ENVIRONMENTAL ASSESSMENT
SR 520 BRIDGE REPLACEMENT AND HOV PROGRAM

DECEMBER 2009

SR 520, Medina to SR 202: Eastside Transit and HOV Project

Appendix G

Air Quality Technical Memorandum

Washington State Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

SR 520, Medina to SR 202: Eastside Transit and HOV Project Environmental Assessment

Air Quality
Technical Memorandum

Prepared for

Washington State Department of Transportation

Federal Highway Administration

Lead Author

CH2M HILL

Consultant Team

HDR Engineering, Inc.

Parametrix, Inc.

CH2M HILL

Parsons Brinckerhoff

Michael Minor and Associates

Pacific Rim Resources

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Acronyms and Abbreviations

$\mu g/m^3$	micrograms per cubic meter
AADT	annual average daily traffic volume
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
FR	Federal Register
HOV	high-occupancy vehicle
LOS	level of service
mph	miles per hour
MSAT	mobile source air toxic
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_x	oxides of nitrogen
NS	no standard established
PM	particulate matter
PM_{10}	particulate matter smaller than 10 microns in diameter
$PM_{2.5}$	particulate matter smaller than 2.5 microns in diameter
ppm	parts per million
PSCAA	Puget Sound Clean Air Agency
PSRC	Puget Sound Regional Council
RCW	Revised Code of Washington
RTP	Regional Transportation Plan
SEPA	State Environmental Policy Act

SIP	State Implementation Plan
SO_2	sulfur dioxide
SR	State Route
TIP	Transportation Improvement Plan
U.S.C.	United States Code
VMT	vehicle miles traveled
VOC	volatile organic compound
WAC	Washington Administrative Code
WASIST	Washington State Intersections Screening Tool
WSDOT	Washington State Department of Transportation

1. Introduction

Why is air quality considered in an environmental assessment?

Clean air is vital to human health, and is a resource protected by various federal, state, and local regulations. Pollutants in air can adversely affect not only humans, but plants, animals, and physical structures. National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) regulations require evaluation of a proposed project's effects on air quality.

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 U.S.C. §§ 7401 et seq. 1970) and its amendments, and the Washington State Clean Air Act (RCW 70.94), currently regulate air quality. The U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the local Puget Sound Clean Air Agency (PSCAA) enforce regulations developed to protect air quality.

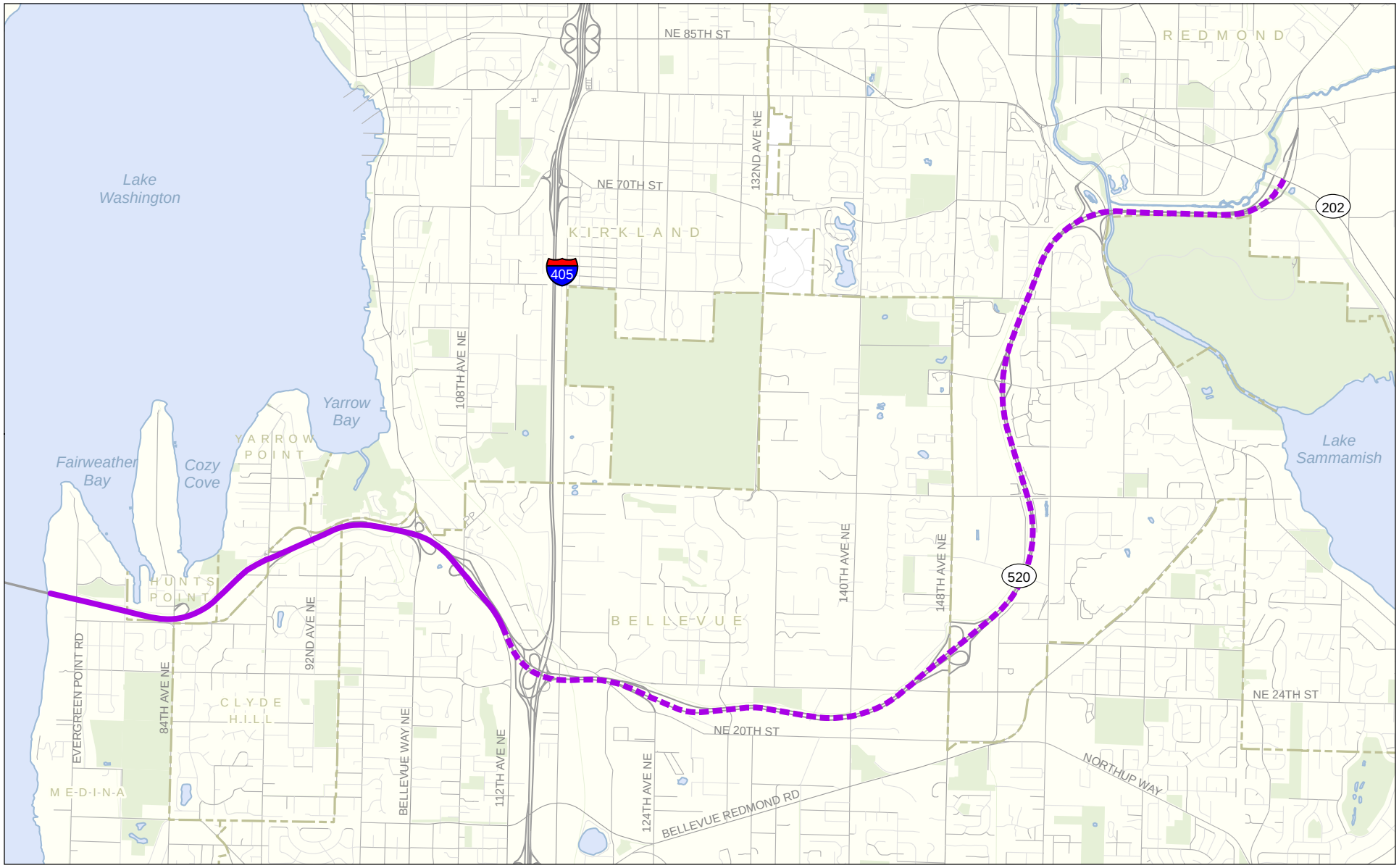
EPA delegates its authority to manage air quality issues to the states. In Washington, EPA and Ecology further delegate authority to local air quality agencies. PSCAA has authority to regulate air quality in four counties, including King County, where the proposed project is located.

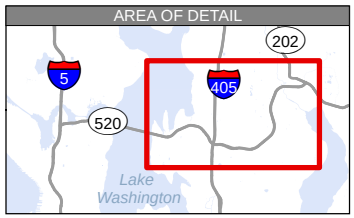
What is the project?

The Washington State Department of Transportation (WSDOT) is proposing to construct the SR 520, Medina to SR 202: Eastside Transit and HOV Project to reduce transit and high-occupancy vehicle (HOV) travel times and to enhance travel time reliability, mobility, access, and safety for transit and HOVs in rapidly growing areas along the State Route (SR) 520 corridor east of Lake Washington. Exhibit 1 shows the project vicinity. Some of the improvements included in this project were originally part of the SR 520 Bridge and HOV Project. On June 18, 2008, the Federal Highway Administration (FHWA) authorized WSDOT to develop the SR 520, Medina to SR 202: Eastside Transit and HOV Project as an independent project. The project includes building a complete HOV system between Lake Washington and 108th Avenue NE and restriping the existing HOV lanes from the outside lanes to the inside lanes between the 108th Avenue NE interchange and SR 202 in Redmond.

The portion of the project between Evergreen Point Road and 108th Avenue NE was previously part of the SR 520 Bridge Replacement and HOV Project. The SR 520, Medina to SR 202: Eastside Transit and HOV Project has been an independent project to address needs specific to the portion of SR 520 east of Lake Washington. The project limits extend approximately 8.8 miles along SR 520 from the east shore of Lake Washington (vicinity of Evergreen Point Road) to the interchange with SR 202 in Redmond.

WSDOT is considering two alternatives for the project: the Build Alternative and the No Build Alternative.





Construction Extent

Restriping Extent

Park

City Limits

N

0 0.5 1 Miles

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

Exhibit 1. **Project Vicinity**

Medina to SR 202: Eastside Transit and HOV Project

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Build Alternative

Under the Build Alternative, the proposed project would include the improvements described below.

SR 520 Improvements from Lake Washington to I-405

The proposed project would reconstruct SR 520 from just west of Evergreen Point Road to just east of 108th Avenue NE. Elements constructed as part of this section include the following:

- Construct a new eastbound HOV lane from Lake Washington to the existing eastbound HOV lane west of the I-405 interchange. This improvement would complete the currently discontinuous HOV network on the Eastside and improve travel time reliability for buses and carpools.
- Relocate the existing westbound HOV lane from the outside lane to the inside lane from Lake Washington to I-405. This change would enhance safety by eliminating the need for merging vehicles to weave across the faster-moving HOV lanes to reach the general-purpose lanes.
- Construct a lid with inside transit stop over SR 520 at Evergreen Point Road.
- Construct a new lid and modify the existing half-diamond interchange at 84th Avenue NE.
- Construct a new lid with inside transit stop over SR 520 at 92nd Avenue NE and modify the existing interchange.
- Reconfigure the existing interchange at Bellevue Way NE.

> What is a lid?
>
> The term "lid" is short for "lidded highway". Lids are long bridges that cover a length of highway. Lid surface areas can carry paths and trails to connect communities across the highway, landscaping to create open space and places for passive recreation, and items such as pergolas, seating, and transit waiting areas.

- Construct new HOV direct access ramps at 108th Avenue NE. This improvement would create a more efficient connection for transit and HOV from SR 520 to the South Kirkland Park-and-Ride via local streets.
- Add a bike/pedestrian path from Lake Washington to approximately 108th Avenue NE. This improvement would facilitate nonmotorized use of SR 520, provide transit connections for bikes and pedestrians, and complement the existing nonmotorized transportation network on the Eastside.

SR 520 Improvements from I-405 to SR 202

- Restripe existing eastbound and westbound HOV lanes from the outside to the inside lane. This change would enhance safety by eliminating the need for merging vehicles to weave across the faster-moving HOV lanes to reach the general-purpose lanes.

Other Improvements

- Provide noise walls between Evergreen Point Road and Bellevue Way NE.
- Provide retaining walls and stormwater management system improvements.

- Improve stream habitat by realigning portions of the Yarrow Creek channel and shortening some culverts.
- Improve fish passage culvert crossings to restore fish passage and open up habitat that was previously inaccessible to salmon and other fish species.
- Mitigate the project's effects on wetlands and streams at a site or sites as determined through future negotiations with permitting agencies.

No Build Alternative

Under the No Build Alternative, the project would not be built. Only routine maintenance, repair, and minor safety improvements would take place on SR 520 in the study area over the next 20 years. The No Build Alternative would not improve transit reliability and transit and HOV travel times on SR 520. Also included in the No Build Alternative for traffic modeling purposes is the assumption that the SR 520, Bridge Replacement and HOV Project would not be built until this project is complete.

WSDOT is evaluating the No Build Alternative to provide a reference point for comparing the effects, both positive and negative, associated with the proposed project.

What are the key points of this technical memorandum?

Project construction could temporarily affect air quality as a result of fugitive dust from excavation and earth moving activities and emissions from diesel-fueled construction equipment. After the project is completed, many of the effects would be positive under the Build Alternative. The Build Alternative would improve the capacity of the roadway, resulting in lower vehicle emissions through reduction in traffic congestion.

The air quality discipline team evaluated the effects of the project in terms of motor vehicle emissions, both regionally and at specific intersections. A qualitative assessment of traffic delay and volume in 2030 indicated that the project would not violate ambient air quality standards.

This technical memorandum 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 National Ambient Air Quality Standards (NAAQS).
- The project is expected to have a low potential for mobile source air toxic (MSAT) emissions.
- The project meets conformity requirements in 40 CFR Parts 51 and 93.
- Any air quality effects related to project construction would be temporary.

2. Methodology

How was the information collected?

The air quality discipline team identified the air quality standards and regulations of EPA, Ecology, and PSCAA that apply to the study area. The team also reviewed information from the National Climatic Data Center to determine how climate and terrain affect 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 with the applicable air quality standards.

3. Affected Environment

How do climate and weather affect air quality?

The study area lies in the Puget Sound Lowland, which is comprised of a narrow strip of land along the western side of Puget Sound extending from the Strait of Juan de Fuca in the north to the southern cities of Centralia and Chehalis, and a somewhat wider strip along the eastern side of Puget Sound extending northward to the Canadian border. Buffered by the Olympic and Cascade mountain ranges and Puget Sound, the Puget Sound Lowland has a relatively mild, marine climate with cool summers and mild, wet, and cloudy winters.

In the study area, weather conditions such as temperature, fog, rain, and snowfall can vary within short distances, influenced by such factors as the distance from Puget Sound, the rolling terrain, and air from the ocean moving through the Strait of Juan de Fuca and the Chehalis River valley.

During the summer, winds tend to be light and variable, with a prevailing wind direction from the north or northwest. The average wind velocity is less than 10 mph. Persistent high-pressure cells often dominate summer weather, creating stagnant air conditions. This weather pattern sometimes contributes to the formation of photochemical smog, which includes ground-level ozone.

During the winter wet season, the prevailing wind direction is south or southwest. Cold air occasionally flows southward from the interior of Canada through the Fraser River canyon into the Puget Sound Lowland. In the fall and winter, severe storms can produce strong winds that cross the state from the southwest.

Although the Puget Sound Lowland is the most densely populated and industrialized area in Washington, there is sufficient wind most of the year to disperse air pollutants released into the atmosphere. Particulate matter is usually most noticeable in the late fall and winter, under conditions of clear skies, light wind, and a sharp temperature inversion. Temperature inversions occur when cold air is trapped under warm air, preventing vertical mixing in the atmosphere. Inversions can last several days and can prevent pollutants from being dispersed by the wind. Inversions are most likely to occur during the months of January, February, October, November, and December. If poor dispersion persists for more than 24 hours, the PSCAA can declare an “air pollution episode” or local “impaired air quality.”

What are the air pollutants generated by transportation projects?

The major airborne pollutants of interest for transportation projects are carbon monoxide (CO), particulate matter (PM), ozone, and ozone precursors: volatile organic compounds (VOCs) and oxides of nitrogen (NO_x). These are *criteria pollutants*. Both federal and state standards regulate these criteria pollutants, along with two others: sulfur dioxide (SO_2) and lead. However, lead and SO_2 are not pollutants of concern for transportation projects, and therefore were not addressed in this analysis. See Attachment 1 for more detailed information about the characteristics and health effects of the criteria pollutants.

Ozone:

A compound consisting of three atoms of oxygen that can develop when oxides of nitrogen (NO_X), volatile organic compounds (VOCs), and sunlight interact in the lower atmosphere; ozone is the primary constituent of smog.

Photochemical Smog:

A combination of primary pollutants, NO_X and VOCs, and the secondary pollutants that are formed in the presence of sunlight. A brownish haze, caused by nitrogen dioxide, is often an indicator of smog.

Motor vehicles emit six pollutants that EPA classifies as priority mobile source air toxics (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.

Another substance generated by fuel combustion in motor vehicles is carbon dioxide (CO_2), one of several pollutants classified as a greenhouse gas that traps heat within the earth's atmosphere. CO_2 accounts for more than 80 percent of the greenhouse gases emitted in the United States. CO_2 is not directly harmful to human health; however, increasing emissions of CO_2 and other greenhouse gases results in changes to global temperatures, leading to environmental effects such as rising sea levels and altered weather patterns. Greenhouse gases are discussed in more detail in the Energy Technical Memorandum (WSDOT 2009a).

