for roads with primarily passenger vehicle traffic
- 8 to 10 feet for major arterial roads and minor highways with some heavy truck traffic
- 10 to 12 feet for major highways with a high level of heavy truck traffic

Depressed Corridor with Lid



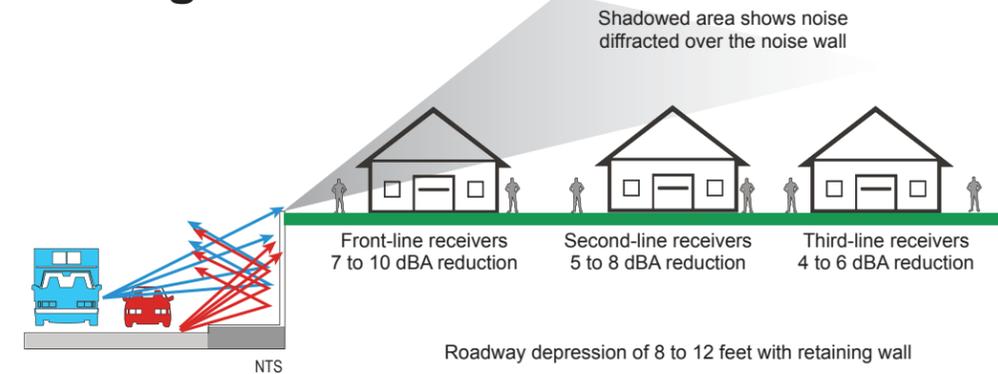
LOCATIONS: Montlake lid and 10th and Delmar lid

Lid Portal

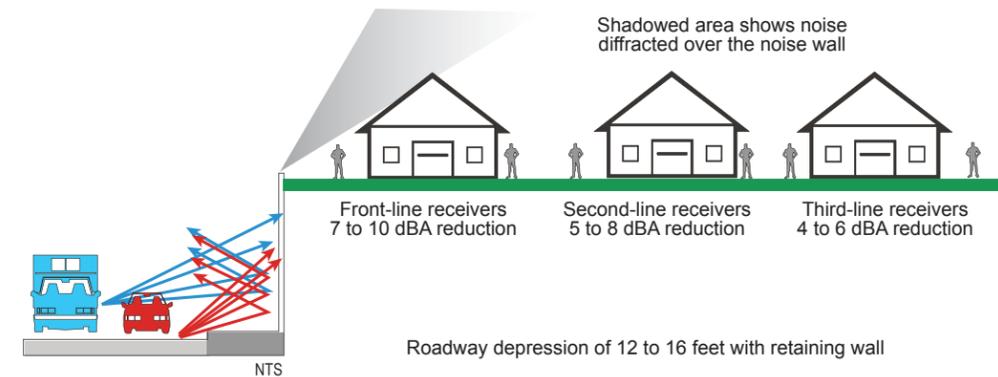


LOCATIONS: Montlake lid, 10th and Delmar lid, and I-5 enhanced pedestrian crossing

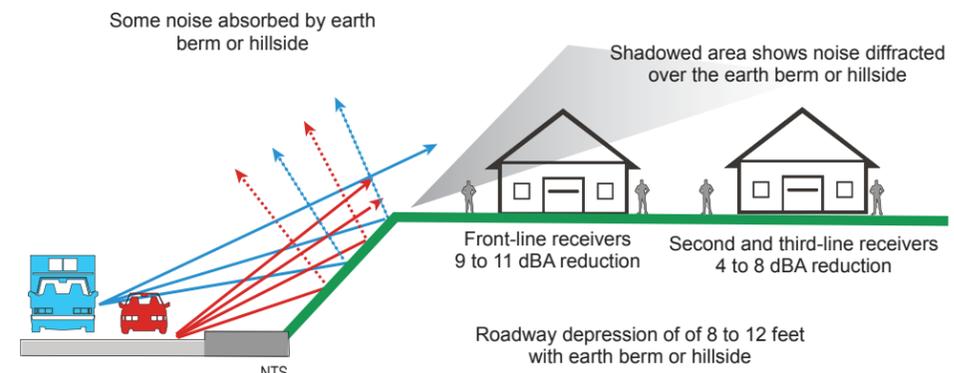
Above-grade receiver



LOCATIONS: Roanoke, North Capitol Hill and I-5/SR 520 Interchange



LOCATIONS: Roanoke, North Capitol Hill and I-5/SR 520 Interchange



LOCATIONS: Roanoke, North Capitol Hill and I-5/SR 520 Interchange

NTS = not to scale



[LINK TO FEIS Noise Discipline Report](#)

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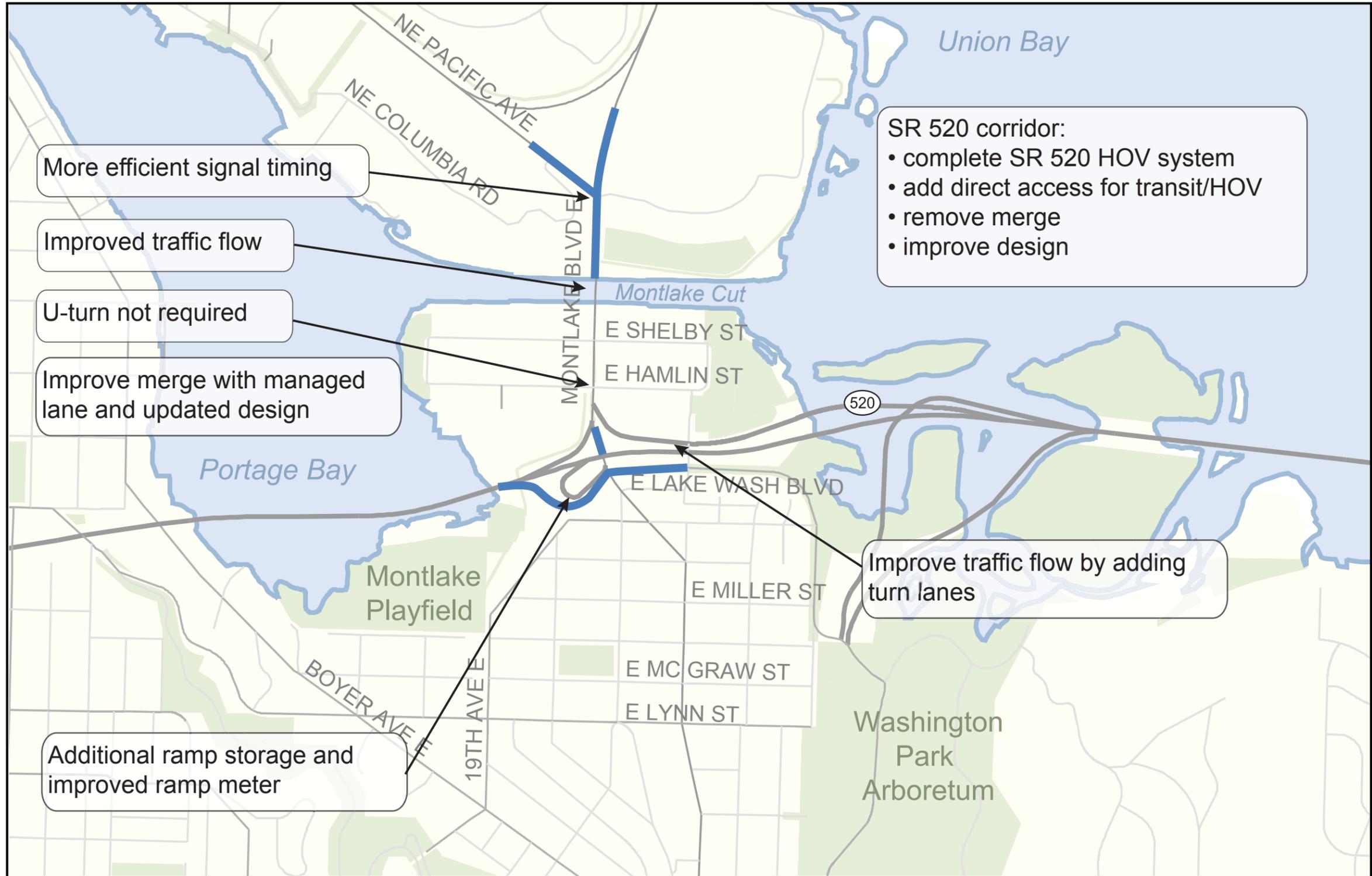
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How is traffic affected now and in future?

