Air Quality Discipline Report

Washington State
Department of Transportation

U.S. Department of Transportation
Federal Highway
Administration

SR 520: I-5 to Medina Bridge Replacement and HOV Project Supplemental Draft EIS

Air Quality Discipline Report

Prepared for

Washington State Department of Transportation

Federal Highway Administration

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Acronyms and Abbreviations

$\mu g/m^3$	microgram(s) per cubic meter
AADT	average daily traffic volume
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
GHG	greenhouse gas
LOS	level of service
MSATs	mobile source air toxics
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_x	oxides of nitrogen
PM	particulate matter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
ppm	part(s) per million
PSCAA	Puget Sound Clean Air Agency
PSRC	Puget Sound Regional Council
RCW	Revised Code of Washington
RTP	Regional Transportation Plan
SDEIS	supplemental draft environmental impact statement

SEPA	State Environmental Policy Act
SIP	State Implementation Plan
SO_2	sulfur dioxide
TIP	Transportation Improvement Program
VMT	vehicle miles traveled
VOC	volatile organic compound
WAC	Washington Administrative Code
WASIST	Washington State Intersections Screening Tool
WSDOT	Washington State Department of Transportation

Introduction

Why is air quality considered in an environmental impact statement?

Clean air is vital to human health and is a resource protected by various federal, state, and local regulations. Pollutants in air can not only affect humans, but can negatively affect plants, animals, and physical structures. National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) regulations require that the effects of a proposed project on air quality be evaluated in an environmental impact statement (EIS).

Ambient air quality is a function of many factors, including climate, topography, meteorological conditions, and the production of airborne pollutants by natural or artificial sources. Both the federal Clean Air Act (42 USC §§ 7401 et seq. 1970) and its amendments and the Washington State Clean Air Act (RCW 70.94) currently regulate air quality.

Greenhouse gas (GHG) emissions are addressed in the Energy Discipline Report (WSDOT 2009a). Although GHGs are emitted from vehicle exhaust like other air pollutants, they are not regulated by the National Ambient Air Quality Standards (NAAQS).

What are the key points of this report?

Under the No Build Alternative and 6-Lane Alternative options, traffic using SR 520 would have no noticeable effect on air quality in the region or locally.

Construction activities from implementing any of the 6-Lane Alternative options would increase dust and fumes in the immediate vicinity of the activity during the duration of construction.

The air quality analysts evaluated the operational effects of the project by performing modeling of emissions from motor vehicles, both regionally and at specific intersections. Region emissions estimates were performed for the year 2030 using the U.S. Environmental Protection Agency (EPA)-approved MOBILE6 model (U.S. EPA 2002). Local intersection hotspot modeling was performed using the Washington State Intersections Screening Tool (WASIST) for the years

2018 and 2030. The results of the modeling indicated that the 6-Lane Alternative options would not violate ambient air quality standards.

The report presents the following key findings that resulted from the air quality analysis:

- The project is not expected to cause or contribute to any new violation of the NAAQS.
- The project is expected to have a low potential for mobile source air toxic (MSAT) emissions.
- The project meets conformity requirements.

What is the I-5 to Medina: Bridge Replacement and HOV Project?

The Interstate 5 (I-5) to Medina: Bridge Replacement and High-Occupancy Vehicle (HOV) Project is part of the State Route (SR) 520 Bridge Replacement and HOV Program (SR 520 Program) (detailed in the text box below) and encompasses parts of three main geographic areas—Seattle, Lake Washington, and the Eastside.

The project area includes the following:

- Seattle communities: Portage Bay/Roanoke, North Capitol Hill, Montlake, University District, Laurelhurst, and Madison Park
- Eastside communities: Medina, Hunts Point, Clyde Hill, and Yarrow Point
- The Lake Washington ecosystem and associated wetlands
- Usual and accustomed fishing areas of tribal nations that have historically used the area's aquatic resources and have treaty rights

The SR 520 Bridge Replacement and HOV Project Draft Environmental Impact Statement (EIS), published in August 2006, evaluated a 4-Lane Alternative, a 6-Lane Alternative, and a No Build Alternative. Since the Draft EIS was published, circumstances surrounding the SR 520 corridor have changed in several ways. These changes have resulted in decisions to forward advance planning for potential catastrophic failure of the Evergreen Point Bridge, respond to increased demand for transit service on the Eastside, and evaluate a new set of community-based designs for the Montlake area in Seattle.

What is the SR 520 Program?

The SR 520 Bridge Replacement and HOV Program will enhance safety by replacing the aging floating bridge and keep the region moving with vital transit and roadway improvements throughout the corridor. The 12.8-mile program area begins at I-5 in Seattle and extends to SR 202 in Redmond.

In 2006, WSDOT prepared a Draft EIS—published formally as the SR 520 Bridge Replacement and HOV Project—that addressed corridor construction from the I-5 interchange in Seattle to just west of I-405 in Bellevue. Growing transit demand on the Eastside and structure vulnerability in Seattle and Lake Washington, however, led WSDOT to identify new projects, each with a separate purpose and need, that would provide benefit even if the others were not built. These four independent projects were identified after the Draft EIS was published in 2006, and these now fall under the umbrella of the entire SR 520 Bridge Replacement and HOV Program:

- I-5 to Medina: Bridge Replacement and HOV Project replaces the SR 520 roadway, floating bridge approaches, and floating bridge between I-5 and the eastern shore of Lake Washington. This project spans 5.2 miles of the SR 520 corridor.
- Medina to SR 202: Eastside Transit and HOV Project completes and improves the transit and HOV system from Evergreen Point Road to the SR 202 interchange in Redmond. This project spans 8.6 miles of the SR 520 corridor.
- Pontoon Construction Project involves constructing the pontoons needed to restore the Evergreen Point Bridge in the event of a catastrophic failure and storing those pontoons until needed.
- Lake Washington Congestion Management Project, through a grant from the U.S. Department of Transportation, improves traffic using tolling, technology and traffic management, transit, and telecommuting.

To respond to these changes, the Washington State Department of Transportation (WSDOT) and the Federal Highway Administration (FHWA) initiated new projects to be evaluated in separate environmental documents. Improvements to the western portion of the SR 520 corridor—known as the I-5 to Medina: Bridge Replacement and HOV Project (the *I-5 to Medina project*)—are being evaluated in a Supplemental Draft EIS (SDEIS); this discipline report is a part of that SDEIS. Project limits for this project extend from I-5 in Seattle to 92nd Avenue NE in Yarrow Point, where it transitions into the Medina to SR 202: Eastside Transit and HOV Project (the *Medina to SR 202 project*). Exhibit 1 shows the project vicinity.

Exhibit 1. Project Vicinity Map

What are the project Alternatives?

As noted above, the Draft EIS evaluated a 4-Lane Alternative, a 6-Lane Alternative (including three design options in Seattle), and a No Build Alternative. In 2006, following Draft EIS publication, Governor Gregoire identified the 6-Lane Alternative as the state's preference for the SR 520 corridor, but urged that the affected communities in Seattle develop a common vision for the western portion of the corridor. Accordingly, a mediation group convened at the direction of the state legislature to evaluate the corridor alignment for SR 520 through Seattle. The mediation group identified three 6-lane design options for SR 520 between I-5 and the floating span of the Evergreen Point Bridge;

these options were documented in a Project Impact Plan (Parametrix 2008). The SDEIS evaluates the following:

- No Build Alternative
- 6-Lane Alternative
  - Option A
  - Option K
  - Option L

These alternatives and options are summarized below. The 4-Lane Alternative and the Draft EIS 6-lane design options have been eliminated from further consideration. More information on how the project has evolved since the Draft EIS was published in 2006, as well as more detailed information on the design options, is provided in the Description of Alternatives Discipline Report (WSDOT 2009b).

What is the No Build Alternative?

Under the No Build Alternative, SR 520 would continue to operate between I-5 and Medina as it does today: as a 4-lane highway with nonstandard shoulders and without a bicycle/pedestrian path. (Exhibit 2 depicts a cross section of the No Build Alternative.) No new facilities would be added to SR 520 between I-5 and Medina, and none would be removed, including the unused R.H. Thomson Expressway ramps near the Washington Park Arboretum. WSDOT would continue to manage traffic using its existing transportation demand management and intelligent transportation system strategies.

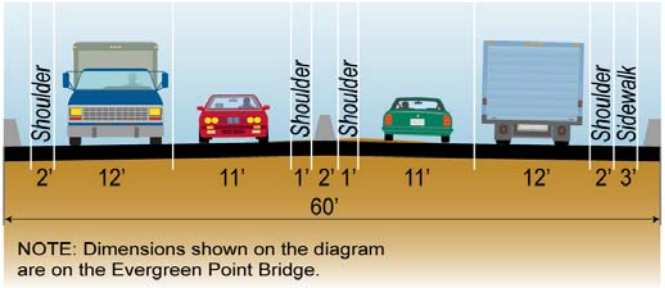
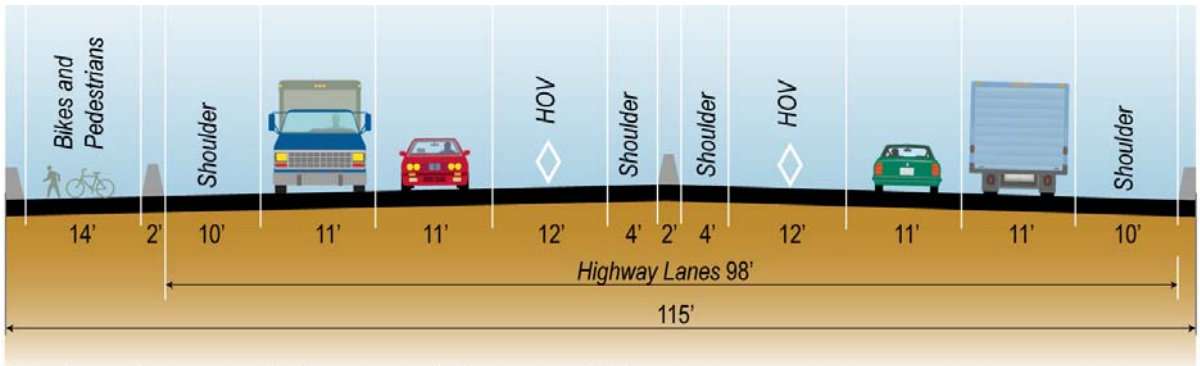


Exhibit 2. No Build Alternative Cross Section

The No Build Alternative assumes that the Portage Bay and Evergreen Point bridges would remain standing and functional through 2030 and that no catastrophic events, such as earthquakes or extreme storms, would cause major damage to the bridges. The No Build Alternative also assumes completion of the Medina to SR 202 project as well as other regionally planned and programmed transportation projects. The No Build Alternative provides a baseline against which project analysts can measure and compare the effects of each 6-Lane Alternative build option.

What is the 6-Lane Alternative?

The 6-Lane Alternative would complete the regional HOV connection (3+ HOV occupancy) across SR 520. This alternative would include six lanes (two 11-foot-wide outer general-purpose lanes and one 12-foot-wide inside HOV lane in each direction), with 4-foot-wide inside and 10-foot-wide outside shoulders (Exhibit 3). The proposed width of the roadway would be approximately 18 feet narrower than the one described in the Draft EIS, reflecting public comment from local communities and the City of Seattle.



NOTE: Dimensions shown on the diagram are on the Evergreen Point Bridge.

Exhibit 3. 6-Lane Alternative Cross Section

SR 520 would be rebuilt from I-5 to Evergreen Point Road in Medina and restriped and reconfigured from Evergreen Point Road to 92nd Avenue NE in Yarrow Point. A 14-foot-wide bicycle/pedestrian path would be built along the north side of SR 520 through the Montlake area and across the Evergreen Point Bridge, connecting to the regional path on the Eastside. A bridge maintenance facility and dock would be built underneath the east approach to the Evergreen Point Bridge.

The sections below describe the 6-Lane Alternative and design options in each of the three geographical areas the project would encompass.

Seattle

Elements Common to the 6-Lane Alternative Options

SR 520 would connect to I-5 in a configuration similar to the way it connects today. Improvements to the I-5/SR 520 interchange would include a new reversible HOV ramp connecting the new SR 520 HOV lanes to existing I-5 reversible express lanes. WSDOT would replace the Portage Bay Bridge and the Evergreen Point Bridge (including the west approach and floating span), as well as the existing local street bridges

across SR 520. New stormwater facilities would be constructed for the project to provide stormwater retention and treatment. The project would include landscaped lids across SR 520 at I-5, 10th Avenue East and Delmar Drive East, and in the Montlake area to help reconnect the communities on either side of the roadway. The project would also remove the Montlake freeway transit station.

The most substantial differences among the three options are the interchange configurations in the Montlake and University of Washington areas. Exhibit 4 depicts these key differences in interchange configurations, and the following text describes elements unique to each option.

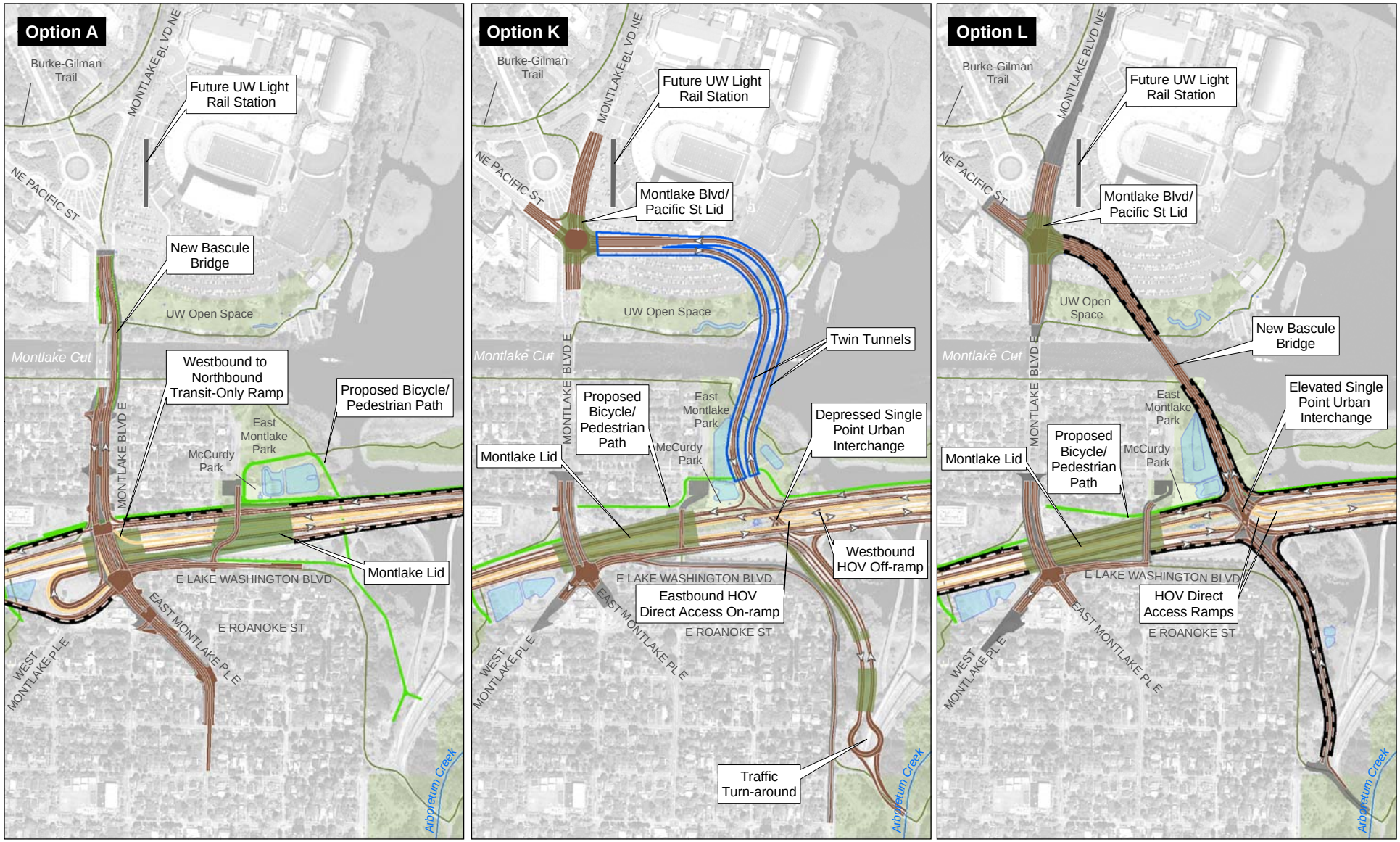
Option A

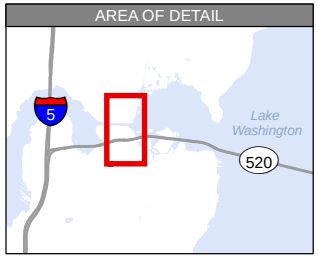
Option A would replace the Portage Bay Bridge with a new bridge that would include six lanes (four general-purpose lanes, two HOV lanes) plus a westbound auxiliary lane. WSDOT would replace the existing interchange at Montlake Boulevard East with a new, similarly configured interchange that would include a transit-only off-ramp from westbound SR 520 to northbound Montlake Boulevard. The Lake Washington Boulevard ramps and the median freeway transit stop near Montlake Boulevard East would be removed, and a new bascule bridge (i.e., drawbridge) would be added to Montlake Boulevard NE, parallel to the existing Montlake Bridge. SR 520 would maintain a low profile through the Washington Park Arboretum and flatten out east of Foster Island, before rising to the west transition span of the Evergreen Point Bridge. Citizen recommendations made during the mediation process defined this option to include sound walls and/or quieter pavement, subject to neighborhood approval and WSDOT's reasonability and feasibility determinations.

Suboptions for Option A would include adding an eastbound SR 520 on-ramp and a westbound SR 520 off-ramp to Lake Washington Boulevard, creating an intersection similar to the one that exists today but relocated northwest of its current location. The suboption would also include adding an eastbound direct access on-ramp for transit and HOV from Montlake Boulevard East, and providing a constant slope profile from 24th Avenue East to the west transition span.

Option K

Option K would also replace the Portage Bay Bridge, but the new bridge would include four general-purpose lanes and two HOV lanes with no westbound auxiliary lane. In the Montlake area, Option K





- Potential Sound Wall
- Existing Regional Bicycle/Pedestrian Path
- Tunnel
- Lid or Landscape Feature
- Proposed Bicycle/Pedestrian Path
- Stormwater Facility
- General Purpose Lane
- HOV, Direct Access, and/or Transit-Only Lane
- Future UW Light Rail Station
- Park

N

0 250 500 1,000 Feet

Source: King County (2006) Aerial Photo, King County (2005) GIS Data (Streams), City of Seattle (1994) GIS Data (Bike/Ped Trail), Seattle Bicycle Map (2008) GIS Data (Bike/Ped Trail) CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91), vertical datum for layers is NAVD88.

Exhibit 4. **Options A, K, and L: Montlake and University of Washington Areas**

I-5 to Medina: Bridge Replacement and HOV Project

would remove the existing Montlake Boulevard East interchange and the Lake Washington Boulevard ramps and replace their functions with a depressed, single-point urban interchange (SPUI) at the Montlake shoreline. Two HOV direct-access ramps would serve the new interchange, and a tunnel under the Montlake Cut would move traffic from the new interchange north to the intersection of Montlake Boulevard NE and NE Pacific Street. SR 520 would maintain a low profile through Union Bay, make landfall at Foster Island, and remain flat before rising to the west transition span of the Evergreen Point Bridge.

Is it a highrise or a transition span?

A transition span is a bridge span that connects the fixed approach bridge to the floating portion of the bridge. The Evergreen Point Bridge has two transition spans, one at the west end of the floating bridge transitioning traffic on and off of the west approach, and one on the east end of the floating bridge transitioning traffic on and off of the east approach. These spans are often referred to as the "west highrise" (shown) and the "east highrise" during the daily traffic report, and the west highrise even has a traffic camera mounted on it.

Today's highrises have two characteristics—large overhead steel trusses and navigation channels below the spans where boat traffic can pass underneath the Evergreen Point Bridge. The new design for the floating bridge would not include overhead steel trusses on the transition spans, which would change the visual character of the highrise. For the SDEIS, highrise and transition span are often used interchangeably to refer to the area along the bridge where the east and west approach bridges transition to the floating bridge.

A land bridge would be constructed over SR 520 at Foster Island. Citizen recommendations made during the mediation process defined this option to include only quieter pavement for noise abatement, rather than the sound walls that were included in the 2006 Draft EIS. However, because quieter pavement has not been demonstrated to meet all FHWA and WSDOT avoidance and minimization requirements in tests performed in Washington State, it cannot be considered as noise mitigation under WSDOT and FHWA criteria. As a result, sound walls could be included in Option K. The decision to build sound walls depends on neighborhood interest, the findings of the Noise Discipline Report (WSDOT 2009c), and WSDOT's reasonability and feasibility determinations.

A suboption for Option K would include constructing an eastbound off-ramp to Montlake Boulevard East configured for right turns only.

Option L

Under Option L, the Montlake Boulevard East interchange and the Lake Washington Boulevard ramps would be replaced with a new, elevated SPUI at the Montlake shoreline. A bascule bridge (drawbridge) would span the east end of the Montlake Cut, from the new interchange to the

intersection of Montlake Boulevard NE and NE Pacific Street. This option would also include a ramp connection to Lake Washington Boulevard and two HOV direct-access ramps providing service to and from the new interchange. SR 520 would maintain a low, constant slope profile from 24th Avenue East to just west of the west transition span of the floating bridge. Noise mitigation identified for this option would include sound walls as defined in the Draft EIS.

Suboptions for Option L would include adding a left-turn movement from Lake Washington Boulevard for direct access to SR 520 and adding capacity on northbound Montlake Boulevard NE to NE 45th Street.

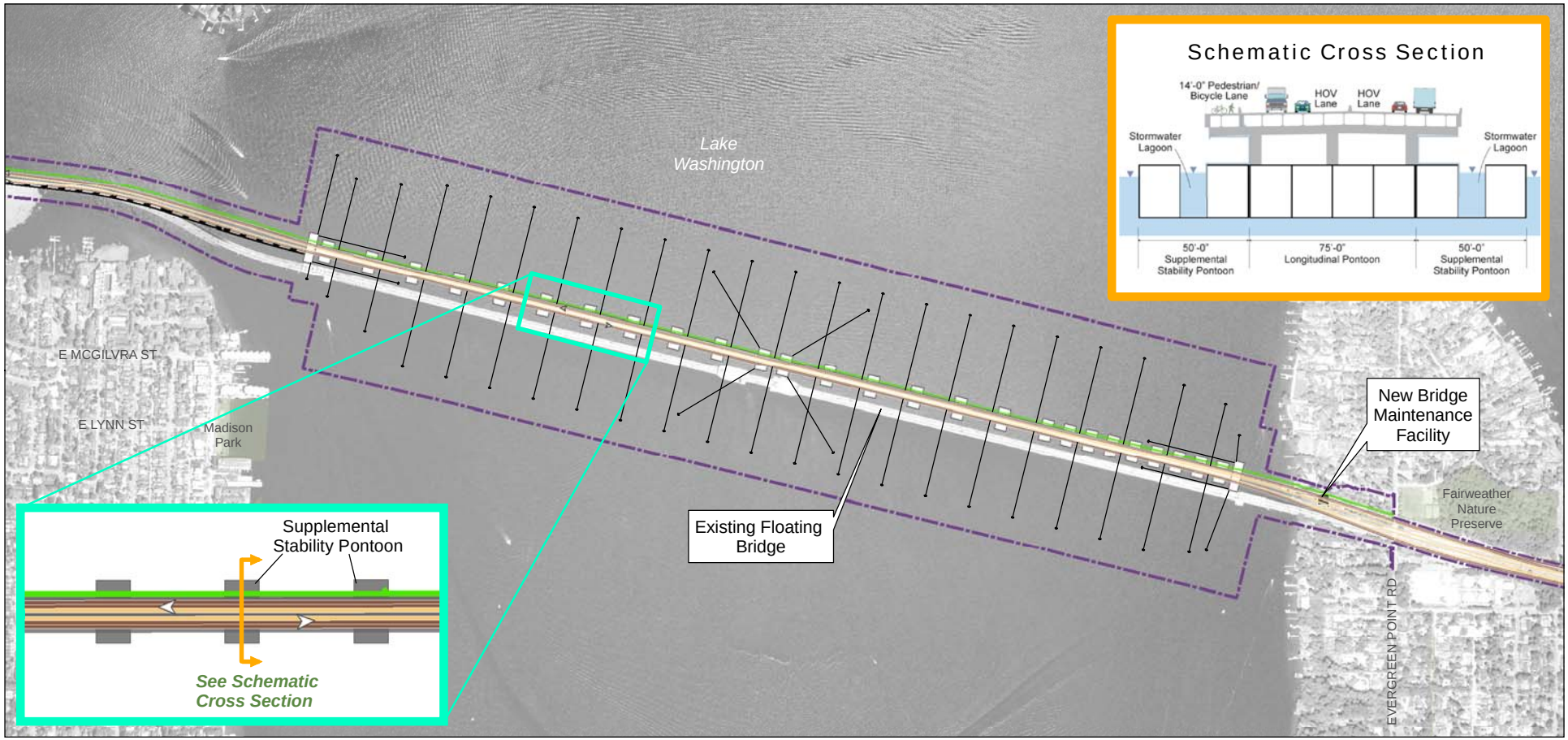
Lake Washington

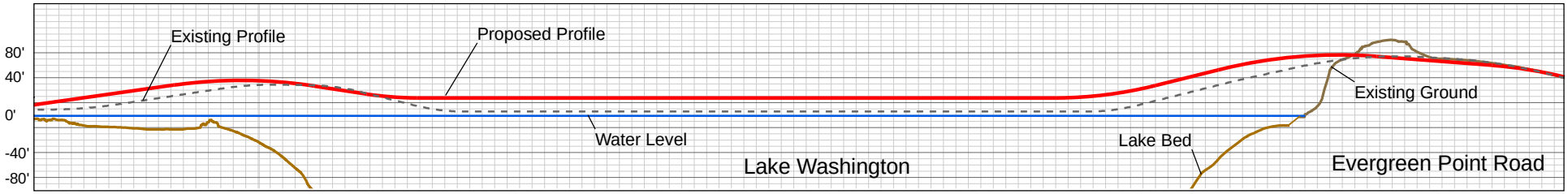
Floating Bridge

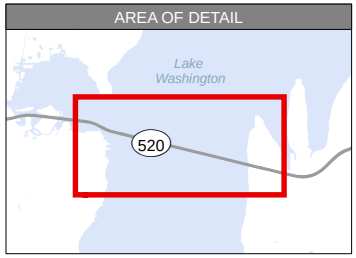
The floating span would be located approximately 190 feet north of the existing bridge at the west end and 160 feet north at the east end (Exhibit 5). Rows of three 10-foot-tall concrete columns would support the roadway above the pontoons, and the new spans would be approximately 22 feet higher than the existing bridge. A 14-foot-wide bicycle/pedestrian path would be located on the north side of the bridge.

The design for the new 6-lane floating bridge includes 21 longitudinal pontoons, two cross pontoons, and 54 supplemental stability pontoons. A single row of 75-foot-wide by 360-foot-long longitudinal pontoons would support the new floating bridge. One 240-foot-long by 75-foot-wide cross-pontoon at each end of the bridge would be set perpendicularly to the longitudinal pontoons. The longitudinal pontoons would be bolstered by the smaller supplemental stability pontoons on each side for stability and buoyancy. The longitudinal pontoons would not be sized to carry future high-capacity transit (HCT), but would be equipped with connections for additional supplemental stability pontoons to support HCT in the future. As with the existing floating bridge, the floating pontoons for the new bridge would be anchored to the lake bottom to hold the bridge in place.

Near the east approach bridge, the roadway would be widened to accommodate transit ramps to the Evergreen Point Road transit stop. Exhibit 5 shows the alignment of the floating bridge, the west and east approaches, and the connection to the east shore of Lake Washington.







- Anchor and Cable
- Pontoons
- Limits of Construction
- Proposed Bicycle/Pedestrian Path
- General Purpose Lanes
- HOV, Direct Access, and/or Transit-Only Lane
- Park

N

0 250 500 1,000 Feet

Source: King County (2006) Aerial Photo, CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91), vertical datum for layers is NAVD88.

Exhibit 5. **6-Lane Alternative at the Evergreen Point Bridge (Common to All Options)**

I-5 to Medina: Bridge Replacement and HOV Project

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Bridge Maintenance Facility

Routine access, maintenance, monitoring, inspections, and emergency response for the floating bridge would be based out of a new bridge maintenance facility located underneath SR 520 between the east shore of Lake Washington and Evergreen Point Road in Medina. This bridge maintenance facility would include a working dock, an approximately 7,200-square-foot maintenance building, and a parking area.

Eastside Transition Area

The I-5 to Medina project and the Medina to SR 202 project overlap between Evergreen Point Road and 92nd Avenue NE in Yarrow Point. Work planned as part of the I-5 to Medina project between Evergreen Point Road and 92nd Avenue NE would include moving the Evergreen Point Road transit stop west to the lid (part of the Medina to SR 202 project) at Evergreen Point Road, adding new lane and ramp striping from the Evergreen Point lid to 92nd Avenue NE, and moving and realigning traffic barriers as a result of the new lane striping. The restriping would transition the I-5 to Medina project improvements into the improvements to be completed as part of the Medina to SR 202 project.

Pontoon Construction and Transport

If the floating portion of the Evergreen Point Bridge does not fail before its planned replacement, WSDOT would use the pontoons constructed and stored as part of the Pontoon Construction Project in the I-5 to Medina project. Up to 11 longitudinal pontoons built and stored in Grays Harbor as part of the Pontoon Construction Project would be towed from a moorage location in Grays Harbor to Puget Sound for outfitting (see the sidebar to the right for an explanation of pontoon *outfitting*). All outfitted pontoons, as well as the remaining pontoons stored at Grays Harbor would be towed to Lake Washington for incorporation into the floating bridge. Towing would occur as weather permits during the months of March through October. Exhibit 6 illustrates the general towing route from Grays Harbor to Lake Washington, and identifies potential outfitting locations.

> What is Outfitting?
>
> Pontoon outfitting is a process by which the columns and elevated roadway of the bridge are built directly on the surface of the pontoon.

The I-5 to Medina project would build an additional 44 pontoons needed to complete the new 6-lane floating bridge. The additional pontoons could be constructed at the existing Concrete Technology

Exhibit 6. Possible Towing Route and Pontoon Outfitting Locations

Corporation facility in Tacoma, and/or at a new facility in Grays Harbor that is also being developed as part of the Pontoon Construction Project. The new supplemental stability pontoons would be towed from the construction location to Lake Washington for incorporation into the floating bridge. For additional information about pontoon construction, please see the Construction Techniques Discipline Report (WSDOT 2009d).

Would the project be built all at once or in phases?

Revenue sources for the I-5 to Medina project would include allocations from various state and federal sources and from future tolling, but there remains a gap between the estimated cost of the project and the revenue available to build it. Because of these funding limitations, there is a strong possibility that WSDOT would construct the project in phases over time.