How is air quality regulated?

As previously mentioned, Washington state is subject to air quality regulations issued by EPA, Ecology, and PSCAA. EPA's National Ambient Air Quality Standards (NAAQS) set limits on concentration levels of criteria pollutants. Concentration levels of the criteria pollutants must not exceed the NAAQS. Ecology and PSCAA monitor air quality in the Puget Sound region by measuring and comparing the levels of criteria pollutants found in the atmosphere with the NAAQS.

The NAAQS are comprised of two sets of standards: (1) the primary standards are intended to protect public health; and (2) the secondary standards 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 2 lists all of the national, state, and local air quality standards in effect for the criteria pollutants in Washington.

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 (PSCAA 2009), 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.

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

Exhibit 2. National, State, and Local Ambient Air Quality Standards

Pollutant	National		Washington State	Puget Sound Region
	Primary	Secondary		
Nitrogen Dioxide				
Annual Average (ppm)	0.053	0.053	0.05	0.05
Carbon Monoxide (CO)				
8-Hour Average (ppm)	9	NS	9	9
1-Hour Average (ppm)	35	NS	35	35
Ozone				
8-Hour Average (ppm)	0.075	0.075	NS	NS
Lead				
Maximum Arithmetic Mean ($\mu g/m^3$) (averaged over calendar quarter)	1.5	1.5	NS	1.5
Sulfur Dioxide				
Annual Arithmetic Average (ppm)	0.03	NS	0.02	0.02
24-Hour Average (ppm)	0.14	NS	0.10	0.10
3-Hour Average (ppm)	NS	0.5	NS	NS
1-Hour Average (ppm)	NS	NS	0.40	0.40
Particulate Matter (PM_{10})				
24-Hour Average ($\mu g/m^3$)	150	150	150	150
Particulate Matter ($PM_{2.5}$)				
Annual Arithmetic Average ($\mu g/m^3$)	15	15	NS	NS
24-Hour Average ($\mu g/m^3$)	35	35	NS	NS

Sources: U.S. EPA 2009a; WAC 173-474-100; Washington State Standards (RCW 70.94)
$\mu g/m^3$ = micrograms per cubic meter
NS = No standard established
PM_{10} = particulate matter smaller than 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than 2.5 microns in diameter
ppm = parts per million

How is air quality measured?

Both Ecology and PSCAA operate ambient air quality monitors to assess the levels of regulated pollutants and to verify continued compliance with the NAAQS. 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 southwest of the western terminus of the project. The nearest CO monitoring location to the study area is in downtown Bellevue, approximately 1 mile south of SR 520. There are no additional CO monitors along the SR 520 corridor east of Lake Washington.

Air monitor located in the University District in Seattle

How does air quality compare with current standards in the study area?

EPA designated the Central Puget Sound region as maintenance status for CO in 1996; therefore, this status applies to the study area. Exhibit 3 shows air quality maintenance areas in the Puget Sound region. The Central Puget Sound region is currently in attainment for all other criteria pollutants.

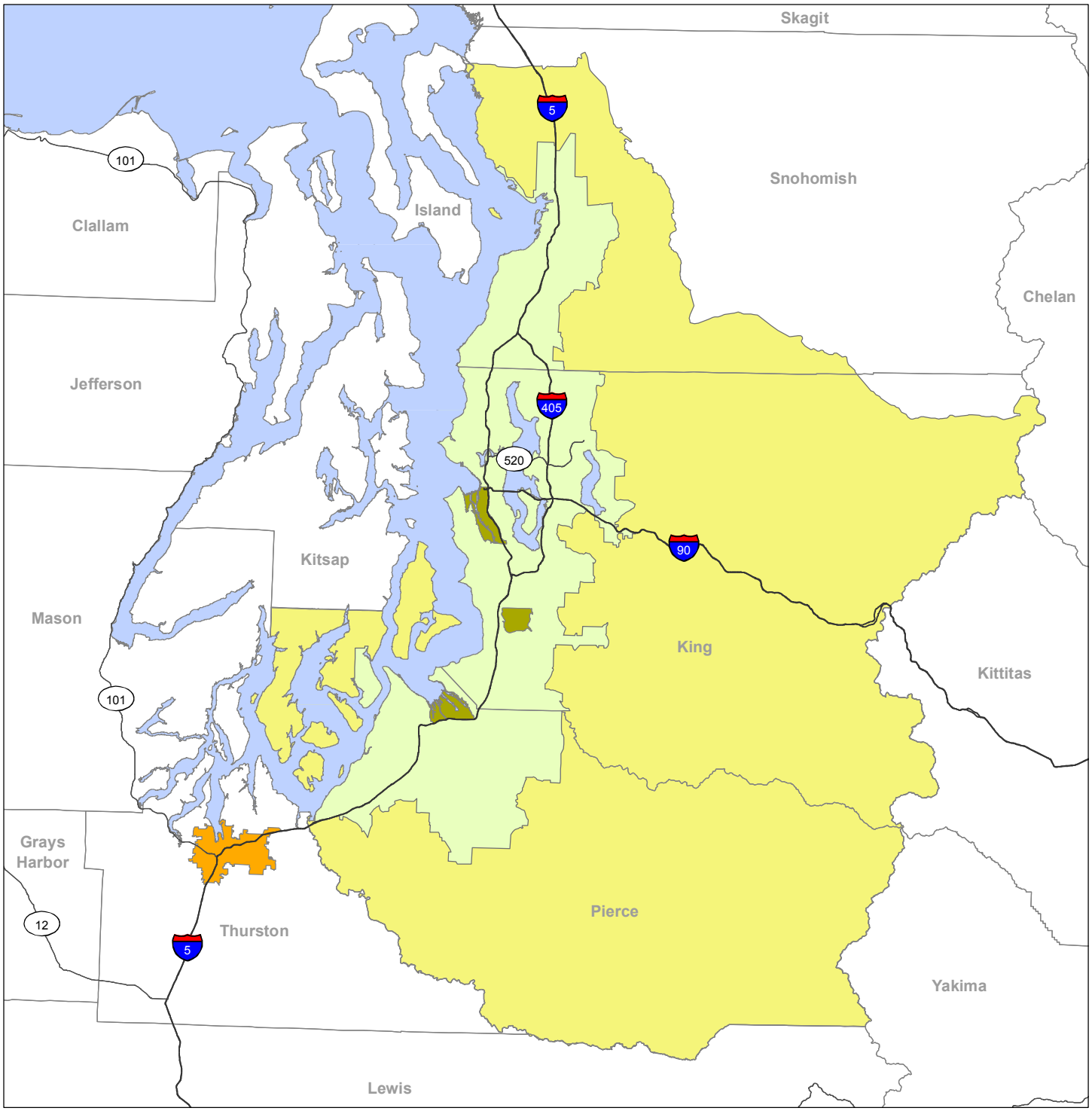
Ambient air concentrations of the monitored pollutants in the project vicinity have been below the NAAQS for the last several years. Exhibit 4 summarizes monitored data in the vicinity of the project site over the last 5 years. Data from a monitor in Enumclaw, Washington are also included in the exhibit. This monitor exceeded the 8-hour ozone standard in 2008. To attain the ozone standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. The data indicate that concentrations have been below the NAAQS for the remaining criteria pollutants for the past 5 years.

What is attainment?

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

What is a maintenance area?

A maintenance area is a former non-attainment 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.



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

Source: Ecology(1998) GIS data (Carbon Monoxide, Ozone, and Particulates), WSDOT (1995) GIS Data (County), WSDOT (2004) GIS Data (State Route), City of Redmond (2005) GIS Data (Lake), 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.

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.

N

0 5 10 Miles

Exhibit 3. **Air Quality Maintenance Areas**

Medina to SR 202: Eastside Transit and HOV Project

Exhibit 4. Ambient Criteria Pollutant Concentration Levels

Monitoring Location	Parameter	Maximum Concentration 2004	2005	2006	2007	2008	Ambient Air Quality Standard
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
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
Ozone							
4103 Beacon Ave. S, Seattle	8-hour average (ppm)[c]	0.058	0.049	–	0.05	0.052	0.075
30525 SE Mud Mountain Rd, Enumclaw	8-hour average (ppm) [c]	0.073	0.063	0.087	0.068	0.075	0.075
Nitrogen Dioxide							
4103 Beacon Ave. S, Seattle	Annual average (ppm)	0.018	0.018	0.018	–	–	0.05
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

Source: U.S. EPA 2009b

"–" : 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 $\mu g/m^3$).

[b] Values are the 98th percentile of 24-hour average concentrations for the year. NAAQS are exceeded when the 3-year average of these values is greater than 35 $\mu g/m^3$.

[c] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm

What is the trend for Puget Sound regional air quality?

Emission projections and ongoing monitoring throughout the Central Puget Sound region indicate that the ambient air pollution concentrations for CO and PM_{10} have been decreasing over the past decade. Measured ozone concentrations, in contrast, have remained fairly static. The decline of CO is due primarily to improvements made to emission controls on motor vehicles and the retirement of older, higher-polluting vehicles. As shown in Exhibit 5, national data indicate that progress has been made in reducing emissions from motor vehicles in comparison with changes in other demographics, such as population, over the same period.

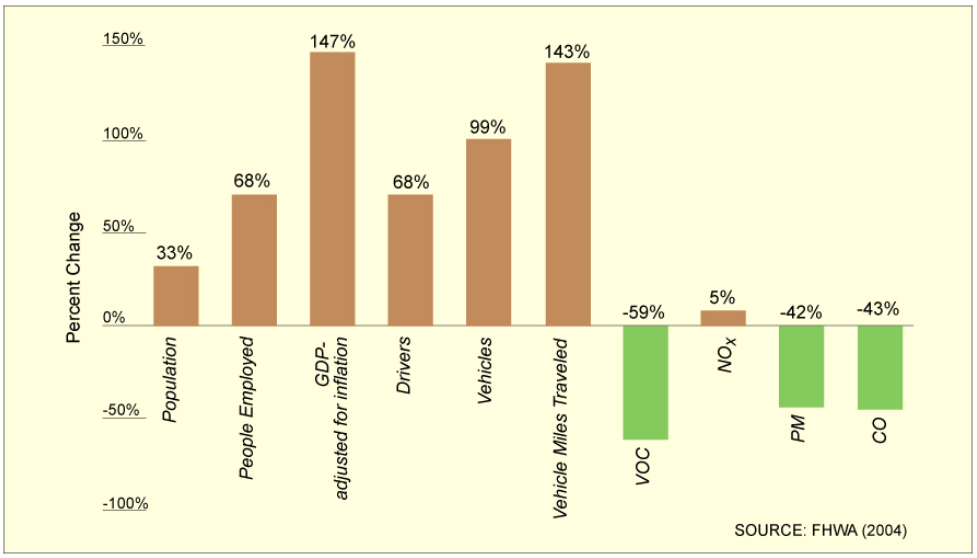


Exhibit 5. Percent Change in Vehicle Emissions Compared with Demographics and Transportation (1970 to 1999)

Voluntary programs, such as the local Diesel Solutions Program and the Department of Energy's Clean Cities Program, are in place to encourage public and private fleet operators to use ultra-low sulfur diesel and/or to install retrofit devices to filter or oxidize vehicle exhaust (PSCAA 2004). Ecology and EPA support other voluntary programs that encourage diesel emission reductions. Reduced diesel emissions result in reduced emissions of fine particulates, nitrogen dioxide, and a combination of hazardous pollutants regulated as diesel particulate matter, a priority MSAT.

Over time, however, other factors have the potential to counteract this downward emission trend. For example, each year more motor vehicles travel on the region's roadways, and people in the area are making more trips of greater distance. Puget Sound Regional Council (PSRC 2004) estimates suggest that VOC and PM_{10} emissions will gradually increase between 2010 and 2030, while CO and NO_x emissions will decline between 2010 and 2020, then gradually increase by 2030. If emissions increase to a point where local air monitoring data indicate that concentrations are above the NAAQS, the region's attainment status could change, forcing more stringent constraints on travel and economic growth, and the possible loss of state transportation funds for highway expansion (PSRC 2001). See *What are conformity requirements?* below for a discussion of regulatory compliance and funding of transportation projects.

What are conformity requirements?

Transportation projects that are located in maintenance and nonattainment areas must meet the conformity requirements set forth in the federal Clean Air Act (implemented by EPA regulations 40 CFR Parts 51 and 93) and the Washington Clean Air Act. The SR 520, Medina to SR 202: Eastside Transit and HOV Project is subject to these conformity requirements because it 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 comply 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). The SR 520, Medina to SR 202: Eastside Transit and HOV Project is included in the RTP, *Destination 2030* (PSRC 2007), and in the 2007–2010 TIP (PSRC 2009). Both the RTP and TIP conform to the SIP. The TIP lists all current transportation projects in King, Kitsap, Pierce, and Snohomish counties. PSRC updates this list every 2 years, identifying the priority projects and the amount of funding they receive from federal, state, or local funds.

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 of 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.

4. Potential Effects of the Project

What methods were used to evaluate the project's potential effects on regional air quality?

Air quality is a resource without boundaries. In general, actions that affect air quality do so on a regional basis because 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 motor vehicles is released during the entire trip of each vehicle and disperses to areas beyond the limits of the proposed project.

The air quality discipline team performed an emissions burden analysis to evaluate emissions effects on a regional basis. The team calculated the emissions from vehicles in the region and compared them to the emission budget for the region, as presented in the Central Puget Sound Maintenance Plan for the National Ambient Carbon Monoxide Standard, 2004. This budget, established and approved as a part of the SIP, is the allowed pollutant emissions for motor vehicles within the region. Effects from mobile source air toxics (MSATs) are addressed qualitatively.

The team performed the emission burden analysis based on operating conditions in 2030, which is consistent with the regional emissions estimates calculated in *Destination 2030* (PSRC 2007). 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. The team obtained emission factors from the MOBILE6.2 model, in terms of grams per VMT.

The MOBILE6.2 model (U.S. EPA, version 6.2, September 24, 2003) calculates emission factors for gasoline-fueled and diesel highway motor vehicles. The model accounts for incorporation of Tier 2 standards for vehicle model years 2007 and newer. Input values were provided by PSRC. The transportation analysis data for this project provided the daily VMT.

What methods were used to evaluate the project's potential localized effects on air quality?

Localized effects can occur in areas where heavy traffic congestion occurs, causing vehicles to slow down or even stop for some period of time. This phenomenon results in more pollutants emitted from vehicles in the congested area. Under certain meteorological conditions, the pollutants can build up to unhealthy concentrations near or above the ambient air quality standards. The air quality discipline team performed an analysis at intersections with the greatest potential for localized effects, sometimes called a "hot spots" analysis. The team performed the analysis according to methodology prescribed in the federal conformity rule, the *Guidebook for Conformity, Air Quality Assistance for Nonattainment Areas* (KJS Associates, Inc. 1995) and EPA's *Guideline for Modeling Carbon Monoxide from Roadway Intersections* (U.S. EPA 1992). To avoid violation of the standards, the team's analysis used prescribed methodologies that are based on conservative assumptions designed to produce modeled results higher than what would likely occur under actual conditions.

Although many pollutants are present in vehicle exhaust, CO is the primary pollutant of regulatory concern for transportation projects. The analysis of localized effects involves estimating the CO emissions generated by vehicles and then using a dispersion model to estimate the ambient concentration at receptors placed around the intersections analyzed.

