What are air quality effects?

monitoring locations

Exhibit 5. **Intersections Evaluated for CO**

I-5 to Medina: Bridge Replacement and HOV Project

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.

typical emission sources

- Dust generated during construction unloding 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.

Tim Whelan

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.

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

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November 2011

CONCEPTUAL
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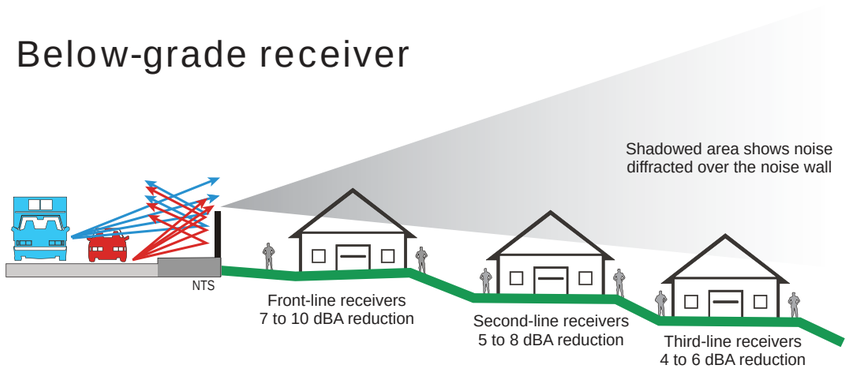
Washington State Department of Transportation

STATE ROUTE 520

Typical Noise Reduction

Below-grade receiver

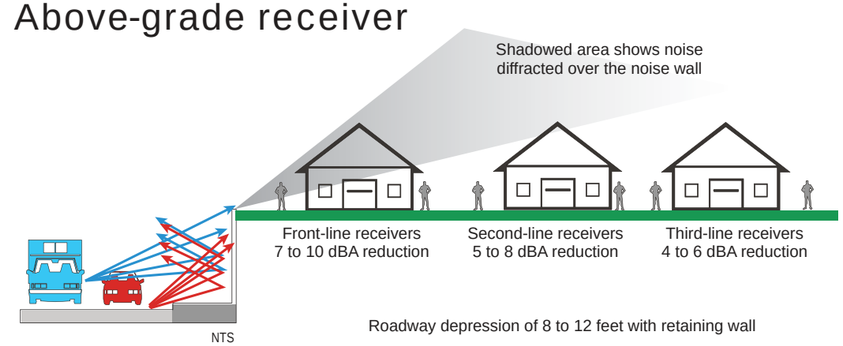


LOCATIONS: Shelby/Hamlin and Portage Bay neighborhoods

Typical sound wall heights for below-grade residences:

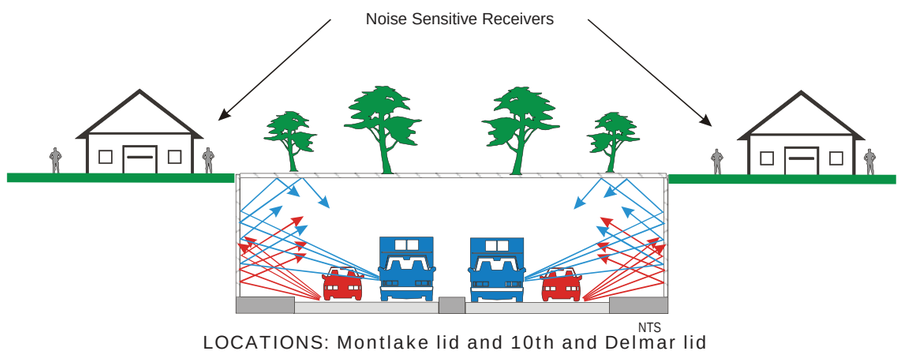
- 6 to 8 feet for roads with primarily passenger vehicle traffic
- 8 to 10 feet for major arterial roads and minor highways with some heavy truck traffic
- 10 to 12 feet for major highways with a high level of heavy truck traffic