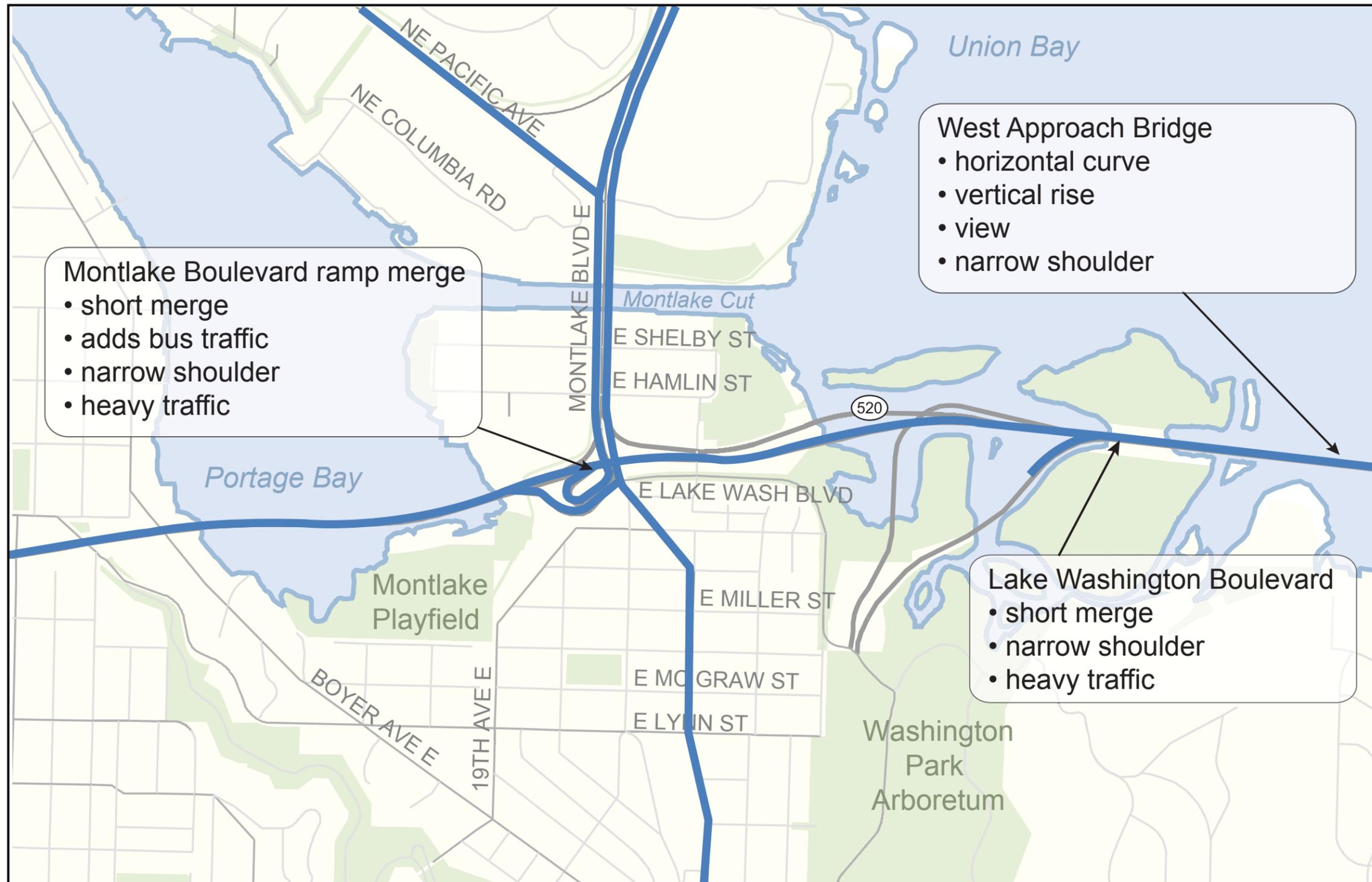
PREFERRED ALTERNATIVE TRAFFIC



PM Peak Period

How is traffic affected now and in future?

EXISTING TRAFFIC CONGESTION



PM Peak Period

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Sustainability Values

SUSTAINABLE PRACTICE

Sustainable Communities go beyond the concept of livability by addressing issues of **economic vitality**, **social and cultural equity**, and **environmental stewardship** from local to global levels. Effective transportation and mobility are key components of sustainable communities. New and redesigned infrastructure must:

- Provide a healthy, safe movement of people and goods (to and through a community).
- Promote multiple modes of travel.
- Strive to reduce its overall consumption of materials and energy while it fulfills its purpose.

Integrated Transportation



Source: Chuck Pelley 2009 All Rights Reserved

Neighborhood Boulevard



Source: Joe Mabel

VALUE CHOICES FOR SUSTAINABLE COMMUNITIES

In order to be fair, consistent, and effective, sustainable design must be guided by a set of values. Recognizing that a project balances multiple values of both local neighborhoods and the region, the value choices for SR 520 include the following:

SEE OR HEAR?

Noise walls and bridge railings are areas where the desire for views can clash with the desire to reduce noise. Which prevails in a given location?

TO OR THROUGH?

Is a particular feature or facility intended to be a destination or a place that people pass through?

GREEN OR GRAY?

Where can we use natural materials and reduce the use of carbon-intensive materials such as concrete?

SINGLE OR SEVERAL?

Does a facility have only a single function or can multiple functions be layered to create more value for the investment?

FEW OR MANY?

Does a feature or facility benefit only a few constituents or does it provide benefits to many?

BIG WHEELS AND LITTLE WHEELS?

While considering the needs of the mainstream bike/pedestrian community, how are special needs being addressed?

CONNECT THE DOTS?

Are neighborhoods, parks, paths, etc. being connected in a meaningful and useful way?

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ANALYSIS REQUIRED.