The team performed a screening analysis to identify the worst-case intersections for performing a CO hot spots analysis based on 2030 forecasts. AM and PM peak hour level of service (LOS) and traffic volume were provided by the traffic discipline team for each signalized intersection in the traffic study area. LOS values range from LOS A, indicating good operating conditions, to LOS F, indicating extreme congestion and long vehicle delays.

Level of service (LOS) is a measure of how well a freeway or local signalized intersection operates. For freeways, LOS is a measure of traffic congestion typically based on volume-to-capacity ratios. For local intersections, LOS is based on how long it takes a typical vehicle to clear the intersection. Other criteria may also be used to gauge the operating performance of transit, non-motorized, and other transportation modes.

Current EPA conformity rules indicate that air analysts must evaluate all signalized intersections affected by the project that are at (or will be at) LOS D, E, or F. AM and PM peak-hour LOS and traffic volume were provided by the traffic discipline team for each signalized intersection for the Build Alternative in 2030. All AM peak intersections had an LOS of A, B, or C; therefore, only PM data were evaluated. Exhibit 6 shows the PM LOS and peak-hour traffic volumes for all signalized intersections for the design year 2030.

Exhibit 6. 2030 PM Peak LOS and Volume for Signalized Intersections

Intersection	No Build LOS	No Build Volume (veh/hr)	Build LOS	Build Volume (veh/hr)
Bellevue Way NE / Lake Washington Blvd NE at Northup Way	E	4,820	E	5,030
Lake Washington Blvd NE at NE 38th Pl	F	3,510	F	3,710
Bellevue Way at SR 520 westbound on-ramp	N/A	3,970	B	4,010
Bellevue Way at SR 520 eastbound off-ramp	N/A	2,950	C	3,610
108th Ave NE at SR 520 eastbound on-ramp	N/A	1,820	C	1,990
108th Ave NE at Northup Way	F	4,330	F	4,670
108th Ave NE at SR 520 westbound ramps/transit and HOV ramps	D	3,540	E	3,660

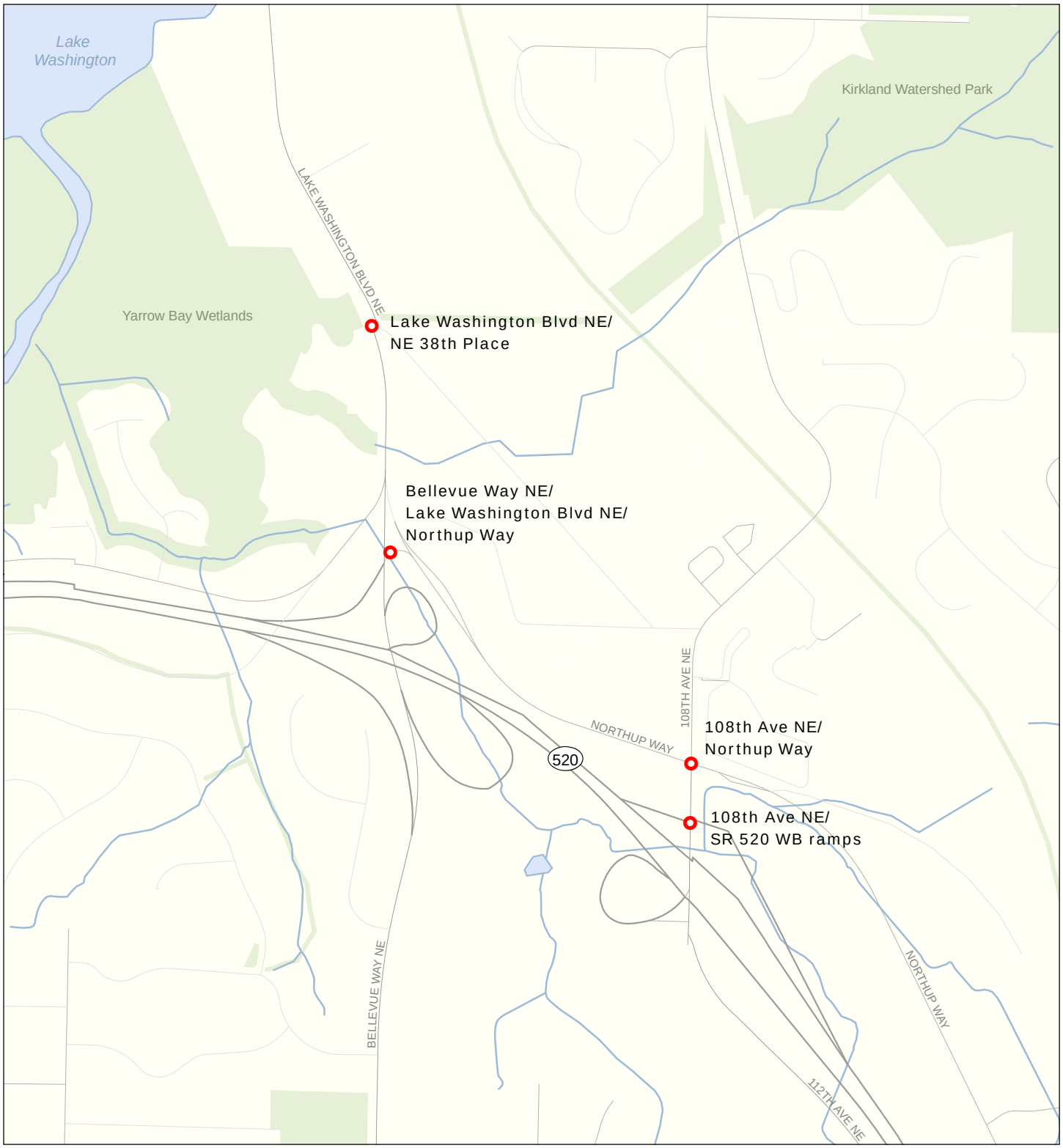
N/A: intersection is not signalized in the No Build scenario

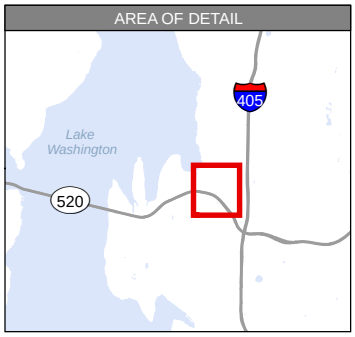
The screening analysis indicated that the five intersections with the worst case conditions are as follows:

- Bellevue Way NE and Lake Washington Boulevard NE
- Lake Washington Blvd NE and NE 38th Place
- 108th Ave NE and Northup Way
- 108th Ave NE and SR 520 westbound ramp

The four worst case intersections were evaluated using WSDOT's Washington State Intersections Screening Tool (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 2. A background value of 3 ppm was added to all model results, as recommended in guidance for suburban business areas (U.S. EPA 1992).

Existing conditions based on 2008 data were modeled for each intersection as well as Build and No Build scenarios for opening year 2014 and design year 2030. 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. Exhibit 7 shows the four intersections evaluated.





Intersection modeled with WASIST

Source: King County (2005) GIS Data (Street), King County (2007) GIS Data (Waterbody), CH2M HILL (2008) GIS Data (Park and Stream). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

N

0 125 250 500 Feet

Exhibit 7. **Modeled Intersections for CO Hot Spot Analysis**

Medina to SR 202: Eastside Transit and HOV Project

\\SIMBA\PROJ\PARAMETRIX\180171\GIS\MAPFILES\EA\AIRQUALITY\EA_DR_AQ_MONITORING.MXD 11/8/2009

How would the project permanently affect regional and local air quality?

Regional Air Quality

Exhibit 7 shows the emissions projected in the study area for the Build and No Build alternatives. Emissions are based on the regional travel demand model forecast data which, at a planning level, take into account the project's effects on transportation. The travel demand model assumptions are consistent with the local and regional land use planning assumptions (see the Transportation Discipline Report [WSDOT 2009b] for more details on the traffic modeling).

Exhibit 7 shows that emissions are almost identical for the Build Alternative compared with those for the No Build Alternative. Consequently, it is not anticipated that the project would worsen regional air quality compared with the No Build Alternative. The predicted VMT increase is so small that it does not noticeably affect the emissions estimates. The increase in VMT would also be offset by the emissions reductions that result from less congestion, i.e., less idling vehicles, which is also not reflected in Exhibit 8. As shown Exhibit 7, there would be no noticeable increase in the percentage of the CO emissions budget consumed by traffic in the study area.

Exhibit 8. Burden Emissions Analysis – Daily Project Emissions for the Study Area (tons per day)

Alternative	VMT	CO	CO % of SIP Budget	VOC	NOx	PM_{10}	$PM_{2.5}$
2030 No Build	13,803,200	175	**7%**	7.7	7.5	0.4	0.2
2030 Build	13,840,100	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 mph and the daily VMT from the Transportation Discipline Report (WSDOT 2009b). SIP inventory data are from 61 FR 53323 (October 11, 1996), which was established through the year 2010.

Mobile Source Air Toxic Emissions

The FHWA guidance outlines 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 a low potential for MSAT effects; or
3. Quantitative analysis to differentiate alternatives for projects with a higher potential for MSAT effects.

A project with no potential for meaningful MSAT effects includes projects that have no or negligible traffic effects. Most projects fall into the category of low potential for MSAT effects. Projects in this

category include those that serve to improve operations of highway, transit, or freight without adding substantial new capacity or without creating a facility that is likely to increase emissions. A project must meet two criteria to fall into the category of a higher potential for MSAT effects. The project must create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location, or it must create or add significant capacity to urban highways where the annual average daily traffic volume (AADT) is projected to be in the range of 140,000 to 150.000, or greater, by the design year.

The SR 520, Medina to SR 202: Eastside Transit and HOV Project is considered to have a low potential for MSAT effects because the projected AADT of 135,000 is under the threshold described above, and the effects were addressed qualitatively.

For the Build and No Build alternatives, the amount of MSAT emissions would be roughly proportional to the vehicle miles traveled, or VMT. Because the estimated VMT would increase by less than 0.3 percent, it is anticipated that there would be no appreciable difference in overall MSAT emissions due to the project. Also, regardless of the project, emissions would likely be lower than present levels in the design year as a result of EPA's national control programs 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 9.

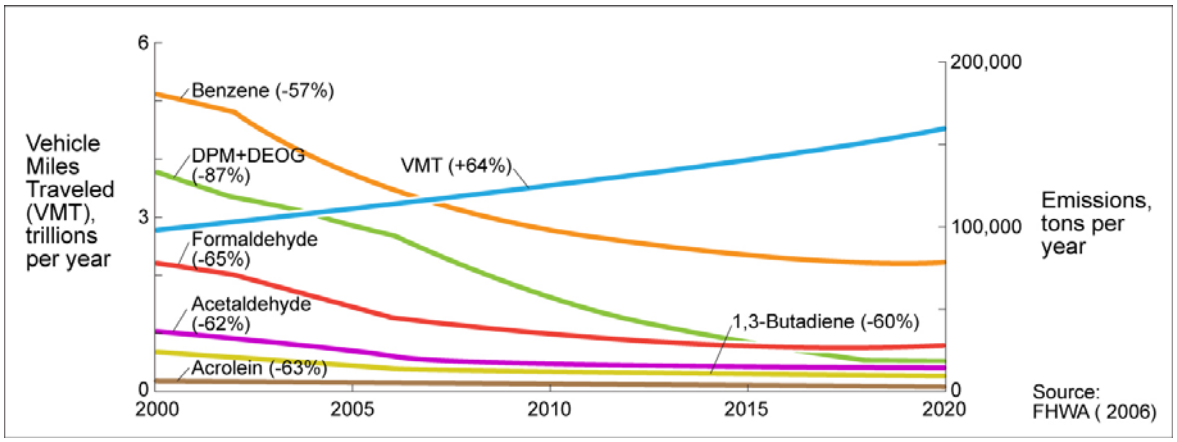


Exhibit 9. Annual Vehicle Miles Traveled vs. Mobile Source Air Toxics Emissions

The team analyzed the results for criteria pollutants and MSAT emissions, finding that the roadway improvements proposed by this project would not adversely affect air quality. The roadway improvements would have an overall beneficial effect in the region by improving traffic flow and reducing idling time.

Local Air Quality

One of the primary objectives of the project is to enhance travel time reliability, mobility, access, and safety for transit and HOVs. This 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 spot analysis at affected intersections to determine whether the emissions would cause a substantial effect.

Exhibits 10 and 11 summarize the WASIST modeling results for CO (see Attachment 2 for WASIST output). The modeled concentrations are below the 1-hour and 8-hour NAAQS for the Build Alternative. 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.

Existing conditions based on 2008 data were modeled for each intersection as well as Build and No Build scenarios for opening year 2014 and design year 2030. The modeled intersections represent worst case conditions. Other intersections in the study area that were not modeled are assumed to have lower CO concentrations than the intersections presented.

Exhibit 10. Maximum 1-Hour Carbon Monoxide Concentrations (ppm)

Intersection Name	2008 Existing	2014 No Build	2014 Build	2030 No Build	2030 Build
Bellevue Way NE / Lake Washington Blvd NE at Northup Way	8.4	7.0	7.0	6.2	6.2
Lake Washington Blvd NE at NE 38th Pl	7.2	6.3	6.3	5.5	5.7
108th Ave NE at Northup Way	7.6	6.3	8.0	5.7	5.9
108th Ave NE at SR 520 westbound ramps/transit and HOV ramps	7.3	6.1	6.0	5.6	5.4
CO NAAQS	35 ppm				

Note: All concentrations include a background concentration of 3 ppm.

Exhibit 11. Maximum 8-Hour Carbon Monoxide Concentrations (ppm)

Intersection Name	2008 Existing	2014 No Build	2014 Build	2030 No Build	2030 Build
Bellevue Way NE / Lake Washington Blvd NE at Northup Way	6.8	5.8	5.8	5.2	5.2
Lake Washington Blvd NE at NE 38th Pl	5.9	5.3	5.3	4.8	4.9
108th Ave NE at Northup Way	6.2	5.3	6.5	4.9	5.0
108th Ave NE at SR 520 westbound ramps/transit and HOV ramps	6.0	5.2	5.1	4.8	4.7
CO NAAQS	9 ppm				

Note: All concentrations include a background concentration of 3 ppm.

The Build Alternative would result in higher concentrations at Lake Washington Boulevard NE at NE 38th Place and 108th Avenue NE at Northrup Way compared with the No Build Alternative.

Although model results predicted an increase in CO concentrations for the Build Alternative, the project is not expected to cause a violation of the NAAQS for any analysis year.

Does the project meet project-level conformity requirements?

Because it is not anticipated that the project would create any new violations of the CO standard, nor increase the frequency of an existing violation, it was determined to conform with the purpose of the current SIP and the requirements of the Clean Air Act and the Washington Clean Air Act. The proposed project is included in the RTP, *Destination 2030* (PSRC 2007), and in the 2007–2010 TIP (PSRC 2009). The RTP and the TIP meet the conformity requirements identified by federal and state regulations for CO.

How would project construction temporarily affect air quality?

The following section provides a qualitative discussion of the project's effect on air quality due to construction. The air quality discipline team's analysis evaluated potential effects on air quality for the Build Alternative. The No Build Alternative was not evaluated because it would have no construction effects.

During construction of roadway projects, soil-disturbing activities, heavy-duty equipment, commuting workers, and the laying of asphalt may generate emissions that can temporarily affect air quality. Typical sources of emissions during construction of transportation projects include the following:

- Fugitive dust generated during excavation, grading, loading, and unloading activities.
- Dust generated during demolition of structures and pavement.
- Engine exhaust emissions from construction vehicles, worker vehicles, and diesel fuel-fired construction equipment.
- Increased motor vehicle emissions associated with increased traffic congestion during construction.
- VOC and odorous compounds emitted during asphalt paving.