If the project is phased, WSDOT would first complete one or more of those project components that are vulnerable to earthquakes and windstorms; these components include the following:

- The floating portion of the Evergreen Point Bridge, which is vulnerable to windstorms. This is the highest priority in the

corridor because of the frequency of severe storms and the high associated risk of catastrophic failure.

- The Portage Bay Bridge, which is vulnerable to earthquakes. This is a slightly lower priority than the floating bridge because the frequency of severe earthquakes is significantly less than that of severe storms.
- The west approach of the Evergreen Point Bridge, which is vulnerable to earthquakes (see comments above for the Portage Bay Bridge).

Exhibit 7 shows the vulnerable portions of the project that would be prioritized, as well as the portions that would be constructed later. The vulnerable structures are collectively referred to in the SDEIS as the Phased Implementation scenario. It is important to note that, while the new bridge(s) might be the only part of the project in place for a certain period of time, WSDOT's intent is to build a complete project that meets all aspects of the purpose and need.

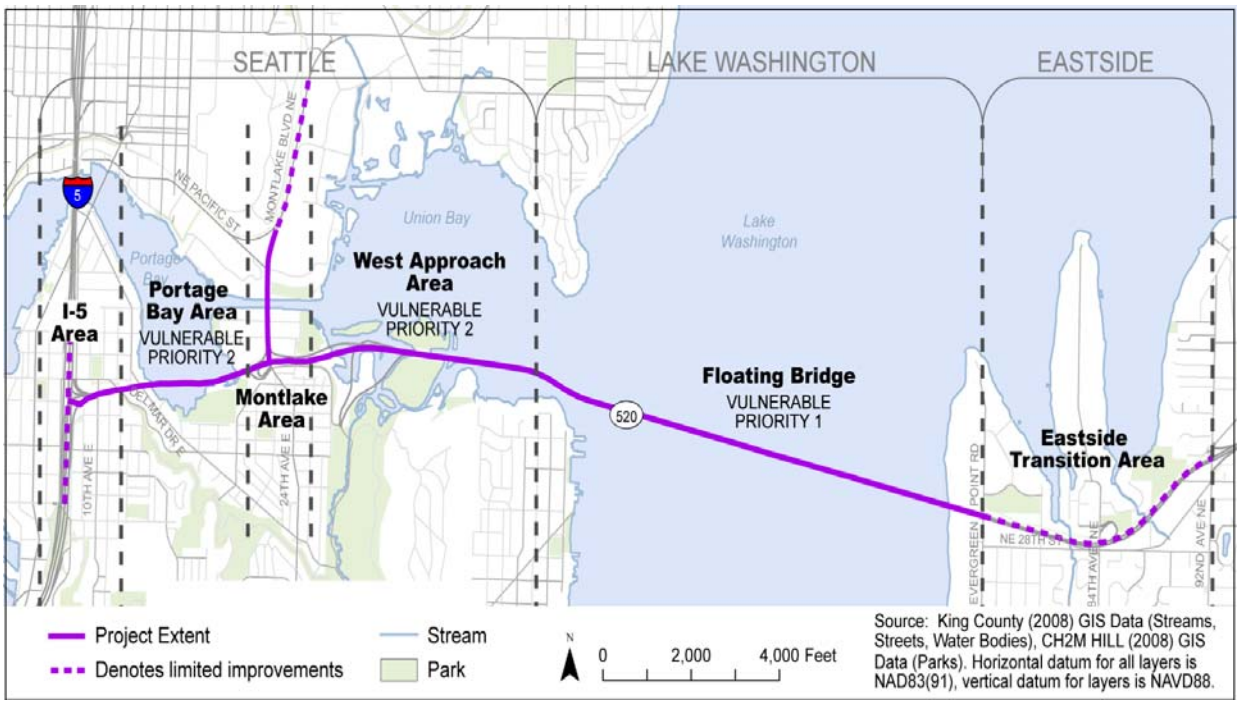


Exhibit 7. Geographic Areas along SR 520 and Project Phasing

The Phased Implementation scenario would provide new structures to replace the vulnerable bridges in the SR 520 corridor, as well as limited transitional sections to connect the new bridges to existing facilities. This scenario would include stormwater facilities, noise mitigation, and

the regional bicycle/pedestrian path, but lids would be deferred until a subsequent phase. WSDOT would develop and implement all mitigation needed to satisfy regulatory requirements.

To address the potential for phased project implementation, the SDEIS evaluates the Phased Implementation scenario separately as a subset of the "full build" analysis. The evaluation focuses on how the effects of phased implementation would differ from those of full build and on how constructing the project in phases might have different effects from constructing it all at one time. Impact calculations for the physical effects of phased implementation (for example, acres of wetlands and parks affected) are presented alongside those for full build where applicable.

Affected Environment

What is the study area and how was it selected?

The air quality study area is the airshed in the project area. Although the airshed has no physical boundaries, analyses were performed within the following localized and regional limits:

- Localized effects were limited to the area in the immediate vicinity of the intersections affected by the proposed project. The intersections affected by the proposed project were determined in the Transportation Discipline Report (WSDOT 2009e).
- Regional effects were considered to be effects on the Central Puget Sound carbon monoxide (CO) maintenance area, which includes the Seattle-Tacoma urban areas in Pierce, King, and Snohomish counties.
- Effects during construction were evaluated on a regional scale, including the Central Puget Sound CO maintenance area and Grays Harbor County.

What is an airshed

An airshed can be compared to a watershed. A watershed is a geographic area where rivers, streams, and run-off flow into a specific body of water. By comparison, an airshed is a geographic area where air pollutants from sources "upstream" or within the area flow and are present in the air.

How was the information collected?

The air quality analysts identified the air quality standards and regulations of EPA, Washington State Department of Ecology (Ecology), and Puget Sound Clean Air Agency (PSCAA) that apply to the study area. The team also reviewed historical climate data to determine how climate and terrain affect the air quality in the study area. Finally, the team evaluated the status of air quality in the study area by comparing recent air monitoring data available from EPA, Ecology, and PSCAA to the applicable air quality standards.

How do climate and weather affect air quality?

Weather directly influences air quality. Important meteorological factors include wind, temperature, and sunlight intensity. Temperature

inversions, which are associated with higher air pollution concentrations, occur when warmer air overlies cooler air. During temperature inversions in late fall and winter, particulates and CO from wood stoves and vehicle sources can be trapped close to the ground, which can lead to violations of the NAAQS. Ozone formation requires warm weather and direct sunlight. In the Puget Sound area, the highest ozone concentrations occur from mid-May until mid-September, when urban emissions are trapped by temperature inversions followed by intense sunlight and high temperatures.

What air pollutants would the project generate?

The major airborne pollutants of interest for transportation-related projects are CO, particulate matter (PM), ozone, and oxides of nitrogen (NO_X); these are commonly referred to as criteria pollutants. Volatile organic compounds (VOCs) are also regulated as precursors to ozone under the ozone ambient air quality standard. Federal and state standards regulate these pollutants, along with two other criteria pollutants, sulfur dioxide (SO_2) and lead. Lead and SO_2 are not pollutants of air quality concern for transportation-related projects and therefore are not addressed in this analysis. Attachment 1 describes in more detail the characteristics and health effects of the criteria pollutants.

Motor vehicles emit six pollutants that EPA classifies as MSATs: benzene, formaldehyde, acetaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, and 1,3-butadiene.

The six priority MSATs are known or suspected to cause cancer or other serious health effects. For example, benzene is a known carcinogen found in gasoline. MSATs can also cause other environmental effects, such as damage to plants and animals.

What policies or regulations are related to effects on air quality?

The federal Clean Air Act and its amendments and the Washington State Clean Air Act regulate air quality in the Puget Sound region and the EPA, Ecology, and PSCAA enforce those regulations in the study area. EPA delegates authority to manage air quality issues to the states.

In Washington State, EPA and Ecology further delegate authority to local air quality agencies. PSCAA is the local air agency for the Puget Sound region.

What standards apply to air quality?

Washington is subject to air quality regulations issued by EPA, Ecology, and local air agencies. EPA's NAAQS set limits on concentration levels of criteria pollutants. Concentration levels of the criteria pollutants must not exceed the NAAQS over specified time periods. Ecology and PSCAA monitor air quality in the Puget Sound region to compare the levels of criteria pollutants found in the atmosphere with the NAAQS.

The NAAQS consist of two sets of standards: the primary standards (which are intended to protect public health) and the secondary standards (which are intended to protect the natural environment). In addition to these standards, Ecology and PSCAA have adopted state and local ambient air quality standards that are equivalent to, or more stringent than, EPA's NAAQS. Exhibit 8 summarizes the ambient air quality standards applicable in the study area.

Exhibit 8. Summary of Applicable Ambient Air Quality Standards

Pollutant[a]	Standard	Averaging Period
Nitrogen dioxide	0.053 ppm	annual
Carbon monoxide	9 ppm	8 hours
	35 ppm	1 hour
Ozone	0.075 ppm	8 hours
Lead	1.5 µg/m³	quarterly
Sulfur dioxide	0.02 ppm	annual
	0.10 ppm	24 hours
	0.05 ppm	3 hours
	0.40 ppm	1 hour
Particulate matter (PM_{10})	150 µg/m³	24 hours
Particulate matter ($PM_{2.5}$)	15 µg/m³	annual
	35 µg/m³	24 hours

Source: U.S. EPA (2009b), WAC 173-474-100, and Washington State Standards (RCW 70.94).

[a] CO_2 is not currently subject to federal or state ambient air quality standards.

µg/m^3 = microgram(s) per cubic meter
PM_{10} = particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter
ppm = part(s) per million

Currently, no standards establish allowable concentrations of MSAT emissions in the air. Ecology conducted a study to monitor several air toxic compounds in the Seattle area from 2000 to 2001. This study indicated that the primary contributors to air toxics are diesel exhaust and wood smoke (Ecology 2001).

The National Air Toxic Assessment is an ongoing comprehensive evaluation of air toxics in the United States conducted by EPA. The assessment indicates that the air toxics risk in the Puget Sound region is in the top 5 percent in the nation, which is similar to other major urban areas. Diesel particulates make up almost three-quarters of the total cancer risk from air toxics exposure. The diesel exhaust contribution to the area's toxic air pollutants should be reduced in the near future as a result of a federal regulation that requires cleaner-burning diesel fuel for on-road vehicles, and a federal regulation that requires cleaner-burning diesel fuel for off-road diesel engines by 2010 (U.S. EPA 2009a).

Measuring Air Quality

Both Ecology and PSCAA operate ambient air quality monitors to assess the levels of regulated pollutants and to verify continued compliance with the NAAQS.

For the SR 520 corridor, the Beacon Hill Reservoir monitor is the closest monitor to the study area that measures ozone, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The Beacon Hill site is approximately 5 miles south of the western terminus of the study area. The nearest CO monitoring locations to the project are in the University District, approximately 1 mile north of SR 520, and in downtown Bellevue, approximately 1 mile south of SR 520.

In the Grays Harbor area, the closest monitoring station to the proposed pontoon construction site is in Aberdeen at 359 North Division Street. This monitoring station is within three miles of the site. The Aberdeen station measures $PM_{2.5}$ concentrations. Monitoring data for PM_{10} were obtained from the station located at 1900 College Street SE in Lacey, about 50 miles east of the sites. There are no stations in the close vicinity of the two sites that monitor CO, ozone, NO_x, or SO_2 concentrations.

Air Quality Compared with Current Standards in the Study Area

EPA designated the Central Puget Sound region as maintenance status for CO in 1996. The I-5 to Medina project, therefore, is located in an area that is currently designated a maintenance area for CO. Exhibit 9 shows the air quality maintenance area in the Puget Sound region. The Central Puget Sound region is currently in attainment for the remaining criteria pollutants.

Ambient air concentrations of the monitored pollutants in the study area have been below the NAAQS for the last several years. Exhibit 10 provides a summary of monitored data in the vicinity of the SR 520 project site over the last 5 years. The data indicate that concentrations have been below the NAAQS for each of the criteria pollutants.

What is attainment?

An area considered to have air quality as good as or better than the NAAQS for a criteria pollutant designated in the Clean Air Act is said to be in attainment. An area can be in attainment for one pollutant but still be in non-attainment for another.

What is a maintenance area?

A former nonattainment area that has met the NAAQS for the criteria pollutants designated in the Clean Air Act and is being managed to continue to meet (i.e., maintain) the NAAQS is a maintenance area.

Grays Harbor is in attainment for all pollutants. Exhibit 11 provides a summary of monitoring data in the vicinity of the Grays Harbor pontoon construction site for the past 5 years.

Conformity Requirements

In Washington State, transportation projects that are located in maintenance and nonattainment areas must meet the conformity requirements of the federal Clean Air Act (implemented by EPA regulations 40 CFR Parts 51 and 93) and the Washington Clean Air Act. The I-5 to Medina project is subject to these conformity requirements because it is a major transportation project that is located in a maintenance area for CO.

In nonattainment and maintenance areas, the federal Clean Air Act and the Washington Clean Air Act require transportation projects to conform with the State Implementation Plan (SIP), the state's plan for meeting and maintaining compliance with the NAAQS. Conformity with the SIP means that transportation activities will not produce new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS.

In addition, "regionally significant" projects must be included in the Regional Transportation Plan (RTP) and the Transportation Improvement Program (TIP).

What is the Puget Sound Regional Council?

The Puget Sound Regional Council (PSRC) is an inter-governmental agency that addresses regional transportation issues in western Washington. PSRC is responsible for the region's long-term transportation plan.

Areas designated as Attainment or Unclassified for all Criteria Pollutants

Former 1-Hour Ozone Maintenance Areas

Carbon Monoxide and Former 1-Hour Ozone Maintenance Areas

Particulate Matter, Carbon Monoxide, and Former 1-Hour Ozone Maintenance Areas

Particulate Matter Maintenance Areas

Note: The region is in attainment for the new 8-hour ozone and PM2.5 standards. The existing PM10 standard will remain in effect, but the 1-hour ozone standard was revoked as of June 15, 2005.

Source: WSDOE (1998) GIS data (Carbon Monoxide, Ozone, and Particulates), WSDOT (2004) GIS Data (State Routes), WSDOT (1995) GIS Data (Counties), and King County (2007) GIS Data (Waterbody). Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

N

0 5 10 Miles

Exhibit 9. **Central Puget Sound Region Designated Maintenance Areas**

I-5 to Medina: Bridge Replacement and HOV Project

Exhibit 10. Ambient Criteria Pollutant Concentration Levels in the Vicinity of SR 520

Monitoring Location	Parameter	Maximum Concentration					
		2004	2005	2006	2007	2008	Ambient Air Quality Standard
Nitrogen dioxide							
4103 Beacon Ave. S, Seattle	annual average (ppm)	0.018	0.018	0.018	–	–	0.053
Carbon monoxide							
2421 148th NE, Bellevue	8-hour average (ppm)	3.2	4.0	3.7	2.7	2.3	9
	1-hour average (ppm)	4.8	5.9	5.1	3.9	3.4	35
1307 NE 45th St., Seattle	8-hour average (ppm)	3.4	3.8	2.4	--	--	9
	1-hour average (ppm)	4.9	4.6	3.4	--	--	35
Ozone							
4103 Beacon Ave. S, Seattle	8-hour average (ppm)	0.058	0.049	–	0.05	0.052	0.075
Sulfur Dioxide							
4103 Beacon Ave. S, Seattle	annual average (ppm)	0.003	0.004	–	0.002	0.001	0.02
	24-hour average (ppm)	0.019	0.014	–	0.007	0.011	0.1
	3-hour average (ppm)	0.045	0.028	–	0.028	0.03	0.5
	1-hour average (ppm)	0.06	0.044	–	0.039	0.073	0.4
Particulate Matter (PM_{10})							
4103 Beacon Hill S, Seattle	24-hour average ($\mu g/m^3$)	33	30	42	--	–	150
Particulate Matter ($PM_{2.5}$)							
4103 Beacon Hill S, Seattle	annual arithmetic mean ($\mu g/m^3$) [a]	8.51	7.95	7.94	7.19	7.25	15
	24-hour average ($\mu g/m^3$)[b]	32.6	27.6	25.7	29.4	20.5	35

Source: U.S. EPA 2009c.

"–" : data not available

[a] Arithmetic mean of 24-hour values for the year. This value, rounded to the nearest 0.1 microgram, should not exceed the level of the annual standard (15.0 µg/m3).

[b] Values are the 98th percentile of 24-hour average concentrations for the year. NAAQS is exceeded when the 3-year average of these values is greater than 35 µg/m3.

Exhibit 11. Ambient Criteria Pollutant Concentration Levels Measured from 2006 to 2008 near Grays Harbor

Monitoring Location	Parameter	Maximum Concentration					
		2004	2005	2006	2007	2008	NAAQS
Particulate Matter (PM_{10})							
1900 College Street SE, Lacey	24-hour average (µg/m^3)	40	32	41	–	–	150
Particulate Matter ($PM_{2.5}$)							
359 North Division, Aberdeen	Annual arithmetic mean (µg/m^3)	8.18	–	–	–	–	15
	24-hour average (µg/m^3) [a]	12.3	–	–	–	–	35

Source: U.S. EPA (2009c)

"-": data not available

[a] Values are the 98th percentile of 24-hour average concentrations for the year. NAAQS is exceeded when the 3-year average of these values is greater than 35 µg/m3.

Because the project is in a maintenance area for CO, a project-level analysis is necessary to verify that no localized effects would cause or contribute to a violation of the NAAQS. The analysis must also include air dispersion modeling to calculate CO concentrations in the vicinity of selected intersections chosen based on their high level of traffic and delay. The purpose for this is to demonstrate that the project would not cause a new violation or increase the frequency or severity of an existing violation of the air quality standards. The results of this analysis are discussed in the next section.

Potential Effects of the Project

What methods were used to evaluate the project's potential effects?

The project team evaluated effects of the project on air quality both during the construction phase and during operation of the completed project using current FHWA guidance, as described below.

Construction Effects

The air quality analysts qualitatively addressed effects during construction. Construction activities that typically result in emissions of air pollutants are described in this discipline report.

Regional Air Quality Effects

Air quality is a resource without boundaries. In general, actions that affect air quality do so on a regional basis, as pollutants released to the air are subject to dilution and mixing throughout the entire airshed. This is particularly true for mobile sources of emissions, such as the motor vehicles using the roads affected by this project. Exhaust from the motor vehicles is released during the entire trip of each vehicle, including areas beyond the limits of the proposed project.

The air quality analysts performed an emissions burden analysis to evaluate emissions effects on a regional basis. The team calculated the emissions from vehicles in the region for each option of the 6-Lane Alternative and compared them to the emission budget for the region, as calculated by PSRC. This budget, established and approved as a part of the SIP, is the allowed pollutant emissions for motor vehicles within the region. Effects from MSATs were addressed qualitatively.

An emission burden analysis was completed for each option by assuming operating conditions in the design year 2030 to be consistent with *Destination 2030* (PSRC 2007a), which calculated regional emissions for the same year. Emissions in tons per day of NO_X, CO, and VOCs were estimated using regional emission factor data and forecasted vehicle miles traveled (VMT) on a daily basis. Emission

factors were obtained from the MOBILE6.2 model, in terms of grams per vehicle mile traveled.

The MOBILE6.2 model (U.S. EPA 2002) calculates emission factors for gasoline-fueled light-duty vehicles, trucks, heavy-duty vehicles, and motorcycles, and for diesel-fueled light-duty vehicles, trucks, and heavy-duty vehicles. The model accounts for progressively more stringent tailpipe emission standards over the vehicle model years evaluated. Input values were provided by PSRC. The transportation analysis data (WSDOT 2009e) for this project provided the daily VMT.

FHWA guidance (FHWA 2006) suggests a three-tiered approach to analyzing the effects of a transportation project in terms of public exposure to MSAT emissions. The level of analysis is related to expected size and effect of the project, as follows:

1. No analysis for projects with no potential for meaningful MSAT effects; or
2. Qualitative analysis for projects with low potential MSAT effects; or
3. Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

This project does not meet the annual average daily traffic volume to warrant a quantitative MSAT analysis. Options K and L have the highest annual average daily traffic volume (AADT) of 133,750, which is below the threshold of 140,000 AADT recommended by FHWA for a quantitative MSAT analysis. The effects from each alternative and options were evaluated qualitatively.

Local Air Quality Effects

For project-level conformity, a project must demonstrate that it will not cause a localized effect, defined as an exceedance of the CO NAAQS. Dispersion modeling was performed for intersections in the study area. This analysis compared the No Build Alternative to the 6-Lane Alternative options for the year of opening (2018) and the design year (2030).

With over 30 signalized intersections in the study area, the team performed a screening analysis to identify the worst-case intersections. It was assumed that if the worst-case intersections did not cause a violation of the NAAQS, then the remaining intersections for all alternative options also would not cause a violation of the NAAQS.

AM and PM peak-hour level of service (LOS) and traffic volume were provided by the traffic discipline team for each signalized intersection for every build alternative option in 2030, which is provided in Attachment 2. The number of LOS F intersections occurring in the AM and the PM peak hours were compared. PM peak hours had more intersections with LOS F than the AM peak hours; therefore, only PM peak-hour data was evaluated.

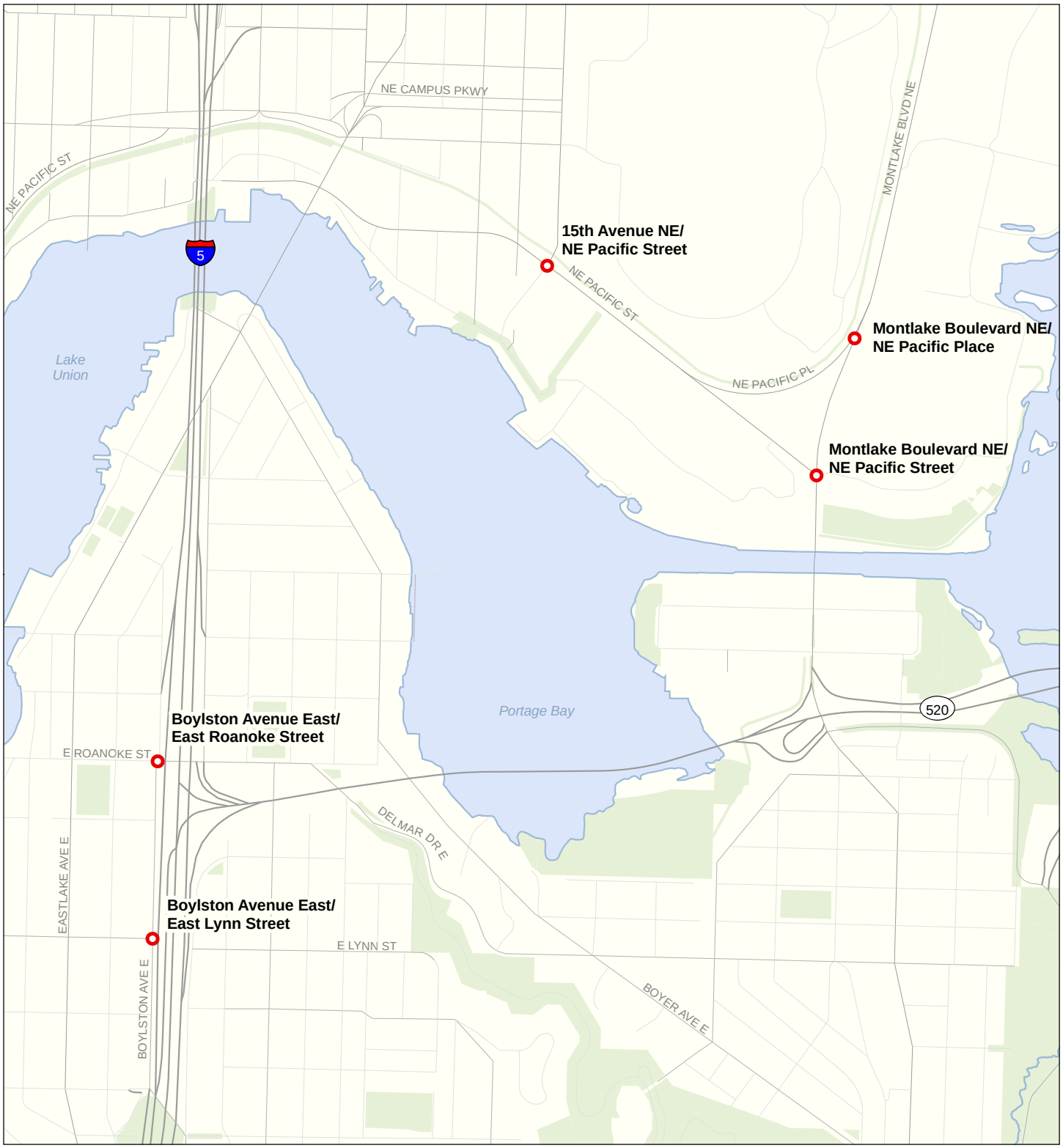
The intersections were then narrowed down to only consider those with an LOS E or F because they have longer delay. The remaining intersections were screened by volume. If the volume did not increase by more than 10 percent as a result of the 6-Lane Alternative, the intersection was not considered to have a significant effect and was not modeled. The screening analysis indicated that the five intersections with the worst-case conditions are:

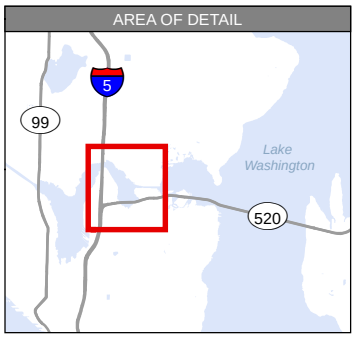
> **Level of Service**
>
> A measure of how well a freeway or local signalized intersection operates. For local intersections, LOS is based on how long it takes a typical vehicle to clear the intersection. LOS ranges from A to F, with A representing the least amount of delay and F representing the longest delay.

- Boylston Avenue and East Lynn Street
- Boylston Avenue and East Roanoke Street
- Montlake Boulevard NE and Pacific Place
- Pacific Street and 15th Avenue NE
- Montlake Boulevard NE and Pacific Street

The five worst-case intersections are shown on a map in Exhibit 12. Each intersection was evaluated using WSDOT's WASIST. Intersection-specific traffic volumes and signal timing were input to WASIST, and the tool estimated the maximum CO concentration in the vicinity of the intersection. The WASIST results are presented in Attachment 3. A background value of 5 ppm was added to all model results, as recommended in guidance for urban areas (U.S. EPA 1992).

All 6-Lane Alternative options were modeled for the design year 2030. One option (Option L) was selected as the worst-case in terms of air quality, and hotspot modeling was performed for opening year 2018. The No Build Alternative was modeled for existing conditions, opening year, and design year. It was assumed that if the modeled intersections do not cause a violation of the NAAQS, then the other intersections in the study area also would not cause a violation of the NAAQS.





Intersection modeled with WASIST

Source: King County (2005) GIS Data (Streams and Streets) King County (2007) GIS Data (Water Bodies), and CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

N

0 250 500 1,000 Feet

Exhibit 12. **Modeled Intersections for CO Hot Spot Analysis**

I-5 to Medina: Bridge Replacement and HOV Project

How would construction of the project affect air quality?

SR 520 Corridor

No Build Alternative

If the project is not built, there would be no effects on air quality related to construction activities.

6-Lane Alternative

During construction of roadway projects, soil-disturbing activities, heavy-duty equipment, commuting construction workers, and the laying of asphalt may generate emissions that can temporarily affect air quality. The total emissions and the timing of the emissions from these sources would vary depending on the phasing of the project and options chosen for the project.

Typical sources of emissions during construction of transportation projects include the following:

- Fugitive dust generated during excavation, grading, and loading and 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
- VOCs and odorous compounds emitted during asphalt paving

The regulated pollutants of concern for fugitive dust are $PM_{2.5}$ and PM_{10}. Engine and motor vehicle exhaust would result in emissions of VOC, NO_X, PM_{10}, $PM_{2.5}$, and MSATs. Construction would be phased over a period of approximately 7 years.

For conformity purposes, emissions from construction activities that exceed 5 years must be evaluated. When a design option is selected and if its construction will last for 5 or more years, a detailed construction emissions analysis will be included in the Final EIS.

Phased Implementation Scenario

If the I-5 to Medina project were delivered in phases, the Evergreen Point Bridge (floating portion and approaches) and the Portage Bay Bridge would be completed first. Construction of these elements would result in fewer air emissions than those anticipated for full project build-out. Should detailed construction emissions estimates be required for conformity purposes, the emissions would be presented for each phase.

Pontoon Production and Transport

As previously mentioned, an additional 44 supplemental stability pontoons would be constructed as part of the I-5 to Medina project. These pontoons would be constructed at the existing CTC facility in Tacoma, and some would be constructed at the new facility in Grays Harbor.

During pontoon construction, onsite operation of heavy-duty construction equipment would generate exhaust emissions containing pollutants such as CO, NO_X, VOCs, SO_2, PM_{10}, and $PM_{2.5}$. An onsite concrete batch plant would produce PM_{10} and $PM_{2.5}$ emissions. Offsite vehicle trips made by employees and supply trucks to and from the sites would generate additional vehicle exhaust emissions. Tugboats would generate exhaust emissions during pontoon transport similar to that of other heavy-duty diesel equipment.

When a design option is selected and if its construction would last for 5 or more years, emissions from pontoon production and transport would be included in the construction emissions analysis in the Final EIS.

How would operation of the project affect regional and local air quality?

Regional Air Quality

The 6-Lane Alternative and options would have no noticeable effect on regional air quality. Air quality would continue to improve even under the No Build Alternative. The introduction of cleaner fuels and cleaner engines will reduce criteria pollutant emissions and MSAT emissions by the design year 2030.

Exhibit 13 shows the criteria emissions projected in the study area for each of the 6-Lane Alternative options. Emissions are based on the regional travel demand model forecast data which, at a planning level, take into account the project effects on transportation. The travel demand model assumptions are consistent with the local and regional land use planning assumptions. Please see the Transportation Discipline Report (WSDOT 2009e) for more details on the traffic modeling.

The table shows that emissions are almost identical for all 6-Lane Alternative options and the No Build Alternative. Consequently, the project is not anticipated to worsen regional air quality compared to the No Build Alternative. The predicted VMT would decrease for Option A and increase for Options K and L over the No Build Alternative, but the differences are so small that they minimally affect the emissions estimates. The decrease in Option A is a result of the reduced capacity to the Westside interchanges. As shown in Exhibit 13, there would be no noticeable increase in the percentage of the CO emissions budget consumed by traffic in the study area. All alternatives and options would result in lower emissions than current conditions.

Exhibit 13. Burden Emissions Analysis—Daily Project Emissions of Criteria Pollutants (tons per day)

Alternative	VMT	CO	CO % of SIP Budget	VOCs	NOx	PM_{10}	$PM_{2.5}$
2008 Existing	10,996,900	222	9%	15.5	23.3	0.6	0.4
2030 No Build	13,803,200	175	7%	7.7	7.5	0.4	0.2
2030 Option A	13,785,200	175	7%	7.7	7.5	0.4	0.2
2030 Option K/L	13,866,800	175	7%	7.7	7.6	0.4	0.2
SIP Budget	N/A	2,510		N/A	N/A	N/A	N/A

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 2009e). SIP inventory data are from 61 CFR 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.