Shaping Spaces through Activity and Movement

design vocabulary

examples



field sports



court sports



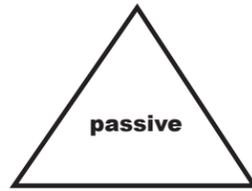
play ground



special events



gardening



reading, sunbathing



board games



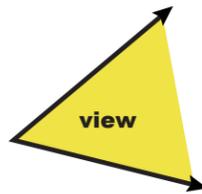
gathering, people watching



water feature



walking/dogs



partial view



open view



open view from knoll



framed view



noise wall



earth berm



planting beds with fence



tall vegetation



paved winding path to park feature



path under structure



steep slope stairs



steep slope ramp



shared use



buffered bike path



water feature



boardwalk



amphitheatre



market

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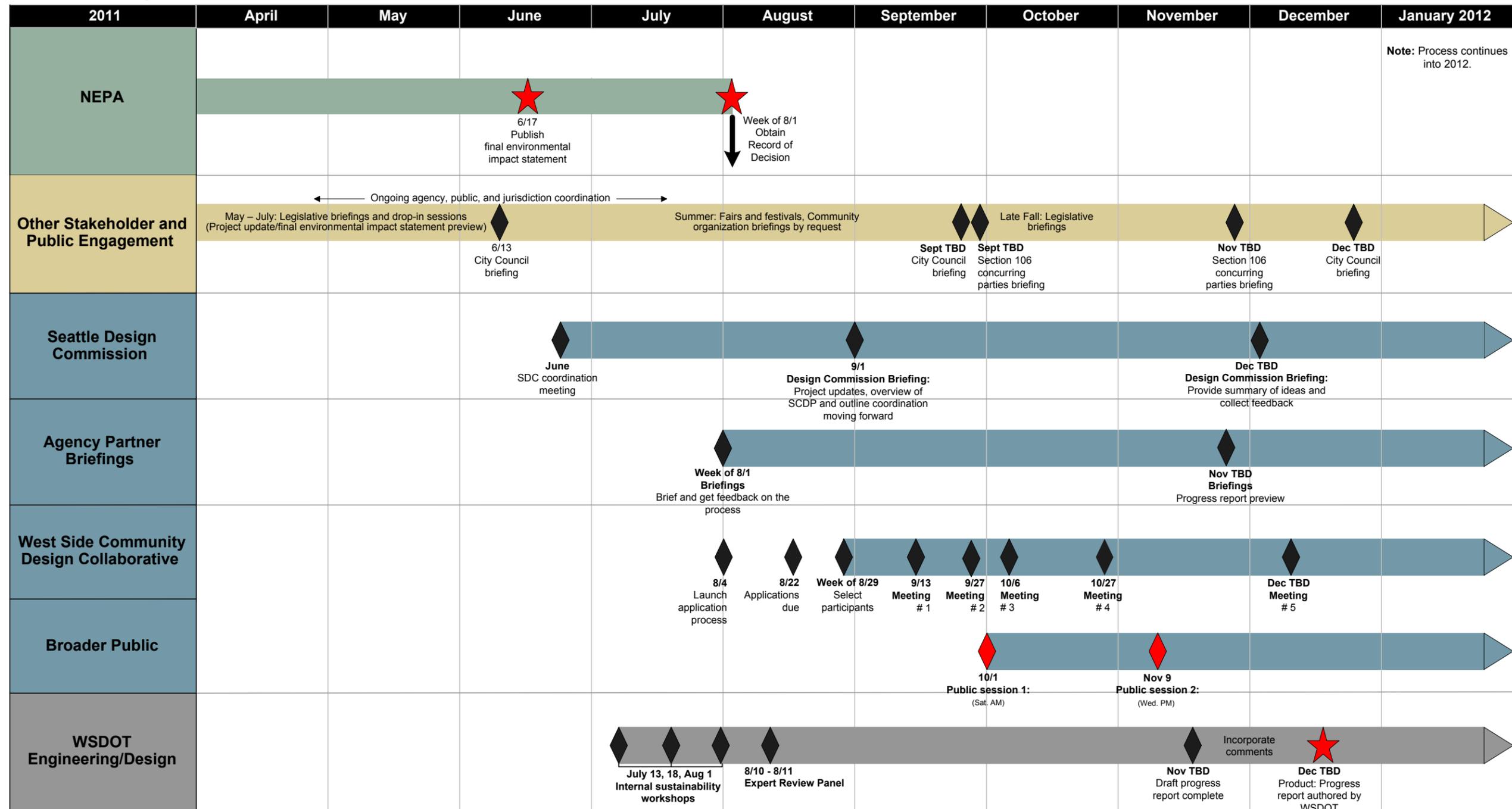


Seattle Community Design Process (SCDP)