The regulated pollutants of concern for the first two source types are $PM_{2.5}$ and PM_{10}. Engine and motor vehicle exhaust would result in emissions of VOCs, NO_x, PM_{10}, $PM_{2.5}$, and MSATs.

Would the project have any indirect or cumulative effects on regional air quality?

No indirect effects have been identified on air quality.

Air emissions from increased traffic capacity would have a cumulative effect on regional air quality. There may be other traffic improvement activities in the study area which, combined with this project,

would have the cumulative effect of improving traffic flow, reducing delay, and reducing emissions from motor vehicles using these roadways, compared with what would occur under the No Build Alternative. Air quality in the vicinity of the project should not be significantly affected by the cumulative effects of this and other projects.

5. Mitigation

How will negative effects be avoided or minimized?

No permanent effects on air quality are anticipated as a result of this project; therefore, no mitigation is proposed. 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, and driving of vehicles and machinery on and off the site, and through wind events. WSDOT will comply with the procedures outlined in the Memorandum of Agreement between WSDOT and the PSCAA for controlling fugitive dust (WSDOT 2008). Controlling fugitive dust emissions may require some of the following actions:

- Spraying exposed soil with water or other suppressant to reduce emissions of PM_{10} and increase deposition of particulate matter.
- Using phased development to keep disturbed areas to a minimum.
- Using wind fencing to reduce disturbance to soils.
- Minimizing dust emissions during transport of fill material or soil by wetting down or by ensuring adequate freeboard (space from the top of the material to the top of the truck bed) on trucks.
- Promptly cleaning up spills of transported material on public roads.
- Scheduling work tasks to minimize disruption of the existing vehicle traffic on streets.
- Restricting traffic onsite to reduce soil upheaval and the transport of material to roadways.
- Locating construction equipment and truck staging areas away from sensitive receptors, as practical, and in consideration of potential effects on other resources.
- Providing wheel washers to remove particulate matter that would otherwise be carried offsite by vehicles to decrease deposition of particulate matter on area roadways.
- Covering dirt, gravel, and debris piles, as needed, to reduce dust and windblown debris.
- Minimizing odors onsite by covering loads of hot asphalt.

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

Federal regulations have been adopted that 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 will require reduction of the sulfur content of diesel fuel from its current level of 500 ppm to 15 ppm—a 97-percent reduction—and they will result in a decrease in both SO_2 and PM emissions from these engines. WSDOT would encourage contractors to reduce idling time of equipment and vehicles and to use newer construction equipment or equipment with add-on emission controls.

How could the project compensate for unavoidable negative effects?

Because no permanent negative effects on air quality are anticipated as a result of this project, no compensation is proposed.

6. Conclusion

The project team concluded that project construction for the Build Alternative could temporarily affect air quality as a result of fugitive dust from excavation and earth moving activities and emissions from diesel-fueled construction equipment. Mitigation measures would be used to minimize fugitive dust emissions. After the project is completed, many of the effects would be positive under the Build Alternative. The Build Alternative would improve the capacity of the roadway, resulting in lower vehicle emissions through reduction in traffic congestion.

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.

Attachment 1

Characteristics and Health Effects of Pollutants

Ozone and Volatile Organic Compounds (VOCs)

VOCs come from vehicle exhaust, paint thinners, solvents, and other petroleum-based products. VOCs and nitrogen oxides react in the presence of sunlight to form ozone. 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.

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 hydrocarbons, 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. Preschool 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)

Particulate matter is composed of 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 (*Transportation Conformity: A Basic Guide for State and Local Officials*. Federal Highway Administration. Revised June 19, 2000).

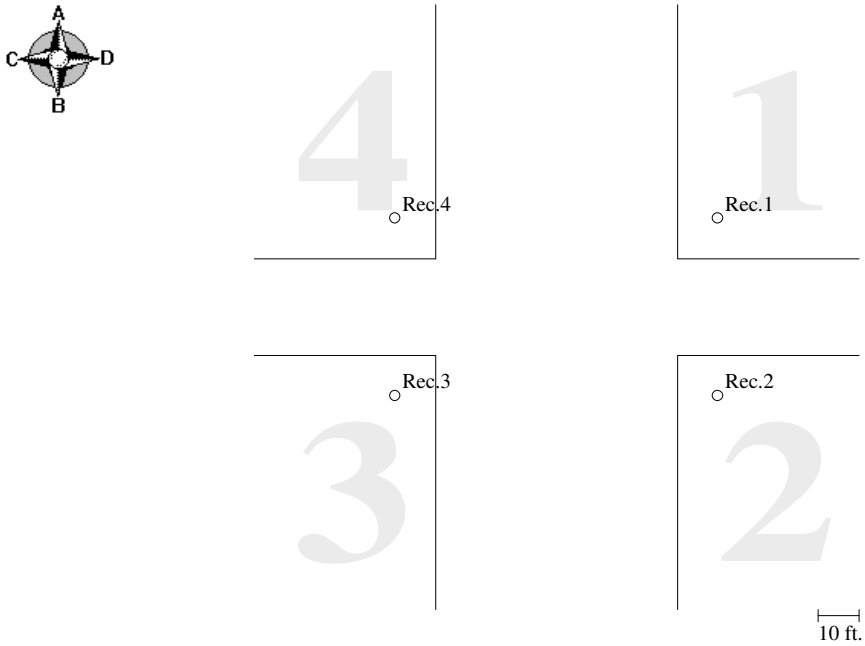
Attachment 2

Washington State Intersections Screening Tool (WASIST) Results

Washington State Intersection Screening Tool 1.0

07-21-09
10:37 AM
SR520 CO hotspot

Description: **74 NE Point Dr. & Lk Wash Blvd 2008 EX**
Performed by: **JF - CH2M Hill**
916-286-03456 - jfrohnin@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/2 Lt Turns**
Street Names: **A-B: A-B Street C-D: C-D 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**	**8.4**	**6.8**	**Pass**
2	2	10	10	7.5	6.2	Pass
3	3	10	10	7.6	6.2	Pass
4	4	10	10	7.3	6.0	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 **3.0** 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

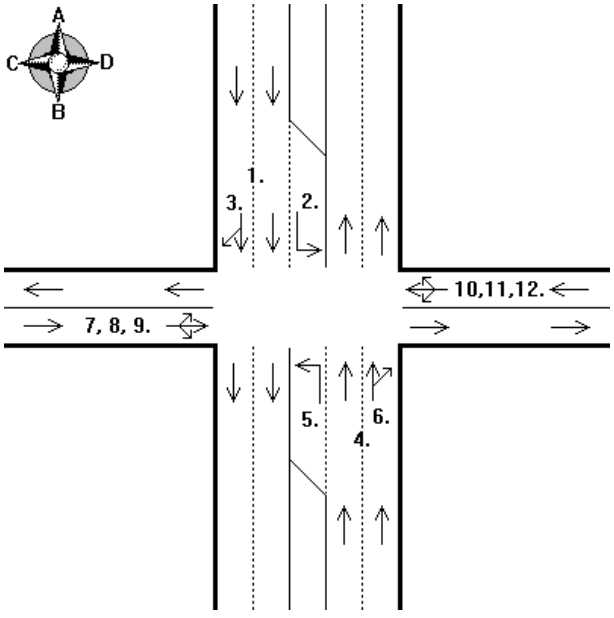
SR520 CO hotspot

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	770
2	A-D Left Turn	260
3	A-C Right Turn	10
4	B-A Thru	990
5	B-C Left Turn	30
6	B-D Right Turn	350
7	C-D Thru	170
8	C-A Left Turn	80
9	C-B Right Turn	180
10	D-C Thru	230
11	D-B Left Turn	310
12	D-A Right Turn	340



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	**35**	**18.79**
Leg D	**35**	**18.79**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**---**
Leg D Thru & Rt	**84**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 1.0

USER COMMENTS

SR520 CO hotspot

User Comments:

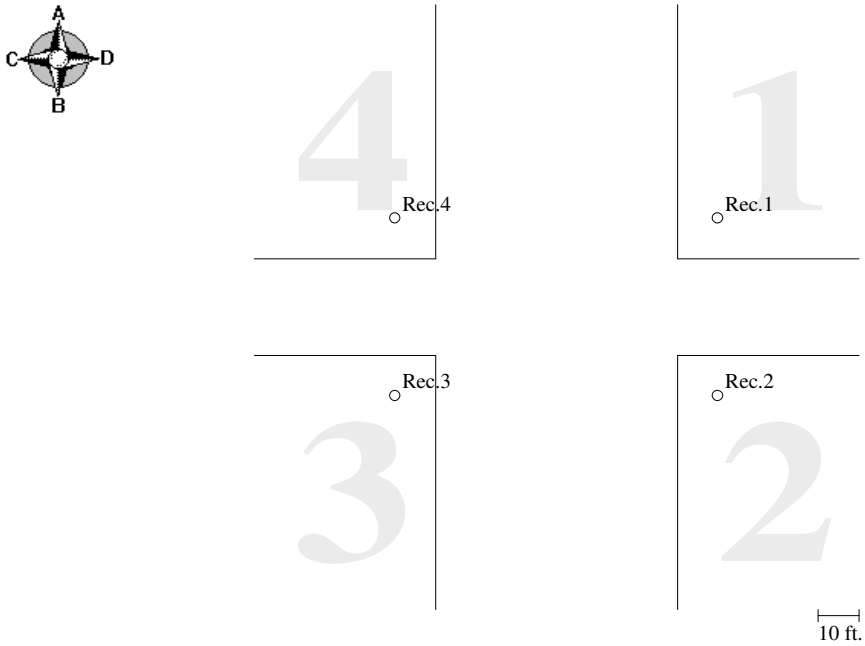
1. **< blank >**

Washington State Intersection Screening Tool 1.0

07-21-09
10:39 AM

SR520 CO hotspot

Description: **74 NE Point Dr. & Lk Wash Blvd Build 2014**
Performed by: **JF - CH2M Hill**
916-286-03456 - jfrohnin@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/2 Lt Turns**
Street Names: **A-B: A-B Street C-D: C-D 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**	**7.0**	**5.8**	**Pass**
2	2	10	10	6.4	5.4	Pass
3	3	10	10	6.2	5.2	Pass
4	4	10	10	6.1	5.2	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 **3.0** 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

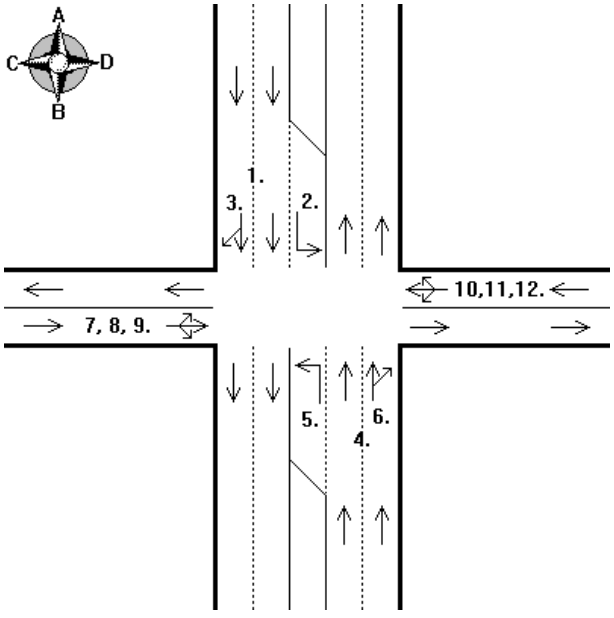
SR520 CO hotspot

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	810
2	A-D Left Turn	320
3	A-C Right Turn	10
4	B-A Thru	1020
5	B-C Left Turn	35
6	B-D Right Turn	335
7	C-D Thru	190
8	C-A Left Turn	90
9	C-B Right Turn	200
10	D-C Thru	255
11	D-B Left Turn	335
12	D-A Right Turn	440



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2014**
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): **79.16**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**13.20**
Leg B	**30**	**13.20**
Leg C	**35**	**13.21**
Leg D	**35**	**13.21**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**---**
Leg D Thru & Rt	**84**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 1.0

USER COMMENTS

SR520 CO hotspot

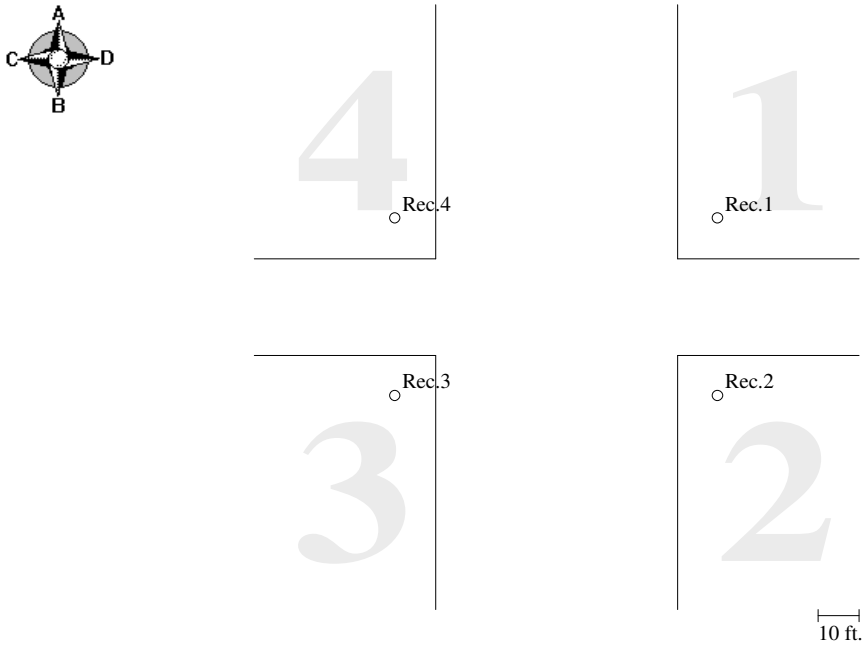
User Comments:

1. **< blank >**

Washington State Intersection Screening Tool 1.0

07-17-09
04:00 PM
SR520 CO hotspot

Description: **74 NE Point Dr. & Lk Wash Blvd NoBuild 2014**
Performed by: **JF - CH2M Hill**
916-286-03456 - jfrohnin@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/2 Lt Turns**
Street Names: **A-B: A-B Street C-D: C-D 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**	**7.0**	**5.8**	**Pass**
2	2	10	10	6.3	5.3	Pass
3	3	10	10	6.3	5.3	Pass
4	4	10	10	6.1	5.2	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 **3.0** 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

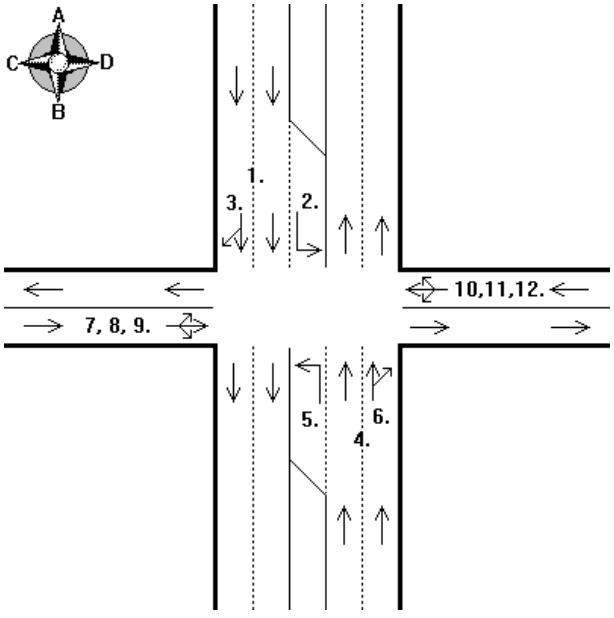
SR520 CO hotspot

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	825
2	A-D Left Turn	285
3	A-C Right Turn	10
4	B-A Thru	1065
5	B-C Left Turn	35
6	B-D Right Turn	380
7	C-D Thru	185
8	C-A Left Turn	90
9	C-B Right Turn	195
10	D-C Thru	250
11	D-B Left Turn	330
12	D-A Right Turn	370