Above-grade receiver

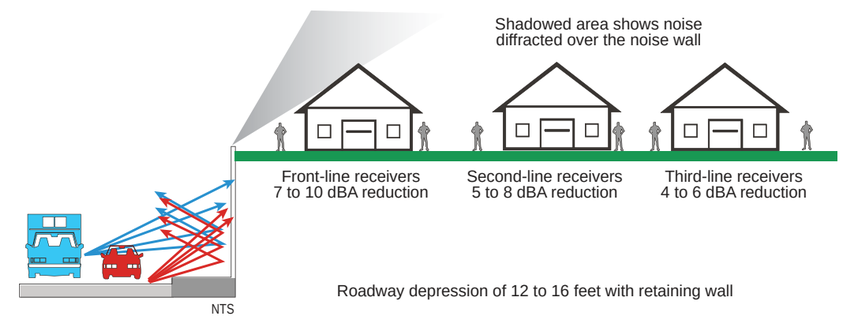


LOCATIONS: Roanoke, North Capitol Hill and I-5/SR 520 Interchange

Depressed Corridor with Lid

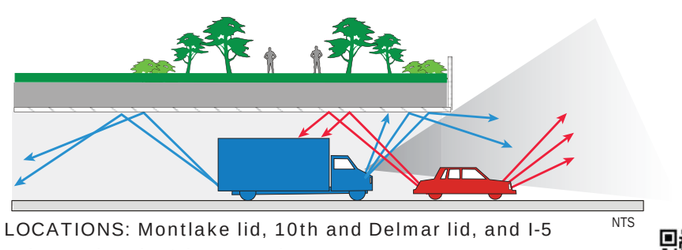


LOCATIONS: Montlake lid and 10th and Delmar lid

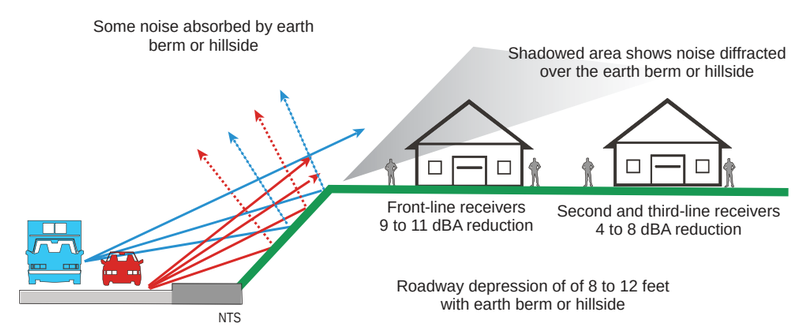


LOCATIONS: Roanoke, North Capitol Hill and I-5/SR 520 Interchange

Lid Portal



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



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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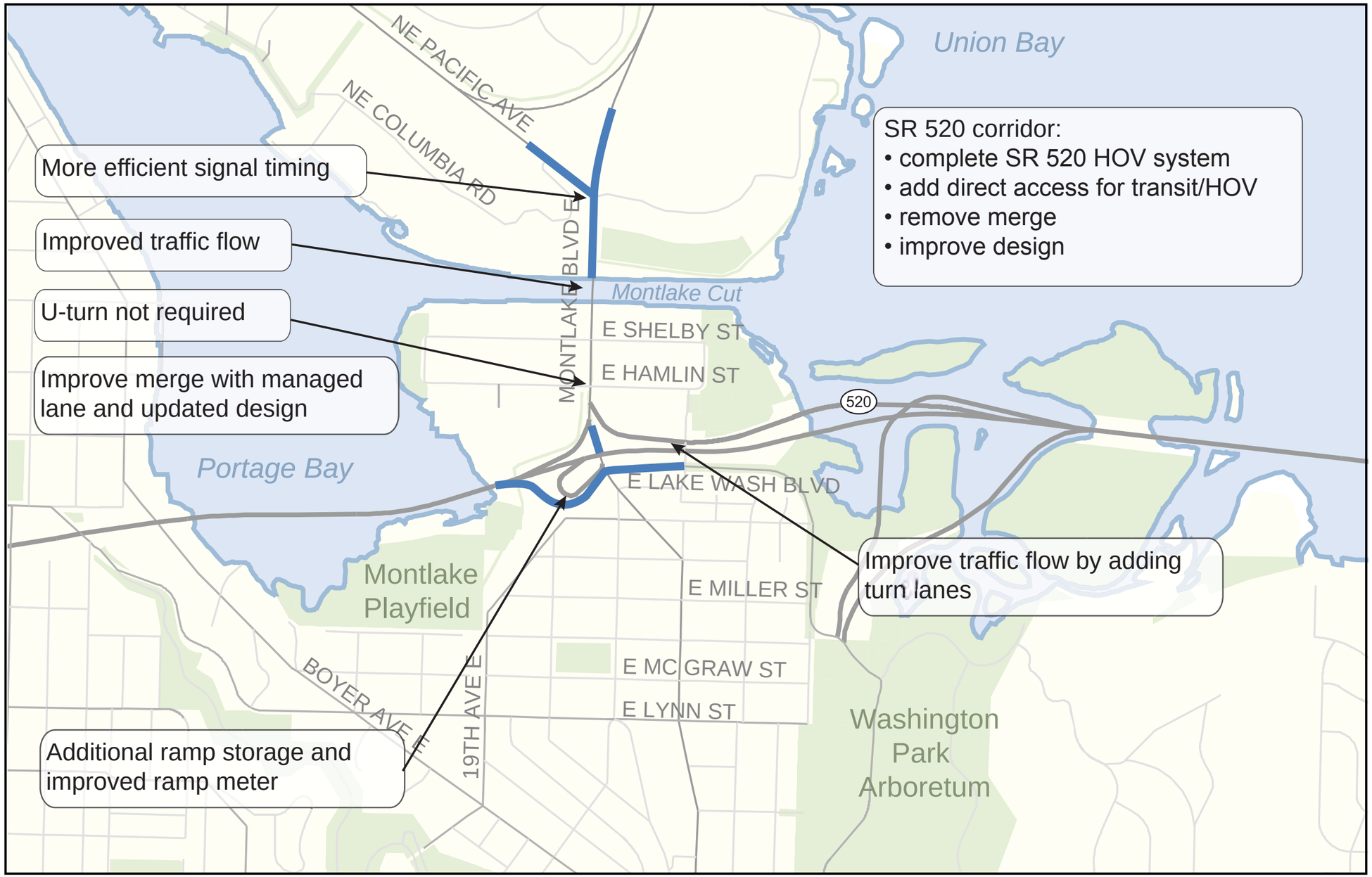
State Route 520