TIMELINE

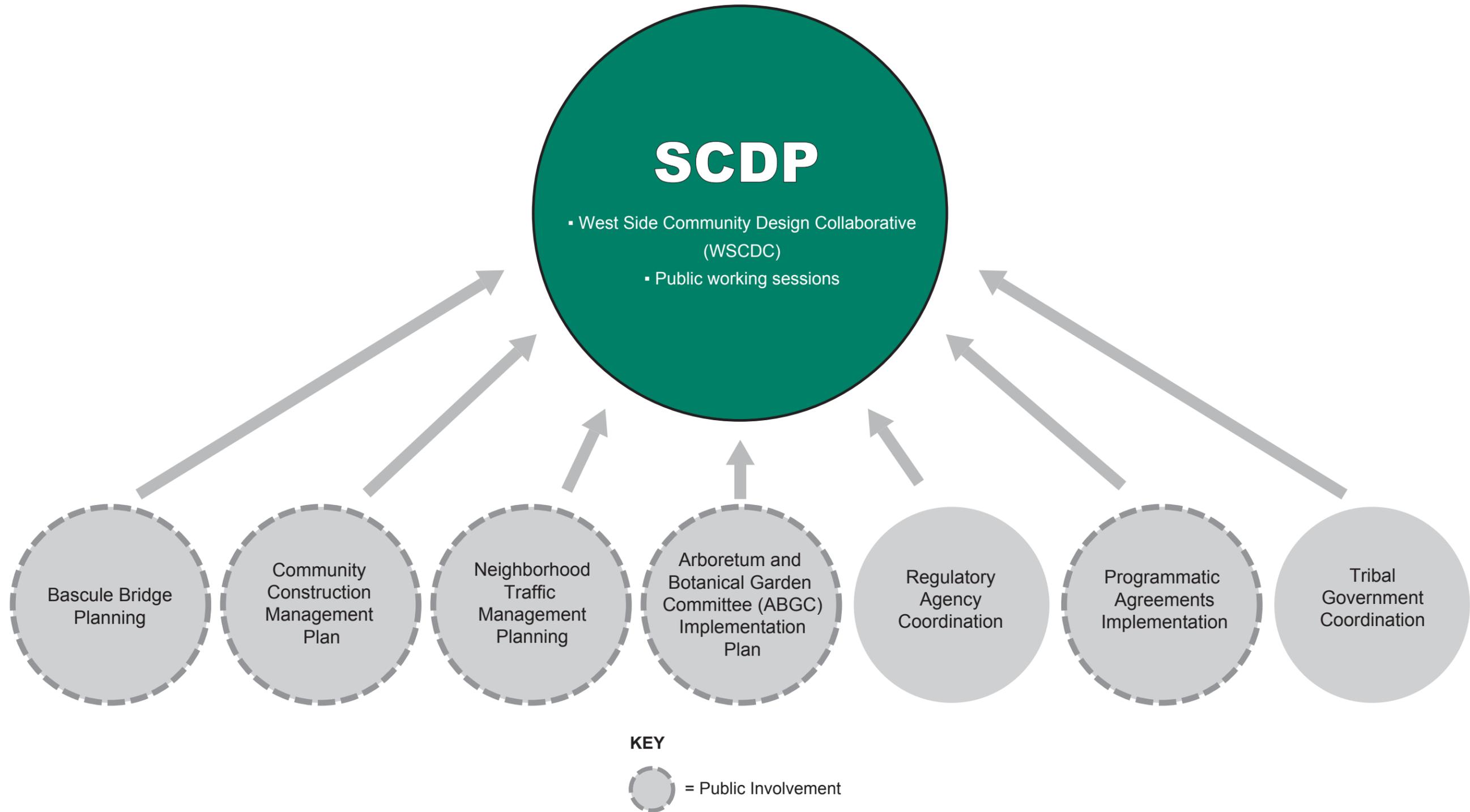
Updated: August 30, 2011

ALL DATES ARE PROPOSED, NOT FINAL



Seattle Community Design Process (SCDP)

CONTRIBUTING STAKEHOLDERS



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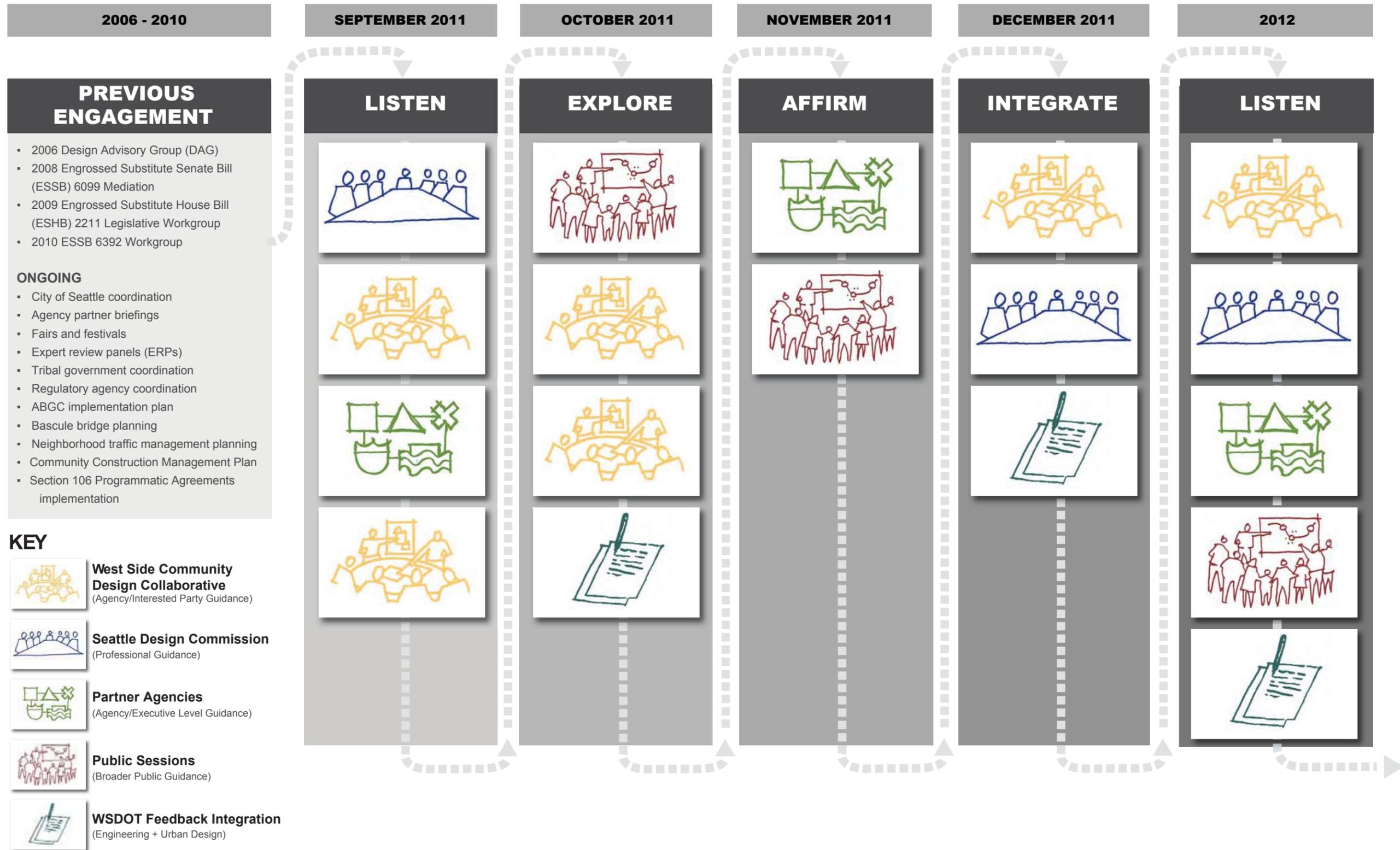
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Seattle Community Design Process (SCDP)

OUTREACH SCHEDULE

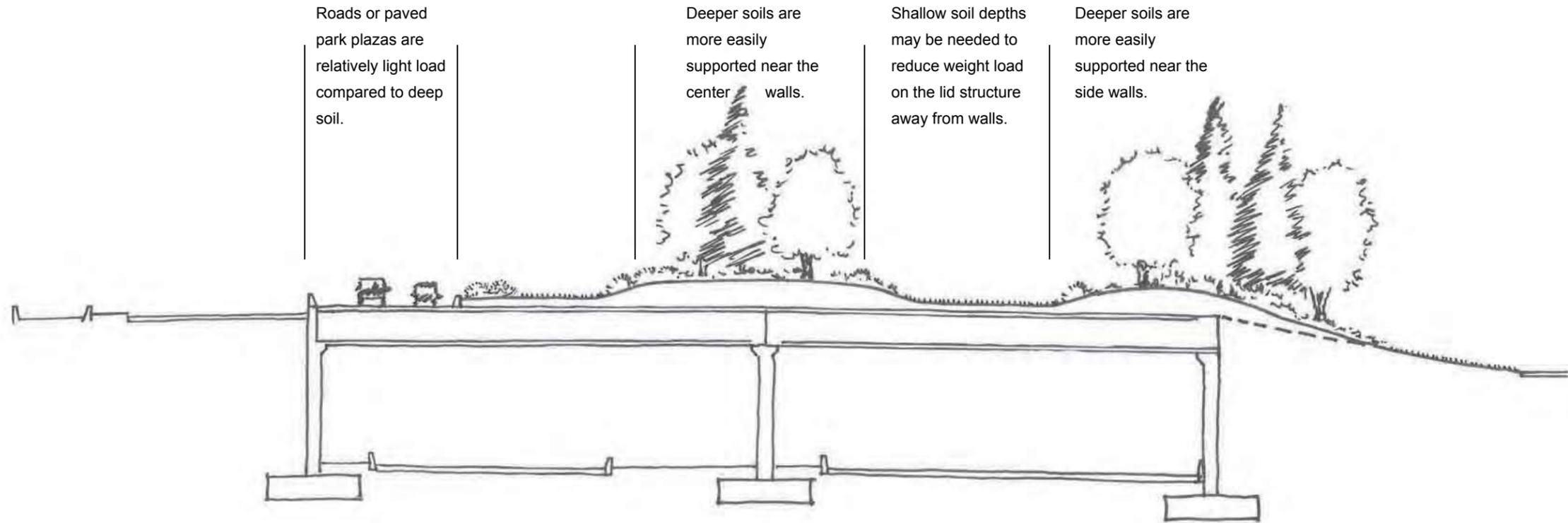


KEY

-  **West Side Community Design Collaborative**
(Agency/Interested Party Guidance)
-  **Seattle Design Commission**
(Professional Guidance)
-  **Partner Agencies**
(Agency/Executive Level Guidance)
-  **Public Sessions**
(Broader Public Guidance)
-  **WSDOT Feedback Integration**
(Engineering + Urban Design)