This project does not meet the annual average daily traffic volume to warrant a quantitative MSAT analysis. Option K and L has the highest AADT of 133,750, which is below the threshold of 140,000 AADT recommended by FHWA for a quantitative MSAT analysis. The effects from each alternative and option were evaluated qualitatively.

For each alternative and option, the amount of MSATs emitted in 2030 would be roughly proportional to the VMT. Because the estimated VMT

under each of the alternatives and options is nearly the same, varying by less than 0.6 percent, it is expected there would be no appreciable difference in their overall MSAT emissions. Also, regardless of the option chosen, emissions would likely be lower in 2030 as a result of improved vehicle technologies that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 and 2020 (FHWA 2006). This decreasing trend is shown in Exhibit 14.

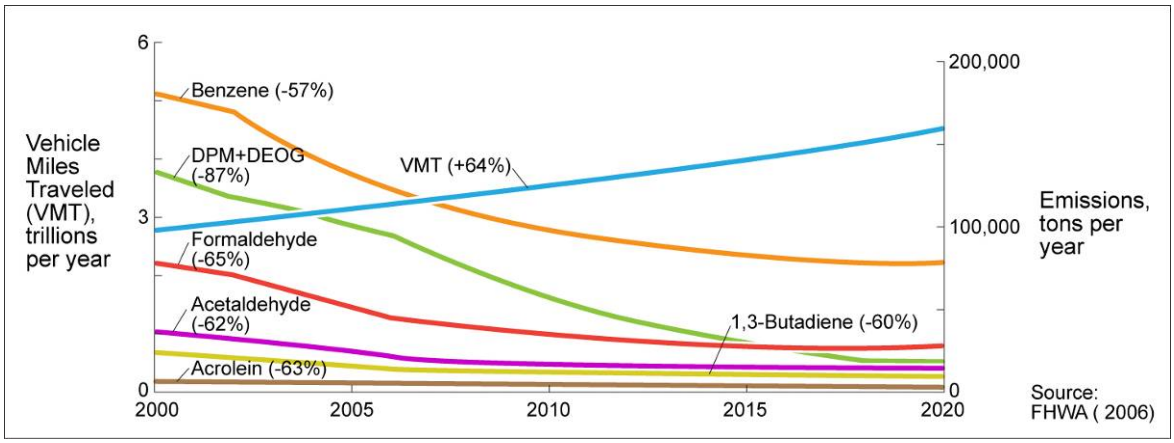


Exhibit 14. Annual Vehicle Miles Traveled vs. Mobile Source Air Toxics Emissions

The analysis results for criteria pollutants and MSATs showed that the roadway improvements proposed by this project would not adversely affect air quality.

Local Air Quality

One of the primary objectives of the project is to increase mobility on SR 520, which translates to fewer delays for motor vehicles and lower vehicle exhaust emissions. Region-wide, fewer delays and lower emissions are a positive effect of the project. However, shifts in traffic patterns could result in localized increases in concentrations of pollutants from motor vehicles. The air quality analysts performed a CO "hot-spots" analysis at affected intersections to determine pollutant concentrations.

Exhibits 15 and 16 summarize the WASIST modeling results for CO (see Attachment 3 for WASIST output). The modeled concentrations are well below the 1-hour and 8-hour NAAQS for all build options. The project would neither cause new violations of the 1-hour or 8-hour CO NAAQS in future years, nor increase the frequency or severity of any existing violation.

Exhibit 15. Maximum 1-Hour Carbon Monoxide Concentrations (ppm)

Intersection Name	2008 Existing	2018 No Build	2018 Opt. L	2030 No Build	2030 Opt. L	2030 Opt. K	2030 Opt. A	2030 Opt. A with Suboptions
Boylston Ave./ E Lynn St.	7.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Boylston Ave./ E Roanoke St.	7.5	6.6	6.6	6.4	6.4	6.4	6.4	6.4
Montlake Blvd./Pacific Pl.	9.6	8.0	8.5	7.8	8.5	8.5	7.8	7.8
Pacific St./ 15th Ave. NE	9.6	8.0	7.9	7.8	7.8	7.8	7.8	7.8
Montlake Blvd./Pacific St.	10.4	8.4	9.7	8.1	9.5	9.2	8.0	8.2
CO NAAQS	35 ppm							

Note: All concentrations include a background concentration of 5 ppm.

Exhibit 16. Maximum 8-Hour Carbon Monoxide Concentrations (ppm)

Intersection Name	2008 Existing	2018 No Build	2018 Opt. L	2030 No Build	2030 Opt. L	2030 Opt. K	2030 Opt. A	2030 Opt. A with Suboptions
Boylston Ave./E Lynn St.	6.8	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Boylston Ave./E Roanoke St.	6.8	6.1	6.1	6.0	6.0	6.0	6.0	6.0
Montlake Blvd./Pacific Pl.	8.2	7.4	7.4	7.0	7.4	7.4	7.0	7.0
Pacific St./15th Ave. NE	8.2	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Montlake Blvd./Pacific St.	8.8	7.4	8.3	7.2	8.1	7.9	7.1	7.2
CO NAAQS	9 ppm							

Note: All concentrations include a background concentration of 5 ppm.

The 6-Lane Alternative Options A, K, and L were modeled, in addition to the No Build Alternative. The effects of Option A suboptions were also evaluated. The modeled intersections represent worst-case conditions. Any intersections that were not modeled are assumed to have lower CO concentrations than the intersections presented. Effects of combinations of suboptions or phasing options cannot be quantified without detailed intersection-level traffic data.

As presented in the above tables, air quality effects vary by intersection and alternative. Although model results predicted an increase in CO

concentrations for some build alternative options, the project is not expected to cause a violation of the NAAQS for any option or analysis year.

How do the options differ in their effects on air quality?

The difference in the effects on air quality due to the different alternatives and options is presented in Exhibits 14 and 15. The CO concentrations vary slightly by intersection and for the alternatives and options, but there are no exceedances of the CO NAAQS. Variations are driven by subtle differences in entering volumes and signal timing in the traffic data.

The variations in CO concentrations by alternatives and options are not significant to compare effects by alternative. An effect on air quality is defined as a violation of the NAAQS. All future scenarios are expected to have lower CO concentrations than existing conditions and are below the CO NAAQS, therefore all future scenarios can be considered to not have an effect on air quality.

Does the project meet project-level conformity requirements?

Because the project is not anticipated to create any new violations, nor increase the frequency of an existing violation of the CO standard, it conforms with the purpose of the current SIP and the requirements of the federal Clean Air Act and the Washington Clean Air Act. The proposed project is included in the RTP, *Destination 2030* (PSRC 2007a), and in the 2007-2010 TIP (PSRC 2007b). The RTP and the TIP meet the conformity requirements identified by federal and state regulations for CO.

Mitigation

What may be done to avoid or minimize negative effects?

During construction, best management practices would be used to minimize construction emissions. For temporary effects during construction, state law requires construction site owners and/or operators to take reasonable precautions to prevent fugitive dust from becoming airborne. Fugitive dust may become airborne during demolition, material transport, grading, driving vehicles and machinery on and off the site, and wind events.

WSDOT will comply with the procedures outlined in the Memorandum of Agreement between WSDOT and the PSCAA for controlling fugitive dust (WSDOT 2008b). Controlling fugitive dust emissions may require some of the following actions:

- Spray exposed soil with water or other dust suppressant to reduce emissions of PM_{10} by increasing deposition of particulate matter.
- Use phased development to keep disturbed areas to a minimum.
- Use wind fencing to reduce wind disturbance of soils.
- Minimize dust emissions during transport of excavated or fill materials by wetting down loads or ensuring adequate freeboard (space from the top of the material to the top of the truck bed) on trucks.
- Promptly clean up spills of transported material on public roads.
- Schedule work tasks to minimize disruption of the existing vehicle traffic on streets.
- Restrict traffic onsite to reduce soil upheaval and tracking material onto roadways.
- Provide wheel washers to decrease deposition of particulate matter on area roadways by removing particulate matter that would otherwise be carried offsite by vehicles.

- Locate construction equipment and truck staging areas away from sensitive receptors as practical and in consideration of potential effects on other resources.
- Cover dirt, gravel, and debris piles as needed to reduce dust and wind-blown debris.

Emissions of PM_{10}, $PM_{2.5}$, VOCs, NO_X, and CO would be minimized whenever reasonable and possible. Since these emissions primarily result from construction equipment, machinery engines would be kept in good mechanical condition to minimize exhaust emissions.

Federal regulations require the use of ultra-low-sulfur diesel fuel in on-road trucks, and regulations will require the use of ultra-low-sulfur diesel fuel for construction equipment by 2010. These regulations require reduction of the sulfur content of diesel fuel from 500 ppm to 15 ppm—a 97 percent reduction—and will result in a decrease of both SO_2 and PM emissions from these engines. WSDOT encourages its contractors to reduce idling time of equipment and vehicles and to use newer construction equipment or equipment with add-on emission controls.

During project operations, air quality would improve from current conditions with all alternatives and options, including the No Build Alternative, because of the introduction of cleaner fuels and more efficient vehicle engines. Therefore, no avoidance or minimization measures are expected to be required.

What would be done to mitigate negative effects that could not be avoided or minimized?

Emissions from construction activities would be temporary, and no adverse effects are expected to remain after avoidance and minimization measures are applied during construction. Operationally, as noted above, air quality would improve from current conditions because of the introduction of cleaner fuels and more efficient vehicle engines. Thus, no mitigation measures are expected to be required.

What negative effects would remain after mitigation?

No negative effects are expected as a result of construction because fugitive dust emissions will be minimized. As noted above, no negative effects that would require mitigation are expected from operations.

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Attachment 1

Characteristics and Health Effects of Criteria Pollutants

Ozone and volatile organic compounds (VOCs): Emission sources do not directly emit ozone. Ozone forms when precursor pollutants, primarily nitrogen oxides and VOCs, react with sunlight. VOCs come from vehicle exhaust, paint thinners, solvents, and other petroleum-based products. Ozone irritates the eyes, impairs the lungs, and aggravates respiratory problems. Ozone can cause chest pain, coughing, nausea, pulmonary congestion, and possible long-term lung damage. A number of exhaust VOCs are also toxic, with the potential to cause cancer. VOCs are not a criteria pollutant, but are often evaluated in conjunction with ozone because it is a precursor.

Nitrogen oxides (NO_x): Under the high pressure and temperature conditions in an engine, nitrogen and oxygen atoms in the air react to form various nitrogen oxides, collectively known as NO_x. NO_x, like VOCs, is a precursor to the formation of ozone and also contributes to the formation of acid rain. NO_x affects the respiratory system, causing a high incidence of acute respiratory diseases. Pre-school children are especially at risk. NO_x also degrades visibility due to its brownish color and its conversion to nitrate particles.

Carbon monoxide (CO): Carbon monoxide is a product of incomplete combustion and occurs when carbon in the fuel is partially oxidized rather than fully oxidized to carbon dioxide (CO_2). Carbon monoxide reduces the flow of oxygen in the bloodstream and is particularly dangerous to persons with heart disease. Exposure to carbon monoxide impairs visual perception, manual dexterity, learning ability, and performance of complex tasks.

Particulate matter (PM): PM is tiny particles of dust that cause irritation and damage to the respiratory system. This can result in difficulty breathing, induce bronchitis, and aggravate existing respiratory disease. Exposure to particulates affects individuals with chronic pulmonary or cardiovascular disease, people with influenza or asthma, children, and elderly persons. Particulates aggravate breathing difficulties, damage

lung tissue, alter the body's defense against foreign materials, and can lead to premature mortality.[1]

[1]Transportation Conformity: A Basic Guide for State and Local Officials. Federal Highway Administration. Revised June 19, 2000.

Attachment 2

Intersection Screening Data

SR-520 Westside AM Intersection Data

Intersection Name	Existing 2008		No Build 2030		A Base 2030		A West 2030		A Add 2030		Alternative K 2030		Alternative L 2030	
	LOS	Vol	LOS	Vol	LOS	Vol	LOS	Vol	LOS	Vol	LOS	Vol	LOS	Vol
Howell St. @ Yale Ave./I-5 SB ONR	D	1760	D	1890	D	1920	D	1920	D	1920	D	1870	D	1870
Stewart St. @ Yale Ave.	B	2480	B	2660	B	2700	B	2700	B	2700	B	2670	B	2670
Stewart St. @ Denny Way	E	3650	F	3930	F	3970	F	3970	F	3970	F	3950	F	3950
Stewart St./I-5 SB OFR/I-5 EL OFR @ Eastlake Ave./John St.	C	2950	D	3220	D	3330	D	3330	D	3330	D	3290	D	3290
Mercer St/I-5 Ramps @ Fairview Ave.	F	6410	F	6880	F	6880	F	6880	F	6880	F	6890	F	6890
Fairview Ave. @ Valley St.	C	3980	D	4250	D	4360	D	4360	D	4360	D	4420	D	4420
Fairview Ave. @ Eastlake Ave.	B	1740	B	1870	B	1900	B	1900	B	1900	B	1910	B	1910
7th Ave. NE @ NE 42nd St./I-5 EL Ramp	B	530	B	580	B	590	B	590	B	590	B	570	B	570
NE 45th St. @ 7th Ave. NE	C	2740	B	2800	B	2860	B	2860	B	2860	B	2740	B	2740
NE 45th St. @ 5th Ave. NE	C	2570	C	2640	C	2680	C	2680	C	2680	B	2570	B	2570
Boylston Ave. @ E Lynn St.	D	1630	E	1760	F	1960	F	1960	F	1960	F	2160	F	2160
Boylston Ave. @ E Roanoke St.	C	1590	C	1710	C	1930	C	1930	C	1930	C	1890	C	1890
E Roanoke St. @ Harvard Ave./SR 520 WB OFR	F	2500	F	2660	F	2970	F	2920	F	2920	F	2470	F	2470
E Roanoke St. @ 10th Ave.	C	2370	C	2640	C	2850	C	2800	C	2800	C	2790	C	2790
NE 45th St @ University Village Entrance	A	3280	A	3510	A	3160	A		A	3160	B	3970	B	3970
Montlake Blvd. @ NE 45th St.	C	3500	B	3760	B	3390	B		B	3400	C	4210	C	4210
Montlake Blvd. @ NE 44th St./Walla Walla Road	A	2420	A	2850	A	2360	A		A	2360	A	3170	A	3170
25th Ave. NE @ NE 44th St./Pend Oreille Rd.	C	1460	B	1630	B	1500	B		B	1500	C	1770	C	1770
Montlake Blvd. @ 25th Ave. NE	B	3080	B	3320	A	3080	A		A	3080	B	4160	B	4160
Montlake Blvd. @ Pacific Pl.	A	3260	A	3570	A	3340	A		A	3340	B	4460	C	4460
Pacific St. @ 15th Ave. NE	D	2500	D	2740	C	2510	C		D	2510	D	2930	D	2930
Pacific St. @ Pacific Pl.	B	2170	B	2390	C	2170	B		B	2180	C	2610	B	2610
Pacific St. @ Hospital Exit	A	1500	A	1640	A	1550	A		A	1550	A	1990	B	1990
Pacific St. @ Hospital Emergency Entrance	A	1500	A	1640	A	1550	A		A	1550	A	1990	A	1990
Montlake Blvd. @ Pacific St.	C	4250	C	4650	B	4400	B		C	4400	D	5910	D	6630
Montlake Blvd. @ E Shelby St.	B	4200	D	4590	A	4350	A		A	4370	A	3150	A	3860
Montlake Blvd. @ E Hamlin St.	A	4450	A	4860	A	5180	A		A	5090	A	3140	A	3850
Montlake Blvd. @ SR 520 WB Ramps	n/a		n/a		A	3870	A		A	3870	NA		NA	
Montlake Blvd. @ Lake Washington Blvd./SR 520 EB Ramps (Montlake Blvd. @ W Montlake Pl E in K & L)	E	4010	E	4440	D	4640	D		C	4260	D	4090	D	4090
Montlake Blvd. @ E Roanoke St.	B	2340	A	2600	A	2580	B		B	2410	NA		NA	
Lake Washington Blvd. @ SR 520 WB OFR (Lake Washington Blvd. @ SR 520 WB OFR/EB ONR)	B		C		NA		A		A	1030	NA		NA	
SPUI Interchange	NA		NA		NA		NA		NA		B	2320	D	2320

At unsignalized Intersections analyzed using the Two-Way Stop Control (TWSC) HCM methods, delay for the overall intersection is reported in addition to the worst approach.
TWSC also indicates unsignalized intersections that may have less than two stopped approaches, but for which the HCM TWSC analysis is still used.
Intersection delay does not include impact of downstream delays and queuing and therefore actual operations may be significantly worse.

SR-520 Westside PM Intersection Data

Intersection Name	Existing 2008		No Build 2030		A Base 2030		A West 2030		A Add 2030		Alternative K 2030		Alternative L 2030	
	LOS	Vol	LOS	Vol	LOS	Vol	LOS	Vol	LOS	Vol	LOS	Vol	LOS	Vol
Howell St. @ Yale Ave./I-5 SB ONR	E	2550	F	3000	F	3050	F	3050	F	3050	F	2990	F	2990
Stewart St. @ Yale Ave.	C	1950	E	2150	E	2140	E	2140	E	2140	D	2110	D	2110
Stewart St. @ Denny Way	D	2760	D	2960	D	2910	D	2910	D	2910	D	2900	D	2900
Stewart St./I-5 SB OFR/I-5 EL OFR @ Eastlake Ave./John St.	C	1460	C	1550	C	1550	C	1550	C	1550	C	1540	C	1540
Mercer St/I-5 Ramps @ Fairview Ave.	F	7070	F	7920	F	7920	F	7920	F	7920	F	7900	F	7900
Fairview Ave. @ Valley St.	D	3410	D	3470	D	3430	D	3430	D	3430	D	3390	D	3390
Fairview Ave. @ Eastlake Ave.	B	2090	B	2130	B	2090	B	2090	B	2090	B	2070	B	2070
7th Ave. NE @ NE 42nd St./I-5 EL Ramp	C	1040	C	1130	C	1150	C	1150	C	1150	C	1110	C	1110
NE 45th St. @ 7th Ave. NE	D	3620	D	3840	E	4080	E	4080	D	3860	E	3890	E	3890
NE 45th St. @ 5th Ave. NE	C	2940	C	3080	C	3220	C	3220	C	3120	C	3150	C	3150
Boylston Ave. @ E Lynn St.	D	1490	F	1940	F	1870	F	1870	F	1870	F	2360	F	2360
Boylston Ave. @ E Roanoke St.	C	1680	D	1980	D	2070	D	2070	D	2070	D	2180	D	2180
E Roanoke St. @ Harvard Ave./SR 520 WB OFR	F	2800	F	3380	F	3700	F	3480	F	3480	F	3520	F	3520
E Roanoke St. @ 10th Ave.	B	2350	C	2620	C	3130	C	2910	C	2910	C	2940	C	2940
NE 45th St @ University Village Entrance	B	3680	B	4510	B	4410	B		B	4110	C	5130	C	5130
Montlake Blvd. @ NE 45th St.	C	3840	C	4740	B	4490	B		B	4600	C	5370	C	5370
Montlake Blvd. @ NE 44th St./Walla Walla Road	B	2910	A	3590	B	3400	B		B	3510	B	4270	B	4270
25th Ave. NE @ NE 44th St./Pend Oreille Rd.	C	2360	B	2910	C	2720	C		C	2830	C	3280	C	3280
Montlake Blvd. @ 25th Ave. NE	B	4020	A	4950	B	4660	A		B	4880	B	6080	B	6080
Montlake Blvd. @ Pacific Pl.	B	4380	B	5390	E	5094	F		F	5310	E	6570	E	6570
Pacific St. @ 15th Ave. NE	D	2900	E	3540	E	3490	E		E	3490	F	3950	F	3950
Pacific St. @ Pacific Pl.	C	2560	C	3158	C	3110	C		C	3100	D	3580	D	3580
Pacific St. @ Hospital Exit	A	1790	A	2180	A	2170	A		A	2170	A	2670	A	2670
Pacific St. @ Hospital Emergency Entrance	A	1790	A	2180	A	2170	A		A	2170	A	2670	A	2670
Montlake Blvd. @ Pacific St.	D	5210	F	6410	E	6150	E		E	6370	F	8210	F	8700
Montlake Blvd. @ E Shelby St.	D	5140	F	6310	A	6050	A		A	6280	B	4030	B	4520
Montlake Blvd. @ E Hamlin St.	A	5370	A	6570	A	6080	A		A	6320	A	3940	B	4430
Montlake Blvd. @ SR 520 WB Ramps	n/a		n/a		B	5190	A		A	5290	NA		NA	
Montlake Blvd. @ Lake Washington Blvd./SR 520 EB Ramps (Montlake Blvd. @ W Montlake Pl E in K & L)	E	4510	F	5510	E	5810	F		E	5400	D	4800	F	4800
Montlake Blvd. @ E Roanoke St.	B	2440	B	3010	A	3100	B		A	2930	NA		NA	
Lake Washington Blvd. @ SR 520 WB OFR (Lake Washington Blvd. @ SR 520 WB OFR/EB ONR)	C		E		NA		C		B	1470	NA		NA	
SPUI Interchange	NA		NA		NA		NA		NA		B	3320	D	3530

At unsignalized Intersections analyzed using the Two-Way Stop Control (TWSC) HCM methods, delay for the overall intersection is reported in addition to the worst approach.
TWSC also indicates unsignalized intersections that may have less than two stopped approaches, but for which the HCM TWSC analysis is still used.
Intersection delay does not include impact of downstream delays and queuing and therefore actual operations may be significantly worse.

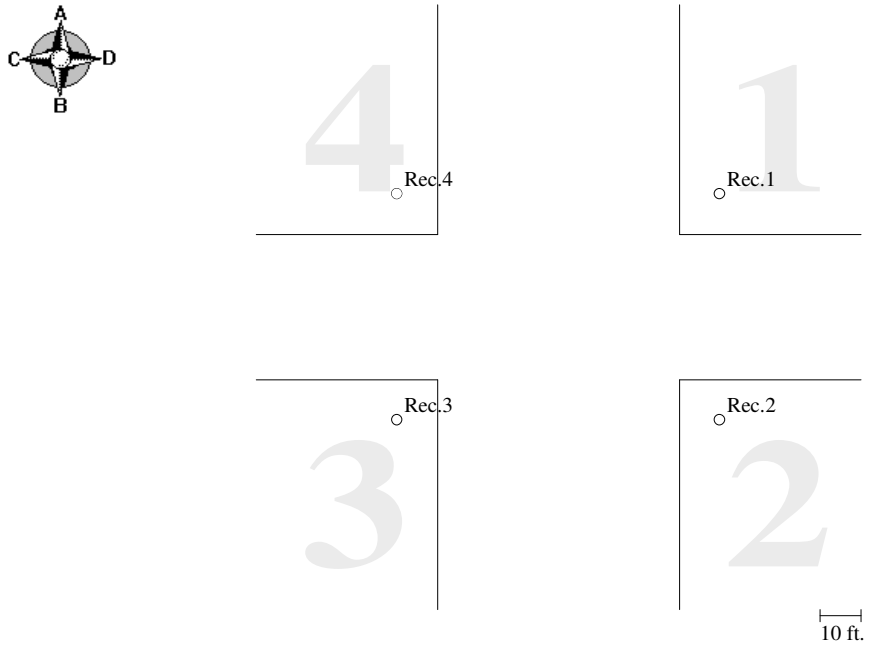
Attachment 3

WASIST Output

Washington State Intersection Screening Tool 1.0

04-16-09
04:28 PM
Westside SR 520

Description: **15th and Pacific - 2030 A Add**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.4	1.7	Pass
3	3	10	10	2.4	1.7	Pass
4	4	10	10	2.4	1.7	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

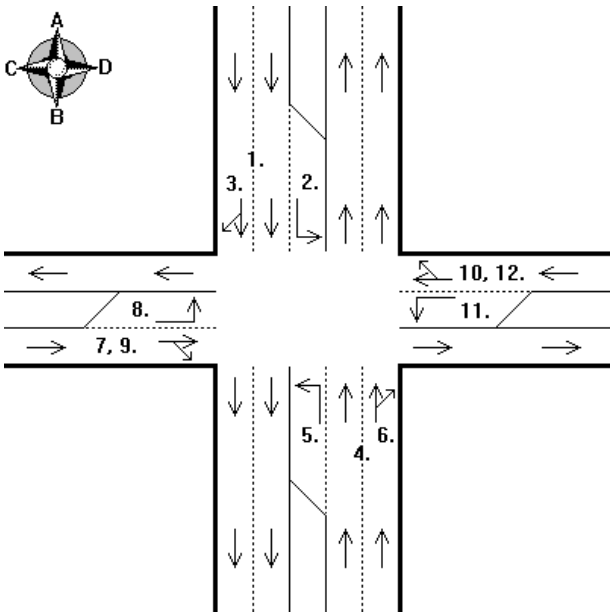
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	830
2	A-D Left Turn	80
3	A-C Right Turn	20
4	B-A Thru	650
5	B-C Left Turn	80
6	B-D Right Turn	340
7	C-D Thru	2
8	C-A Left Turn	230
9	C-B Right Turn	368
10	D-C Thru	100
11	D-B Left Turn	730
12	D-A Right Turn	60



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**74**
Leg A Left Turn	**93**
Leg B Thru & Rt	**74**
Leg B Left Turn	**94**
Leg C Thru & Rt	**78**
Leg C Left Turn	**78**
Leg D Thru & Rt	**72**
Leg D Left Turn	**72**

USER COMMENTS

Westside SR 520

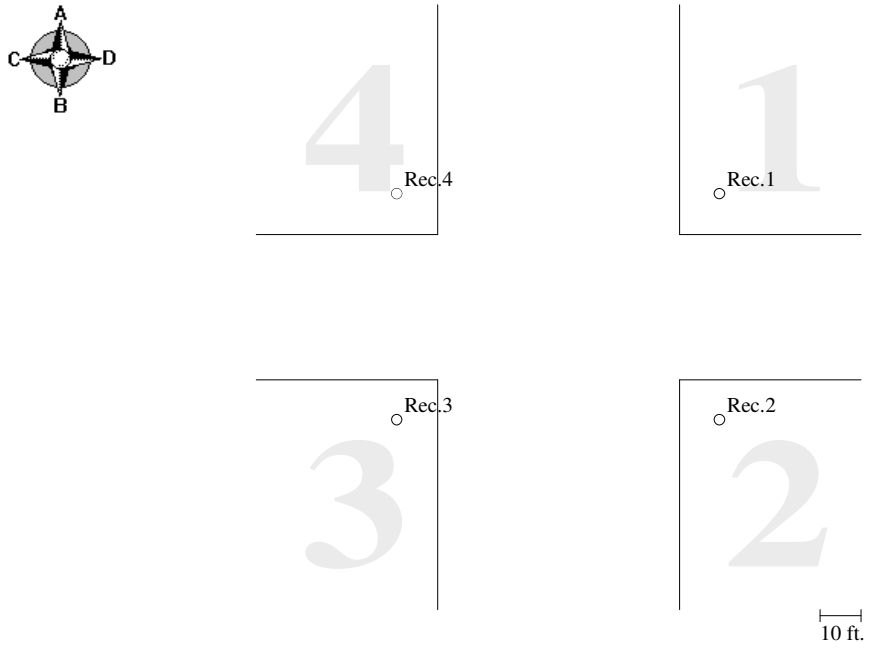
User Comments:

1. **< blank >**

Washington State Intersection Screening Tool 1.0

04-16-09
04:30 PM
Westside SR 520

Description: **15th and Pacific - 2030 A Base**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.4	1.7	Pass
3	3	10	10	2.4	1.7	Pass
4	4	10	10	2.4	1.7	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

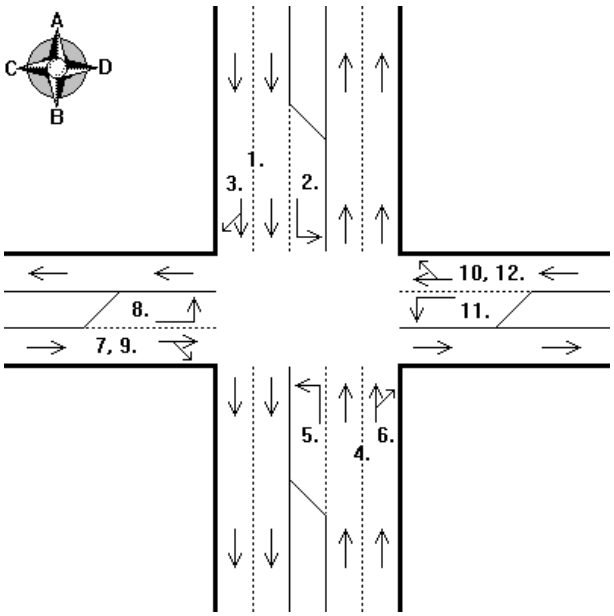
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	830
2	A-D Left Turn	80
3	A-C Right Turn	20
4	B-A Thru	650
5	B-C Left Turn	80
6	B-D Right Turn	340
7	C-D Thru	2
8	C-A Left Turn	230
9	C-B Right Turn	368
10	D-C Thru	100
11	D-B Left Turn	730
12	D-A Right Turn	60



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**74**
Leg A Left Turn	**93**
Leg B Thru & Rt	**74**
Leg B Left Turn	**94**
Leg C Thru & Rt	**78**
Leg C Left Turn	**78**
Leg D Thru & Rt	**72**
Leg D Left Turn	**72**

USER COMMENTS

Westside SR 520

User Comments:

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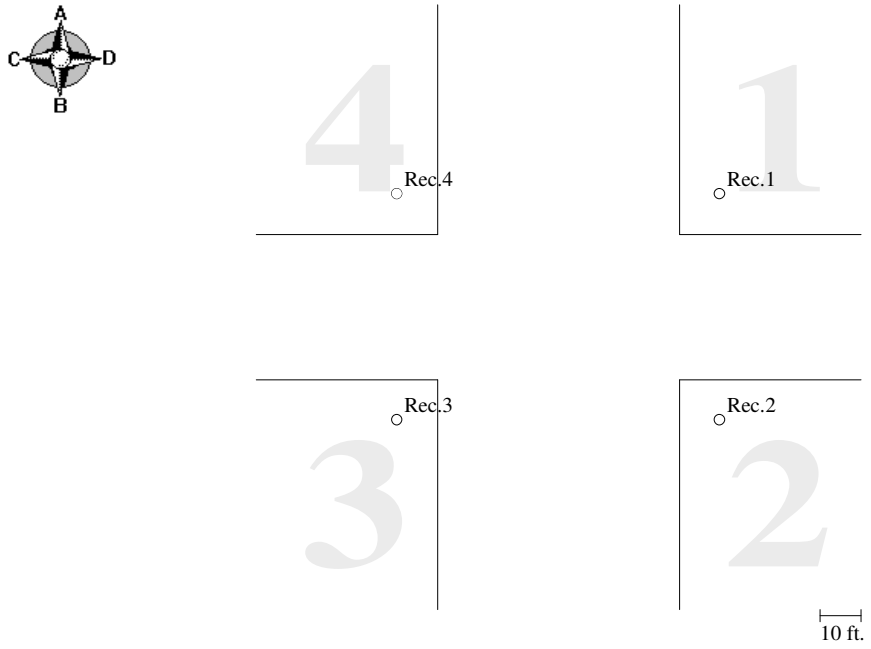
Washington State Intersection Screening Tool 1.0