How is traffic affected now and in future?

PREFERRED ALTERNATIVE TRAFFIC



PM Peak Period

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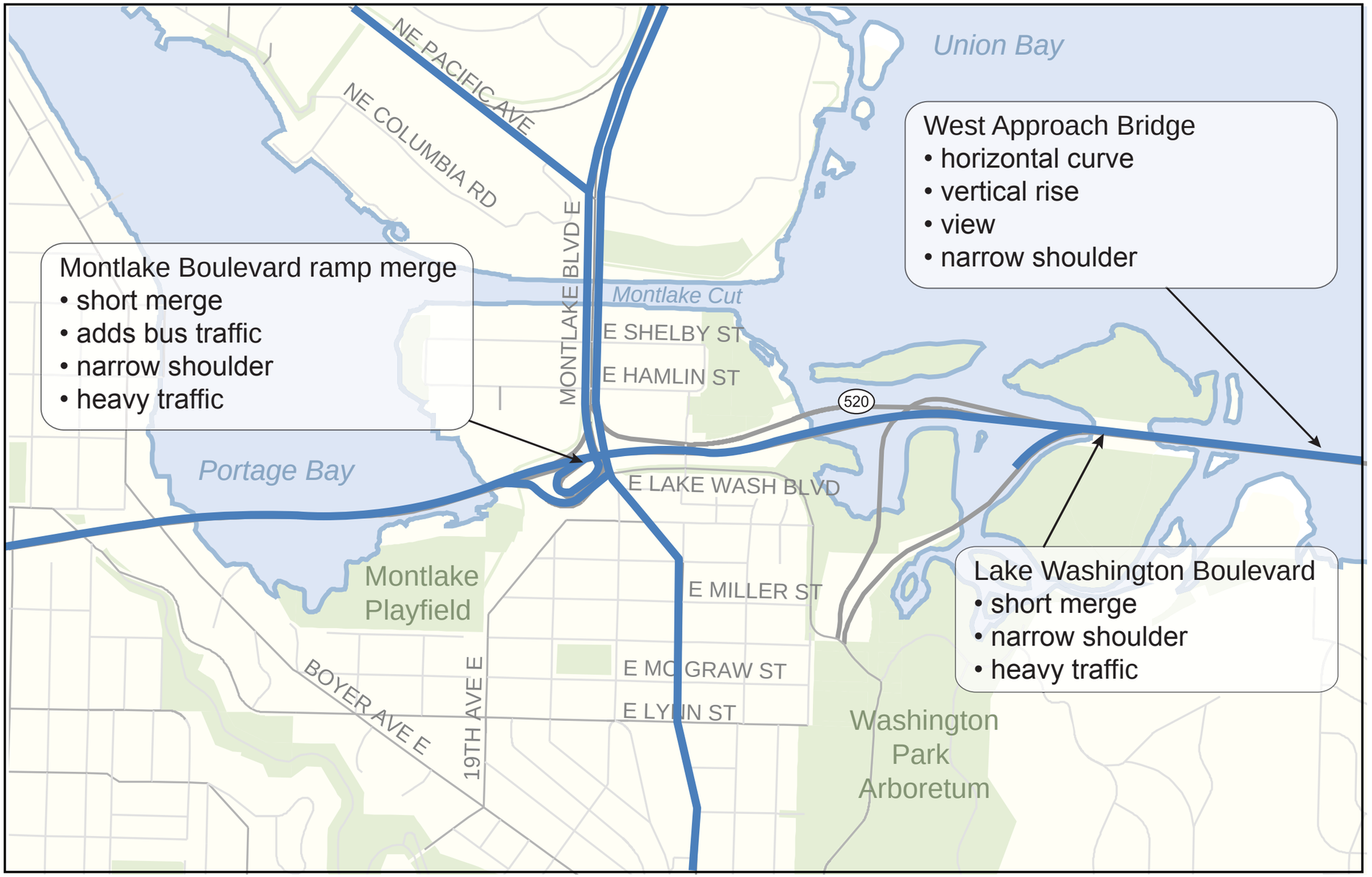
STATE ROUTE 520

How is traffic affected now and in future?