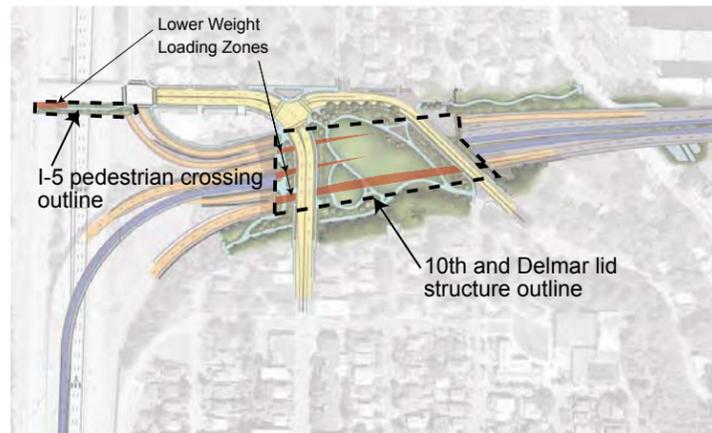
Lid Loading and Vegetation

Landscape Lid Loading Concepts



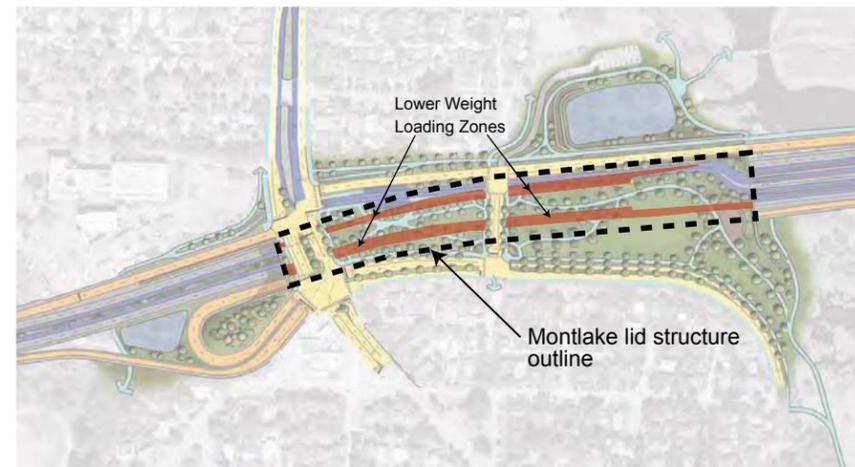
Lid structures are stronger and can support heavier and deeper soils over or near to support walls or columns.
 Trees planted on lid structures require more soil depth for health and for support to stay upright.
 Location of trees with deeper soils over or near support walls can reduce construction costs of lid structures.

I-5 Crossing and 10th & Delmar Area Landscape Lids



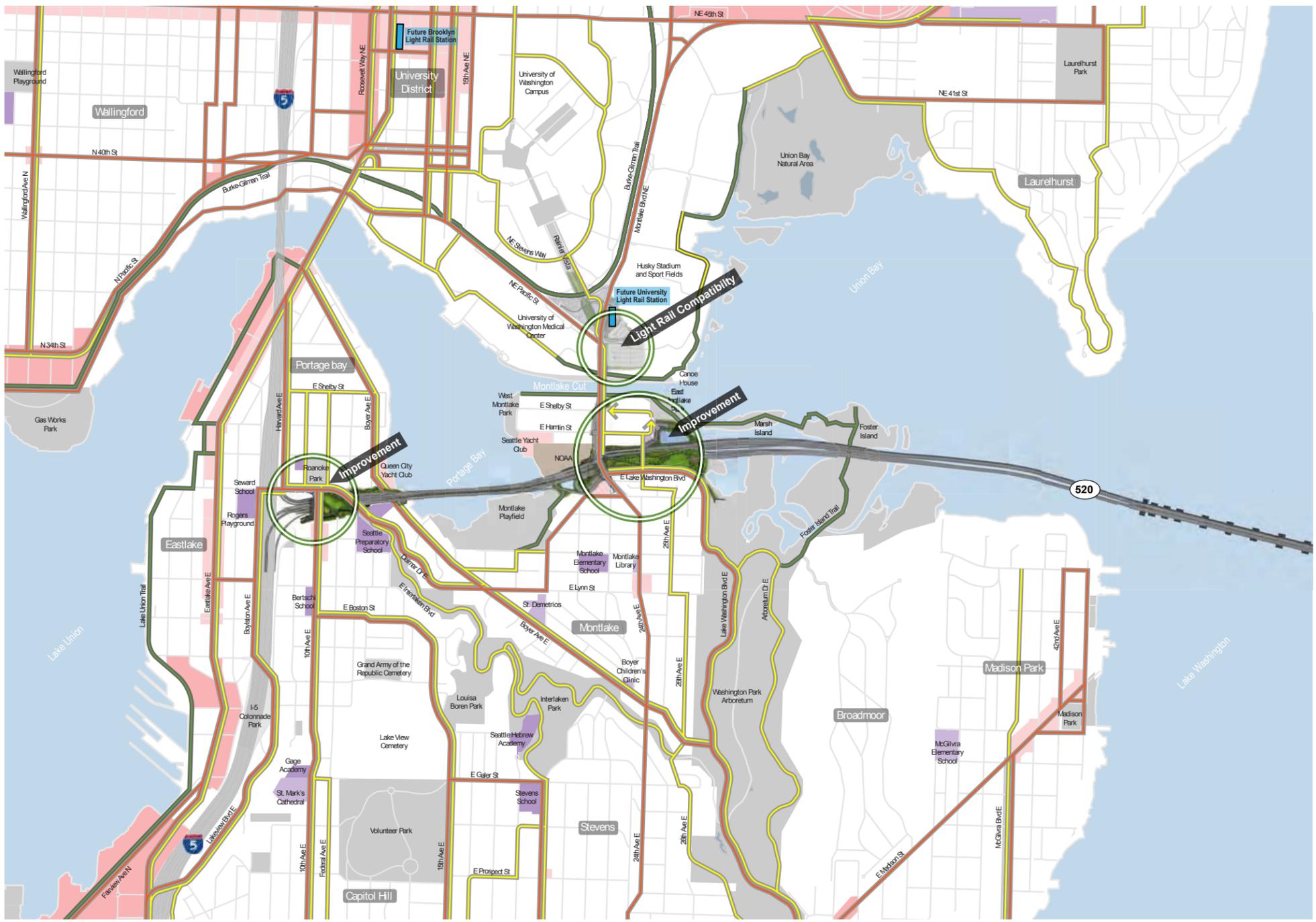
The I-5 pedestrian crossing will be built directly south of the existing bridge, which will remain in place.
 The 10th and Delmar lid structure will include pedestrian paths, lawn areas and landscaping.