04-16-09
04:33 PM
Westside SR 520

Description: **15th and Pacific - 2030 Alt-K**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.4	1.7	Pass
3	3	10	10	2.4	1.7	Pass
4	4	10	10	2.6	1.8	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

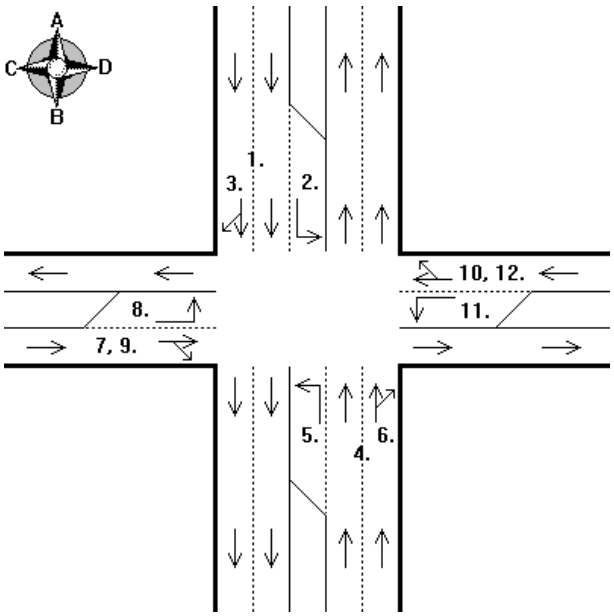
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1050
2	A-D Left Turn	80
3	A-C Right Turn	20
4	B-A Thru	810
5	B-C Left Turn	80
6	B-D Right Turn	340
7	C-D Thru	2
8	C-A Left Turn	230
9	C-B Right Turn	398
10	D-C Thru	100
11	D-B Left Turn	780
12	D-A Right Turn	60



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **150**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**99**
Leg A Left Turn	**140**
Leg B Thru & Rt	**100**
Leg B Left Turn	**141**
Leg C Thru & Rt	**123**
Leg C Left Turn	**123**
Leg D Thru & Rt	**105**
Leg D Left Turn	**105**

USER COMMENTS

Westside SR 520

User Comments:

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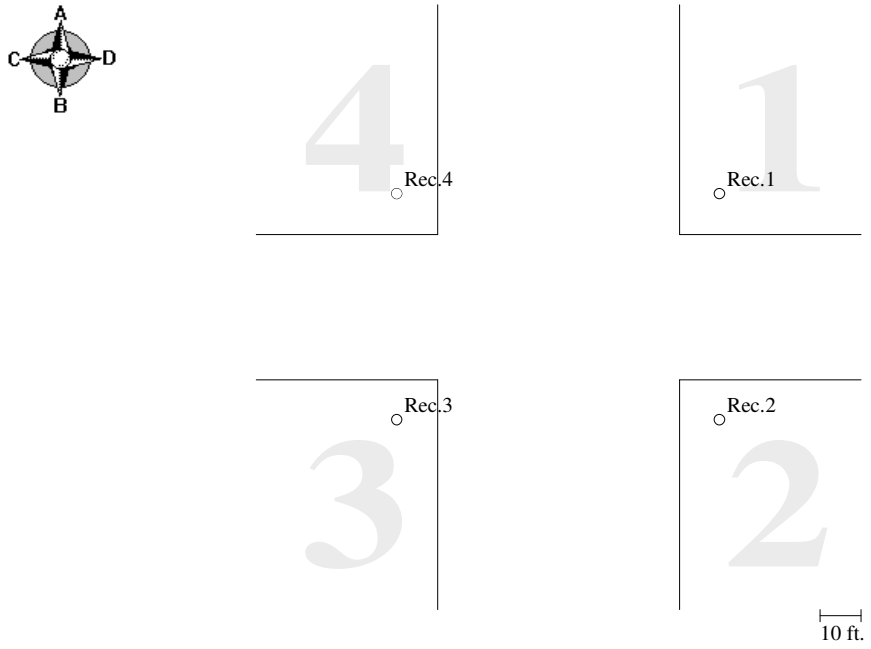
Washington State Intersection Screening Tool 1.0

04-16-09
04:38 PM
Westside SR 520

Description: **15th and Pacific - 2018 Alt-L**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.9	2.0	Pass
2	2	10	10	2.5	1.8	Pass
3	3	10	10	2.5	1.8	Pass
4	4	10	10	2.6	1.8	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

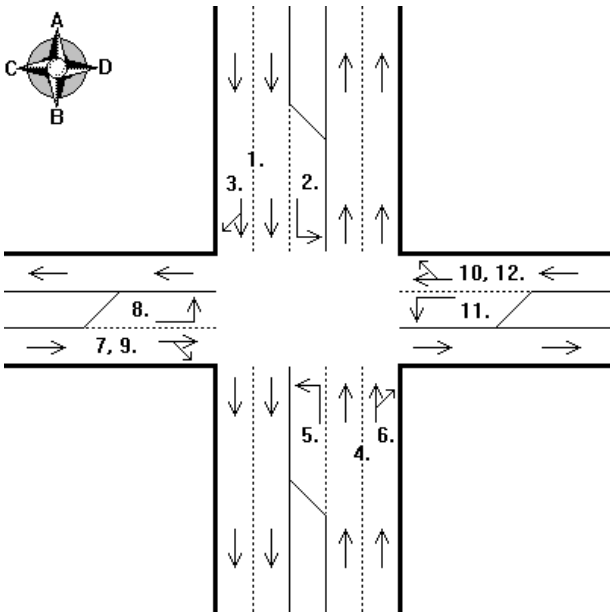
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	925
2	A-D Left Turn	75
3	A-C Right Turn	20
4	B-A Thru	715
5	B-C Left Turn	75
6	B-D Right Turn	300
7	C-D Thru	2
8	C-A Left Turn	210
9	C-B Right Turn	348
10	D-C Thru	90
11	D-B Left Turn	685
12	D-A Right Turn	55



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2018**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**11.35**
Leg B	**30**	**11.35**
Leg C	**30**	**11.35**
Leg D	**30**	**11.35**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **150**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**97**
Leg A Left Turn	**139**
Leg B Thru & Rt	**98**
Leg B Left Turn	**140**
Leg C Thru & Rt	**123**
Leg C Left Turn	**123**
Leg D Thru & Rt	**107**
Leg D Left Turn	**107**

USER COMMENTS

Westside SR 520

User Comments:

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Washington State Intersection Screening Tool 1.0

04-16-09
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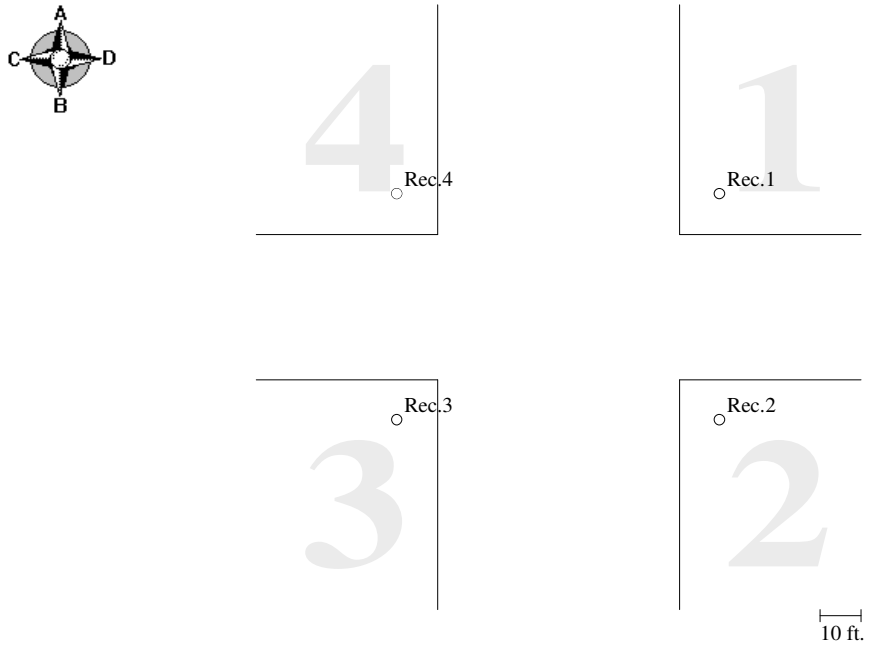
Westside SR 520

Description: **15th and Pacific - 2030 Alt-L**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.4	1.7	Pass
3	3	10	10	2.4	1.7	Pass
4	4	10	10	2.6	1.8	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

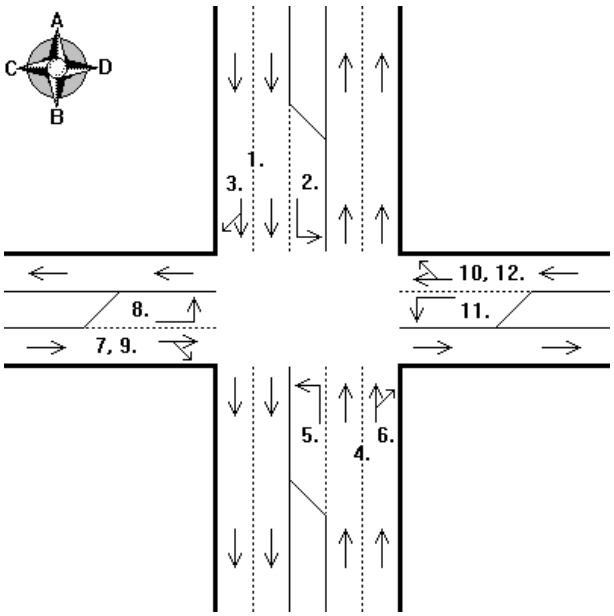
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1050
2	A-D Left Turn	80
3	A-C Right Turn	20
4	B-A Thru	810
5	B-C Left Turn	80
6	B-D Right Turn	340
7	C-D Thru	2
8	C-A Left Turn	230
9	C-B Right Turn	398
10	D-C Thru	100
11	D-B Left Turn	780
12	D-A Right Turn	60



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **150**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**99**
Leg A Left Turn	**140**
Leg B Thru & Rt	**100**
Leg B Left Turn	**141**
Leg C Thru & Rt	**123**
Leg C Left Turn	**123**
Leg D Thru & Rt	**105**
Leg D Left Turn	**105**

USER COMMENTS

Westside SR 520

User Comments:

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Washington State Intersection Screening Tool 1.0

04-16-09
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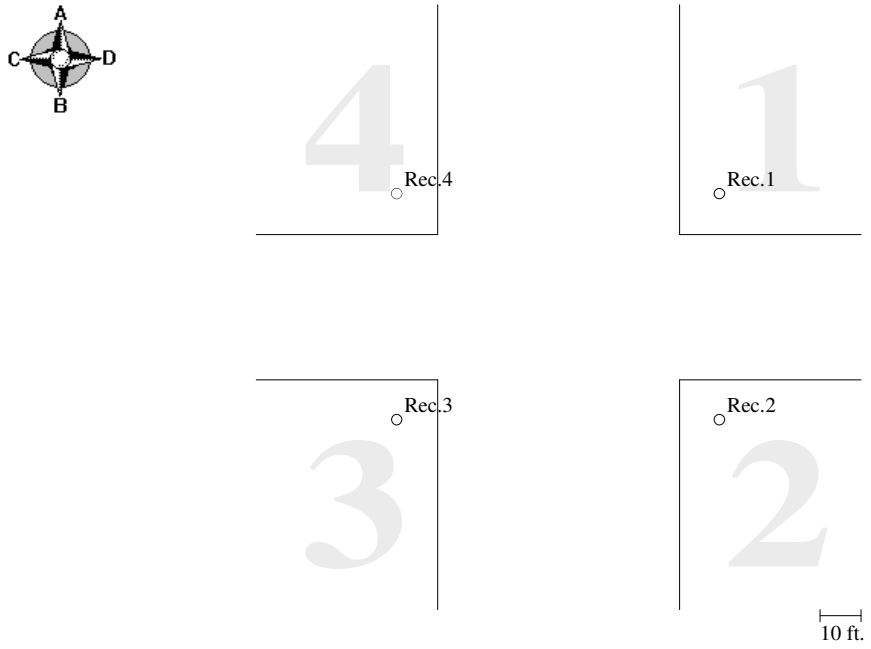
Westside SR 520

Description: **15th and Pacific - 2030 A West**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.4	1.7	Pass
3	3	10	10	2.4	1.7	Pass
4	4	10	10	2.4	1.7	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

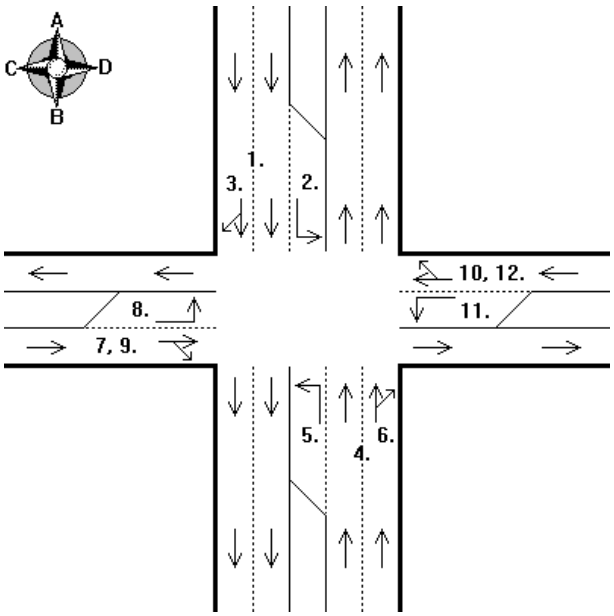
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	830
2	A-D Left Turn	80
3	A-C Right Turn	20
4	B-A Thru	650
5	B-C Left Turn	80
6	B-D Right Turn	340
7	C-D Thru	2
8	C-A Left Turn	230
9	C-B Right Turn	368
10	D-C Thru	100
11	D-B Left Turn	730
12	D-A Right Turn	60



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**74**
Leg A Left Turn	**93**
Leg B Thru & Rt	**74**
Leg B Left Turn	**94**
Leg C Thru & Rt	**78**
Leg C Left Turn	**78**
Leg D Thru & Rt	**72**
Leg D Left Turn	**72**

USER COMMENTS

Westside SR 520

User Comments:

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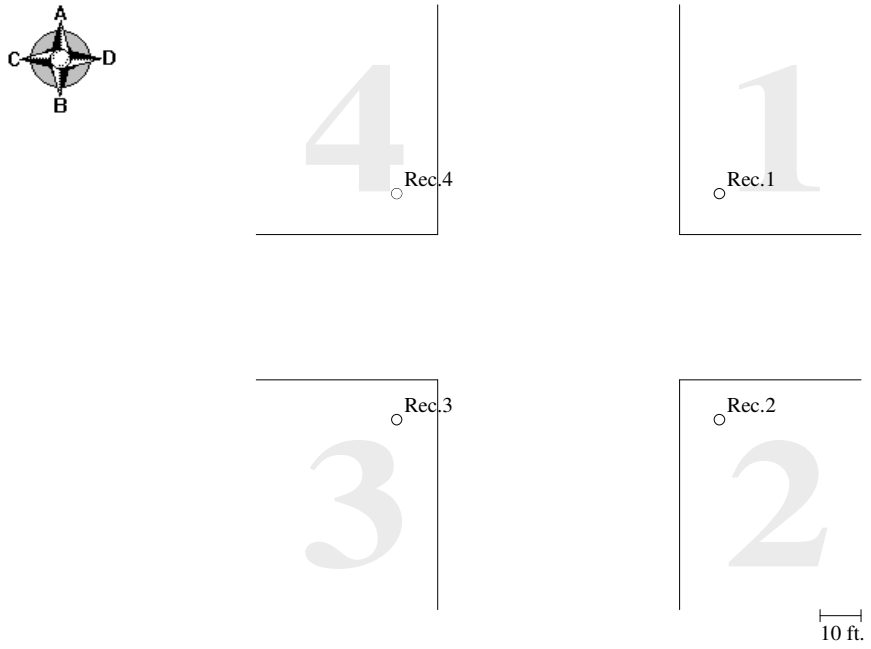
Washington State Intersection Screening Tool 1.0

04-16-09
03:39 PM
Westside SR 520

Description: **15th and Pacific - 2008 EX**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.6	3.2	Pass
2	2	10	10	4.0	2.8	Pass
3	3	10	10	4.0	2.8	Pass
4	4	10	10	3.8	2.7	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

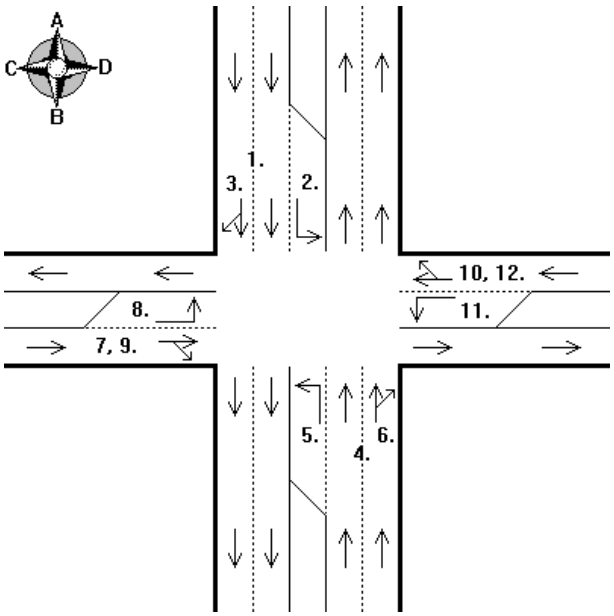
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	690
2	A-D Left Turn	70
3	A-C Right Turn	20
4	B-A Thru	540
5	B-C Left Turn	70
6	B-D Right Turn	270
7	C-D Thru	95
8	C-A Left Turn	95
9	C-B Right Turn	310
10	D-C Thru	80
11	D-B Left Turn	610
12	D-A Right Turn	50



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2008**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **120.19**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**18.80**
Leg B	**30**	**18.80**
Leg C	**30**	**18.80**
Leg D	**30**	**18.80**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**71**
Leg A Left Turn	**93**
Leg B Thru & Rt	**71**
Leg B Left Turn	**93**
Leg C Thru & Rt	**83**
Leg C Left Turn	**83**
Leg D Thru & Rt	**70**
Leg D Left Turn	**70**

USER COMMENTS

Westside SR 520

User Comments:

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Washington State Intersection Screening Tool 1.0

04-16-09
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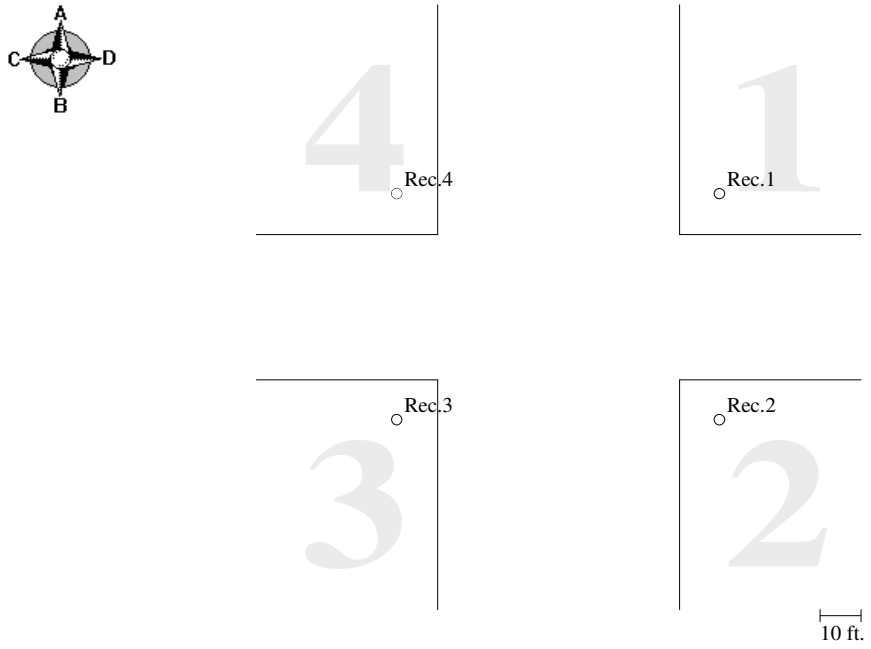
Westside SR 520

Description: **15th and Pacific - 2018 NB**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.0	2.1	Pass
2	2	10	10	2.5	1.8	Pass
3	3	10	10	2.5	1.8	Pass
4	4	10	10	2.6	1.8	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

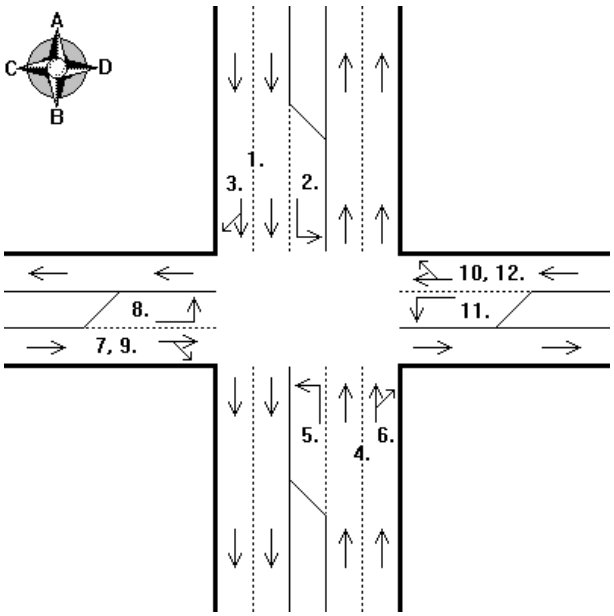
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	760
2	A-D Left Turn	80
3	A-C Right Turn	25
4	B-A Thru	595
5	B-C Left Turn	75
6	B-D Right Turn	295
7	C-D Thru	2
8	C-A Left Turn	210
9	C-B Right Turn	338
10	D-C Thru	90
11	D-B Left Turn	670
12	D-A Right Turn	55



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2018**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**11.35**
Leg B	**30**	**11.35**
Leg C	**30**	**11.35**
Leg D	**30**	**11.35**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**72**
Leg A Left Turn	**93**
Leg B Thru & Rt	**71**
Leg B Left Turn	**94**
Leg C Thru & Rt	**80**
Leg C Left Turn	**80**
Leg D Thru & Rt	**72**
Leg D Left Turn	**72**

USER COMMENTS

Westside SR 520

User Comments:

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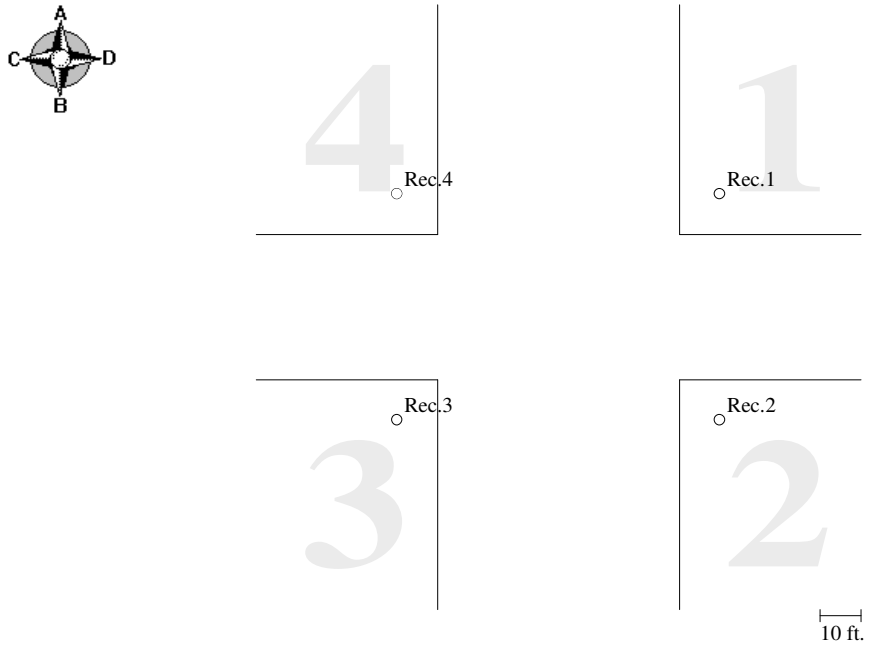
Washington State Intersection Screening Tool 1.0

04-16-09
03:46 PM
Westside SR 520

Description: **15th and Pacific - 2030 NB**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.5	1.8	Pass
3	3	10	10	2.4	1.7	Pass
4	4	10	10	2.4	1.7	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

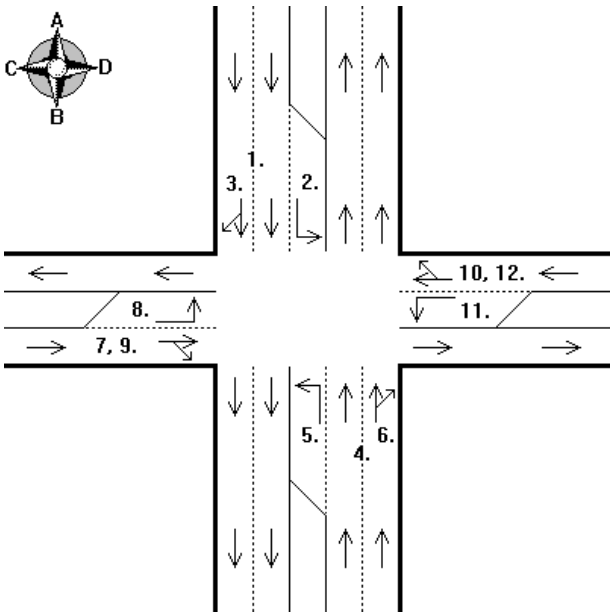
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	840
2	A-D Left Turn	90
3	A-C Right Turn	30
4	B-A Thru	660
5	B-C Left Turn	80
6	B-D Right Turn	330
7	C-D Thru	2
8	C-A Left Turn	230
9	C-B Right Turn	378
10	D-C Thru	100
11	D-B Left Turn	740
12	D-A Right Turn	60



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**74**
Leg A Left Turn	**93**
Leg B Thru & Rt	**75**
Leg B Left Turn	**94**
Leg C Thru & Rt	**78**
Leg C Left Turn	**78**
Leg D Thru & Rt	**72**
Leg D Left Turn	**72**

USER COMMENTS

Westside SR 520

User Comments:

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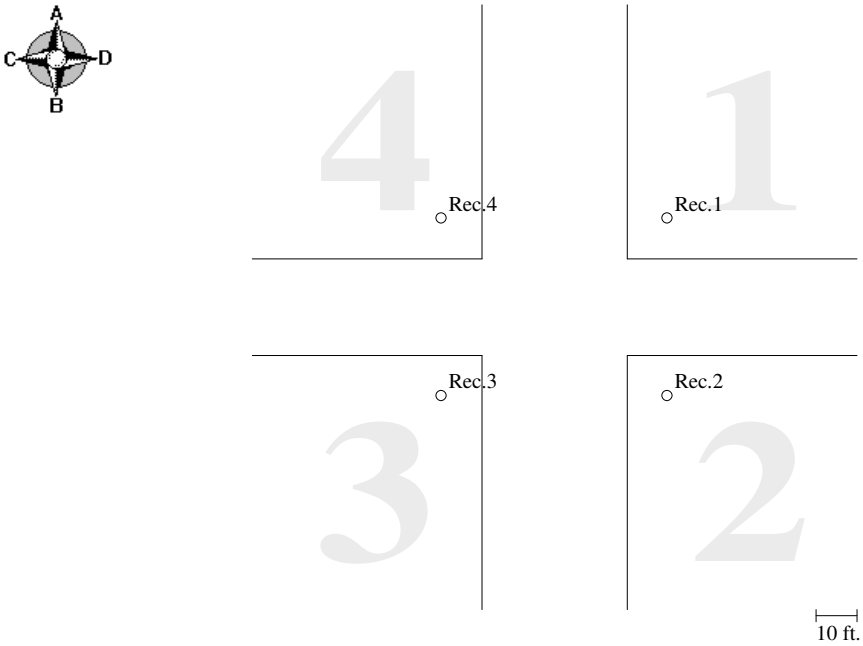
Washington State Intersection Screening Tool 1.0

04-16-09
01:34 PM
Westside SR 520

Description: **E Lynn & Boylston - 2030 A Add**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/2 Lt Turns**
Street Names: **A-B: Boylston C-D: East Lynn**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.1	0.8	Pass
2	2	10	10	1.4	1.0	Pass
3	3	10	10	1.4	1.0	Pass
4	4	10	10	1.6	1.1	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 4**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

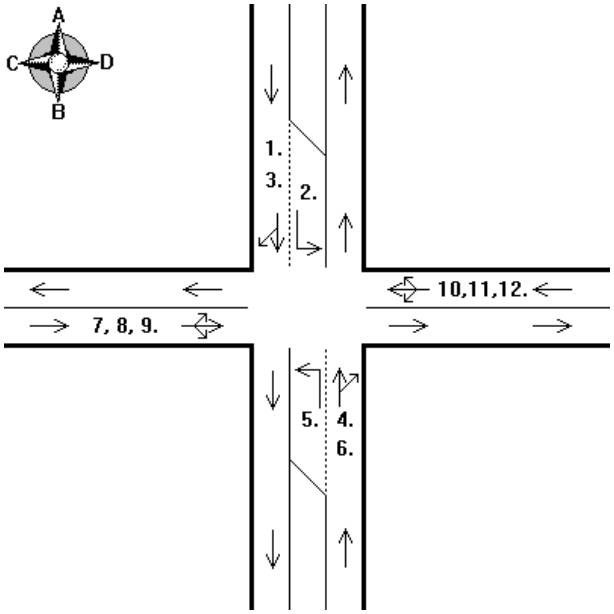
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	550
2	A-D Left Turn	2
3	A-C Right Turn	130
4	B-A Thru	250
5	B-C Left Turn	350
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	290
9	C-B Right Turn	300
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**88**
Leg A Left Turn	**111**
Leg B Thru & Rt	**54**
Leg B Left Turn	**111**
Leg C Thru & Rt	**96**
Leg C Left Turn	**---**
Leg D Thru & Rt	**96**
Leg D Left Turn	**---**

USER COMMENTS

Westside SR 520

User Comments:

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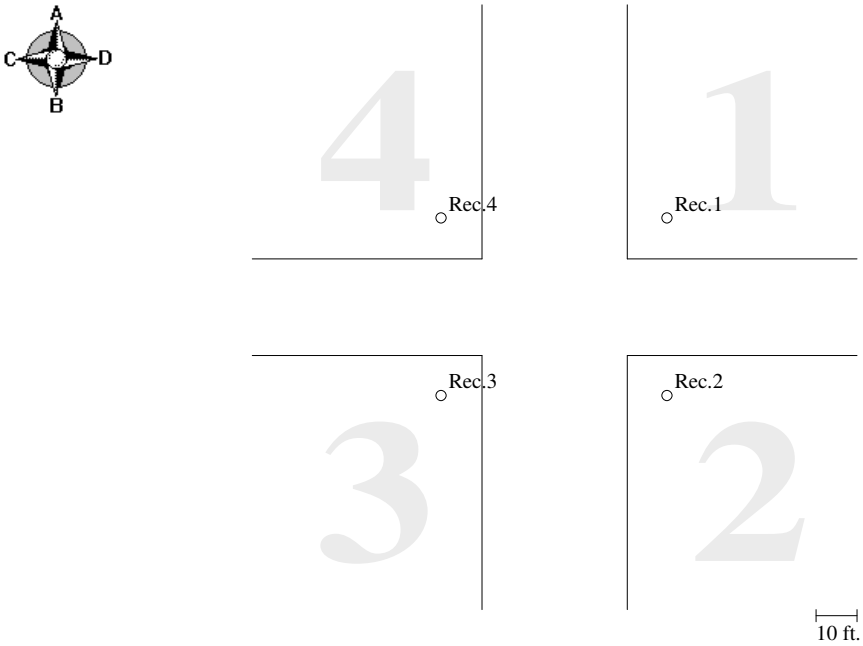
Washington State Intersection Screening Tool 1.0

04-16-09
01:51 PM
Westside SR 520

Description: **E Lynn & Boylston - 2030 A Base**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/2 Lt Turns**
Street Names: **A-B: Boylston C-D: East Lynn**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.1	0.8	Pass
2	2	10	10	1.4	1.0	Pass
3	3	10	10	1.4	1.0	Pass
4	4	10	10	1.6	1.1	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 4**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

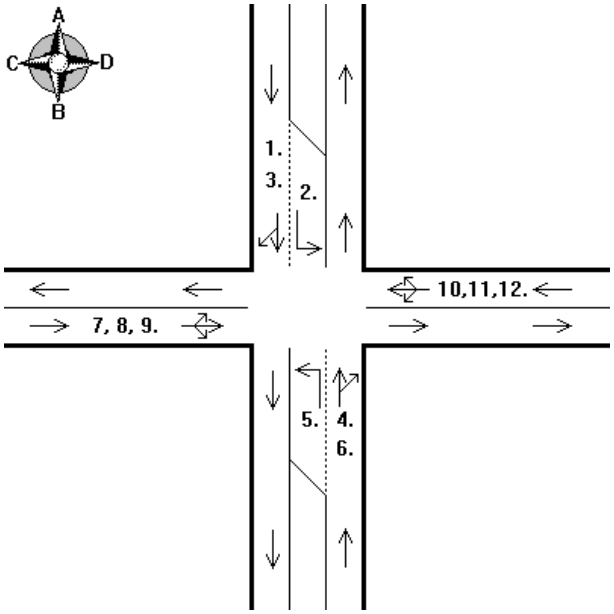
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	550
2	A-D Left Turn	2
3	A-C Right Turn	130
4	B-A Thru	250
5	B-C Left Turn	350
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	290
9	C-B Right Turn	300
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**88**
Leg A Left Turn	**111**
Leg B Thru & Rt	**54**
Leg B Left Turn	**111**
Leg C Thru & Rt	**96**
Leg C Left Turn	**---**
Leg D Thru & Rt	**96**
Leg D Left Turn	**---**

USER COMMENTS

Westside SR 520

User Comments:

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Washington State Intersection Screening Tool 1.0

04-16-09
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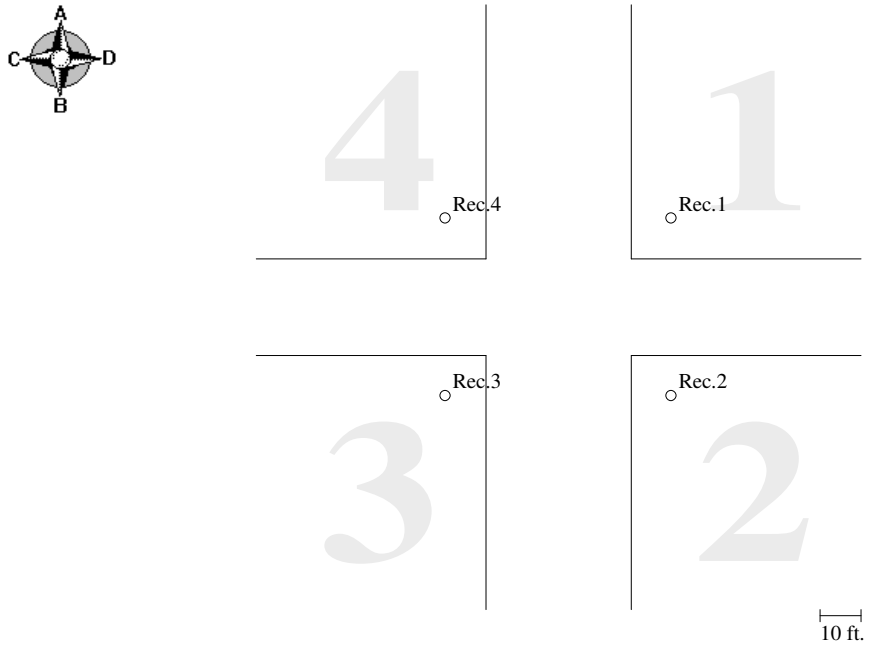
Westside SR 520

Description: **E Lynn & Boylston - 2018 Alt K & L**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/2 Lt Turns**
Street Names: **A-B: Boylston C-D: East Lynn**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.2	0.8	Pass
2	2	10	10	1.5	1.0	Pass
3	3	10	10	1.5	1.0	Pass
4	4	10	10	1.6	1.1	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 4**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

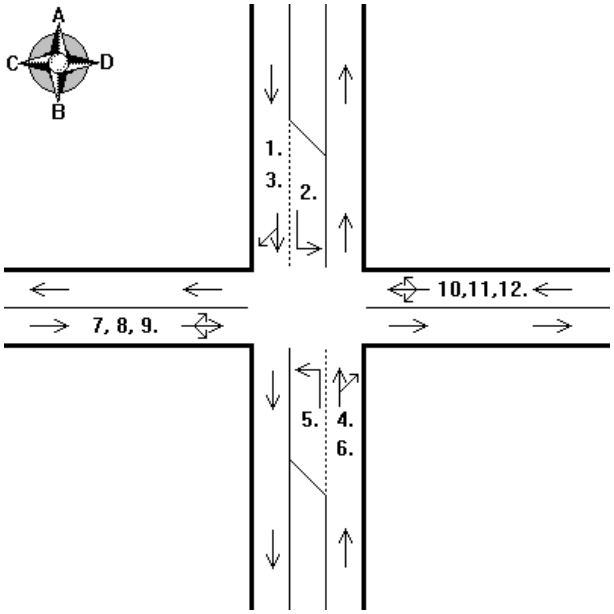
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	495
2	A-D Left Turn	2
3	A-C Right Turn	120
4	B-A Thru	215
5	B-C Left Turn	300
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	265
9	C-B Right Turn	265
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2018**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**11.35**
Leg B	**30**	**11.35**
Leg C	**30**	**11.35**
Leg D	**30**	**11.35**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**88**
Leg A Left Turn	**112**
Leg B Thru & Rt	**55**
Leg B Left Turn	**112**
Leg C Thru & Rt	**94**
Leg C Left Turn	**---**
Leg D Thru & Rt	**94**
Leg D Left Turn	**---**

USER COMMENTS

Westside SR 520

User Comments:

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Washington State Intersection Screening Tool 1.0

04-16-09
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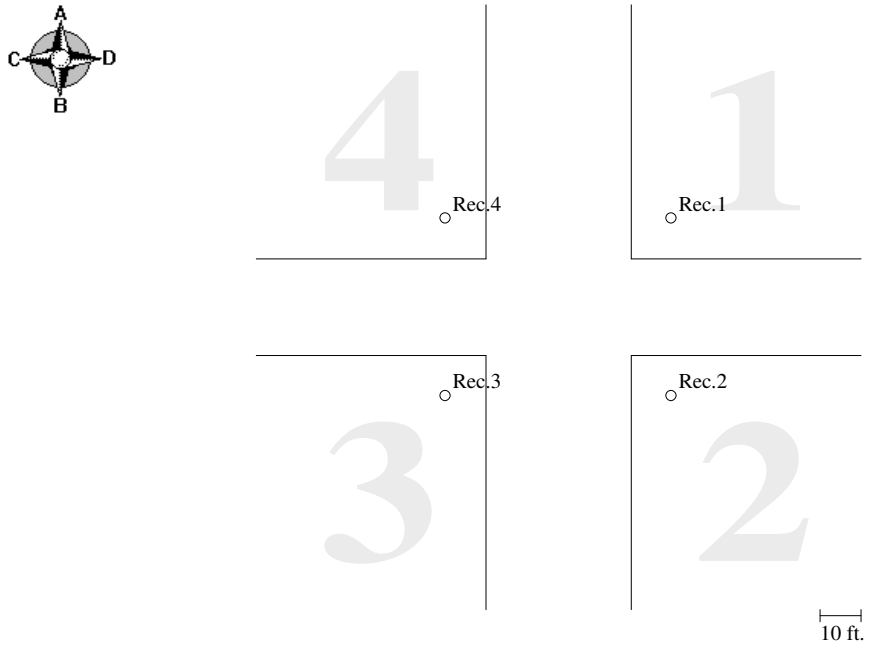
Westside SR 520

Description: **E Lynn & Boylston - 2030 Alt K & L**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/2 Lt Turns**
Street Names: **A-B: Boylston C-D: East Lynn**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.1	0.8	Pass
2	2	10	10	1.4	1.0	Pass
3	3	10	10	1.4	1.0	Pass
4	4	10	10	1.6	1.1	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 4**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

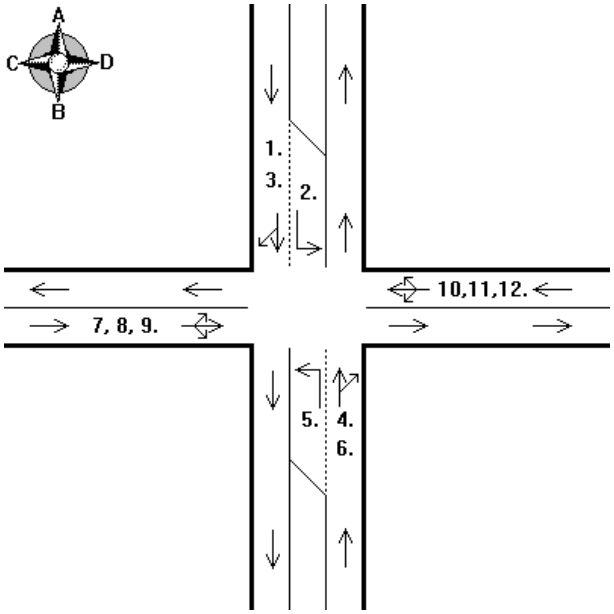
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	550
2	A-D Left Turn	2
3	A-C Right Turn	130
4	B-A Thru	250
5	B-C Left Turn	350
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	290
9	C-B Right Turn	300
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**88**
Leg A Left Turn	**111**
Leg B Thru & Rt	**54**
Leg B Left Turn	**111**
Leg C Thru & Rt	**96**
Leg C Left Turn	**---**
Leg D Thru & Rt	**96**
Leg D Left Turn	**---**

USER COMMENTS

Westside SR 520

User Comments:

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Washington State Intersection Screening Tool 1.0

04-16-09
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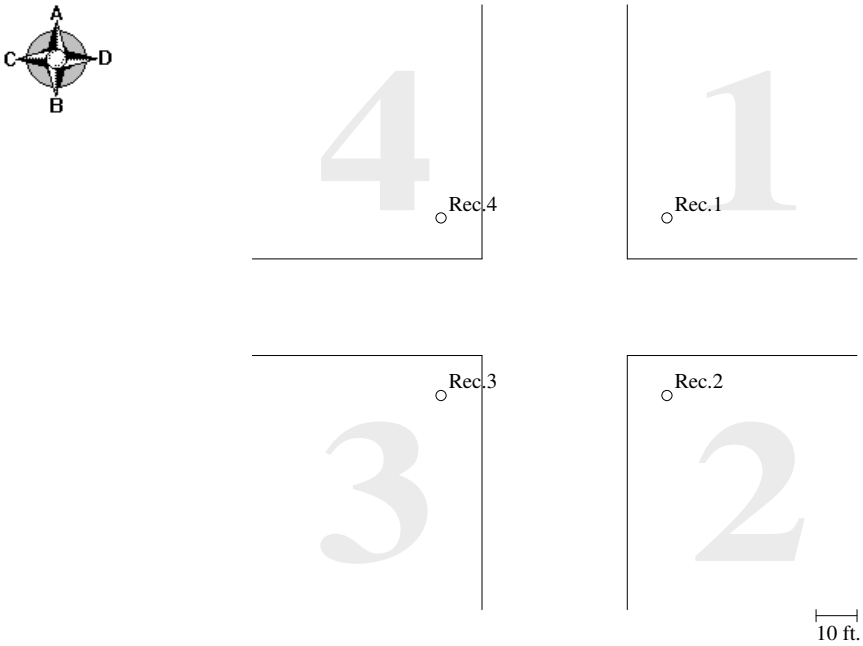
Westside SR 520

Description: **E Lynn & Boylston - 2008 EX**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/2 Lt Turns**
Street Names: **A-B: Boylston C-D: East Lynn**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.0	1.4	Pass
2	2	10	10	2.4	1.7	Pass
3	3	10	10	2.6	1.8	Pass
4	4	10	10	2.2	1.5	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 3**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

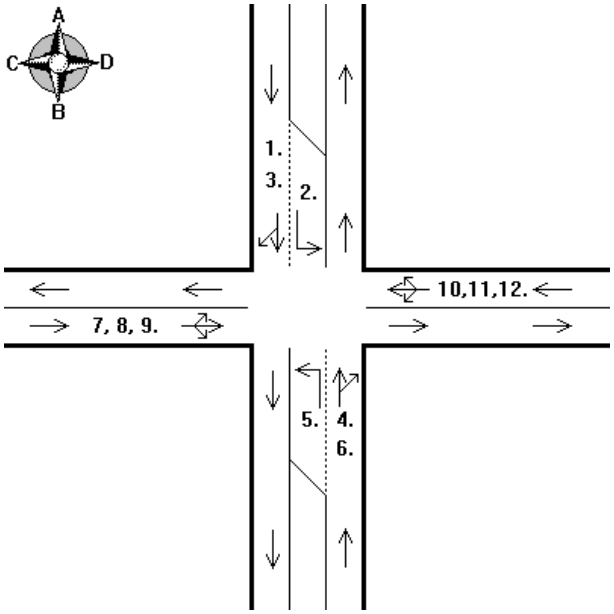
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	450
2	A-D Left Turn	2
3	A-C Right Turn	110
4	B-A Thru	190
5	B-C Left Turn	260
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	240
9	C-B Right Turn	240
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2008**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **120.19**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**18.80**
Leg B	**30**	**18.80**
Leg C	**30**	**18.80**
Leg D	**30**	**18.80**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **109**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**74**
Leg A Left Turn	**74**
Leg B Thru & Rt	**54**
Leg B Left Turn	**84**
Leg C Thru & Rt	**79**
Leg C Left Turn	**---**
Leg D Thru & Rt	**79**
Leg D Left Turn	**---**

USER COMMENTS

Westside SR 520

User Comments:

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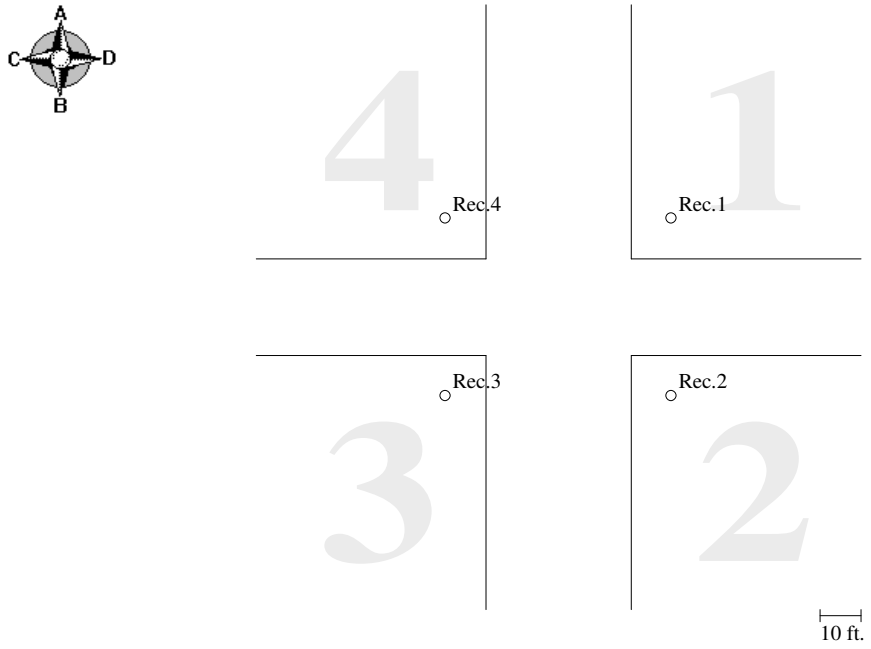
Washington State Intersection Screening Tool 1.0

04-16-09
01:28 PM
Westside SR 520

Description: **E Lynn & Boylston - 2018 NB**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/2 Lt Turns**
Street Names: **A-B: Boylston C-D: East Lynn**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.2	0.8	Pass
2	2	10	10	1.5	1.0	Pass
3	3	10	10	1.6	1.1	Pass
4	4	10	10	1.6	1.1	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 3**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

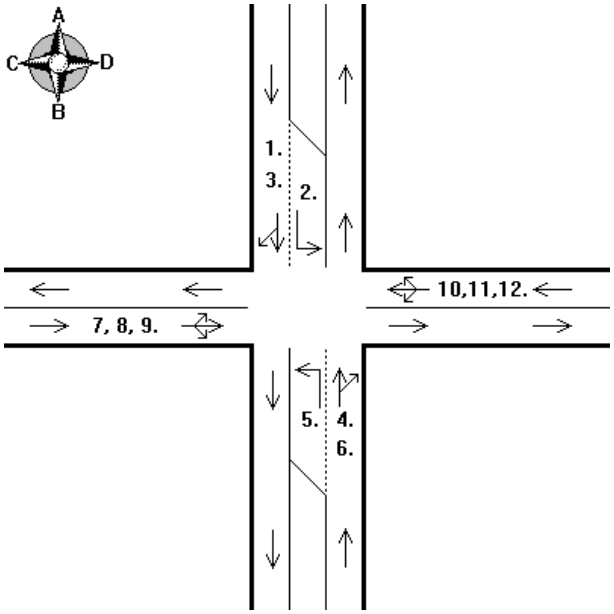
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	500
2	A-D Left Turn	2
3	A-C Right Turn	115
4	B-A Thru	225
5	B-C Left Turn	320
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	260
9	C-B Right Turn	275
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2018**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**11.35**
Leg B	**30**	**11.35**
Leg C	**30**	**11.35**
Leg D	**30**	**11.35**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**88**
Leg A Left Turn	**110**
Leg B Thru & Rt	**54**
Leg B Left Turn	**110**
Leg C Thru & Rt	**96**
Leg C Left Turn	**---**
Leg D Thru & Rt	**96**
Leg D Left Turn	**---**

USER COMMENTS

Westside SR 520

User Comments:

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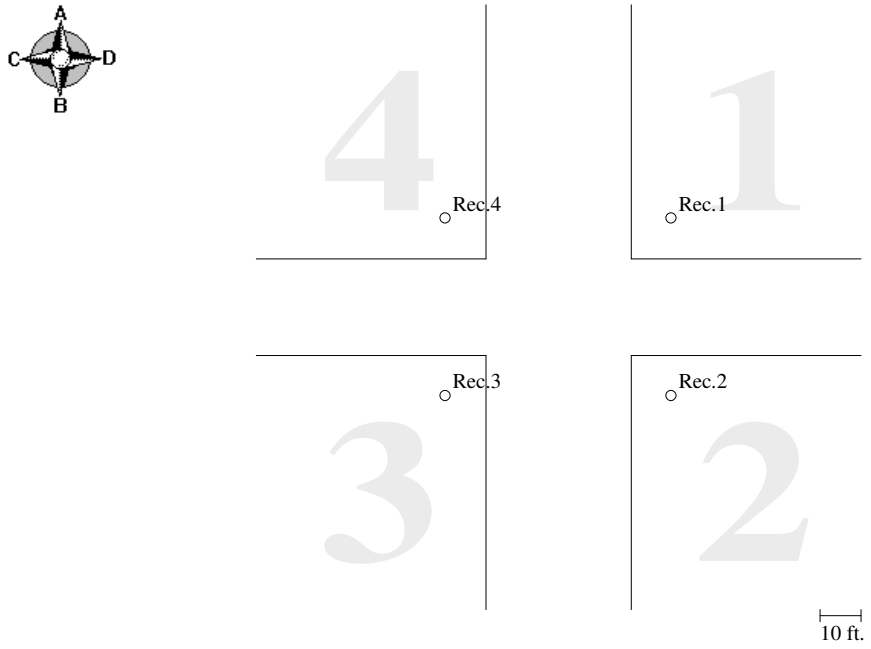
Washington State Intersection Screening Tool 1.0

04-16-09
01:32 PM
Westside SR 520

Description: **E Lynn & Boylston - 2030 NB**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/2 Lt Turns**
Street Names: **A-B: Boylston C-D: East Lynn**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.2	0.8	Pass
2	2	10	10	1.4	1.0	Pass
3	3	10	10	1.4	1.0	Pass
4	4	10	10	1.6	1.1	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 4**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

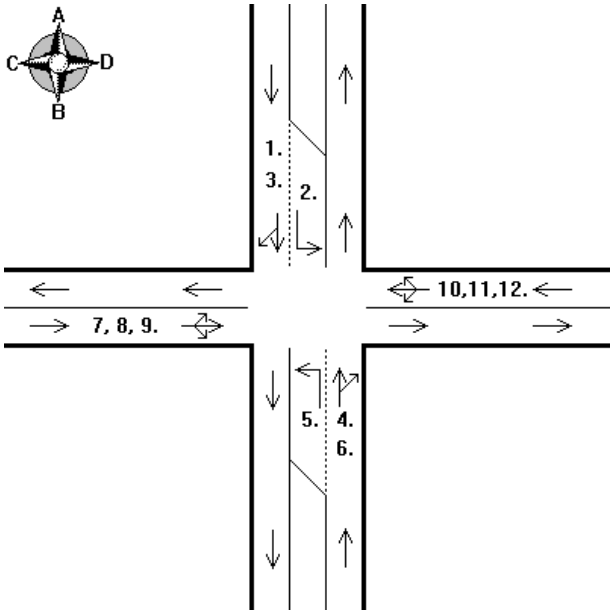
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	560
2	A-D Left Turn	2
3	A-C Right Turn	120
4	B-A Thru	270
5	B-C Left Turn	390
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	280
9	C-B Right Turn	320
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**89**
Leg A Left Turn	**109**
Leg B Thru & Rt	**53**
Leg B Left Turn	**109**
Leg C Thru & Rt	**97**
Leg C Left Turn	**---**
Leg D Thru & Rt	**97**
Leg D Left Turn	**---**

USER COMMENTS

Westside SR 520

User Comments:

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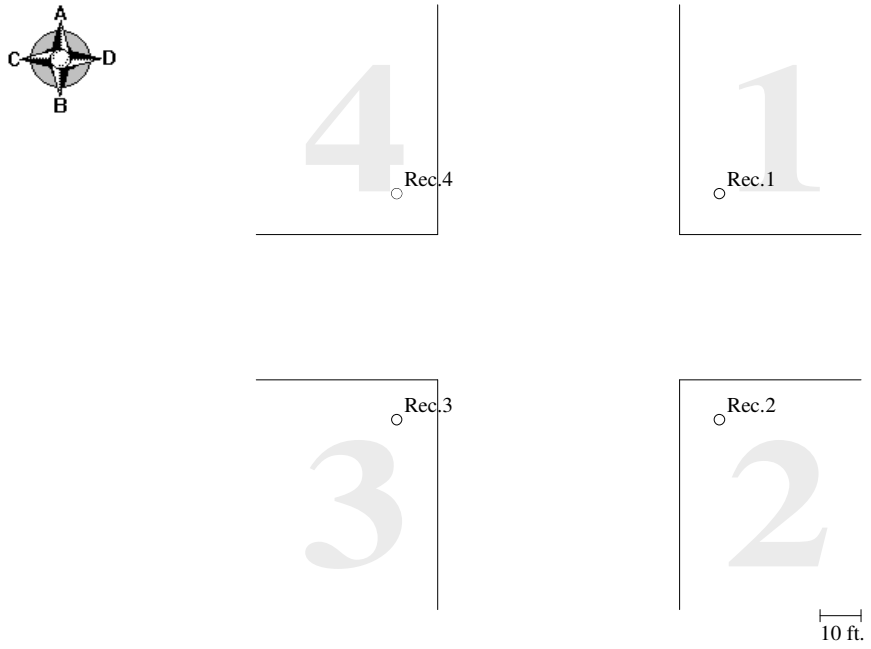
Washington State Intersection Screening Tool 1.0

04-09-09
04:24 PM
Westside SR 520

Description: **Montlake and Pacific Place - 2030 A Add**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Place**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.4	1.7	Pass
3	3	10	10	2.6	1.8	Pass
4	4	10	10	2.4	1.7	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

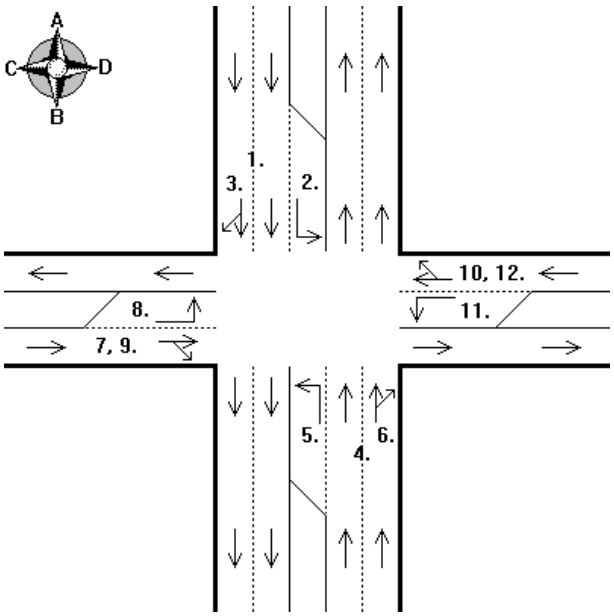
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1690
2	A-D Left Turn	2
3	A-C Right Turn	150
4	B-A Thru	2330
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	340
8	C-A Left Turn	340
9	C-B Right Turn	60
10	D-C Thru	2
11	D-B Left Turn	290
12	D-A Right Turn	100



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**35**	**9.54**
Leg B	**30**	**9.55**
Leg C	**25**	**9.71**
Leg D	**25**	**9.71**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**34**
Leg A Left Turn	**34**
Leg B Thru & Rt	**34**
Leg B Left Turn	**34**
Leg C Thru & Rt	**75**
Leg C Left Turn	**75**
Leg D Thru & Rt	**75**
Leg D Left Turn	**75**

USER COMMENTS

Westside SR 520

User Comments:

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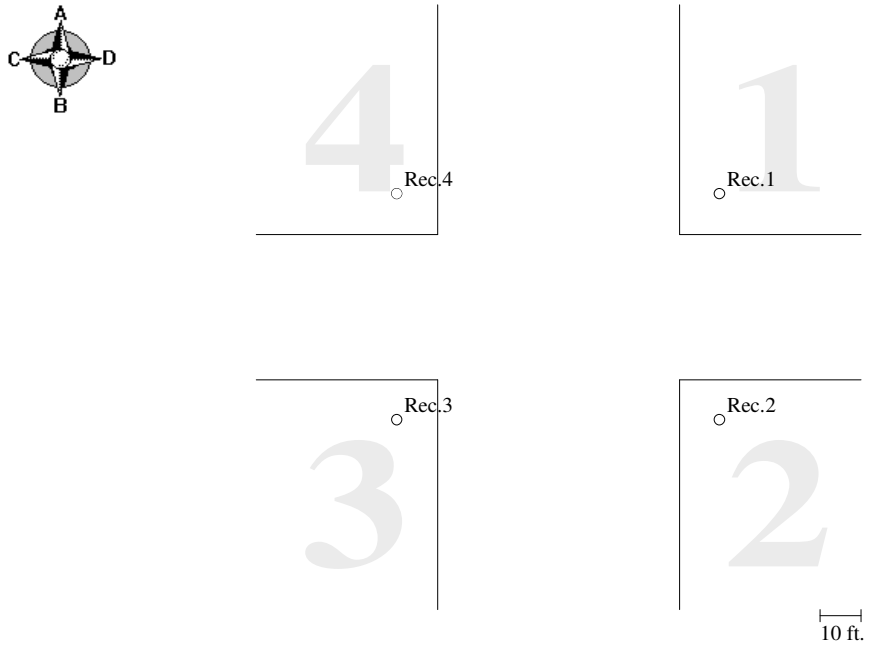
Washington State Intersection Screening Tool 1.0

04-09-09
04:26 PM
Westside SR 520

Description: **Montlake and Pacific Place - 2030 A Base**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Place**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.3	1.6	Pass
3	3	10	10	2.4	1.7	Pass
4	4	10	10	2.2	1.5	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

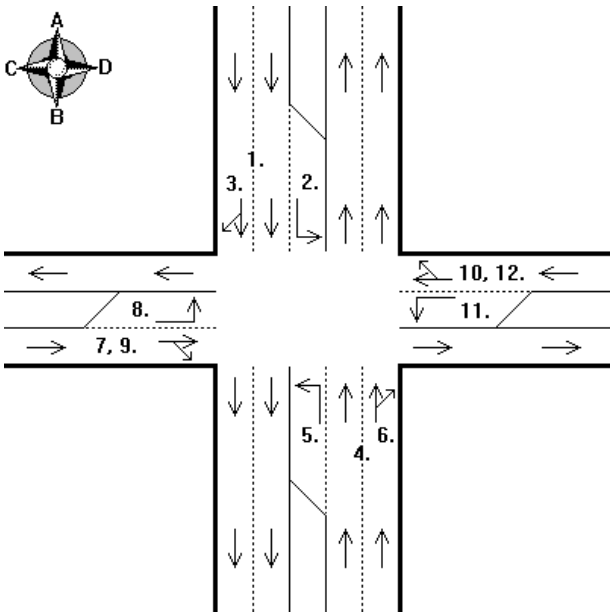
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1590
2	A-D Left Turn	2
3	A-C Right Turn	150
4	B-A Thru	2210
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	340
8	C-A Left Turn	340
9	C-B Right Turn	60
10	D-C Thru	2
11	D-B Left Turn	290
12	D-A Right Turn	100



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**25**	**9.71**
Leg D	**25**	**9.71**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**35**
Leg A Left Turn	**35**
Leg B Thru & Rt	**35**
Leg B Left Turn	**35**
Leg C Thru & Rt	**74**
Leg C Left Turn	**74**
Leg D Thru & Rt	**74**
Leg D Left Turn	**74**

USER COMMENTS

Westside SR 520

User Comments:

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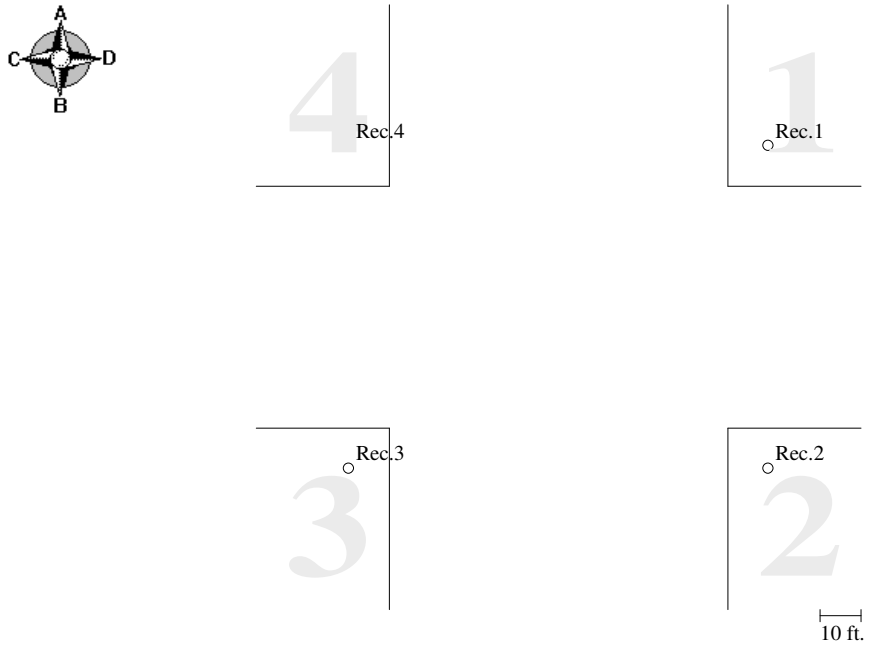
Washington State Intersection Screening Tool 1.0

04-09-09
04:31 PM
Westside SR 520

Description: **Montlake and Pacific Place - 2030 Alt K**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 6 x 4 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Place**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.5	2.4	Pass
2	2	10	10	2.8	2.0	Pass
3	3	10	10	3.0	2.1	Pass
4	4	10	10	2.7	1.9	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

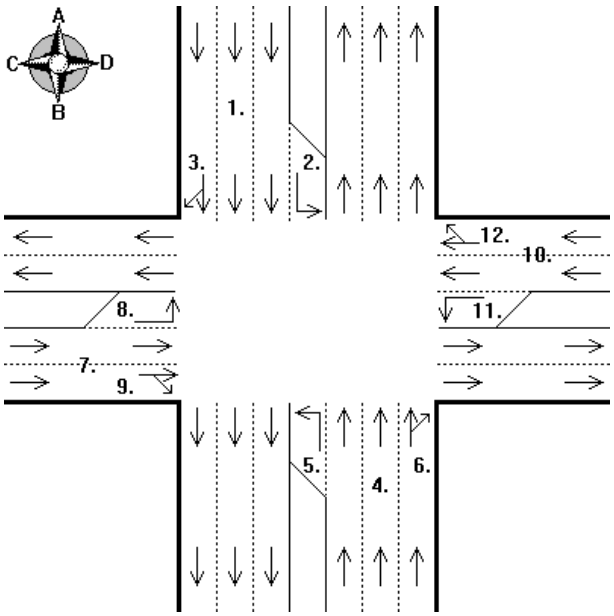
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	2170
2	A-D Left Turn	2
3	A-C Right Turn	150
4	B-A Thru	3030
5	B-C Left Turn	2
6	B-D Right Turn	20
7	C-D Thru	340
8	C-A Left Turn	340
9	C-B Right Turn	60
10	D-C Thru	2
11	D-B Left Turn	320
12	D-A Right Turn	140



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**35**	**9.54**
Leg B	**30**	**9.55**
Leg C	**25**	**9.71**
Leg D	**25**	**9.71**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **150**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**54**
Leg A Left Turn	**54**
Leg B Thru & Rt	**54**
Leg B Left Turn	**54**
Leg C Thru & Rt	**105**
Leg C Left Turn	**105**
Leg D Thru & Rt	**105**
Leg D Left Turn	**105**

USER COMMENTS

Westside SR 520

User Comments:

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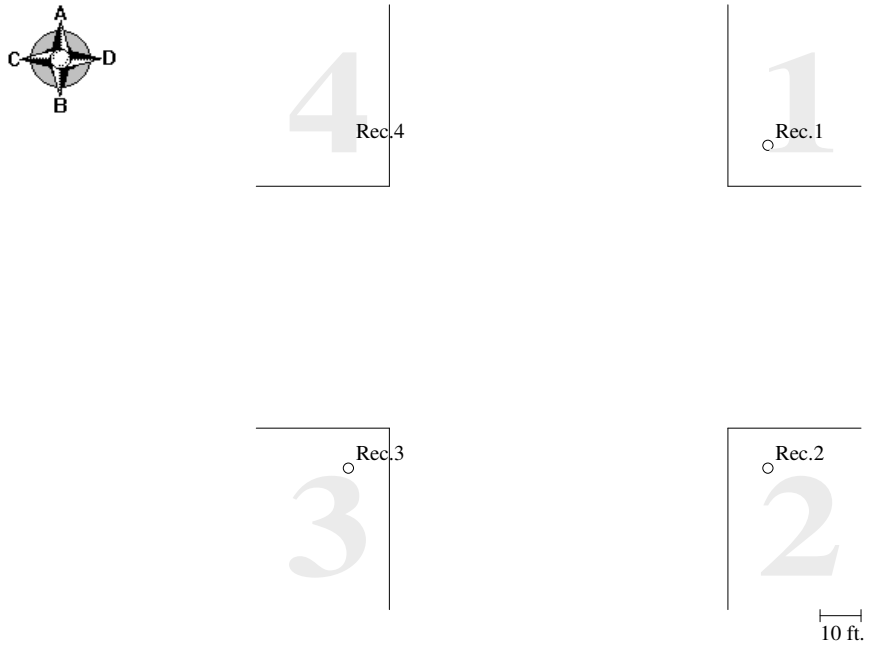
Washington State Intersection Screening Tool 1.0

04-09-09
04:35 PM
Westside SR 520

Description: **Montlake and Pacific Place - 2018 Alt L**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 6 x 4 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Place**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.5	2.4	Pass
2	2	10	10	3.0	2.1	Pass
3	3	10	10	3.2	2.2	Pass
4	4	10	10	2.8	2.0	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

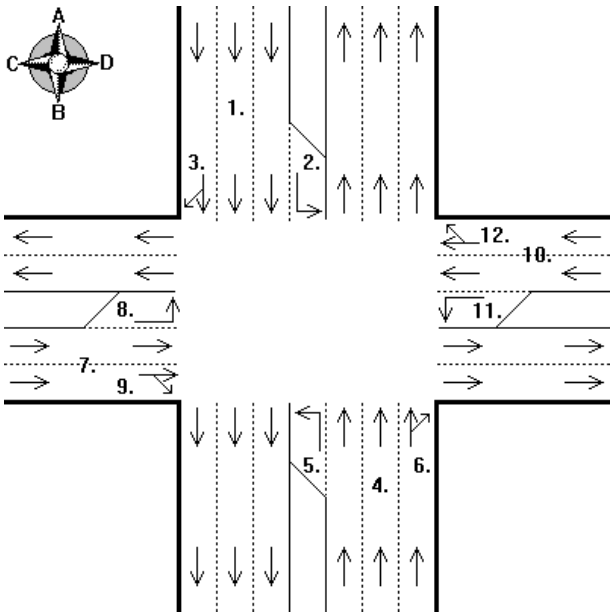
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1875
2	A-D Left Turn	2
3	A-C Right Turn	140
4	B-A Thru	2635
5	B-C Left Turn	2
6	B-D Right Turn	20
7	C-D Thru	310
8	C-A Left Turn	310
9	C-B Right Turn	55
10	D-C Thru	2
11	D-B Left Turn	275
12	D-A Right Turn	130



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2018**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	**35**	**11.35**
Leg B	**30**	**11.35**
Leg C	**25**	**11.54**
Leg D	**25**	**11.54**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **150**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**52**
Leg A Left Turn	**52**
Leg B Thru & Rt	**52**
Leg B Left Turn	**52**
Leg C Thru & Rt	**107**
Leg C Left Turn	**107**
Leg D Thru & Rt	**107**
Leg D Left Turn	**107**

USER COMMENTS

Westside SR 520

User Comments:

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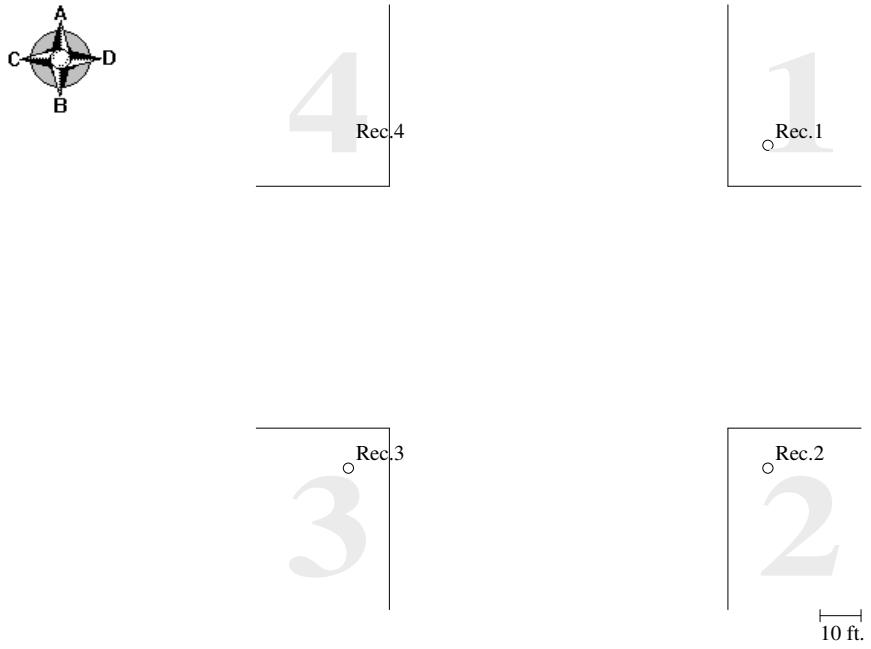
Washington State Intersection Screening Tool 1.0

04-09-09
04:32 PM
Westside SR 520

Description: **Montlake and Pacific Place - 2030 Alt L**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 6 x 4 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Place**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.5	2.4	Pass
2	2	10	10	2.8	2.0	Pass
3	3	10	10	3.0	2.1	Pass
4	4	10	10	2.7	1.9	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

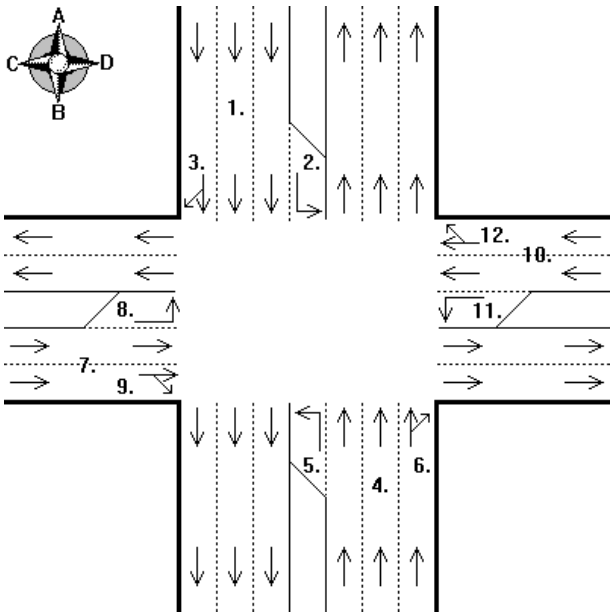
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	2170
2	A-D Left Turn	2
3	A-C Right Turn	150
4	B-A Thru	3030
5	B-C Left Turn	2
6	B-D Right Turn	20
7	C-D Thru	340
8	C-A Left Turn	340
9	C-B Right Turn	60
10	D-C Thru	2
11	D-B Left Turn	320
12	D-A Right Turn	140



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**35**	**9.54**
Leg B	**30**	**9.55**
Leg C	**25**	**9.71**
Leg D	**25**	**9.71**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **150**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**54**
Leg A Left Turn	**54**
Leg B Thru & Rt	**54**
Leg B Left Turn	**54**
Leg C Thru & Rt	**105**
Leg C Left Turn	**105**
Leg D Thru & Rt	**105**
Leg D Left Turn	**105**

USER COMMENTS

Westside SR 520

User Comments:

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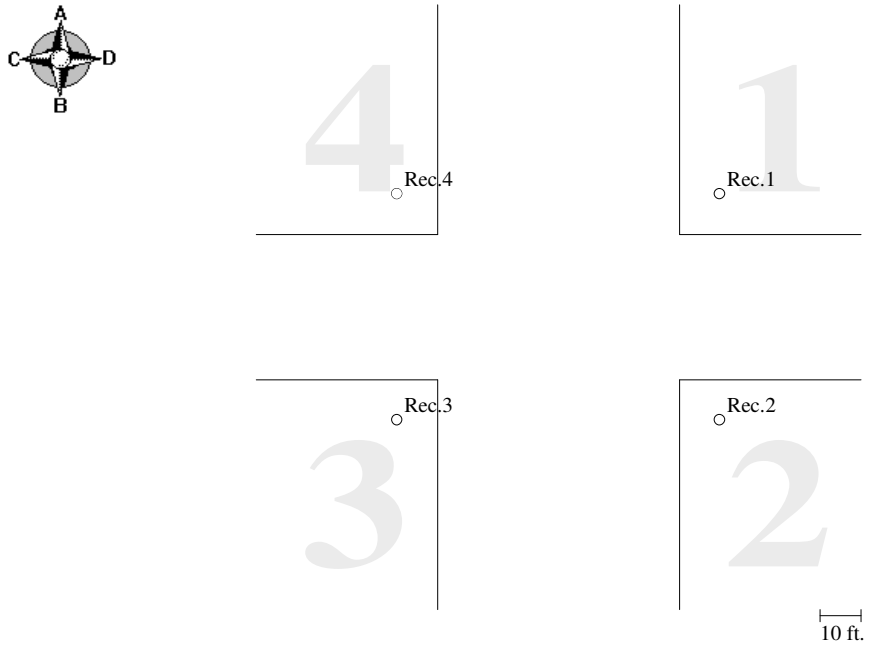
Washington State Intersection Screening Tool 1.0

04-09-09
04:25 PM
Westside SR 520

Description: **Montlake and Pacific Place - 2030 A West**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Place**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.4	1.7	Pass
3	3	10	10	2.6	1.8	Pass
4	4	10	10	2.4	1.7	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

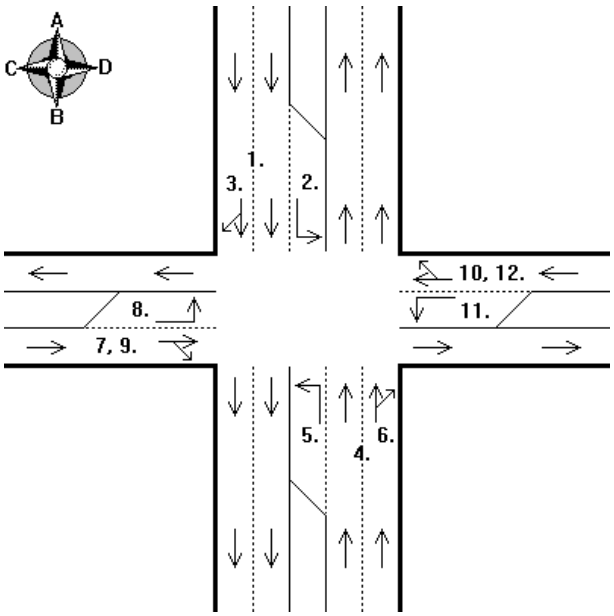
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1690
2	A-D Left Turn	2
3	A-C Right Turn	150
4	B-A Thru	2330
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	340
8	C-A Left Turn	340
9	C-B Right Turn	60
10	D-C Thru	2
11	D-B Left Turn	290
12	D-A Right Turn	100



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**35**	**9.54**
Leg B	**30**	**9.55**
Leg C	**25**	**9.71**
Leg D	**25**	**9.71**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**34**
Leg A Left Turn	**34**
Leg B Thru & Rt	**34**
Leg B Left Turn	**34**
Leg C Thru & Rt	**75**
Leg C Left Turn	**75**
Leg D Thru & Rt	**75**
Leg D Left Turn	**75**

USER COMMENTS

Westside SR 520

User Comments:

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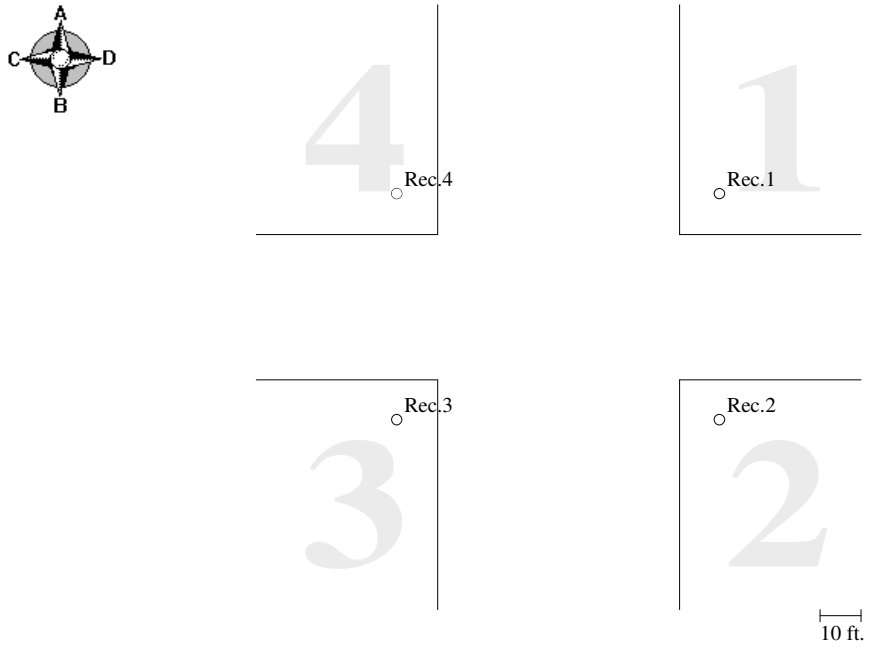
Washington State Intersection Screening Tool 1.0

04-09-09
04:14 PM
Westside SR 520

Description: **Montlake and Pacific Place - 2008 EX**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Place**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.6	3.2	Pass
2	2	10	10	4.1	2.9	Pass
3	3	10	10	4.4	3.1	Pass
4	4	10	10	3.7	2.6	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

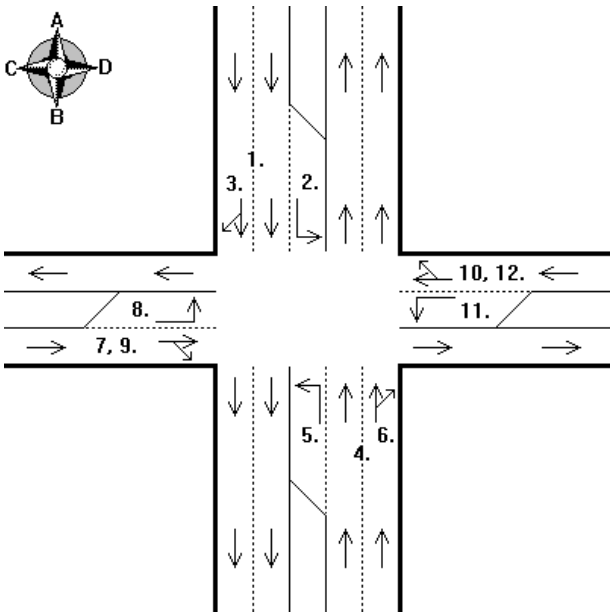
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1390
2	A-D Left Turn	2
3	A-C Right Turn	130
4	B-A Thru	1910
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	285
8	C-A Left Turn	285
9	C-B Right Turn	50
10	D-C Thru	2
11	D-B Left Turn	240
12	D-A Right Turn	80



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2008**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **120.19**

Approach	Speed (mph)	EF (g/mile)
Leg A	**35**	**18.79**
Leg B	**30**	**18.80**
Leg C	**25**	**19.17**
Leg D	**25**	**19.17**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**41**
Leg A Left Turn	**41**
Leg B Thru & Rt	**41**
Leg B Left Turn	**41**
Leg C Thru & Rt	**88**
Leg C Left Turn	**88**
Leg D Thru & Rt	**88**
Leg D Left Turn	**88**

USER COMMENTS

Westside SR 520

User Comments:

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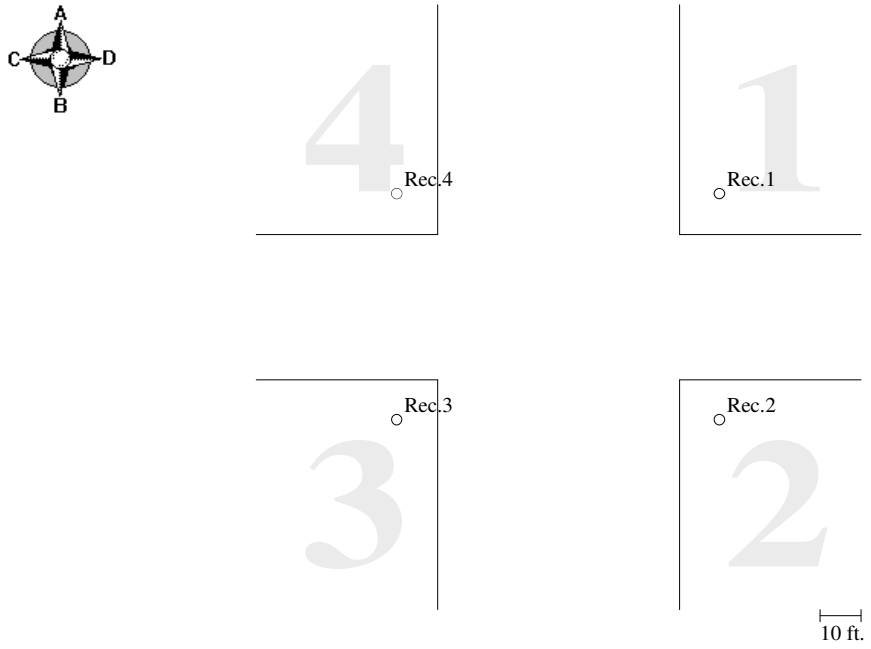
Washington State Intersection Screening Tool 1.0

04-16-09
12:58 PM
Westside SR 520

Description: **Montlake and Pacific Place - 2018 NB**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Place**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.0	2.1	Pass
2	2	10	10	2.7	1.9	Pass
3	3	10	10	2.8	2.0	Pass
4	4	10	10	2.7	1.9	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

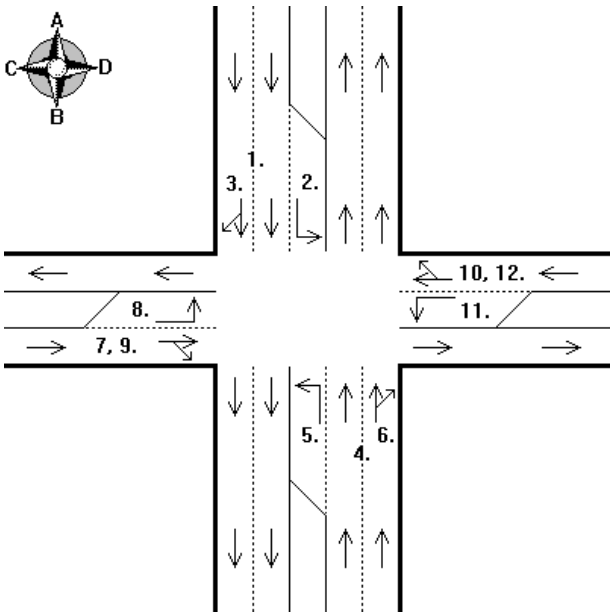
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1535
2	A-D Left Turn	2
3	A-C Right Turn	145
4	B-A Thru	2110
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	318
8	C-A Left Turn	318
9	C-B Right Turn	55
10	D-C Thru	2
11	D-B Left Turn	265
12	D-A Right Turn	90



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2018**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	**35**	**11.35**
Leg B	**30**	**11.35**
Leg C	**25**	**11.54**
Leg D	**25**	**11.54**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**34**
Leg A Left Turn	**34**
Leg B Thru & Rt	**34**
Leg B Left Turn	**34**
Leg C Thru & Rt	**75**
Leg C Left Turn	**75**
Leg D Thru & Rt	**75**
Leg D Left Turn	**75**

USER COMMENTS

Westside SR 520

User Comments:

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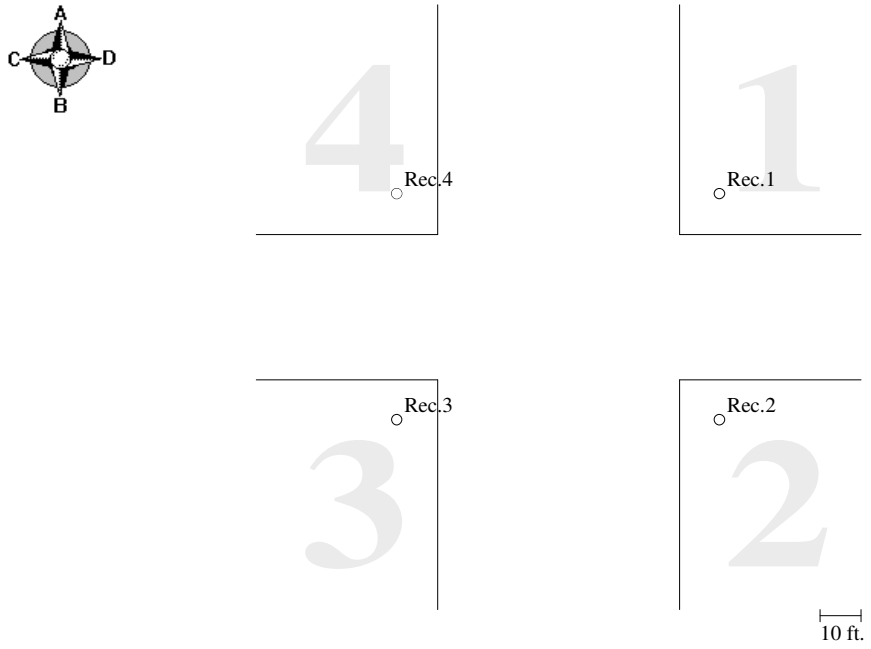
Washington State Intersection Screening Tool 1.0

04-09-09
04:19 PM
Westside SR 520

Description: **Montlake and Pacific Place - 2030 NB**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Place**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.5	1.8	Pass
3	3	10	10	2.6	1.8	Pass
4	4	10	10	2.5	1.8	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

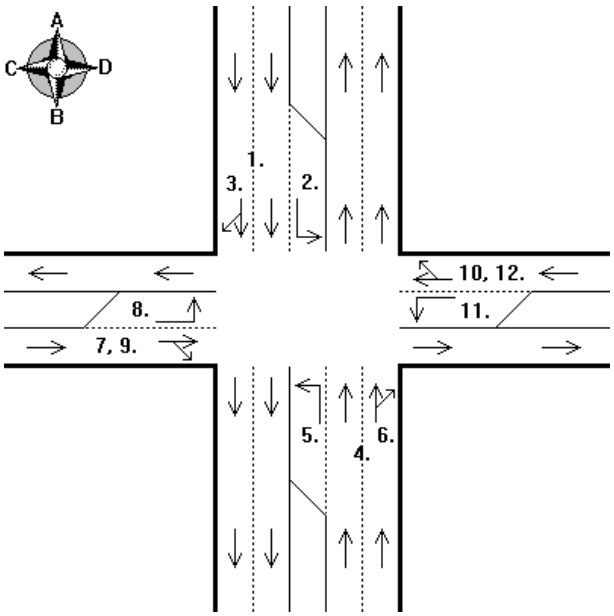
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1710
2	A-D Left Turn	2
3	A-C Right Turn	160
4	B-A Thru	2350
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	355
8	C-A Left Turn	355
9	C-B Right Turn	60
10	D-C Thru	2
11	D-B Left Turn	290
12	D-A Right Turn	100



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**35**	**9.54**
Leg B	**30**	**9.55**
Leg C	**25**	**9.71**
Leg D	**25**	**9.71**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**34**
Leg A Left Turn	**34**
Leg B Thru & Rt	**34**
Leg B Left Turn	**34**
Leg C Thru & Rt	**75**
Leg C Left Turn	**75**
Leg D Thru & Rt	**75**
Leg D Left Turn	**75**

USER COMMENTS

Westside SR 520

User Comments:

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Washington State Intersection Screening Tool 1.0

04-16-09
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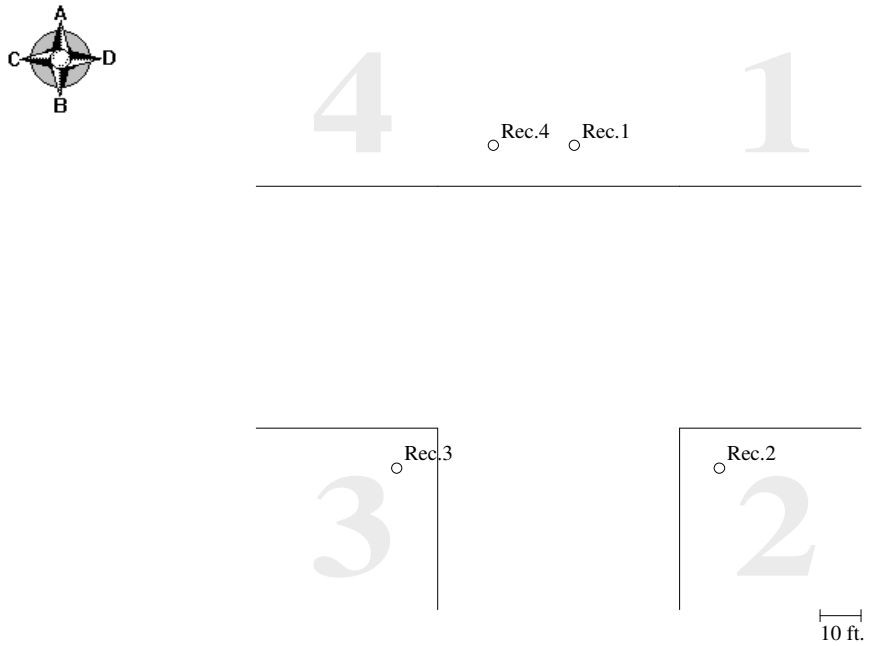
Westside SR 520

Description: **Montlake and Pacific Street - 2030 A Add**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **T-type Intersection, 5 x 4**
Street Names: **A-B: Pacific Street C-D: Montlake**



RESULTS:

Receptor#	Quadrant	Distance from A-B boundary (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.9	2.0	Pass
2	2	10	10	3.2	2.2	Pass
3	3	10	10	3.1	2.2	Pass
4	4	10	10	2.8	2.0	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 2**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

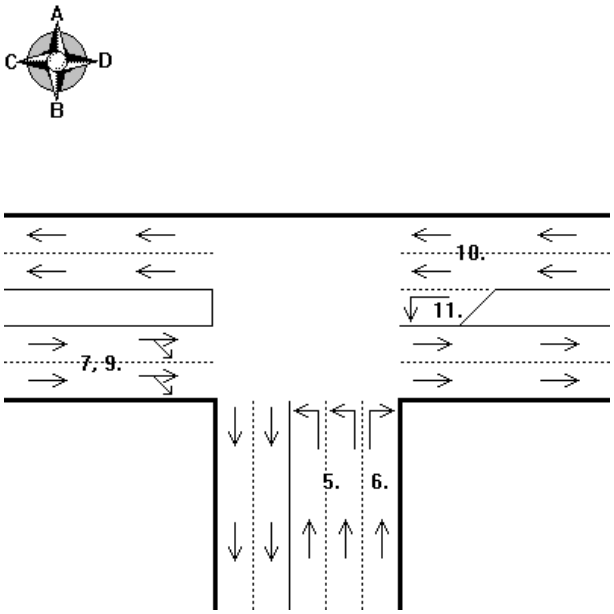
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	-----
2	A-D Left Turn	-----
3	A-C Right Turn	-----
4	B-A Thru	-----
5	B-C Left Turn	928
6	B-D Right Turn	232
7	C-D Thru	1920
8	C-A Left Turn	-----
9	C-B Right Turn	130
10	D-C Thru	2310
11	D-B Left Turn	780
12	D-A Right Turn	-----



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	---	-----
Leg B	30	9.55
Leg C	30	9.55
Leg D	30	9.55

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	---
Leg A Left Turn	---
Leg B Thru & Rt	61
Leg B Left Turn	70
Leg C Thru & Rt	46
Leg C Left Turn	---
Leg D Thru & Rt	30
Leg D Left Turn	65

USER COMMENTS

Westside SR 520

User Comments:

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Washington State Intersection Screening Tool 1.0

04-16-09
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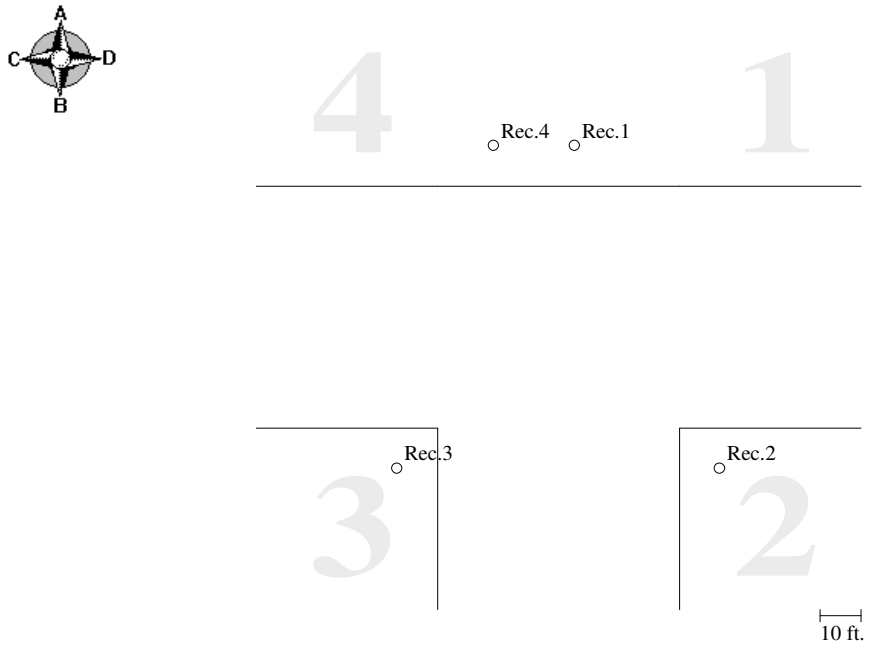
Westside SR 520

Description: **Montlake and Pacific Street - 2030 A Base**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **T-type Intersection, 5 x 4**
Street Names: **A-B: Pacific Street C-D: Montlake**



RESULTS:

Receptor#	Quadrant	Distance from A-B boundary (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.7	1.9	Pass
2	2	10	10	3.0	2.1	Pass
3	3	10	10	2.8	2.0	Pass
4	4	10	10	2.7	1.9	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 2**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

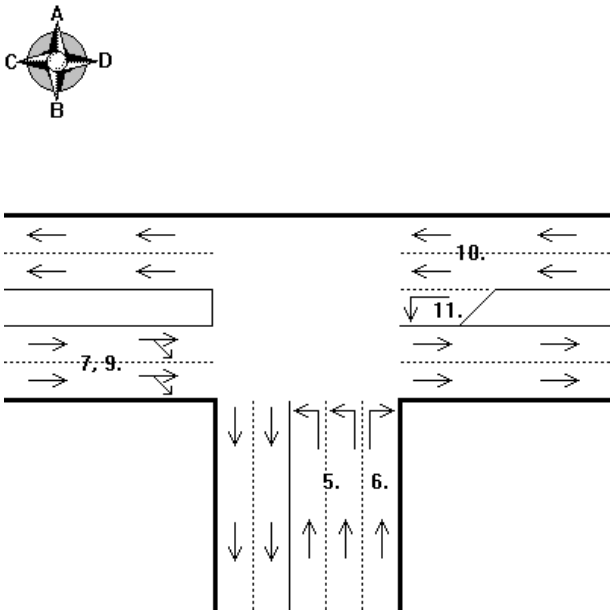
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	-----
2	A-D Left Turn	-----
3	A-C Right Turn	-----
4	B-A Thru	-----
5	B-C Left Turn	928
6	B-D Right Turn	232
7	C-D Thru	1820
8	C-A Left Turn	-----
9	C-B Right Turn	130
10	D-C Thru	2190
11	D-B Left Turn	780
12	D-A Right Turn	-----



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	---	-----
Leg B	30	9.55
Leg C	30	9.55
Leg D	30	9.55

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	---
Leg A Left Turn	---
Leg B Thru & Rt	60
Leg B Left Turn	64
Leg C Thru & Rt	47
Leg C Left Turn	---
Leg D Thru & Rt	30
Leg D Left Turn	69

USER COMMENTS

Westside SR 520

User Comments:

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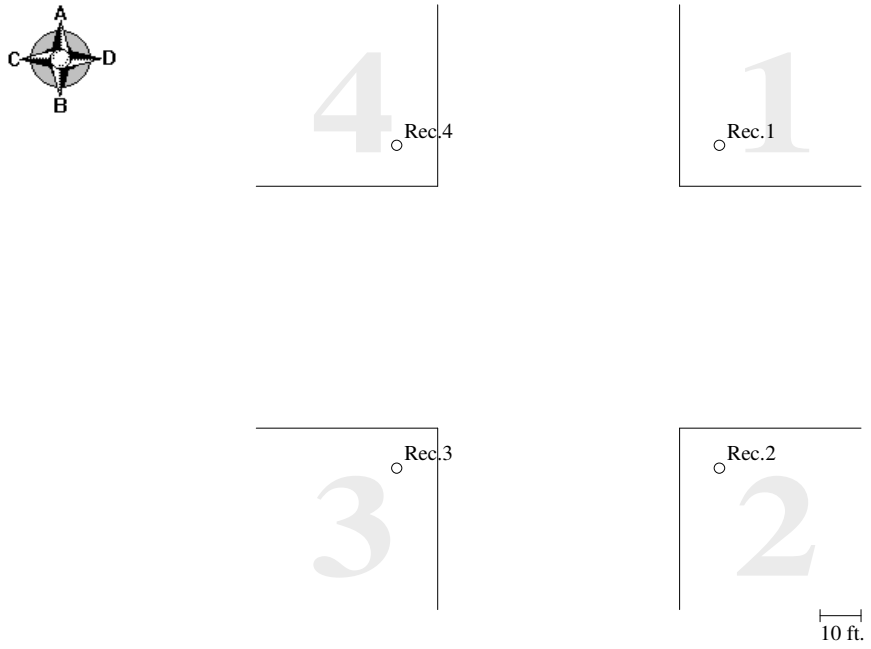
Washington State Intersection Screening Tool 1.0

04-16-09
05:00 PM
Westside SR 520

Description: **Montlake and Pacific Street - 2030 Alt-K**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 4 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Street**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.2	2.9	Pass
2	2	10	10	4.0	2.8	Pass
3	3	10	10	3.7	2.6	Pass
4	4	10	10	3.8	2.7	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

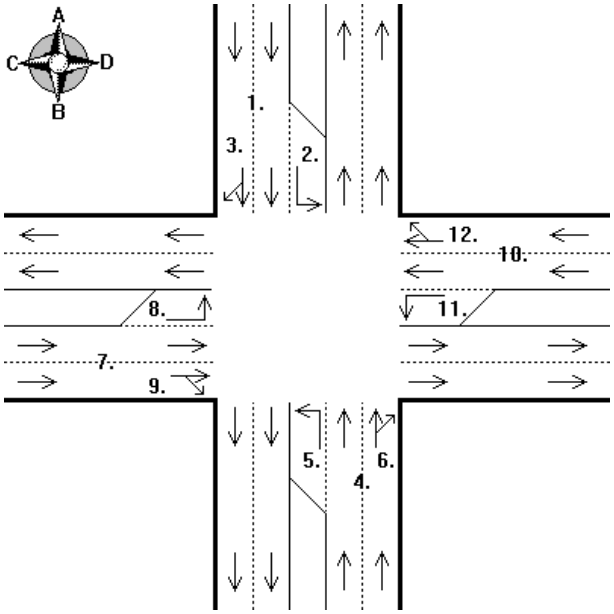
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1160
2	A-D Left Turn	1280
3	A-C Right Turn	130
4	B-A Thru	1550
5	B-C Left Turn	480
6	B-D Right Turn	2
7	C-D Thru	820
8	C-A Left Turn	2
9	C-B Right Turn	650
10	D-C Thru	480
11	D-B Left Turn	90
12	D-A Right Turn	1520



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **150**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**84**
Leg A Left Turn	**110**
Leg B Thru & Rt	**99**
Leg B Left Turn	**125**
Leg C Thru & Rt	**120**
Leg C Left Turn	**120**
Leg D Thru & Rt	**103**
Leg D Left Turn	**137**

USER COMMENTS

Westside SR 520

User Comments:

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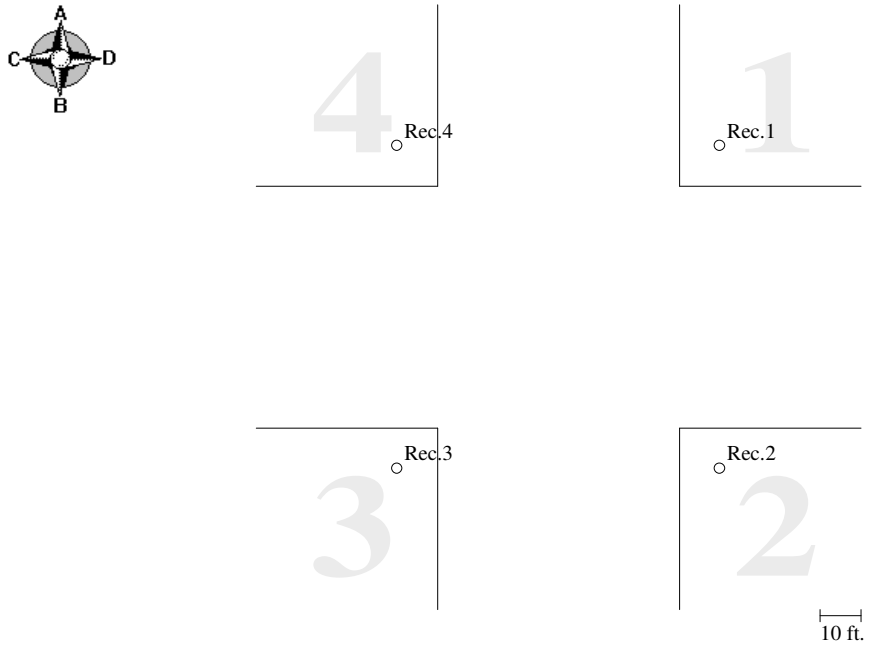
Washington State Intersection Screening Tool 1.0

04-16-09
05:02 PM
Westside SR 520

Description: **Montlake and Pacific Street - 2018 Alt-L**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 4 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Street**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.7	3.3	Pass
2	2	10	10	4.4	3.1	Pass
3	3	10	10	4.1	2.9	Pass
4	4	10	10	4.2	2.9	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

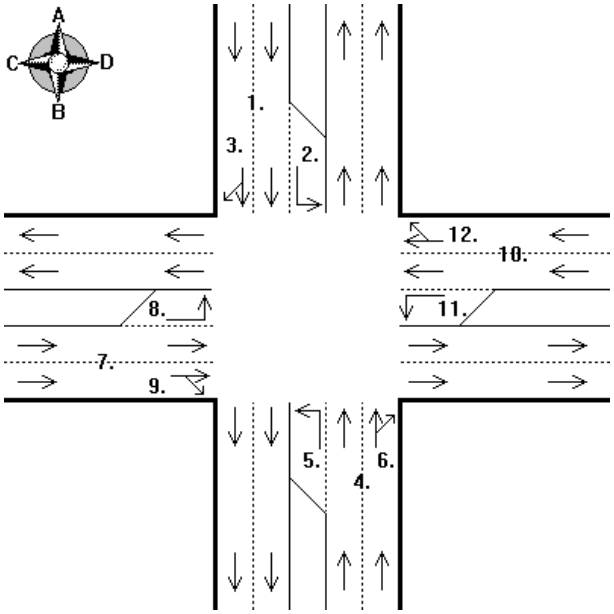
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1060
2	A-D Left Turn	1040
3	A-C Right Turn	120
4	B-A Thru	1420
5	B-C Left Turn	440
6	B-D Right Turn	430
7	C-D Thru	675
8	C-A Left Turn	2
9	C-B Right Turn	595
10	D-C Thru	395
11	D-B Left Turn	75
12	D-A Right Turn	1255



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2018**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**11.35**
Leg B	**30**	**11.35**
Leg C	**30**	**11.35**
Leg D	**30**	**11.35**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **150**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**88**
Leg A Left Turn	**111**
Leg B Thru & Rt	**98**
Leg B Left Turn	**121**
Leg C Thru & Rt	**119**
Leg C Left Turn	**119**
Leg D Thru & Rt	**103**
Leg D Left Turn	**138**

USER COMMENTS

Westside SR 520

User Comments:

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Washington State Intersection Screening Tool 1.0

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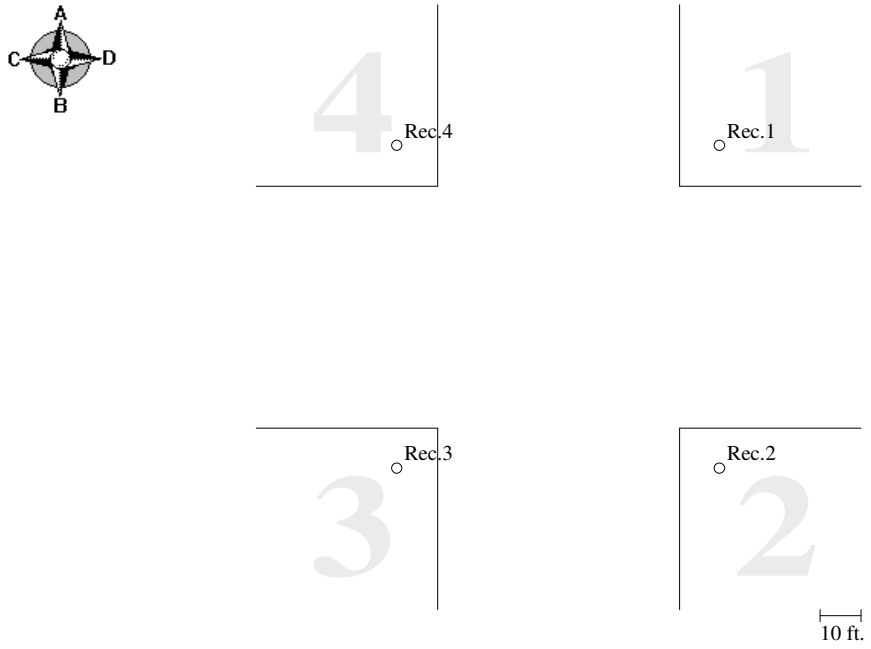
04:56 PM
Westside SR 520

Description: **Montlake and Pacific Street - 2030 Alt-L**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 4 w/4 Lt Turns**
Street Names: **A-B: Montlake C-D: Pacific Street**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.5	3.1	Pass
2	2	10	10	4.3	3.0	Pass
3	3	10	10	3.7	2.6	Pass
4	4	10	10	3.9	2.7	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

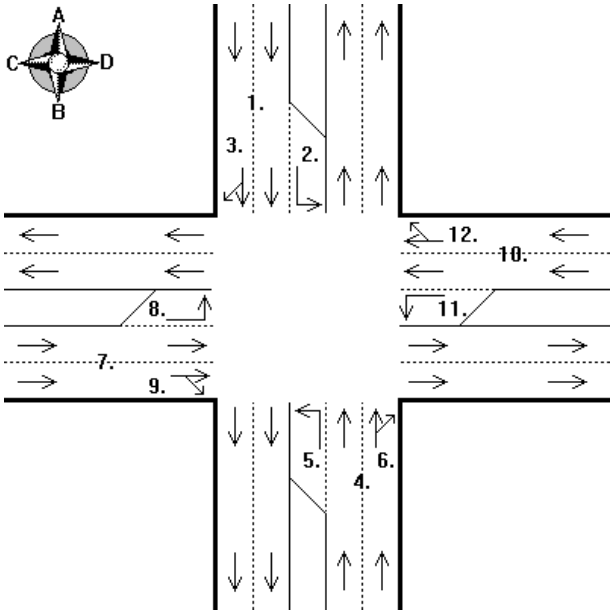
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1160
2	A-D Left Turn	1280
3	A-C Right Turn	130
4	B-A Thru	1550
5	B-C Left Turn	480
6	B-D Right Turn	540
7	C-D Thru	820
8	C-A Left Turn	2
9	C-B Right Turn	650
10	D-C Thru	480
11	D-B Left Turn	90
12	D-A Right Turn	1520



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **150**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**86**
Leg A Left Turn	**110**
Leg B Thru & Rt	**100**
Leg B Left Turn	**124**
Leg C Thru & Rt	**119**
Leg C Left Turn	**119**
Leg D Thru & Rt	**102**
Leg D Left Turn	**137**

USER COMMENTS

Westside SR 520

User Comments:

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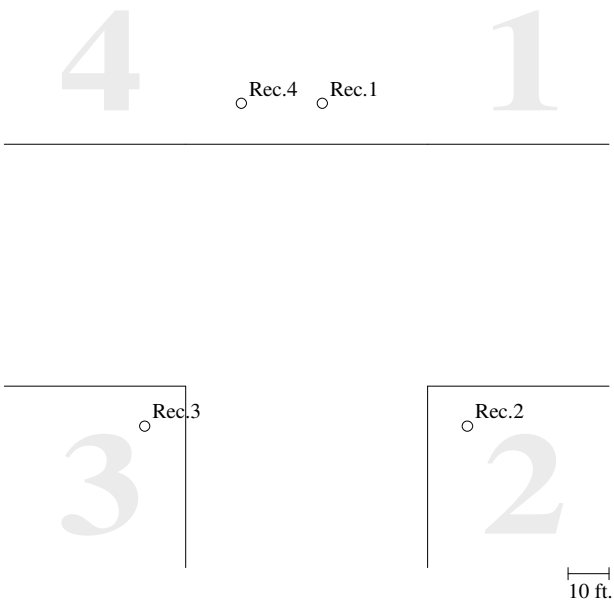
Washington State Intersection Screening Tool 1.0

04-16-09
04:48 PM
Westside SR 520

Description: **Montlake and Pacific Street - 2030 A West**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **T-type Intersection, 5 x 4**
Street Names: **A-B: Pacific Street C-D: Montlake**



RESULTS:

Receptor#	Quadrant	Distance from A-B boundary (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.9	2.0	Pass
2	2	10	10	3.2	2.2	Pass
3	3	10	10	3.1	2.2	Pass
4	4	10	10	2.8	2.0	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 2**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

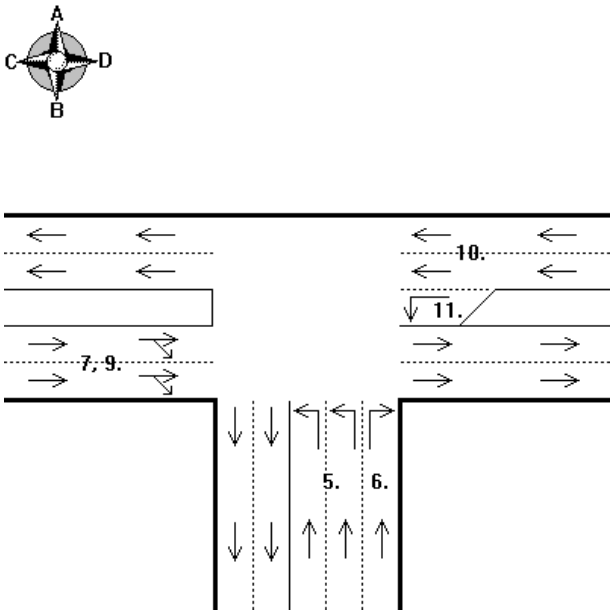
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	-----
2	A-D Left Turn	-----
3	A-C Right Turn	-----
4	B-A Thru	-----
5	B-C Left Turn	928
6	B-D Right Turn	232
7	C-D Thru	1920
8	C-A Left Turn	-----
9	C-B Right Turn	130
10	D-C Thru	2310
11	D-B Left Turn	780
12	D-A Right Turn	-----



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	---	-----
Leg B	30	9.55
Leg C	30	9.55
Leg D	30	9.55

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	---
Leg A Left Turn	---
Leg B Thru & Rt	61
Leg B Left Turn	70
Leg C Thru & Rt	46
Leg C Left Turn	---
Leg D Thru & Rt	30
Leg D Left Turn	65

USER COMMENTS

Westside SR 520

User Comments:

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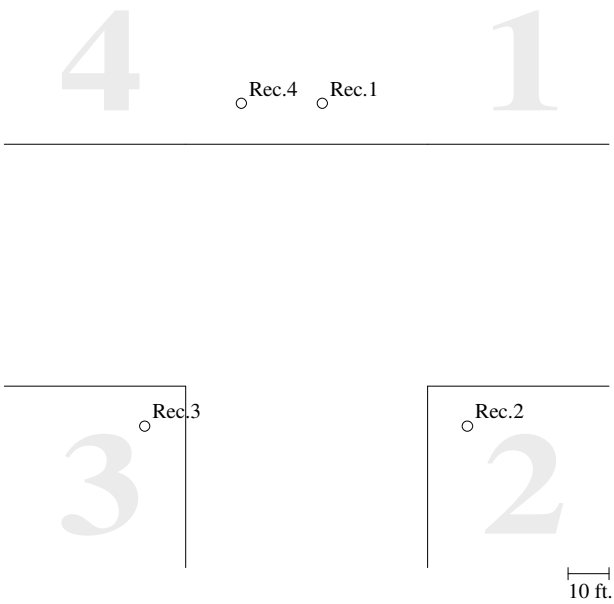
Washington State Intersection Screening Tool 1.0

04-09-09
04:59 PM
Westside SR 520

Description: **Montlake and Pacific Street - 2008 EX**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **T-type Intersection, 5 x 4**
Street Names: **A-B: Pacific Street C-D: Montlake**



RESULTS:

Receptor#	Quadrant	Distance from A-B boundary (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	5.3	3.7	Pass
2	2	10	10	5.4	3.8	Pass
3	3	10	10	5.0	3.5	Pass
4	4	10	10	4.9	3.4	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 2**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

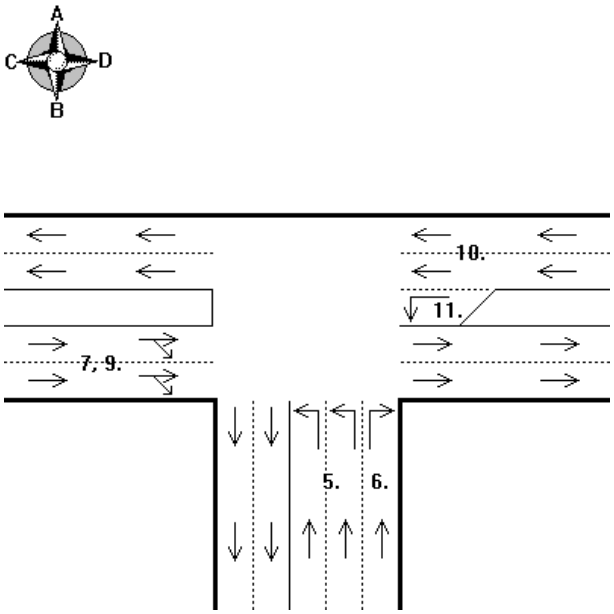
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	-----
2	A-D Left Turn	-----
3	A-C Right Turn	-----
4	B-A Thru	-----
5	B-C Left Turn	806
6	B-D Right Turn	154
7	C-D Thru	1570
8	C-A Left Turn	-----
9	C-B Right Turn	110
10	D-C Thru	1900
11	D-B Left Turn	620
12	D-A Right Turn	-----



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2008**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **120.19**

Approach	Speed (mph)	EF (g/mile)
Leg A	---	-----
Leg B	30	18.80
Leg C	30	18.80
Leg D	30	18.80

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	---
Leg A Left Turn	---
Leg B Thru & Rt	78
Leg B Left Turn	91
Leg C Thru & Rt	50
Leg C Left Turn	---
Leg D Thru & Rt	30
Leg D Left Turn	82

USER COMMENTS

Westside SR 520

User Comments:

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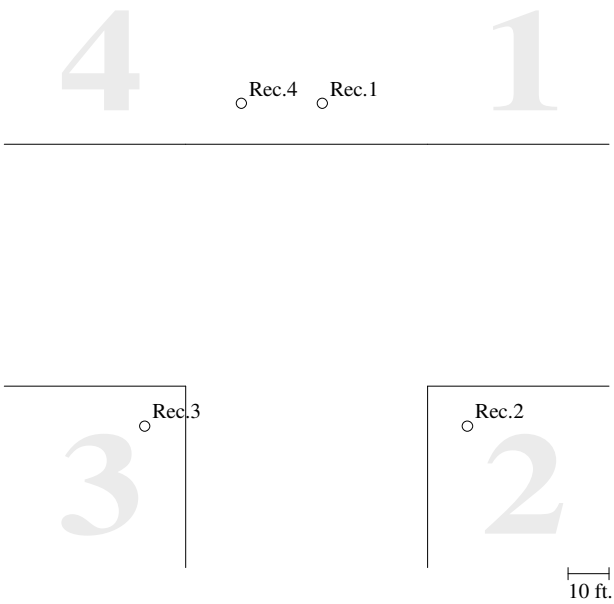
Washington State Intersection Screening Tool 1.0

04-16-09
12:55 PM
Westside SR 520

Description: **Montlake and Pacific Street - 2018 NB**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **T-type Intersection, 5 x 4**
Street Names: **A-B: Pacific Street C-D: Montlake**



RESULTS:

Receptor#	Quadrant	Distance from A-B boundary (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.3	2.3	Pass
2	2	10	10	3.5	2.4	Pass
3	3	10	10	3.1	2.2	Pass
4	4	10	10	3.1	2.2	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 2**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

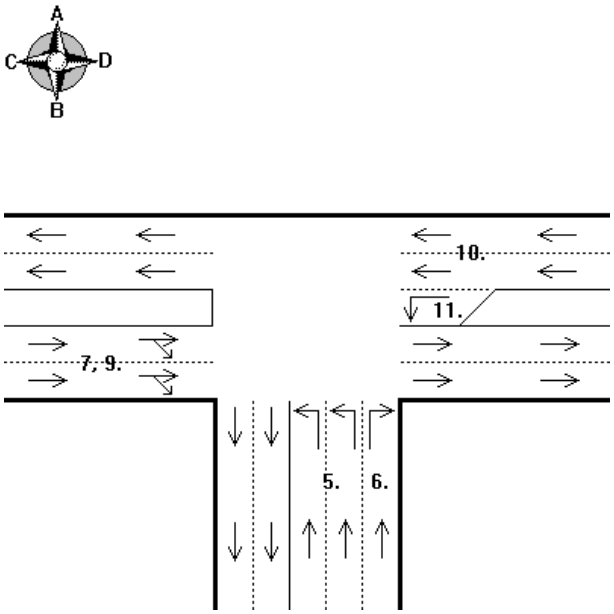
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	-----
2	A-D Left Turn	-----
3	A-C Right Turn	-----
4	B-A Thru	-----
5	B-C Left Turn	930
6	B-D Right Turn	125
7	C-D Thru	1735
8	C-A Left Turn	-----
9	C-B Right Turn	125
10	D-C Thru	2100
11	D-B Left Turn	690
12	D-A Right Turn	-----



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2018**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	---	-----
Leg B	30	11.35
Leg C	30	11.35
Leg D	30	11.35

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	---
Leg A Left Turn	---
Leg B Thru & Rt	57
Leg B Left Turn	76
Leg C Thru & Rt	51
Leg C Left Turn	---
Leg D Thru & Rt	31
Leg D Left Turn	61

USER COMMENTS

Westside SR 520

User Comments:

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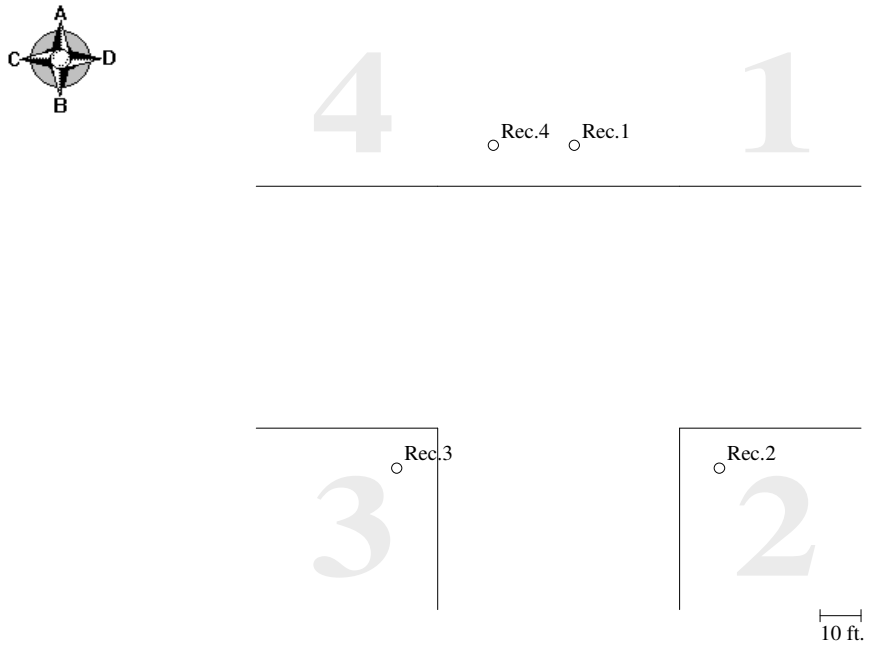
Washington State Intersection Screening Tool 1.0