EXISTING TRAFFIC CONGESTION



PM Peak Period

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STATE ROUTE 520

Sustainability Values

SUSTAINABLE PRACTICE

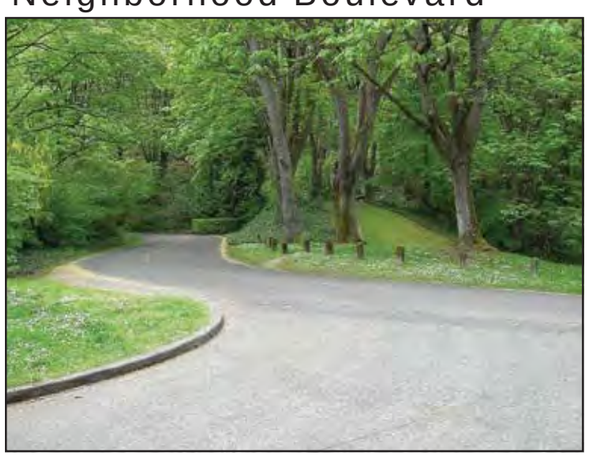
Sustainable Communities go beyond the concept of livability by addressing issues of economic vitality, social and cultural equity, and environmental stewardship from local to global levels. Effective transportation and mobility are key components of sustainable communities. New and redesigned infrastructure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

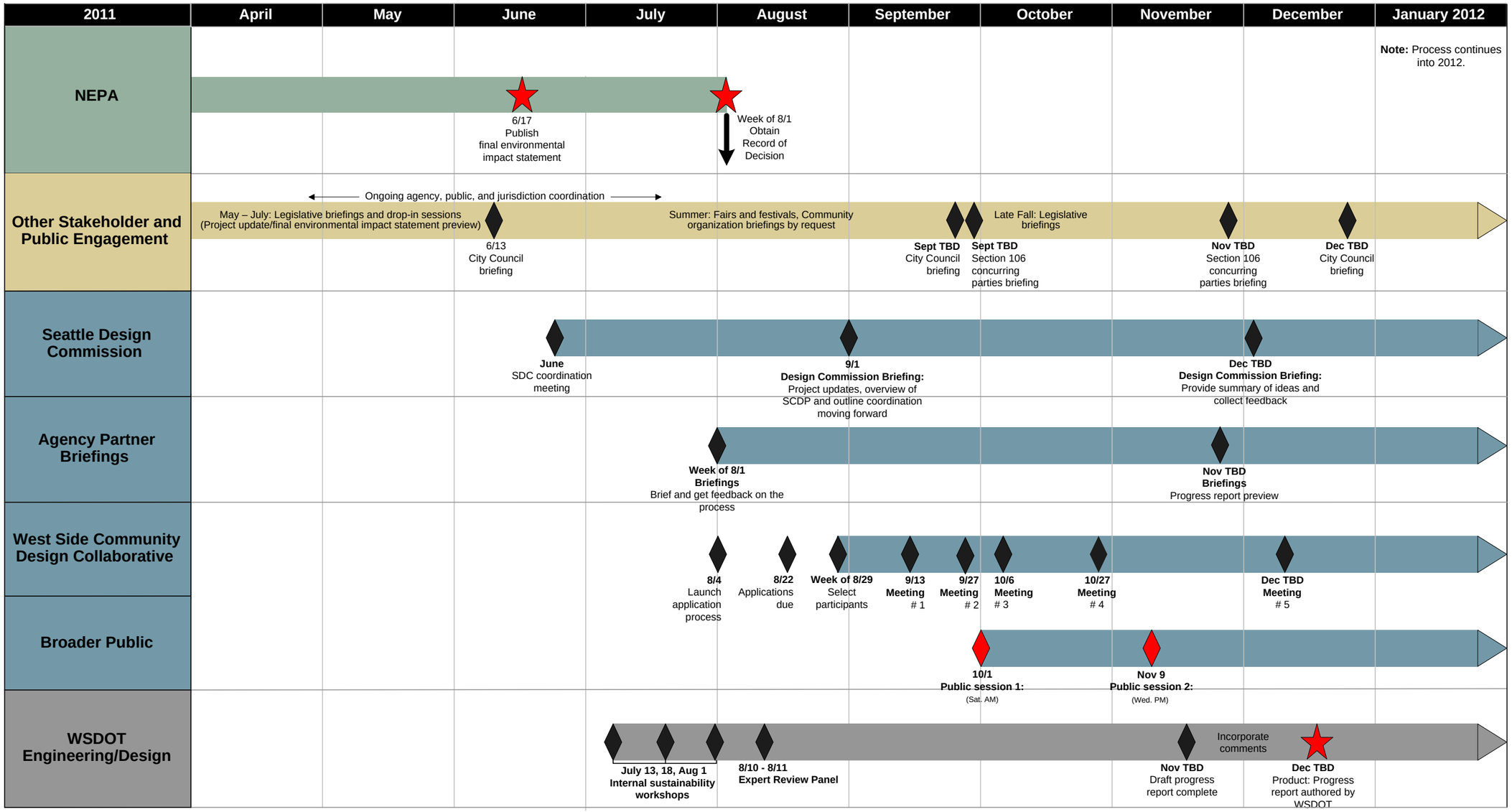
Are neighborhoods, parks, paths, etc. being connected in a meaningful and useful way?