Montlake Area Landscape Lid



The Montlake lid structure extends from Montlake Boulevard on the west to beyond 24th Avenue.
 The Montlake lid structure will include pedestrian paths, lawn areas and landscaping.

Improving Mobility and Movement



Major motorized transit route

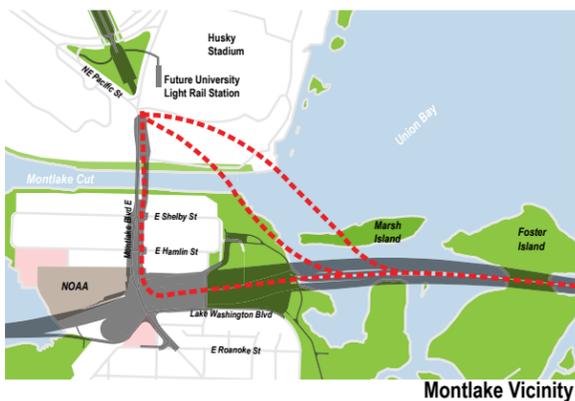
City bike route

Major trail route

Not to Scale

WSDOT COMPATIBILITY & IMPROVEMENTS

Potential Alignment to Accommodate Future Light Rail



Montlake Vicinity

--- Potential Light Rail Transit alignment to future University Light Rail Station

Ped/Bike Improvement Recommendations at Roanoke Area



10th Ave E & Delmar Dr E Vicinity

→ WSDOT improvements
 ↳ Improvements by other agencies under evaluation

Ped/Bike Improvement Recommendations at Montlake Area



Montlake Vicinity

→ WSDOT improvements
 ↳ Improvements by other agencies under evaluation

How does noise work?

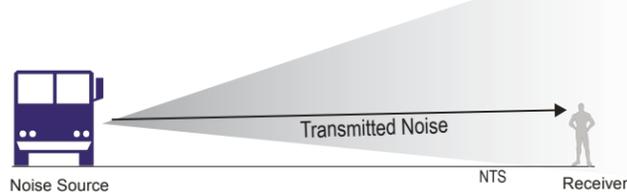
relative loudness of typical noise sources

NOISE SOURCE OR ACTIVITY		SUBJECTIVE IMPRESSION	RELATIVE LOUDNESS (human judgment of different sound levels)
Jet aircraft takeoff from carrier (50 feet)	140	Threshold of pain	64 times as loud
50-horsepower siren (100 feet)	130		32 times as loud
Loud rock concert near stage	120	Uncomfortably loud	16 times as loud
Jet takeoff (200 feet)	110		8 times as loud
Float plane takeoff (100 feet)	100	Very loud	4 times as loud
Jet takeoff (2,000 feet)	90		2 times as loud
Heavy truck or motorcycle (25 feet)*	80	Moderately loud	Reference loudness
Garbage disposal (2 feet)	80		
Pneumatic drill (50 feet)	70		1/2 as loud
Vacuum cleaner (10 feet)	70		
Passenger car at 65 mph (25 feet)*	60		1/4 as loud
Typical office environment	60		
Light auto traffic (100 feet)*	50	Quiet	1/8 as loud
Bedroom or quiet living room	40		1/16 as loud
Bird calls	40		
Quiet library, soft whisper (15 feet)	30	Very quiet	
High quality recording studio	20		
Acoustic test chamber	10	Just audible	
	0	Threshold of hearing	

* See diagram *Natural Noise Reduction Over Distance* for examples for specific **point** (e.g. church bell) and **line** (e.g. constant flowing traffic) sources.
Sources: Beranek (1988) and U.S. EPA (1974).

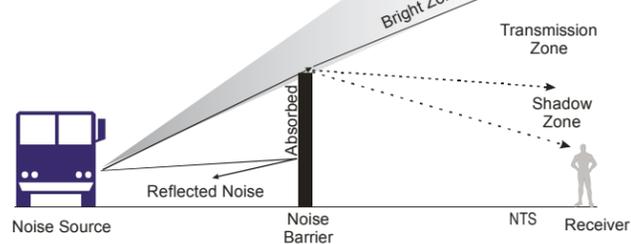
typical noise properties

NOISE SOURCE, PATH AND RECEIVER



Source: Adapted from *Noise Barrier Design Handbook (USDOT 2000a)*

NOISE WALL ABSORPTION, TRANSMISSION, REFLECTION AND DIFFRACTION



Source: Adapted from *Noise Barrier Design Handbook (USDOT 2000a)*

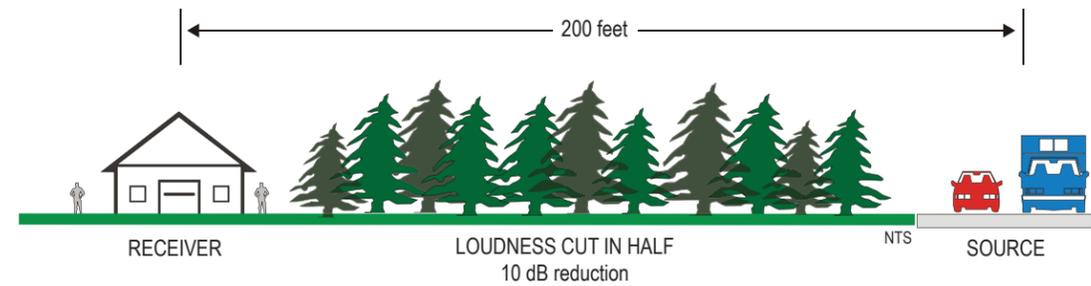
NTS = not to scale



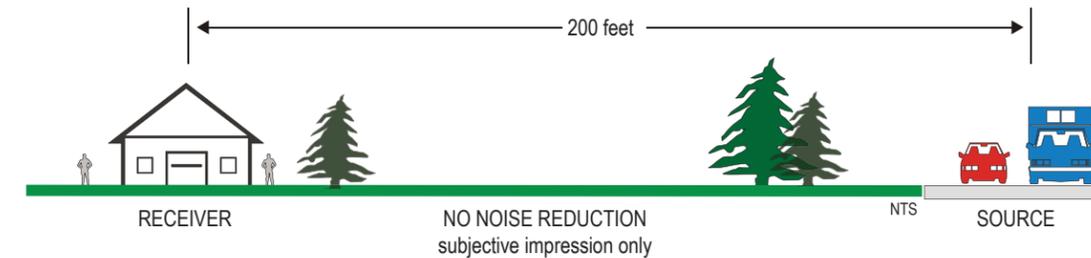
LINK TO FEIS Noise Discipline Report

barrier comparison

DENSE EVERGREEN COVER (200-FOOT MINIMUM)