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2014**
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): **79.16**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**13.20**
Leg B	**30**	**13.20**
Leg C	**35**	**13.21**
Leg D	**35**	**13.21**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**---**
Leg D Thru & Rt	**84**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 1.0

USER COMMENTS

SR520 CO hotspot

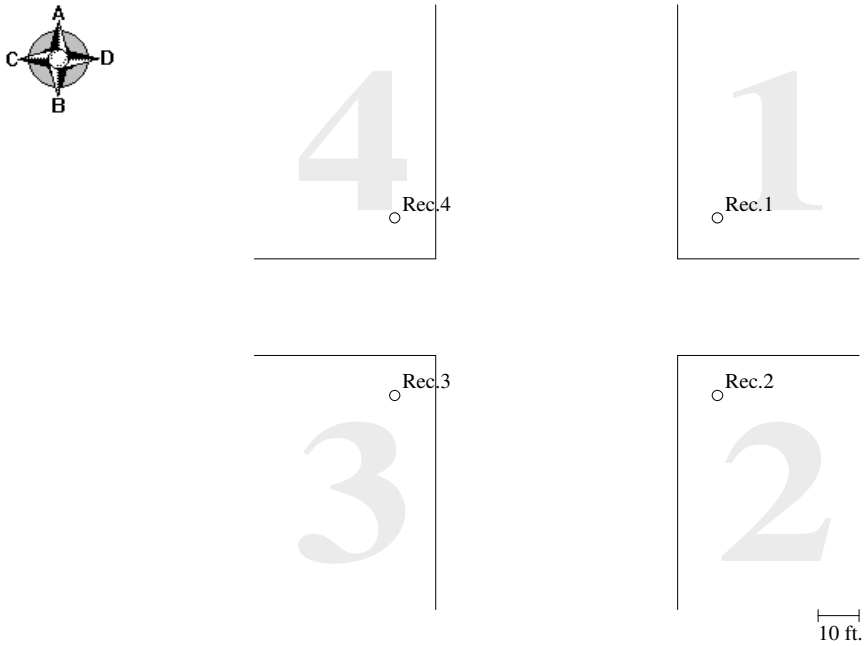
User Comments:

1. **< blank >**

Washington State Intersection Screening Tool 1.0

07-21-09
10:41 AM
SR520 CO hotspot

Description: **74 NE Point Dr. & Lk Wash Blvd Build 2030**
Performed by: **JF - CH2M Hill**
916-286-03456 - jfrohnin@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/2 Lt Turns**
Street Names: **A-B: A-B Street C-D: C-D 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**	**6.2**	**5.2**	**Pass**
2	2	10	10	5.9	5.0	Pass
3	3	10	10	5.9	5.0	Pass
4	4	10	10	5.6	4.8	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 **3.0** 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

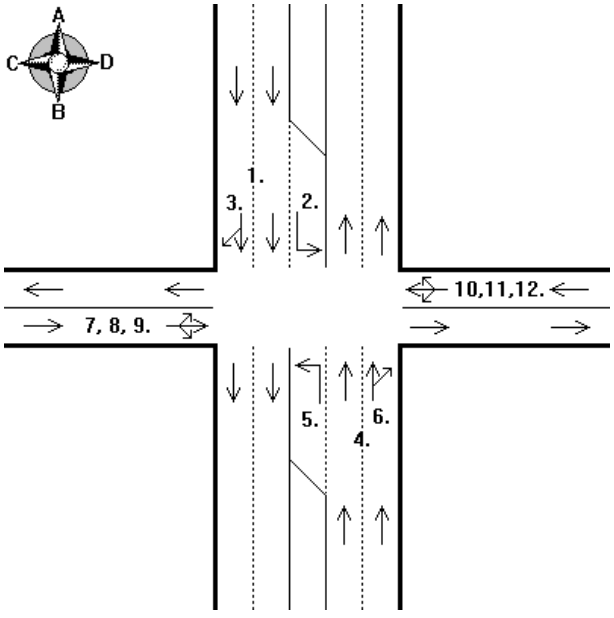
SR520 CO hotspot

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	990
2	A-D Left Turn	400
3	A-C Right Turn	10
4	B-A Thru	1260
5	B-C Left Turn	40
6	B-D Right Turn	450
7	C-D Thru	240
8	C-A Left Turn	110
9	C-B Right Turn	250
10	D-C Thru	320
11	D-B Left Turn	410
12	D-A Right Turn	550



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	**35**	**9.54**
Leg D	**35**	**9.54**

***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): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**---**
Leg D Thru & Rt	**84**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 1.0

USER COMMENTS

SR520 CO hotspot

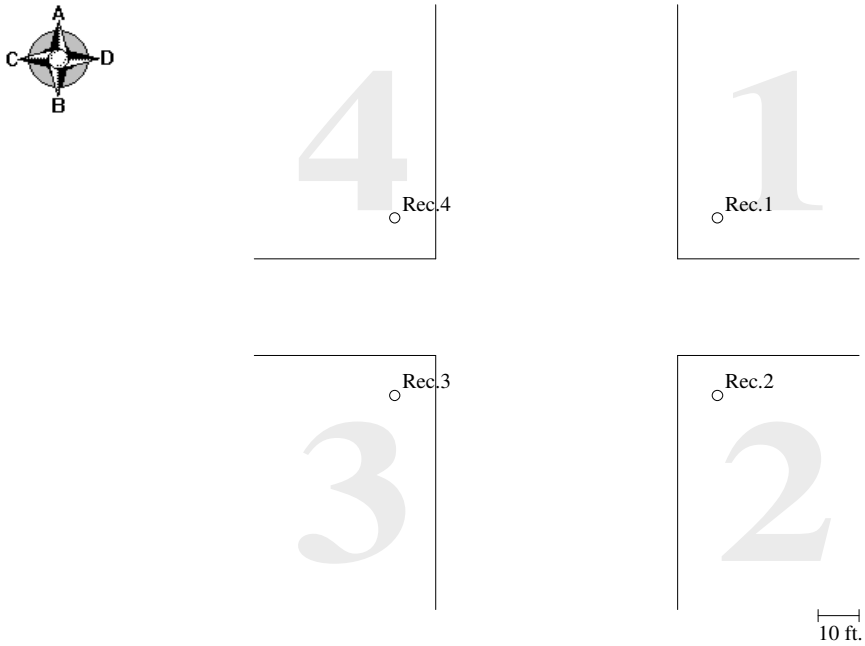
User Comments:

1. **< blank >**

Washington State Intersection Screening Tool 1.0

07-17-09
04:05 PM
SR520 CO hotspot

Description: **74 NE Point Dr. & Lk Wash Blvd NO Build 2030**
Performed by: **JF - CH2M Hill**
916-286-03456 - jfrohnin@ch2m.com
Intersection Type: **Four-Way Intersection, 4 x 2 w/2 Lt Turns**
Street Names: **A-B: A-B Street C-D: C-D 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**	**6.2**	**5.2**	**Pass**
2	2	10	10	5.9	5.0	Pass
3	3	10	10	5.9	5.0	Pass
4	4	10	10	5.6	4.8	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 **3.0** 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

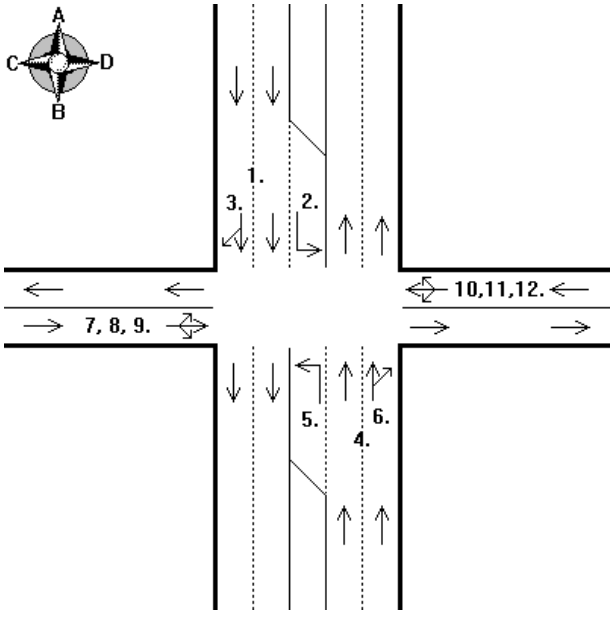
SR520 CO hotspot

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	970
2	A-D Left Turn	350
3	A-C Right Turn	10
4	B-A Thru	1270
5	B-C Left Turn	40
6	B-D Right Turn	460
7	C-D Thru	230
8	C-A Left Turn	110
9	C-B Right Turn	230
10	D-C Thru	310
11	D-B Left Turn	390
12	D-A Right Turn	450



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	**35**	**9.54**
Leg D	**35**	**9.54**

***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): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**---**
Leg D Thru & Rt	**84**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 1.0

USER COMMENTS

SR520 CO hotspot

User Comments:

1. **< blank >**

Washington State Intersection Screening Tool 1.0

07-17-09

04:21 PM

SR 520 CO Hotspot

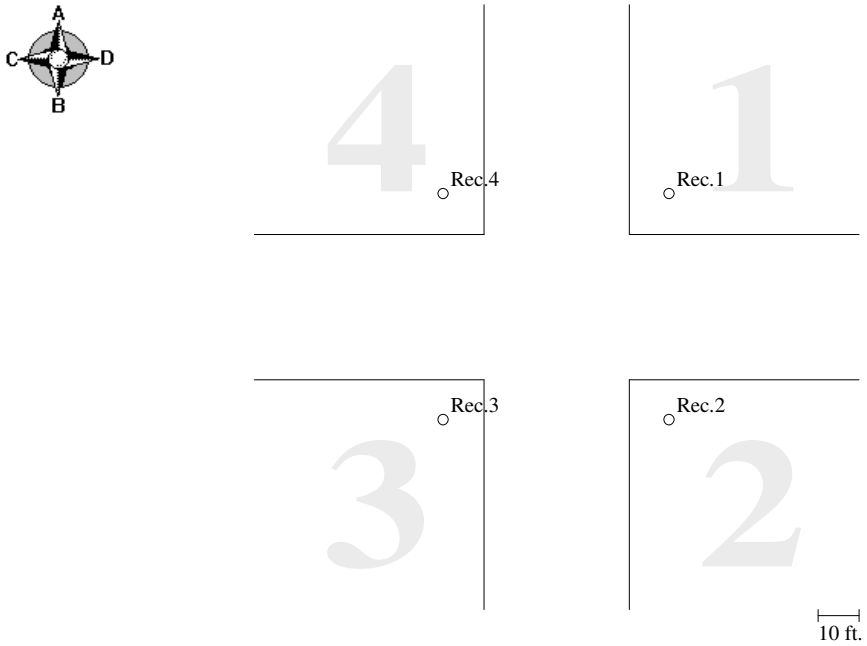
Description: **78 Northup Way and 108th Ave NE EX 2008**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**

Street Names: **A-B: A-B Street C-D: C-D 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**	**8.0**	**6.5**	**Pass**
2	2	10	10	7.7	6.3	Pass
3	3	10	10	7.5	6.2	Pass
4	4	10	10	7.8	6.4	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 **3.0** 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

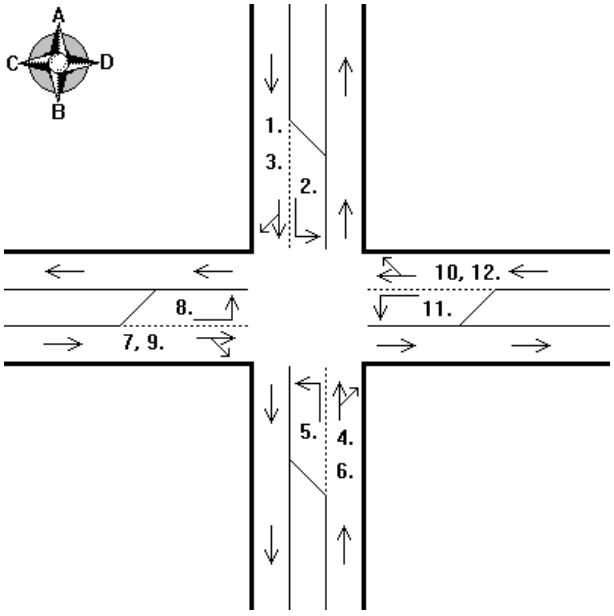
SR 520 CO Hotspot

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	365
2	A-D Left Turn	155
3	A-C Right Turn	55
4	B-A Thru	445
5	B-C Left Turn	550
6	B-D Right Turn	100
7	C-D Thru	250
8	C-A Left Turn	240
9	C-B Right Turn	375
10	D-C Thru	430
11	D-B Left Turn	425
12	D-A Right Turn	345



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	**35**	**18.79**
Leg D	**35**	**18.79**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 1.0

USER COMMENTS

SR 520 CO Hotspot

User Comments:

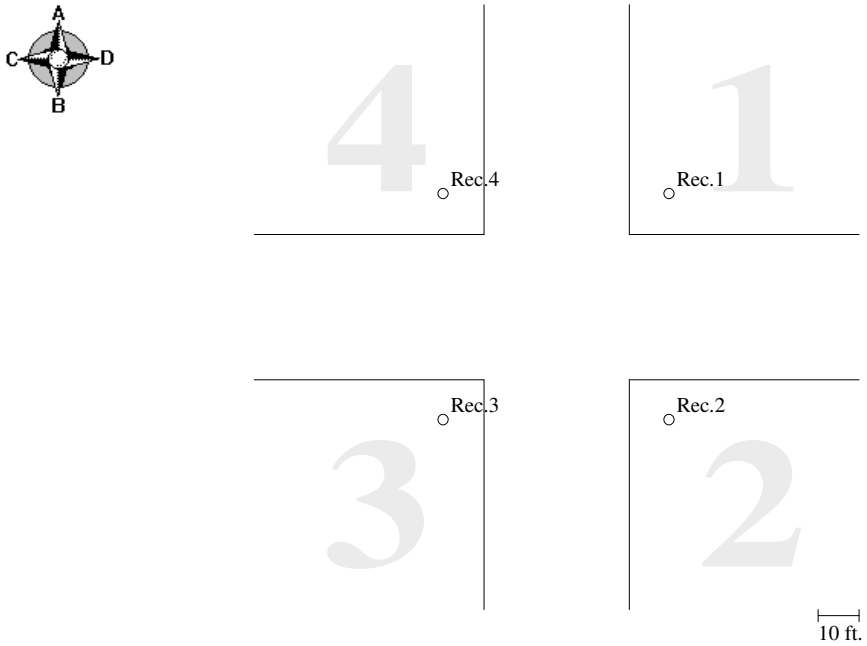
1. **< blank >**

Washington State Intersection Screening Tool 1.0

07-17-09
04:35 PM

SR 520 CO Hotspot

Description: **78 Northup Way and 108th Ave NE 2030 Build**
Performed by: **JF - CH2M Hill**
916-286-0345 - jfrohnin@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**
Street Names: **A-B: A-B Street C-D: C-D 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	5.8	5.0	Pass
2	2	10	10	5.7	4.9	Pass
3	3	10	10	5.7	4.9	Pass
4	4	10	10	5.9	5.0	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 **3.0** 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