Seattle Community Design Process (SCDP)

TIMELINE

Updated: August 30, 2011

ALL DATES ARE PROPOSED, NOT FINAL



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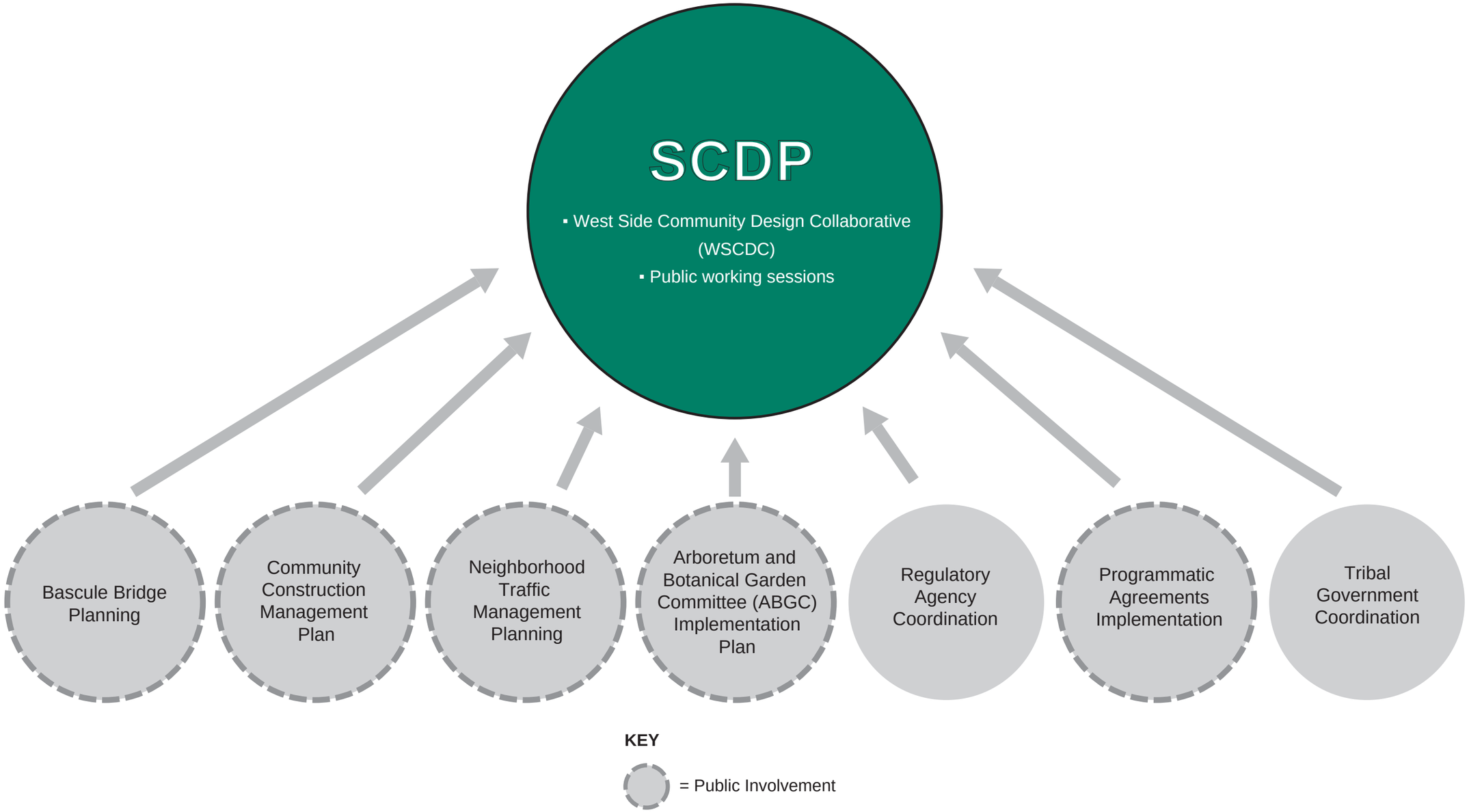
STATE ROUTE 520

Seattle Community Design Process (SCDP)

CONTRIBUTING STAKEHOLDERS



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Washington State Department of Transportation | State Route 520

Seattle Community Design Process (SCDP)