04-14-09
04:03 PM
Westside SR 520

Description: **Montlake and Pacific Street - 2030 NB**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **T-type Intersection, 5 x 4**
Street Names: **A-B: Pacific Street C-D: Montlake**



RESULTS:

Receptor#	Quadrant	Distance from A-B boundary (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.1	2.2	Pass
2	2	10	10	3.0	2.1	Pass
3	3	10	10	2.8	2.0	Pass
4	4	10	10	2.8	2.0	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 1**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

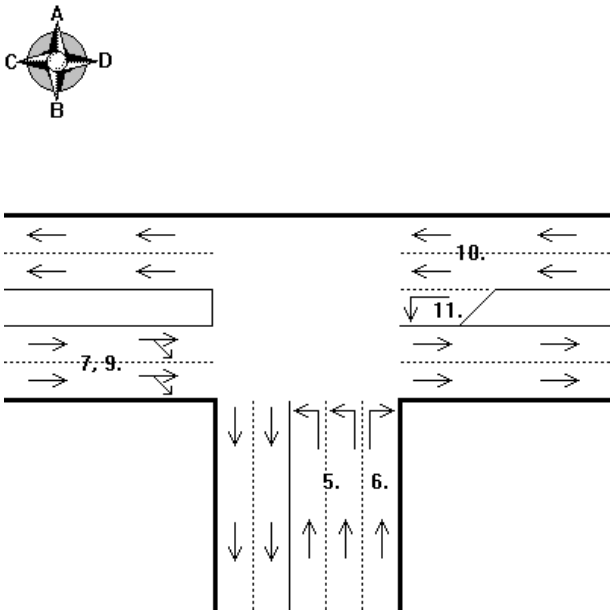
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	-----
2	A-D Left Turn	-----
3	A-C Right Turn	-----
4	B-A Thru	-----
5	B-C Left Turn	1030
6	B-D Right Turn	140
7	C-D Thru	1570
8	C-A Left Turn	-----
9	C-B Right Turn	140
10	D-C Thru	2330
11	D-B Left Turn	770
12	D-A Right Turn	-----



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	---	-----
Leg B	30	9.55
Leg C	30	9.55
Leg D	30	9.55

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	---
Leg A Left Turn	---
Leg B Thru & Rt	59
Leg B Left Turn	78
Leg C Thru & Rt	49
Leg C Left Turn	---
Leg D Thru & Rt	31
Leg D Left Turn	63

USER COMMENTS

Westside SR 520

User Comments:

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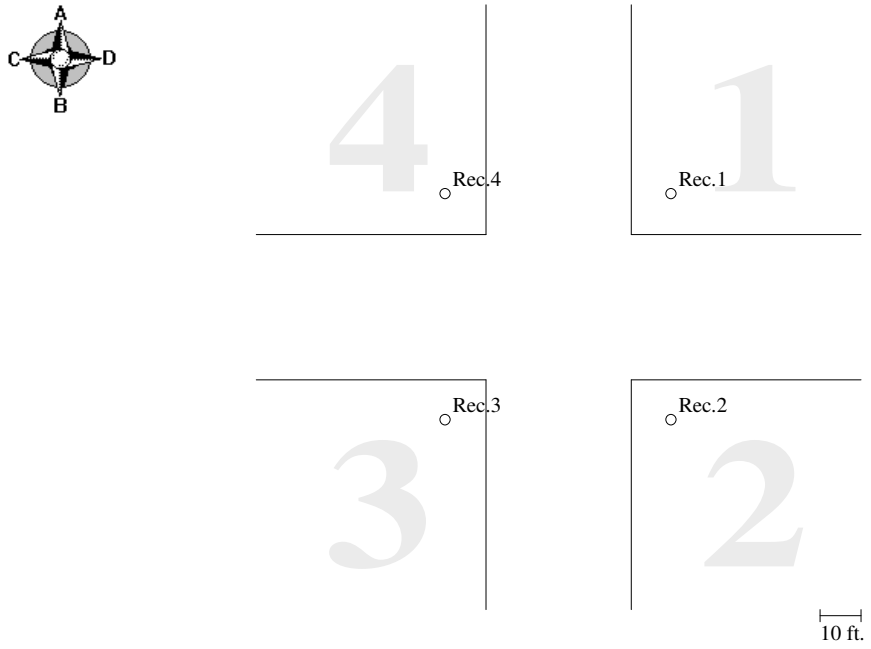
Washington State Intersection Screening Tool 1.0

04-16-09
02:56 PM
Westside SR 520

Description: **E Roanoke & Boylston - 2030 A Add**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**
Street Names: **A-B: Boylston C-D: East Roanoke**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.2	0.8	Pass
2	2	10	10	1.4	1.0	Pass
3	3	10	10	1.2	0.8	Pass
4	4	10	10	1.3	0.9	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 2**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

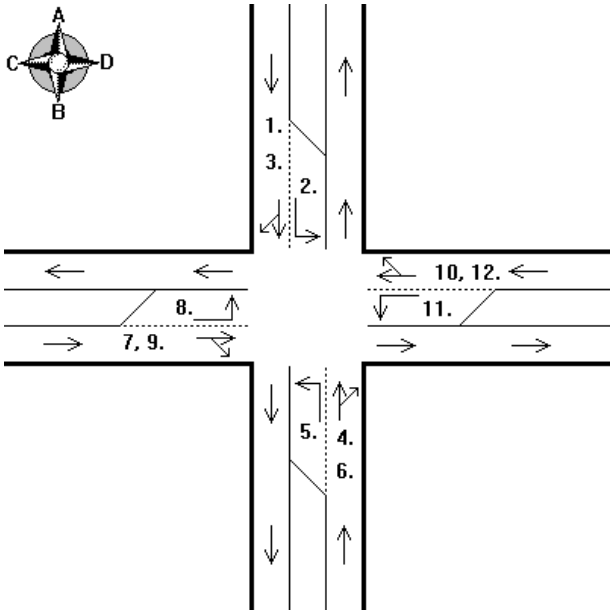
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	350
2	A-D Left Turn	480
3	A-C Right Turn	120
4	B-A Thru	2
5	B-C Left Turn	90
6	B-D Right Turn	490
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	2
10	D-C Thru	210
11	D-B Left Turn	330
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**82**
Leg A Left Turn	**97**
Leg B Thru & Rt	**57**
Leg B Left Turn	**75**
Leg C Thru & Rt	**87**
Leg C Left Turn	**87**
Leg D Thru & Rt	**87**
Leg D Left Turn	**87**

USER COMMENTS

Westside SR 520

User Comments:

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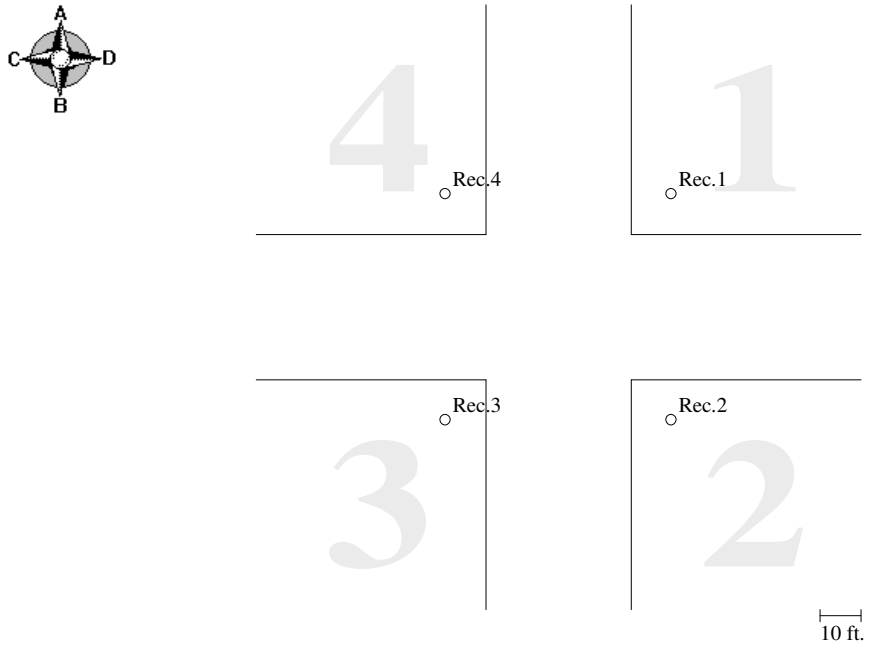
Washington State Intersection Screening Tool 1.0

04-16-09
02:55 PM
Westside SR 520

Description: **E Roanoke & Boylston - 2030 A Base**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**
Street Names: **A-B: Boylston C-D: East Roanoke**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.2	0.8	Pass
2	2	10	10	1.4	1.0	Pass
3	3	10	10	1.2	0.8	Pass
4	4	10	10	1.3	0.9	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 2**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

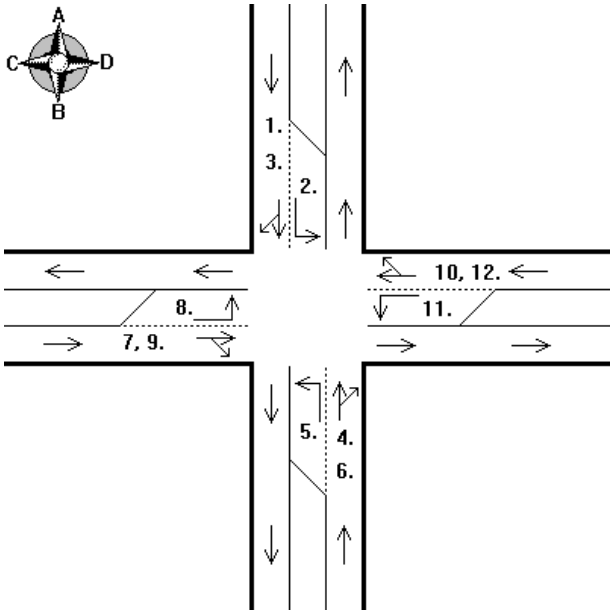
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	350
2	A-D Left Turn	480
3	A-C Right Turn	120
4	B-A Thru	2
5	B-C Left Turn	90
6	B-D Right Turn	490
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	2
10	D-C Thru	210
11	D-B Left Turn	330
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**82**
Leg A Left Turn	**97**
Leg B Thru & Rt	**57**
Leg B Left Turn	**75**
Leg C Thru & Rt	**87**
Leg C Left Turn	**87**
Leg D Thru & Rt	**87**
Leg D Left Turn	**87**

USER COMMENTS

Westside SR 520

User Comments:

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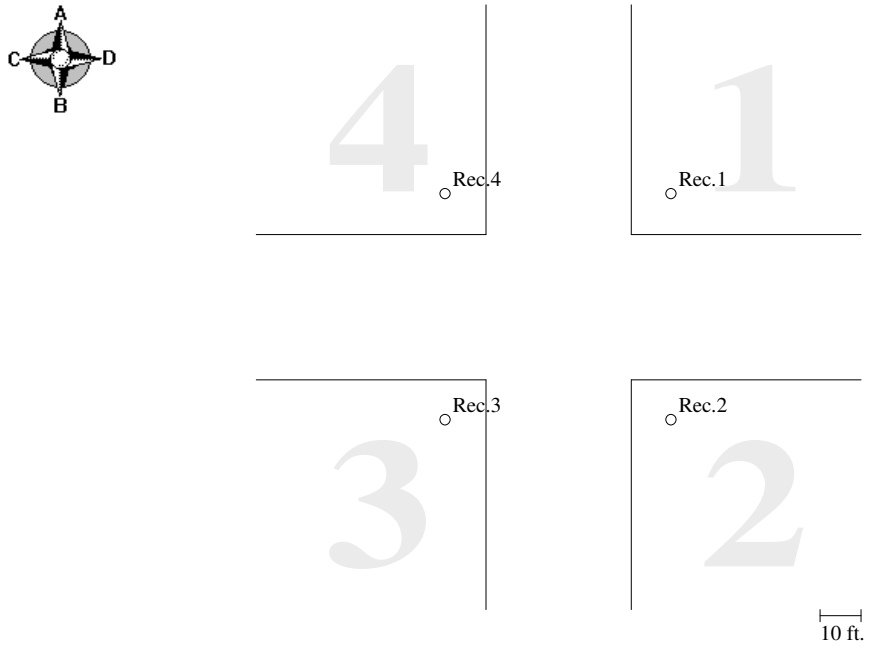
Washington State Intersection Screening Tool 1.0

04-16-09
03:00 PM
Westside SR 520

Description: **E Roanoke & Boylston - 2018 Alt K & L**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**
Street Names: **A-B: Boylston C-D: East Roanoke**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.4	1.0	Pass
2	2	10	10	1.4	1.0	Pass
3	3	10	10	1.4	1.0	Pass
4	4	10	10	1.6	1.1	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 4**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

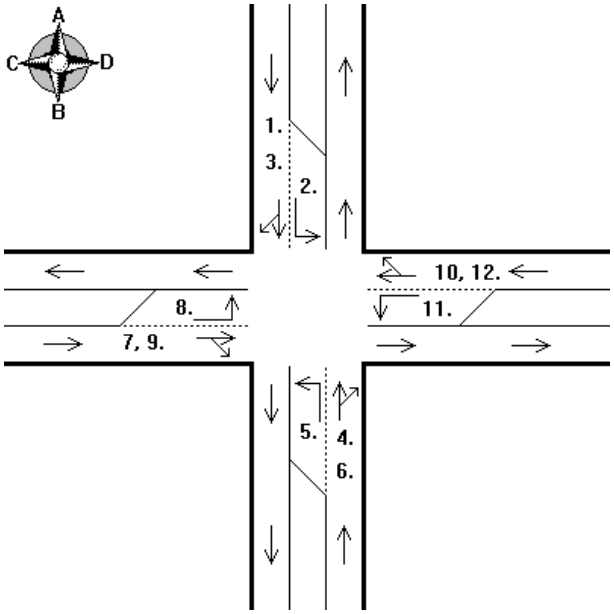
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	315
2	A-D Left Turn	425
3	A-C Right Turn	105
4	B-A Thru	2
5	B-C Left Turn	80
6	B-D Right Turn	430
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	2
10	D-C Thru	190
11	D-B Left Turn	295
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2018**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**11.35**
Leg B	**30**	**11.35**
Leg C	**30**	**11.35**
Leg D	**30**	**11.35**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**83**
Leg A Left Turn	**98**
Leg B Thru & Rt	**56**
Leg B Left Turn	**75**
Leg C Thru & Rt	**87**
Leg C Left Turn	**87**
Leg D Thru & Rt	**87**
Leg D Left Turn	**87**

USER COMMENTS

Westside SR 520

User Comments:

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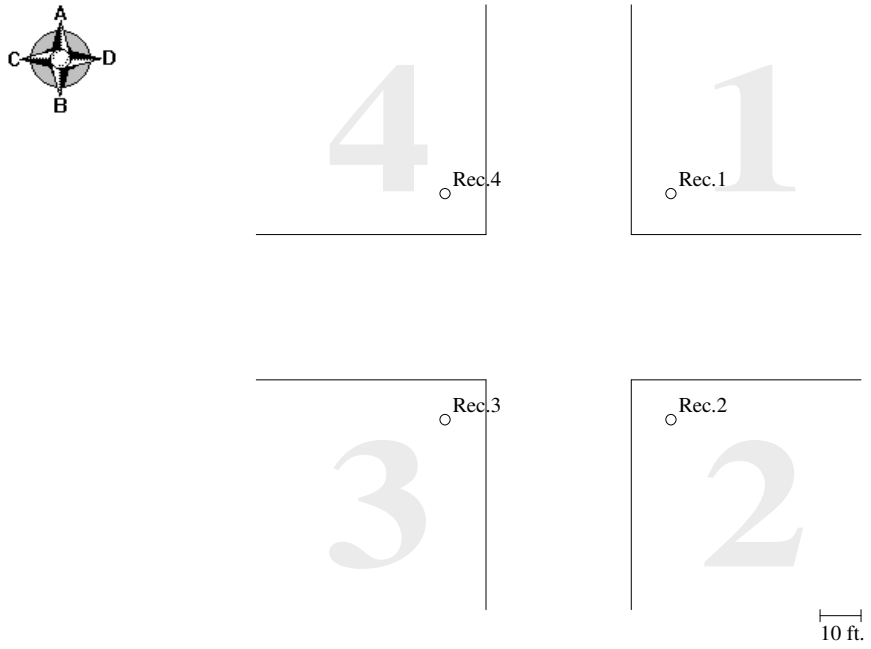
Washington State Intersection Screening Tool 1.0

04-16-09
02:58 PM
Westside SR 520

Description: **E Roanoke & Boylston - 2030 Alt K & L**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**
Street Names: **A-B: Boylston C-D: East Roanoke**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.2	0.8	Pass
2	2	10	10	1.4	1.0	Pass
3	3	10	10	1.2	0.8	Pass
4	4	10	10	1.3	0.9	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 2**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

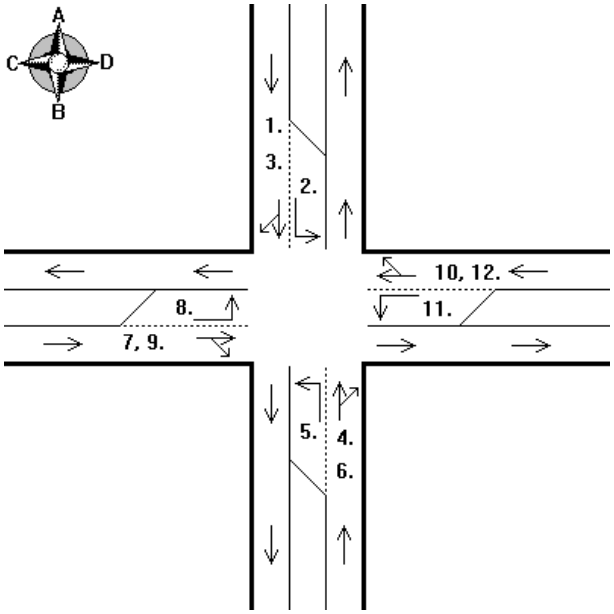
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	350
2	A-D Left Turn	470
3	A-C Right Turn	110
4	B-A Thru	2
5	B-C Left Turn	90
6	B-D Right Turn	480
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	2
10	D-C Thru	210
11	D-B Left Turn	330
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**82**
Leg A Left Turn	**98**
Leg B Thru & Rt	**56**
Leg B Left Turn	**75**
Leg C Thru & Rt	**87**
Leg C Left Turn	**87**
Leg D Thru & Rt	**87**
Leg D Left Turn	**87**

USER COMMENTS

Westside SR 520

User Comments:

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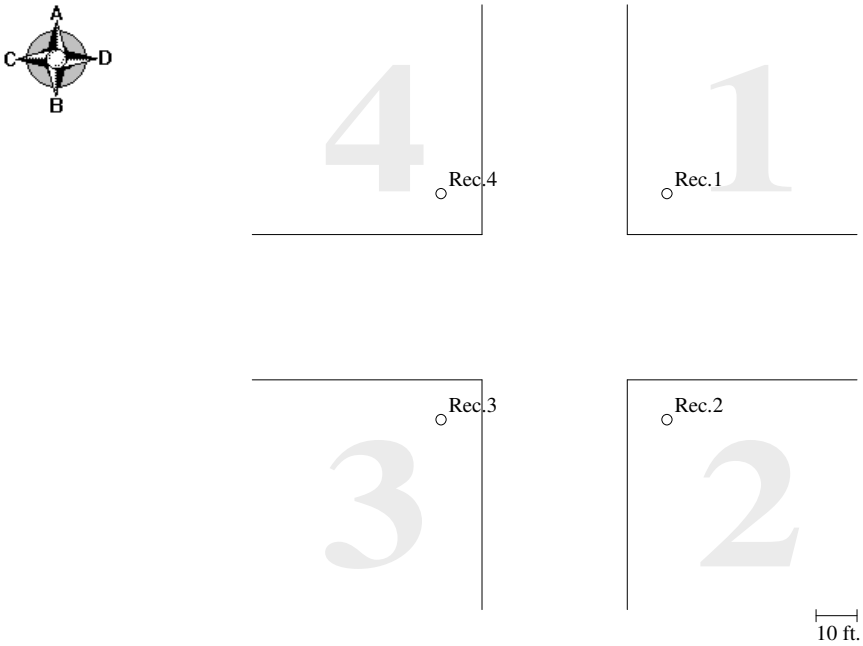
Washington State Intersection Screening Tool 1.0

04-16-09
02:48 PM
Westside SR 520

Description: **E Roanoke & Boylston - 2008 EX**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**
Street Names: **A-B: Boylston C-D: East Roanoke**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.1	1.5	Pass
2	2	10	10	2.5	1.8	Pass
3	3	10	10	2.3	1.6	Pass
4	4	10	10	2.4	1.7	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 2**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

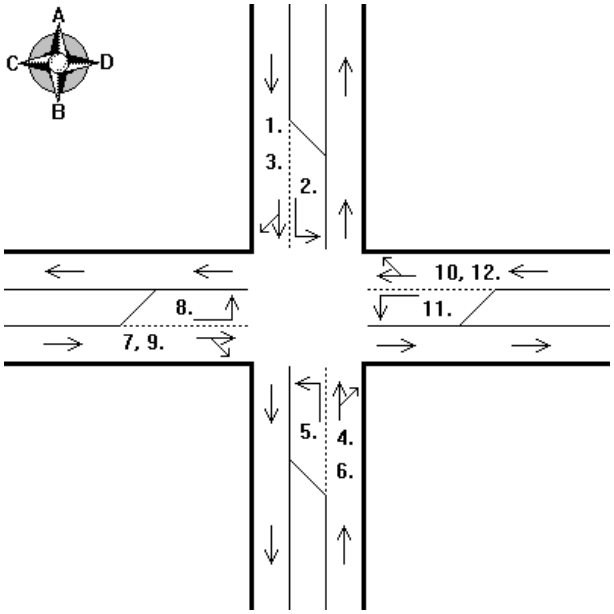
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	290
2	A-D Left Turn	390
3	A-C Right Turn	100
4	B-A Thru	2
5	B-C Left Turn	70
6	B-D Right Turn	390
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	2
10	D-C Thru	170
11	D-B Left Turn	270
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2008**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **120.19**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**18.80**
Leg B	**30**	**18.80**
Leg C	**30**	**18.80**
Leg D	**30**	**18.80**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**65**
Leg A Left Turn	**89**
Leg B Thru & Rt	**46**
Leg B Left Turn	**56**
Leg C Thru & Rt	**85**
Leg C Left Turn	**85**
Leg D Thru & Rt	**85**
Leg D Left Turn	**85**

USER COMMENTS

Westside SR 520

User Comments:

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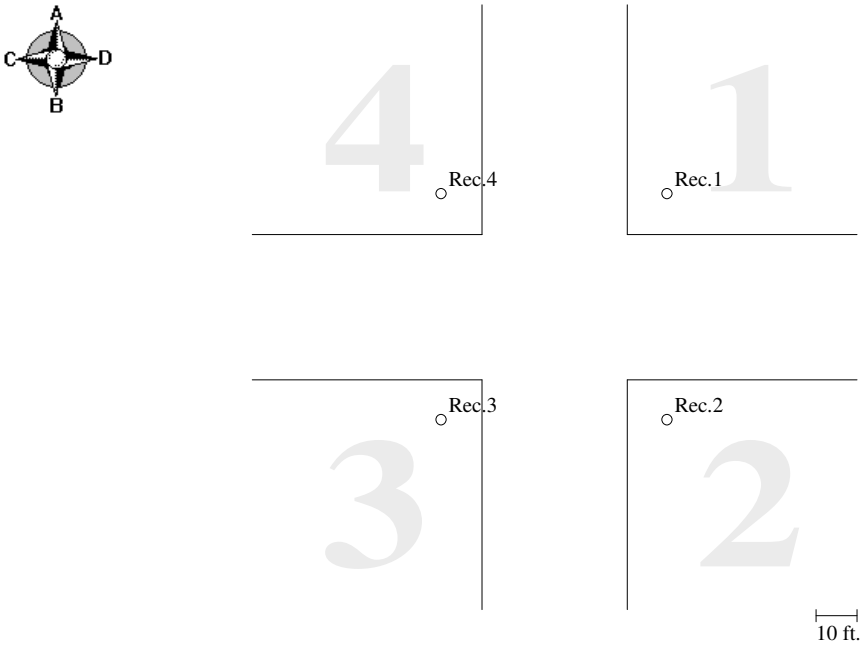
Washington State Intersection Screening Tool 1.0

04-16-09
02:51 PM
Westside SR 520

Description: **E Roanoke & Boylston - 2018 NB**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**
Street Names: **A-B: Boylston C-D: East Roanoke**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.3	0.9	Pass
2	2	10	10	1.5	1.0	Pass
3	3	10	10	1.3	0.9	Pass
4	4	10	10	1.6	1.1	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 4**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

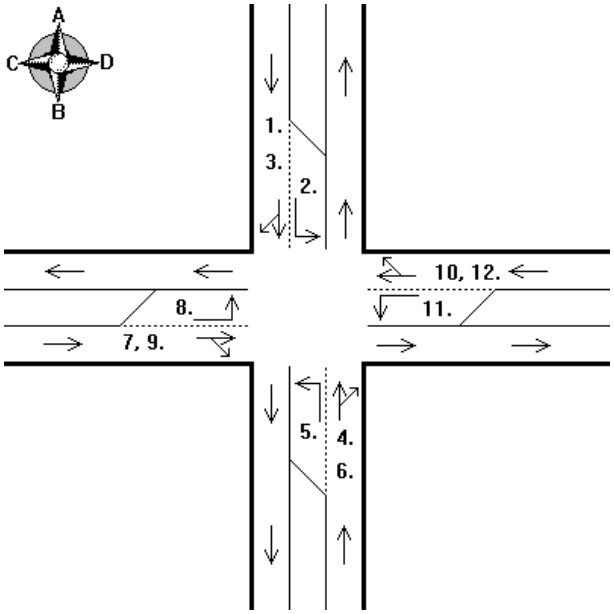
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	305
2	A-D Left Turn	405
3	A-C Right Turn	100
4	B-A Thru	2
5	B-C Left Turn	80
6	B-D Right Turn	430
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	2
10	D-C Thru	190
11	D-B Left Turn	310
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2018**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**11.35**
Leg B	**30**	**11.35**
Leg C	**30**	**11.35**
Leg D	**30**	**11.35**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**85**
Leg A Left Turn	**107**
Leg B Thru & Rt	**47**
Leg B Left Turn	**77**
Leg C Thru & Rt	**85**
Leg C Left Turn	**85**
Leg D Thru & Rt	**85**
Leg D Left Turn	**85**

USER COMMENTS

Westside SR 520

User Comments:

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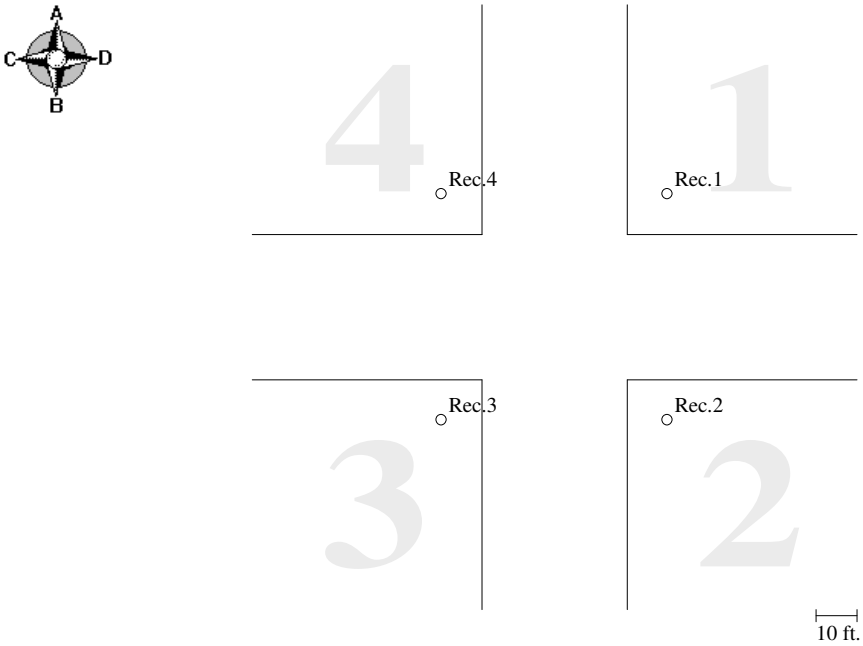
Washington State Intersection Screening Tool 1.0

04-16-09
02:53 PM
Westside SR 520

Description: **E Roanoke & Boylston - 2030 NB**
Performed by: **Ben Beattie - CH2M HILL**
- benjamin.beattie@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**
Street Names: **A-B: Boylston C-D: East Roanoke**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	1.3	0.9	Pass
2	2	10	10	1.4	1.0	Pass
3	3	10	10	1.2	0.8	Pass
4	4	10	10	1.3	0.9	Pass

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 2**.
- All CO concentrations include a background concentration of **0.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 1.0

USER INPUTS

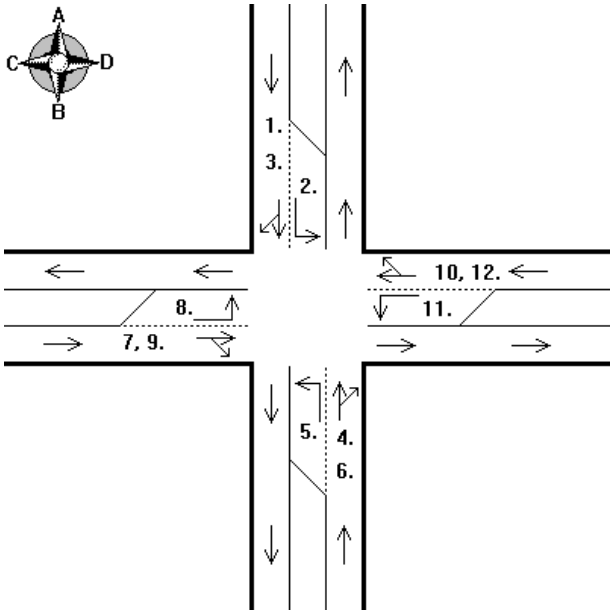
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	320
2	A-D Left Turn	420
3	A-C Right Turn	100
4	B-A Thru	2
5	B-C Left Turn	90
6	B-D Right Turn	480
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	2
10	D-C Thru	210
11	D-B Left Turn	360
12	D-A Right Turn	2



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2030**
Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**30**	**9.55**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **140**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**87**
Leg A Left Turn	**107**
Leg B Thru & Rt	**47**
Leg B Left Turn	**79**
Leg C Thru & Rt	**83**
Leg C Left Turn	**83**
Leg D Thru & Rt	**83**
Leg D Left Turn	**83**

USER COMMENTS

Westside SR 520

User Comments:

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