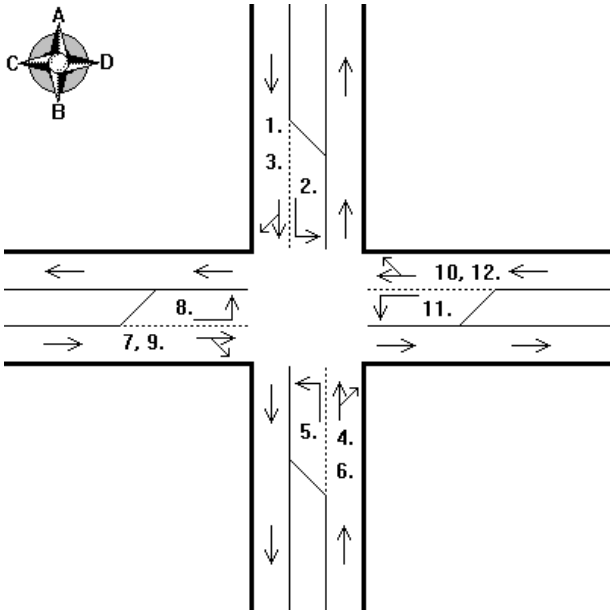
SR 520 CO Hotspot

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	460
2	A-D Left Turn	200
3	A-C Right Turn	70
4	B-A Thru	560
5	B-C Left Turn	680
6	B-D Right Turn	120
7	C-D Thru	310
8	C-A Left Turn	300
9	C-B Right Turn	470
10	D-C Thru	530
11	D-B Left Turn	540
12	D-A Right Turn	430



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	**35**	**9.54**
Leg D	**35**	**9.54**

***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): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 1.0

USER COMMENTS

SR 520 CO Hotspot

User Comments:

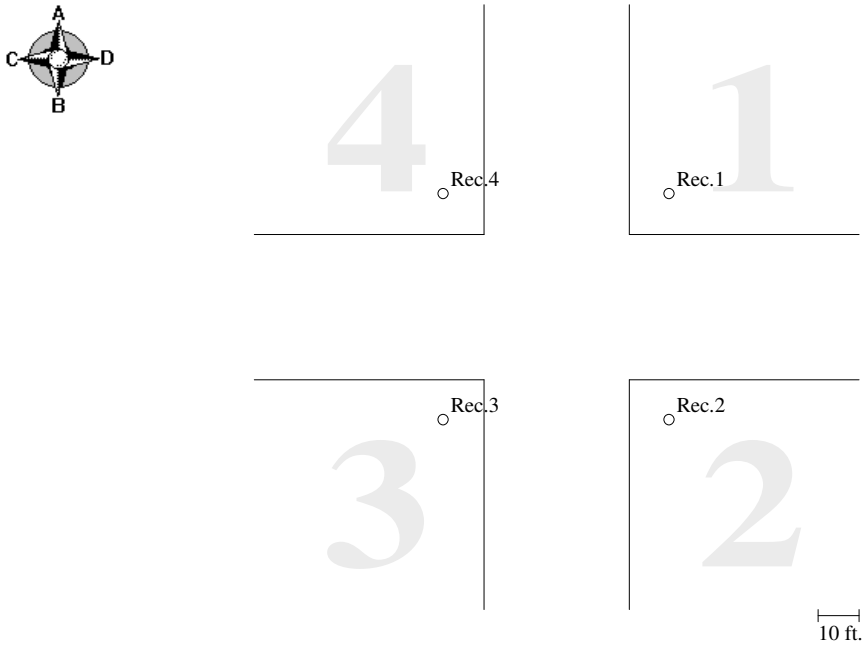
1. **< blank >**

Washington State Intersection Screening Tool 1.0

07-21-09
10:33 AM

SR 520 CO Hotspot

Description: **78 Northup Way and 108th Ave NE 2008 EX**
Performed by: **JF - CH2M Hill**
916-286-0345 - jfrohnin@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**
Street Names: **A-B: A-B Street C-D: C-D 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**	**7.6**	**6.2**	**Pass**
2	2	10	10	7.3	6.0	Pass
3	3	10	10	7.1	5.9	Pass
4	4	10	10	7.4	6.1	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 **3.0** 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

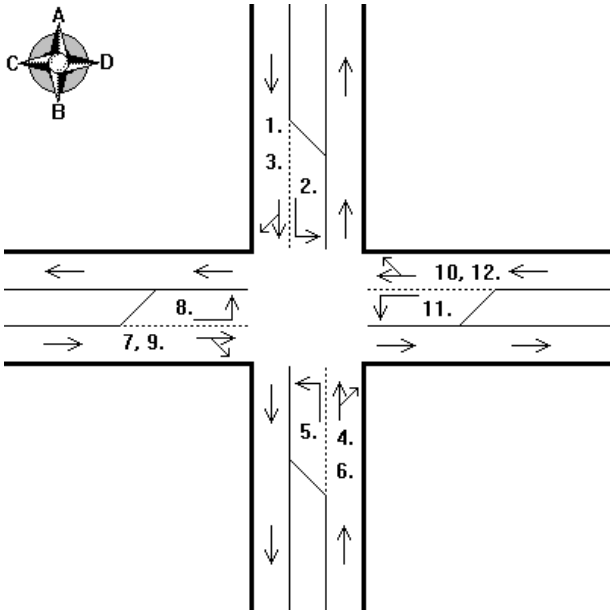
SR 520 CO Hotspot

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	320
2	A-D Left Turn	140
3	A-C Right Turn	60
4	B-A Thru	390
5	B-C Left Turn	410
6	B-D Right Turn	80
7	C-D Thru	240
8	C-A Left Turn	230
9	C-B Right Turn	310
10	D-C Thru	410
11	D-B Left Turn	360
12	D-A Right Turn	310



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	**35**	**18.79**
Leg D	**35**	**18.79**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 1.0

USER COMMENTS

SR 520 CO Hotspot

User Comments:

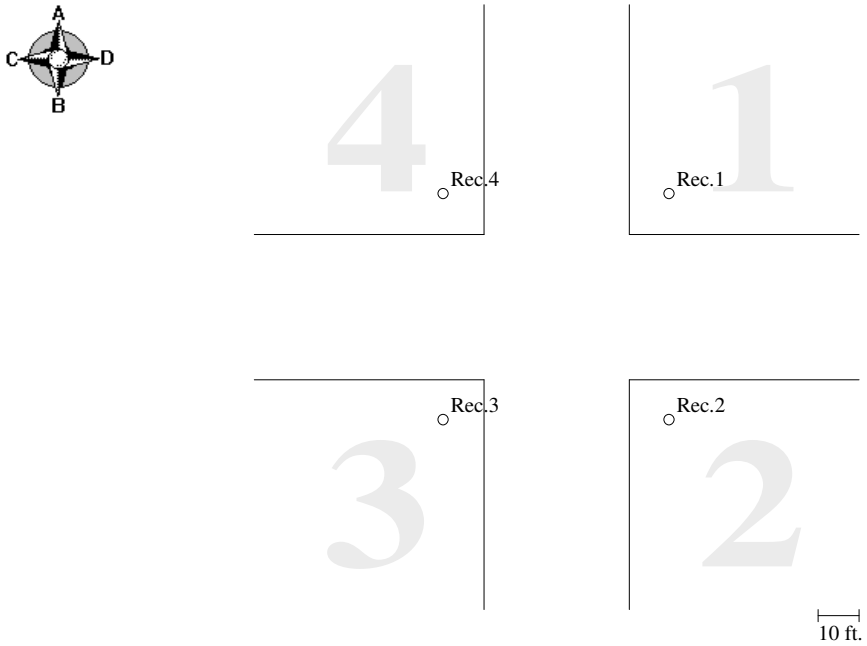
1. **< blank >**

Washington State Intersection Screening Tool 1.0

07-17-09
04:50 PM

SR 520 CO Hotspot

Description: **78 Northup Way and 108th Ave NE 2014 No Build**
Performed by: **JF - CH2M Hill**
916-286-0345 - jfrohnin@ch2m.com
Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**
Street Names: **A-B: A-B Street C-D: C-D 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	6.2	5.2	Pass
2	2	10	10	6.2	5.2	Pass
3	3	10	10	6.0	5.1	Pass
4	4	10	10	6.3	5.3	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 **3.0** 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

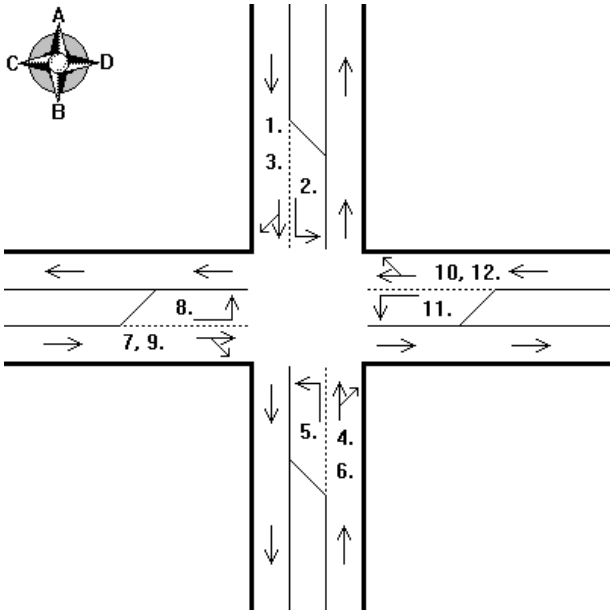
SR 520 CO Hotspot

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	355
2	A-D Left Turn	155
3	A-C Right Turn	65
4	B-A Thru	425
5	B-C Left Turn	445
6	B-D Right Turn	85
7	C-D Thru	260
8	C-A Left Turn	245
9	C-B Right Turn	345
10	D-C Thru	445
11	D-B Left Turn	400
12	D-A Right Turn	335



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2014**
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): **79.16**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**13.20**
Leg B	**30**	**13.20**
Leg C	**35**	**13.21**
Leg D	**35**	**13.21**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 1.0

USER COMMENTS

SR 520 CO Hotspot

User Comments:

1. **< blank >**

Washington State Intersection Screening Tool 1.0

07-17-09

04:38 PM

SR 520 CO Hotspot

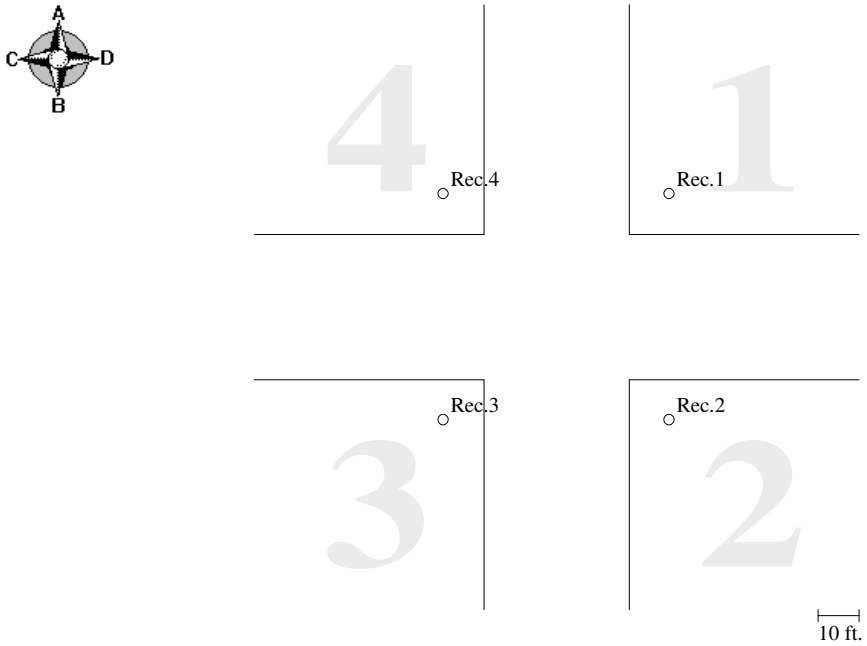
Description: **78 Northup Way and 108th Ave NE 2030 No Build**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**

Street Names: **A-B: A-B Street C-D: C-D 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	5.6	4.8	Pass
2	2	10	10	5.4	4.7	Pass
3	3	10	10	5.4	4.7	Pass
4	4	10	10	5.7	4.9	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 **3.0** 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

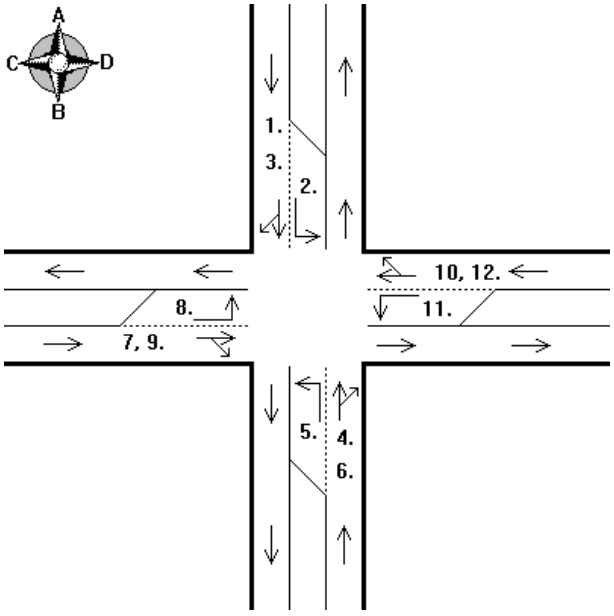
SR 520 CO Hotspot

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	450
2	A-D Left Turn	190
3	A-C Right Turn	70
4	B-A Thru	520
5	B-C Left Turn	530
6	B-D Right Turn	100
7	C-D Thru	310
8	C-A Left Turn	290
9	C-B Right Turn	430
10	D-C Thru	530
11	D-B Left Turn	500
12	D-A Right Turn	410



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	**35**	**9.54**
Leg D	**35**	**9.54**

***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): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 1.0

USER COMMENTS

SR 520 CO Hotspot

User Comments:

1. **< blank >**

Washington State Intersection Screening Tool 1.0

07-20-09

11:01 AM

SR520 Hotspot Modeling

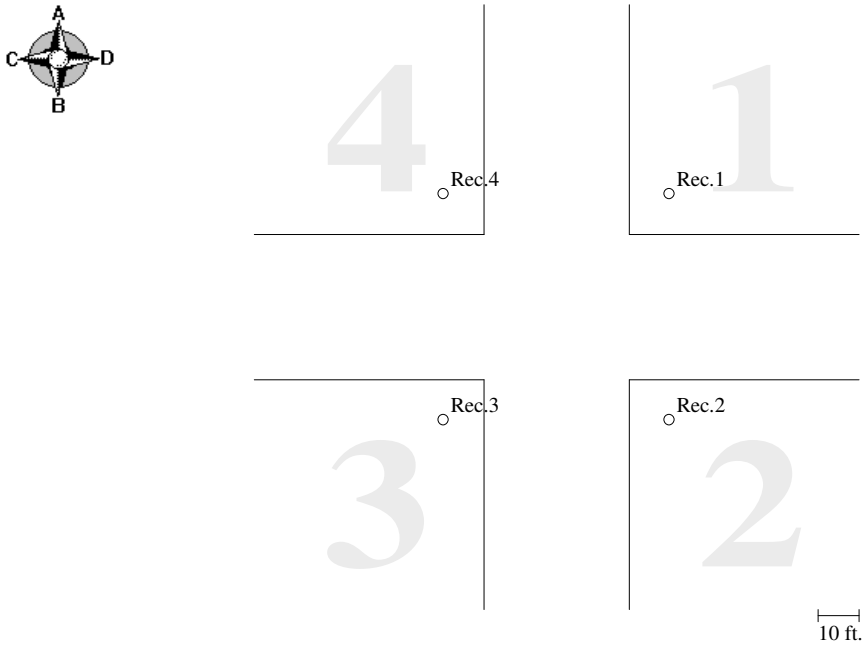
Description: **200 NE 38th pl & lk Wash Blvd. 2008 EX**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**