OUTREACH SCHEDULE

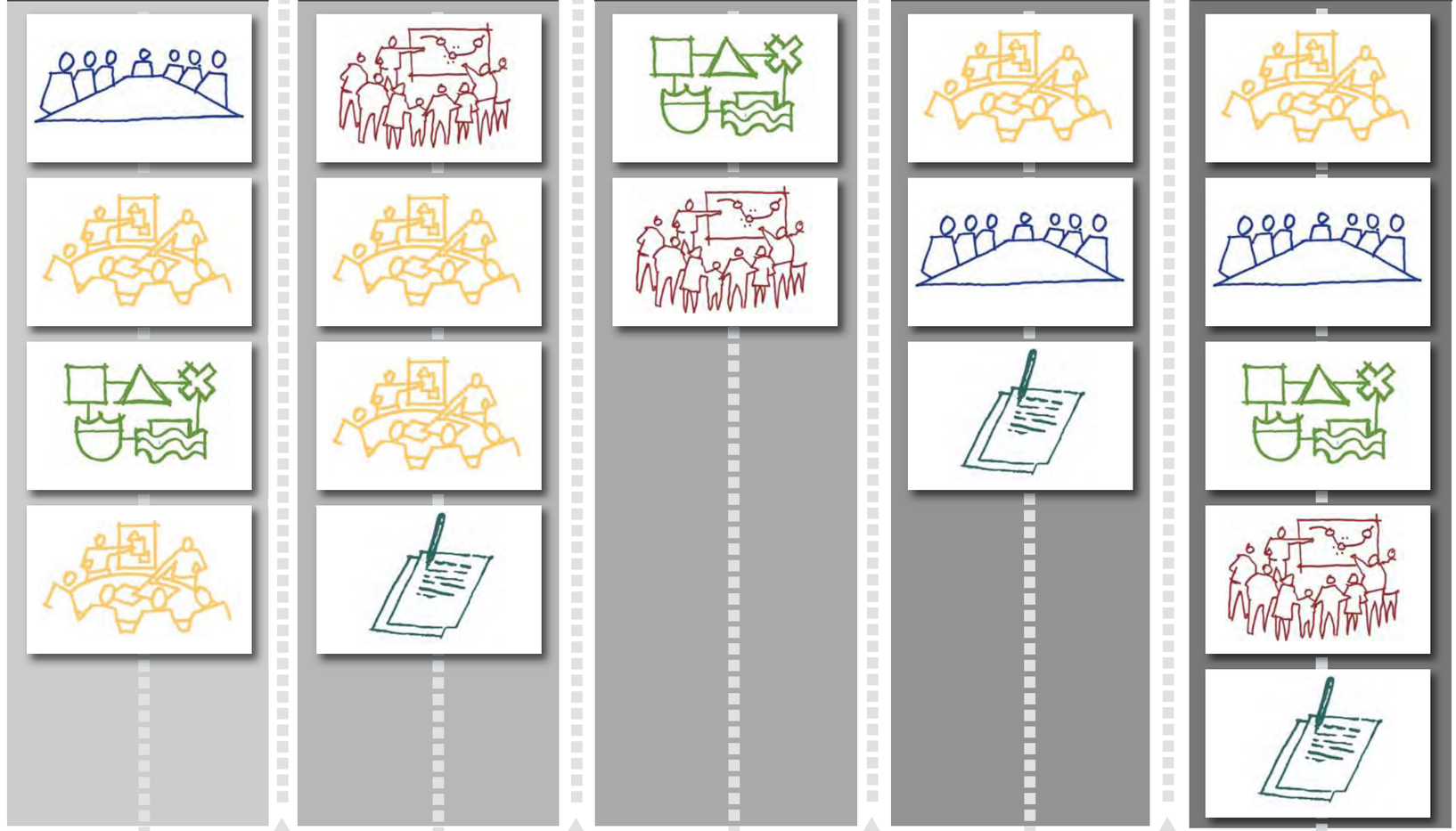
2006 - 2010	SEPTEMBER 2011	OCTOBER 2011	NOVEMBER 2011	DECEMBER 2011	2012
PREVIOUS ENGAGEMENT	LISTEN	EXPLORE	AFFIRM	INTEGRATE	LISTEN

PREVIOUS ENGAGEMENT

- 2006 Design Advisory Group (DAG)
- 2008 Engrossed Substitute Senate Bill (ESSB) 6099 Mediation
- 2009 Engrossed Substitute House Bill (ESHB) 2211 Legislative Workgroup
- 2010 ESSB 6392 Workgroup

ONGOING

- City of Seattle coordination
- Agency partner briefings
- Fairs and festivals
- Expert review panels (ERPs)
- Tribal government coordination
- Regulatory agency coordination
- ABGC implementation plan
- Bascule bridge planning
- Neighborhood traffic management planning
- Community Construction Management Plan
- Section 106 Programmatic Agreements implementation



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)