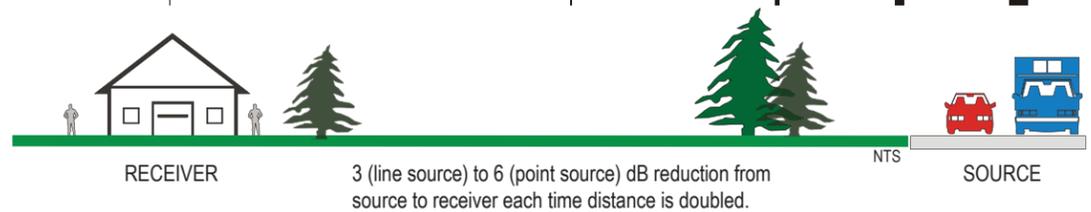
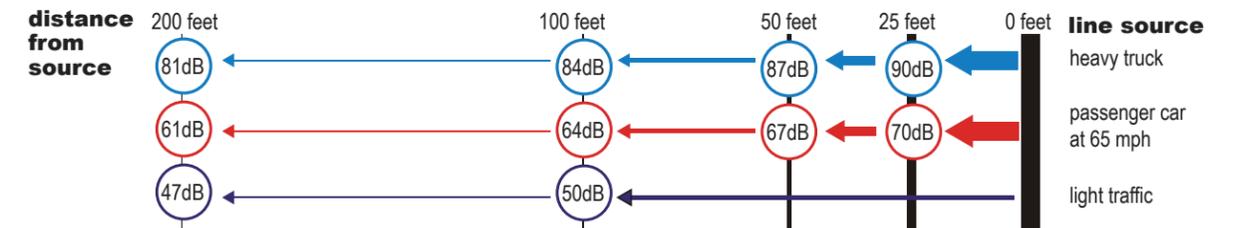
MINIMAL TO NO VEGETATION COVER



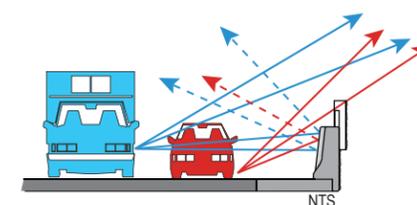
Source: Adapted from *Highway Traffic Noise Analysis and Abatement Policy and Guidance (FHWA 2011)*
http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/polguide05.cfm

The FHWA does not consider the planting of vegetation to be a noise abatement measure. The planting of trees and shrubs provides only psychological benefits and may be provided for visual, privacy, or aesthetic treatment, not noise abatement. Vegetation must be at least 100 feet of evergreens to have any noticeable impact, with slight reductions in traffic noise levels up to 5 dBA.

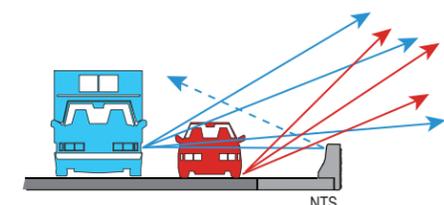
NATURAL NOISE REDUCTION OVER DISTANCE



4-FOOT NOISE ABSORPTIVE TRAFFIC BARRIER



2'-6" TRAFFIC BARRIER



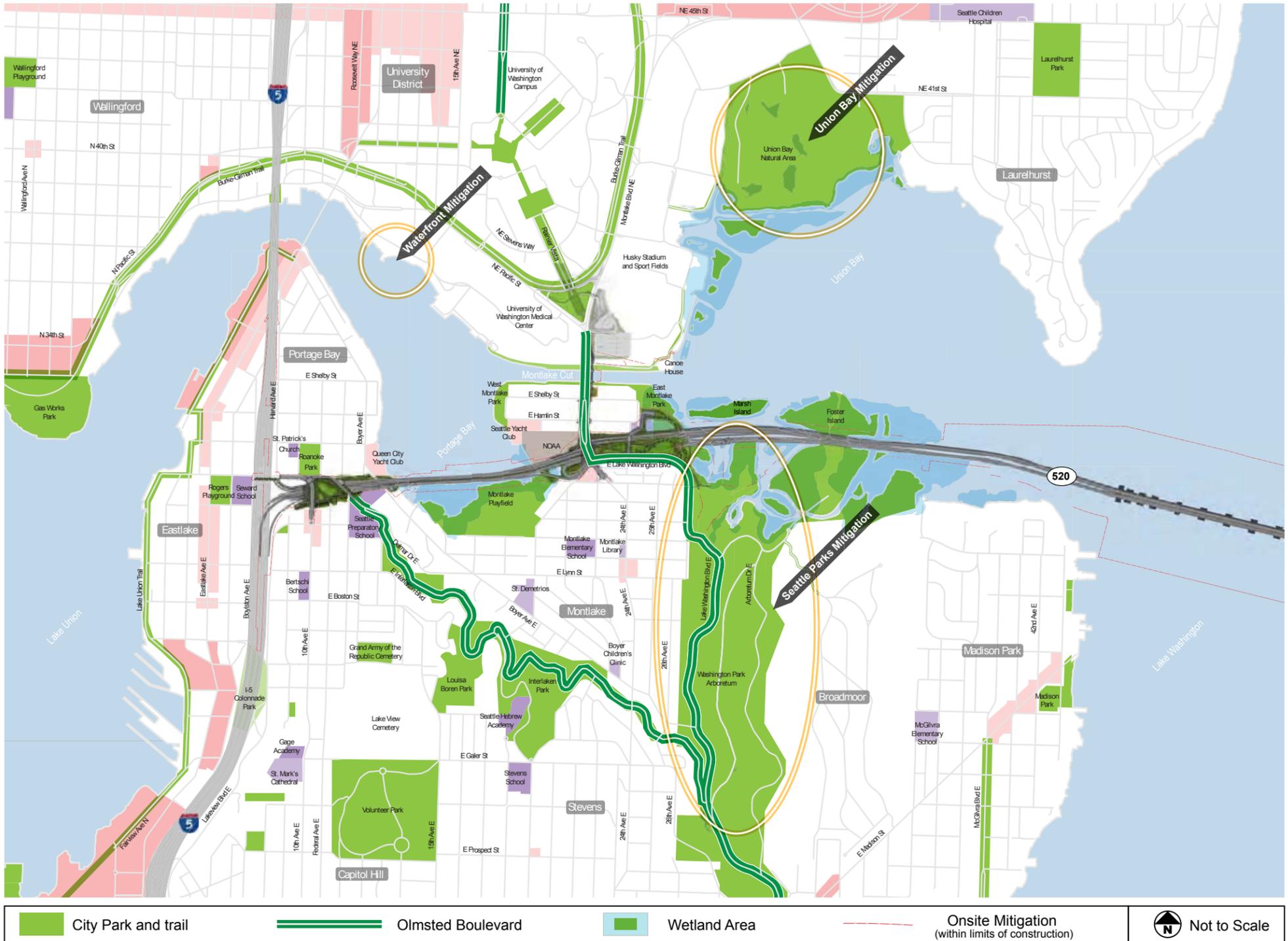
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Enhancing Natural Assets