Street Names: **A-B: A-B Street C-D: C-D 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**	**7.2**	**5.9**	**Pass**
2	2	10	10	6.9	5.7	Pass
3	3	10	10	6.7	5.6	Pass
4	4	10	10	6.1	5.2	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 **3.0** 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

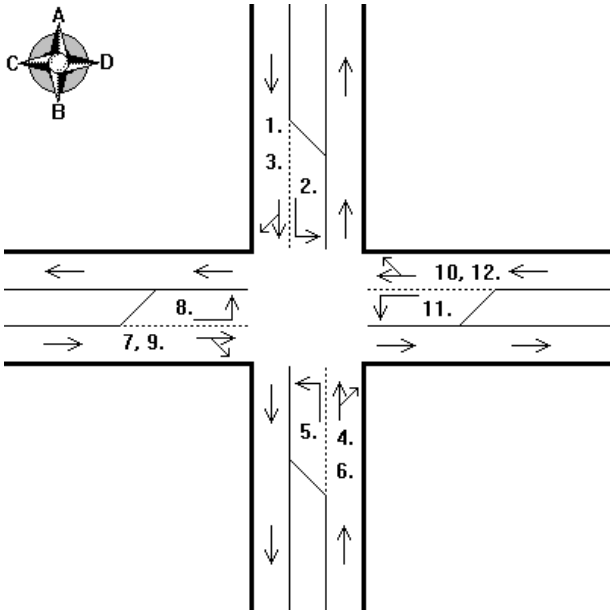
SR520 Hotspot Modeling

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	840
2	A-D Left Turn	70
3	A-C Right Turn	10
4	B-A Thru	1270
5	B-C Left Turn	30
6	B-D Right Turn	110
7	C-D Thru	10
8	C-A Left Turn	20
9	C-B Right Turn	40
10	D-C Thru	20
11	D-B Left Turn	160
12	D-A Right Turn	150



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	**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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

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Washington State Intersection Screening Tool 1.0

07-20-09

11:03 AM

SR520 Hotspot Modeling

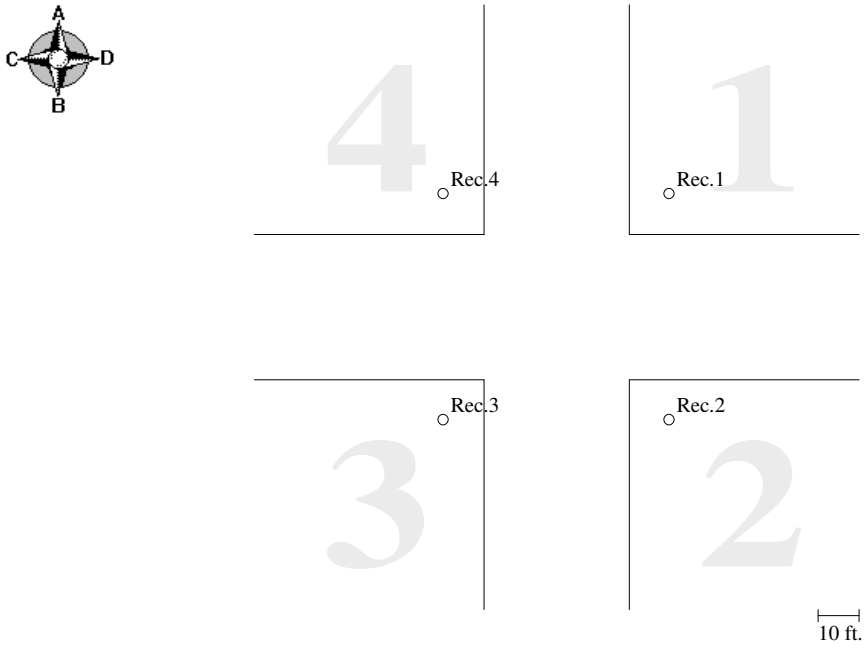
Description: **200 NE 38th pl & lk Wash Blvd. 2014 Build**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**

Street Names: **A-B: A-B Street C-D: C-D 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	6.3	5.3	Pass
2	2	10	10	5.9	5.0	Pass
3	3	10	10	5.6	4.8	Pass
4	4	10	10	5.3	4.6	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 **3.0** 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

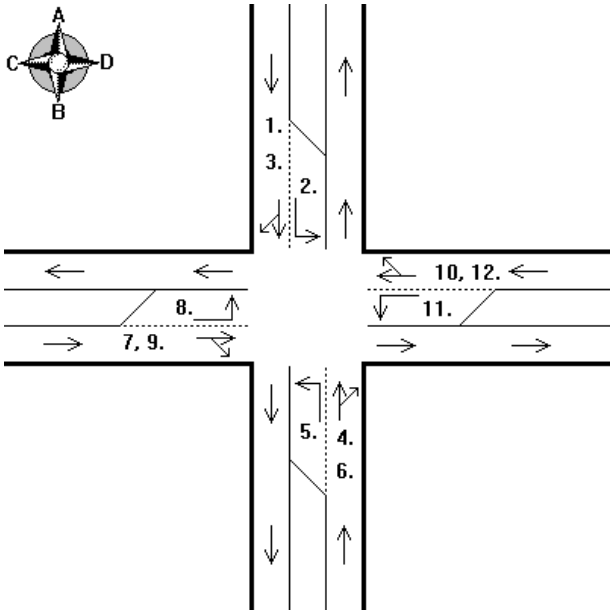
SR520 Hotspot Modeling

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	920
2	A-D Left Turn	80
3	A-C Right Turn	10
4	B-A Thru	1395
5	B-C Left Turn	35
6	B-D Right Turn	120
7	C-D Thru	10
8	C-A Left Turn	24
9	C-B Right Turn	45
10	D-C Thru	25
11	D-B Left Turn	175
12	D-A Right Turn	165



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2014**
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): **79.16**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**13.20**
Leg B	**30**	**13.20**
Leg C	**25**	**13.42**
Leg D	**25**	**13.42**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

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Washington State Intersection Screening Tool 1.0

07-20-09

11:05 AM

SR520 Hotspot Modeling

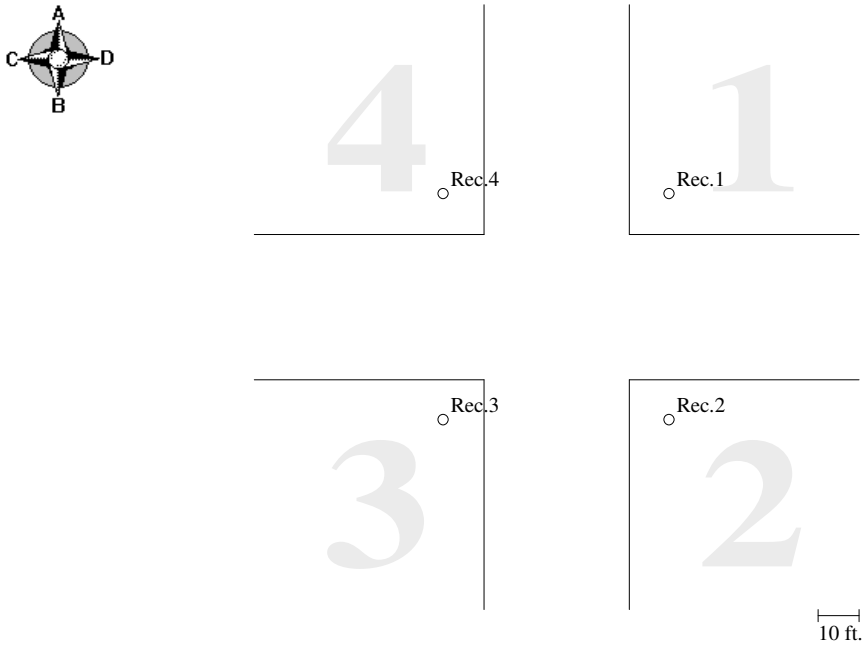
Description: **200 NE 38th pl & lk Wash Blvd. 2014 No Build**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**

Street Names: **A-B: A-B Street C-D: C-D 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**	**6.3**	**5.3**	**Pass**
2	2	10	10	5.9	5.0	Pass
3	3	10	10	5.6	4.8	Pass
4	4	10	10	5.3	4.6	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 **3.0** 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

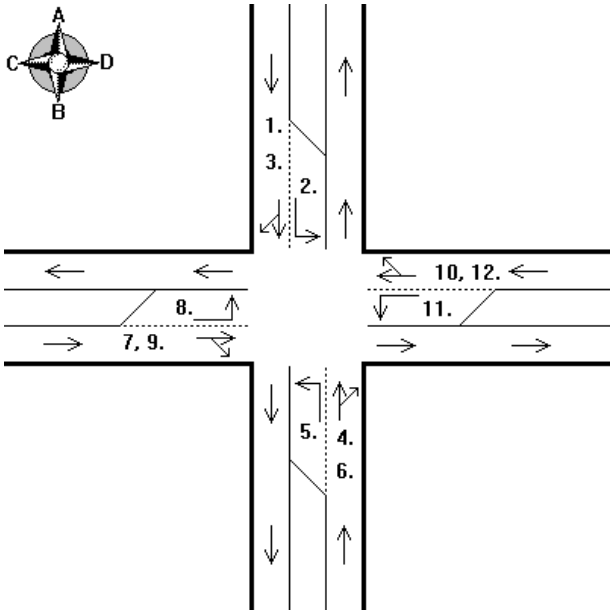
SR520 Hotspot Modeling

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	905
2	A-D Left Turn	75
3	A-C Right Turn	10
4	B-A Thru	1370
5	B-C Left Turn	35
6	B-D Right Turn	120
7	C-D Thru	10
8	C-A Left Turn	24
9	C-B Right Turn	45
10	D-C Thru	25
11	D-B Left Turn	170
12	D-A Right Turn	165



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2014**
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): **79.16**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**13.20**
Leg B	**30**	**13.20**
Leg C	**25**	**13.42**
Leg D	**25**	**13.42**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

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Washington State Intersection Screening Tool 1.0

07-20-09

11:06 AM

SR520 Hotspot Modeling

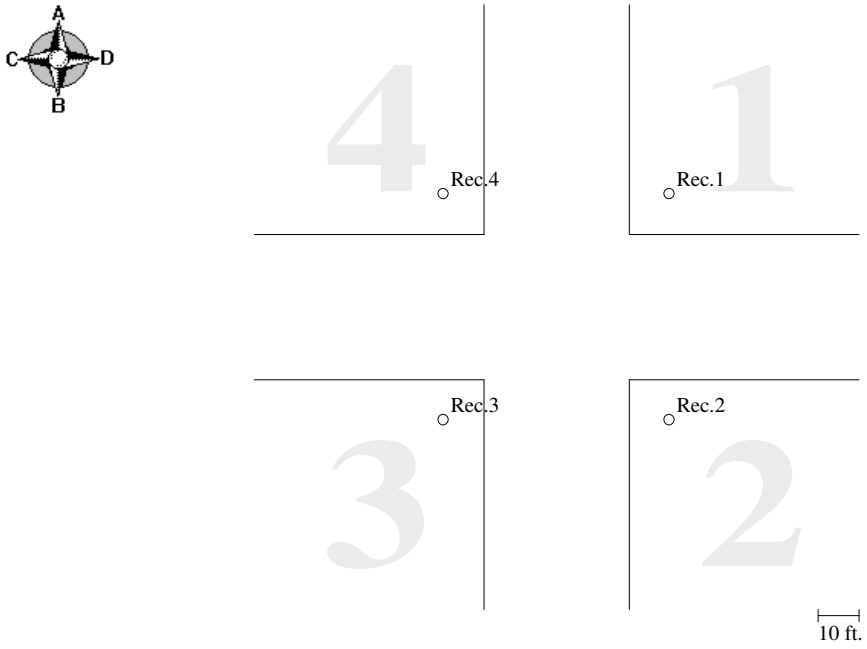
Description: **200 NE 38th pl & lk Wash Blvd. 2030 Build**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**

Street Names: **A-B: A-B Street C-D: C-D 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**	**5.7**	**4.9**	**Pass**
2	2	10	10	5.4	4.7	Pass
3	3	10	10	5.2	4.5	Pass
4	4	10	10	4.9	4.3	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 **3.0** 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

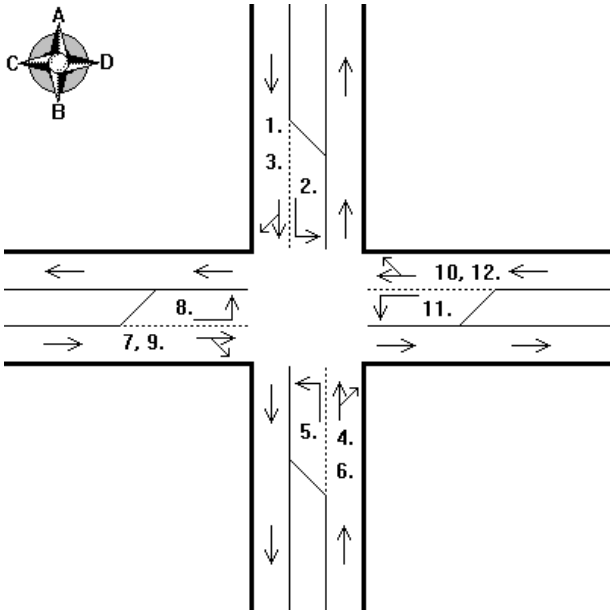
SR520 Hotspot Modeling

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1130
2	A-D Left Turn	100
3	A-C Right Turn	10
4	B-A Thru	1730
5	B-C Left Turn	40
6	B-D Right Turn	150
7	C-D Thru	10
8	C-A Left Turn	30
9	C-B Right Turn	60
10	D-C Thru	30
11	D-B Left Turn	210
12	D-A Right Turn	210



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): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