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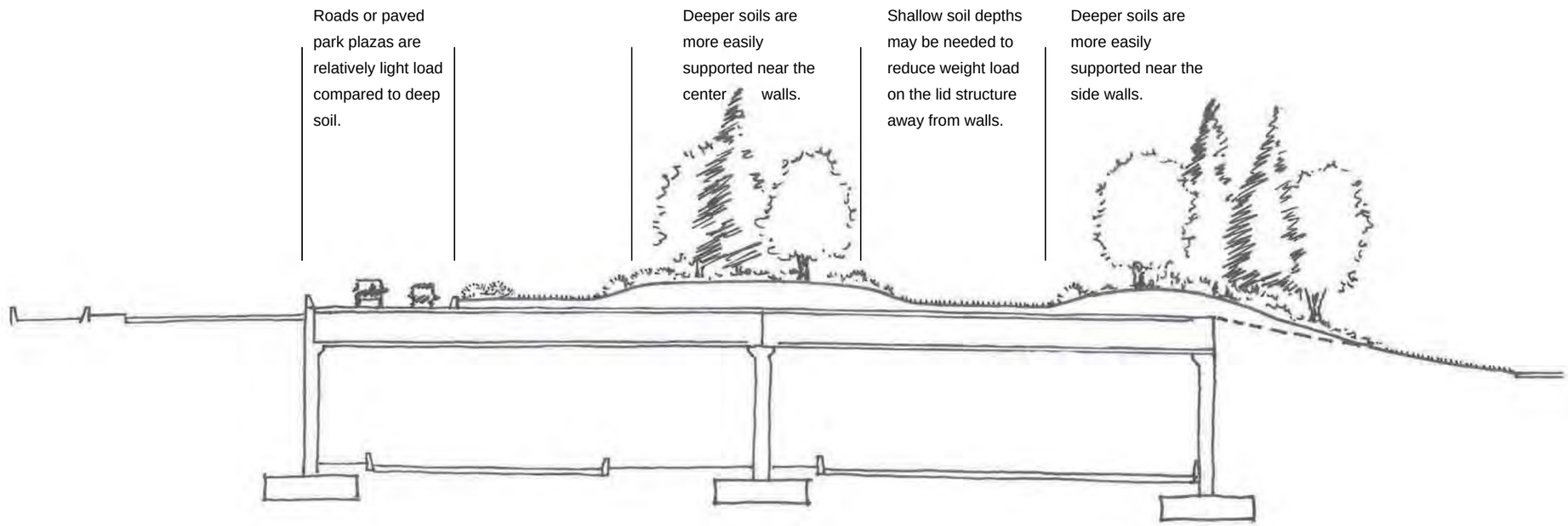
STATE ROUTE 520

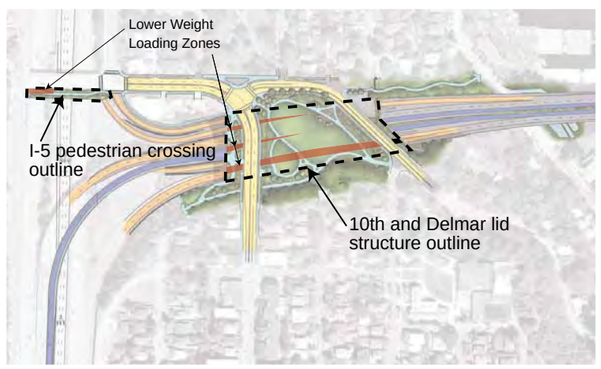
Lid Loading and Vegetation

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.

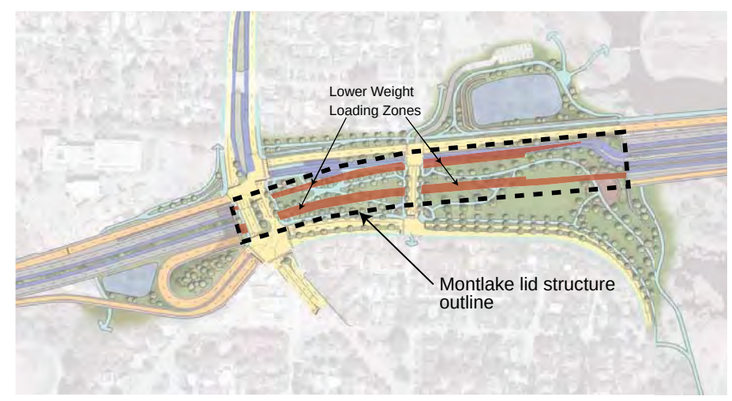
I-5 Crossing and 10th & Delmar Area Landscape Lids



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.