WSDOT NATURAL AREAS AND PARKS MITIGATION

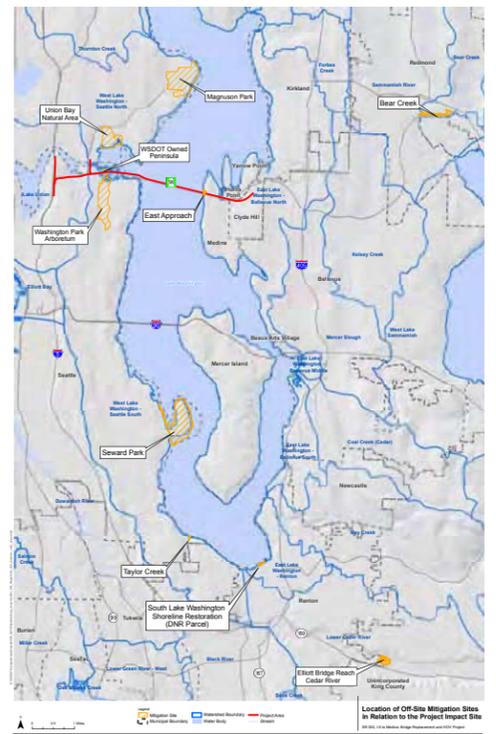
Enhancing Waterfront Recreational Opportunities in PORTAGE BAY



Implementing Opportunities with Arboretum and Botanical Garden Committee at WASHINGTON PARK ARBORETUM



Improving and Enhancing Wetland and Aquatic Habitat REGIONALLY



Case Studies: Under Structures

steep slopes



River Walk, Chattanooga TN



River Walk, Chattanooga TN



Example of "open" tunnel wall with transit



Example of belvedere under structure on shoreline

program activities



Marsupial Bridge Plaza, Milwaukee WI



I-90 Rainier Ave Bus Stop, Seattle WA

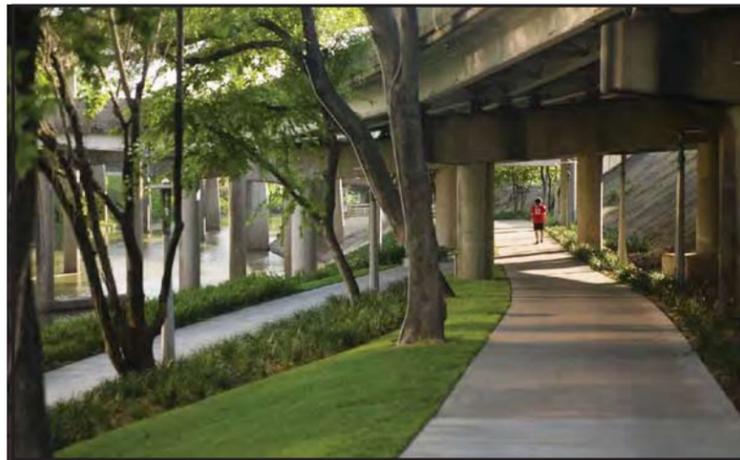


Mission Creek Park, San Francisco CA



Mission Creek Park, San Francisco CA

shorelines



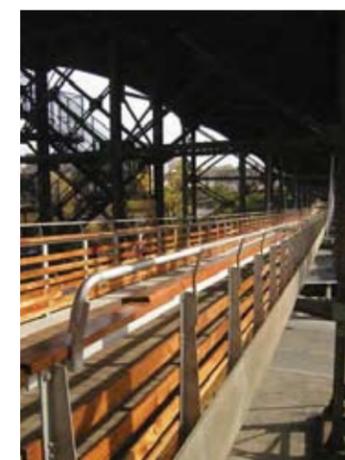
Buffalo Bayou Park, Houston TX



Vancouver BC



I-35 East Bridge over Mississippi, Minneapolis MN



Marsupial Bridge, Milwaukee WI



Eastbank Esplanade, Portland OR

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Case Studies: Stormwater

MOHAI stormwater relative to other regional facilities



MOHAI compared to Tanner Springs, Portland OR



MOHAI compared to Meadowbrook Pond, Seattle WA



MOHAI compared to Thornton Creek Storm Channel, Seattle WA

case studies



Tanner Springs, Portland OR



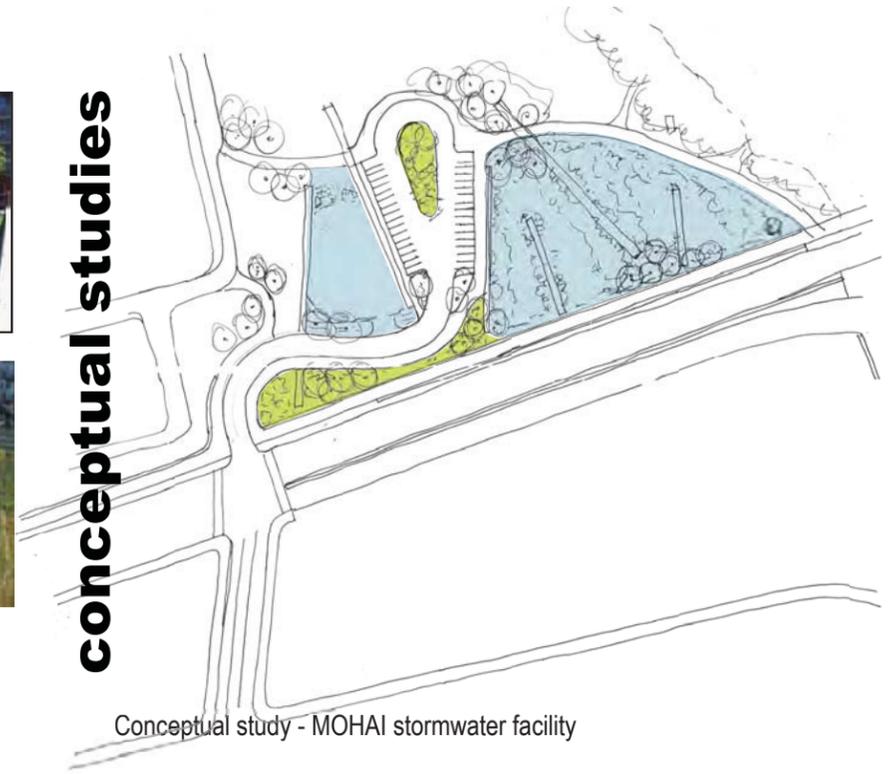
Thornton Creek, Seattle WA



The Dell, University of Virginia, Charlotte VA



conceptual studies



Conceptual study - MOHAI stormwater facility



Waterworks Park, Renton WA



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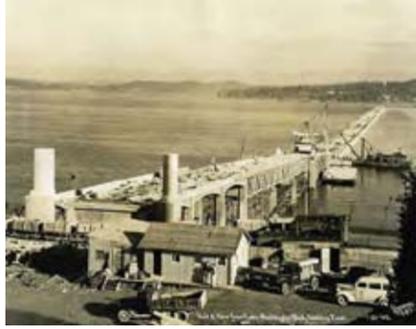
Washington State Department of Transportation



Case Studies: I-90 Corridor

Lid and Bridge Elements

Historic



Bike and pedestrian



Overcrossing at Eastgate



Path tunnel entrance at Sam Smith Park



Mercer Slough path at I-90

Understructure



Freeway bus stop access at Rainier Avenue



Tunnel



Understructure at Mercer Slough

Transit



Mercer Island Park and Ride and Transit

Aesthetics



Salmon sculpture at Eastgate



Leaf wall pattern at Issaquah



Sculpture at Mercer Island Park and Ride

Architectural



Ventilation



Planting and structures



Mercer Lid aerial



Mercer Lid looking west



Tunnel entrance to Seattle



Terraced planting at Issaquah



I-90 off-ramp to I-5 roadside planting



Patterned wall terracing with planting

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