How does noise work?

relative loudness of typical noise sources

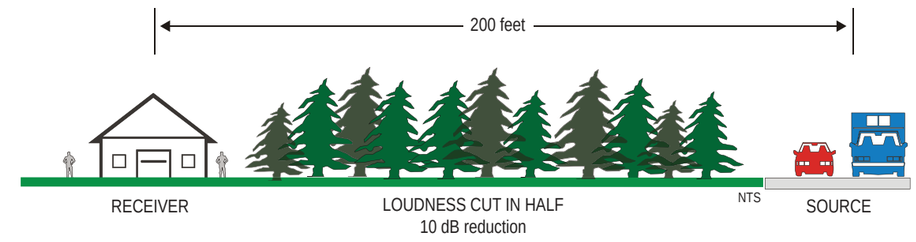
NOISE SOURCE OR ACTIVITY		SUBJECTIVE IMPRESSION	RELATIVE LOUDNESS (human judgment of different sound levels)
Jet aircraft takeoff from carrier (50 feet)	140	Threshold of pain	64 times as loud
50-horsepower siren (100 feet)	130		32 times as loud
Loud rock concert near stage Jet takeoff (200 feet)	120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

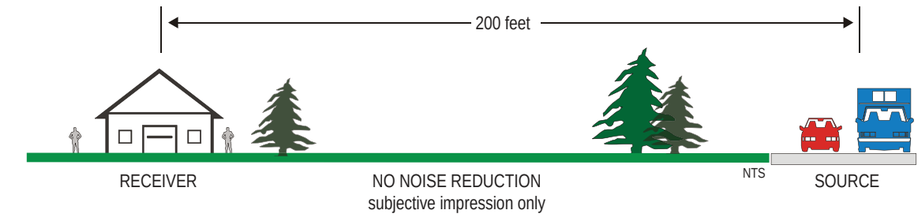
Sources: Beranek (1988) and U.S. EPA (1974).

vegetation, distance and noise reduction

DENSE EVERGREEN COVER (200-FOOT MINIMUM)



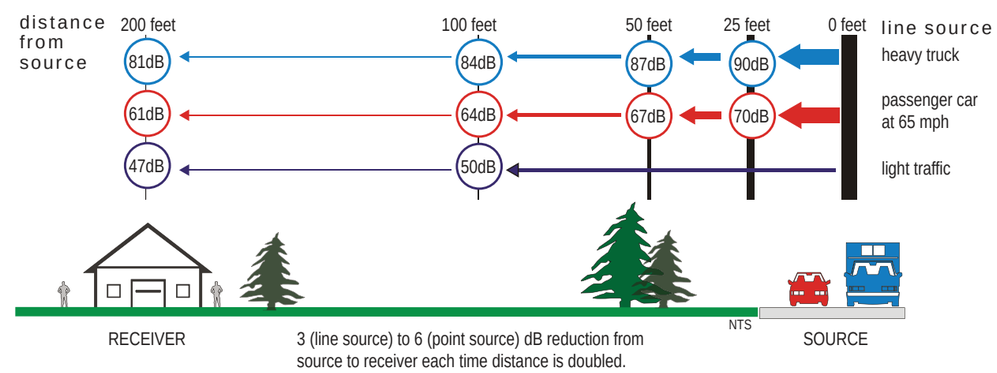
MINIMAL TO NO VEGETATION COVER



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

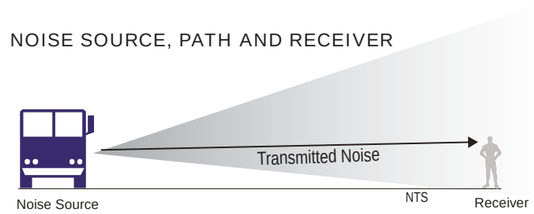
The FHWA does not consider the planting of vegetation to be a noise abatement measure. The planting of trees and shrubs provides only psychological benefits and may be provided for visual, privacy, or aesthetic treatment, not noise abatement. Vegetation must be at least 100 feet of evergreens to have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

NATURAL NOISE REDUCTION OVER DISTANCE



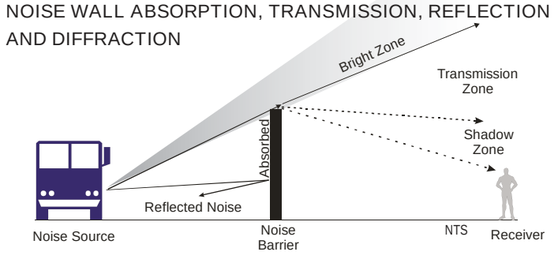
typical noise properties

NOISE SOURCE, PATH AND RECEIVER



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

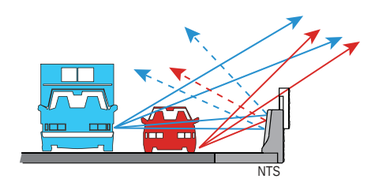
NOISE WALL ABSORPTION, TRANSMISSION, REFLECTION AND DIFFRACTION



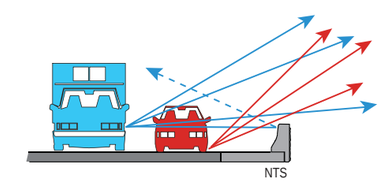
Source: Adapted from Noise Barrier Design Handbook (USDOT 2000a)

barrier comparison

4-FOOT NOISE ABSORPTIVE TRAFFIC BARRIER



2'-6" TRAFFIC BARRIER



NTS = not to scale

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