1. < blank >

Washington State Intersection Screening Tool 1.0

07-20-09

11:08 AM

SR520 Hotspot Modeling

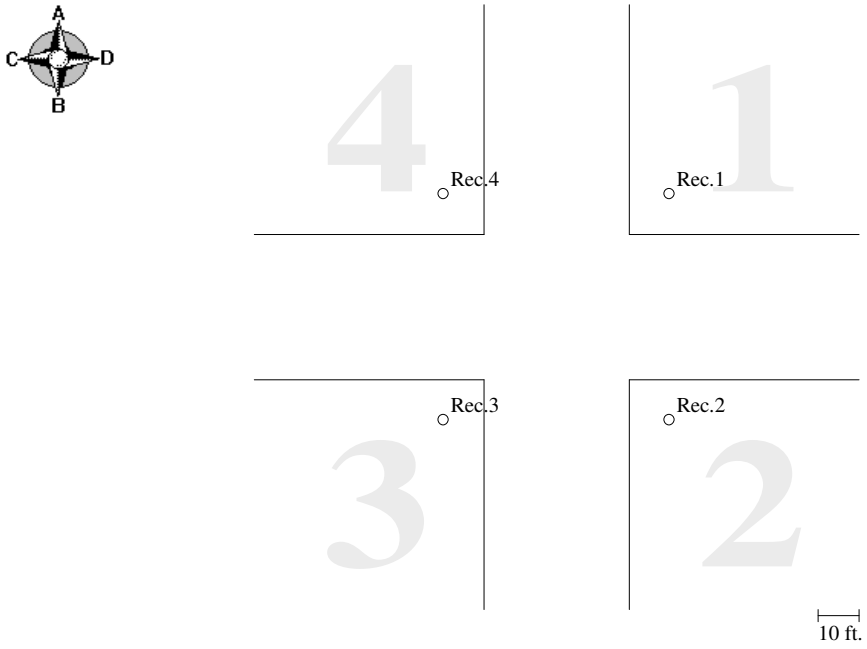
Description: **200 NE 38th pl & lk Wash Blvd. 2030 No Build**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**

Street Names: **A-B: A-B Street C-D: C-D 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**	**5.5**	**4.8**	**Pass**
2	2	10	10	5.4	4.7	Pass
3	3	10	10	5.2	4.5	Pass
4	4	10	10	4.8	4.3	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 **3.0** 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

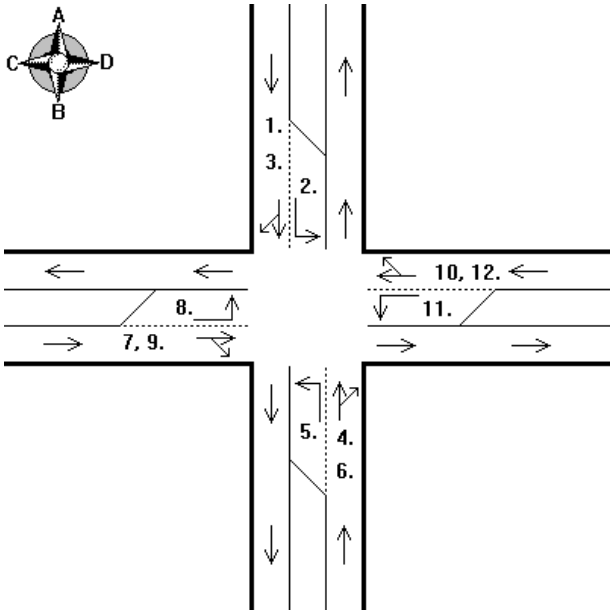
SR520 Hotspot Modeling

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1070
2	A-D Left Turn	90
3	A-C Right Turn	10
4	B-A Thru	1640
5	B-C Left Turn	40
6	B-D Right Turn	140
7	C-D Thru	10
8	C-A Left Turn	30
9	C-B Right Turn	50
10	D-C Thru	30
11	D-B Left Turn	200
12	D-A Right Turn	200



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): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

1. < blank >

Washington State Intersection Screening Tool 1.0

07-20-09

11:49 AM

SR520 Hotspot Modeling

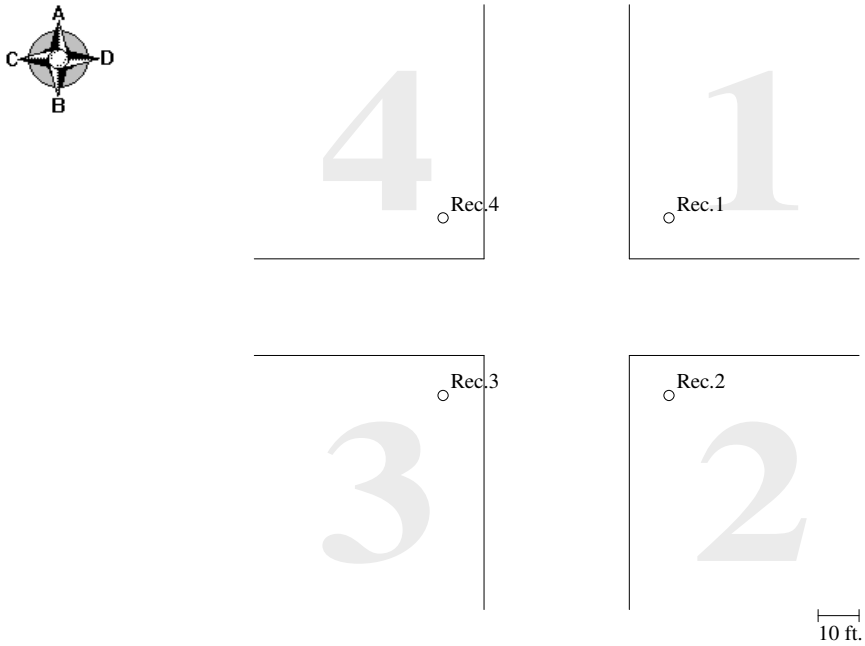
Description: **302 WB onramp and 108th Ave NE 2008 EX**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **One-way Streets, 2 x 2 w/1 Lt Turn**

Street Names: **A-B: A-B Street C-D: C-D 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**	**7.3**	**6.0**	**Pass**
2	2	10	10	7.2	5.9	Pass
3	3	10	10	6.7	5.6	Pass
4	4	10	10	6.7	5.6	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 **3.0** 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

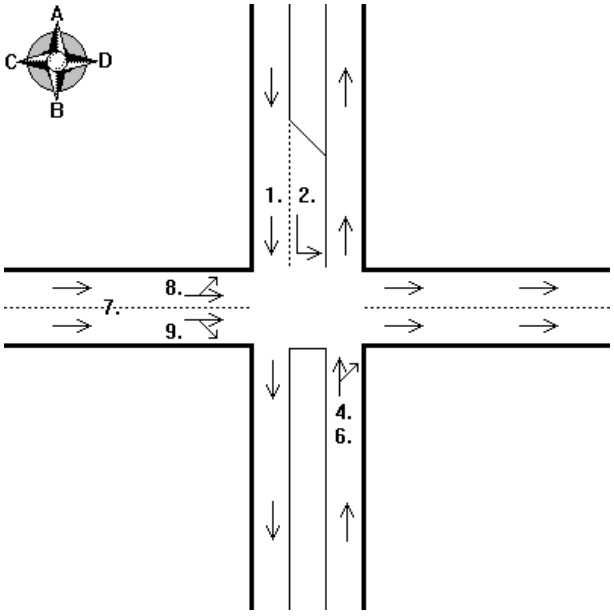
SR520 Hotspot Modeling

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	350
2	A-D Left Turn	80
3	A-C Right Turn	-----
4	B-A Thru	690
5	B-C Left Turn	-----
6	B-D Right Turn	290
7	C-D Thru	2
8	C-A Left Turn	700
9	C-B Right Turn	530
10	D-C Thru	-----
11	D-B Left Turn	-----
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	**30**	**18.80**
Leg B	**30**	**18.80**
Leg C	**30**	**18.80**
Leg D	**---**	**-----**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**---**
Leg C Thru & Rt	**84**
Leg C Left Turn	**---**
Leg D Thru & Rt	**---**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

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Washington State Intersection Screening Tool 1.0

07-21-09

11:32 AM

SR 520 Hotspot Modeling

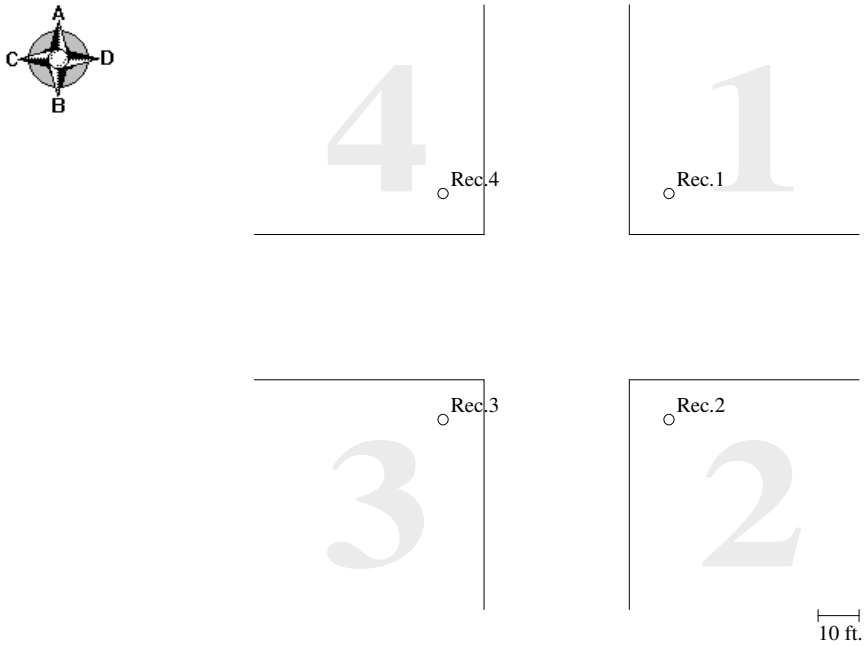
Description: **302 WB onramp and 108th Ave NE 2014 Build**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**

Street Names: **A-B: A-B Street C-D: C-D 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**	**6.0**	**5.1**	**Pass**
2	2	10	10	5.4	4.7	Pass
3	3	10	10	5.6	4.8	Pass
4	4	10	10	5.9	5.0	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 **3.0** 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

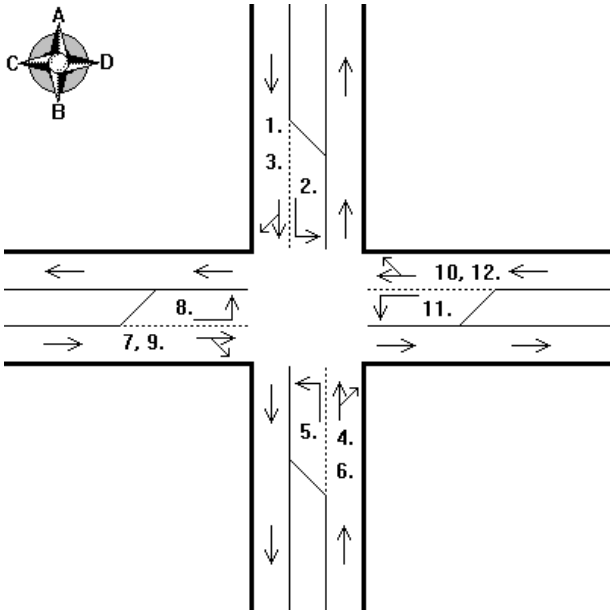
SR 520 Hotspot Modeling

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	785
2	A-D Left Turn	2
3	A-C Right Turn	130
4	B-A Thru	420
5	B-C Left Turn	95
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	95
9	C-B Right Turn	55
10	D-C Thru	2
11	D-B Left Turn	770
12	D-A Right Turn	580



CO Emission Factors Based On:

Location: **Western Washington - KING County**
CO Maint. Area: **Puget Sound**
I/M Program: **Yes**
Model Year: **2014**
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): **79.16**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**13.20**
Leg B	**30**	**13.20**
Leg C	**30**	**13.20**
Leg D	**30**	**13.20**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

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Washington State Intersection Screening Tool 1.0

07-20-09

11:53 AM

SR520 Hotspot Modeling

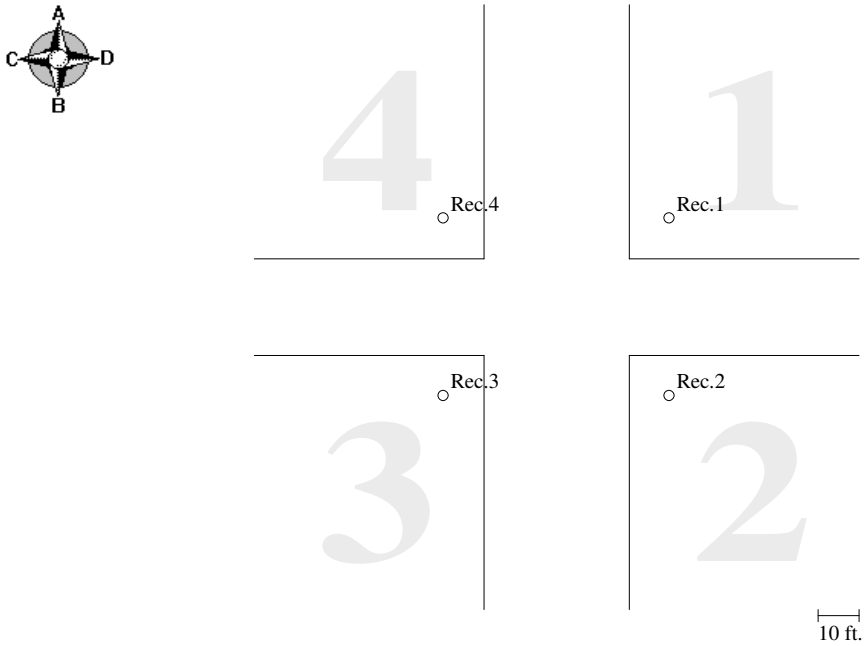
Description: **302 WB onramp and 108th Ave NE 2014 No Build**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **One-way Streets, 2 x 2 w/1 Lt Turn**

Street Names: **A-B: A-B Street C-D: C-D 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**	**6.1**	**5.2**	**Pass**
2	2	10	10	6.1	5.2	Pass
3	3	10	10	5.8	5.0	Pass
4	4	10	10	5.8	5.0	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 **3.0** 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

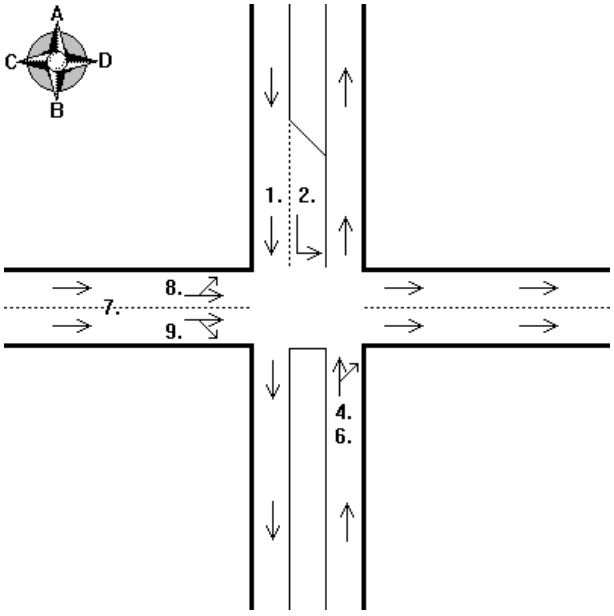
SR520 Hotspot Modeling

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	385
2	A-D Left Turn	85
3	A-C Right Turn	-----
4	B-A Thru	785
5	B-C Left Turn	-----
6	B-D Right Turn	305
7	C-D Thru	2
8	C-A Left Turn	755
9	C-B Right Turn	575
10	D-C Thru	-----
11	D-B Left Turn	-----
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: **2014**
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): **79.16**

Approach	Speed (mph)	EF (g/mile)
Leg A	**30**	**13.20**
Leg B	**30**	**13.20**
Leg C	**30**	**13.20**
Leg D	**---**	**-----**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**---**
Leg C Thru & Rt	**84**
Leg C Left Turn	**---**
Leg D Thru & Rt	**---**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

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Washington State Intersection Screening Tool 1.0

07-21-09

11:34 AM

SR 520 Hotspot Modeling

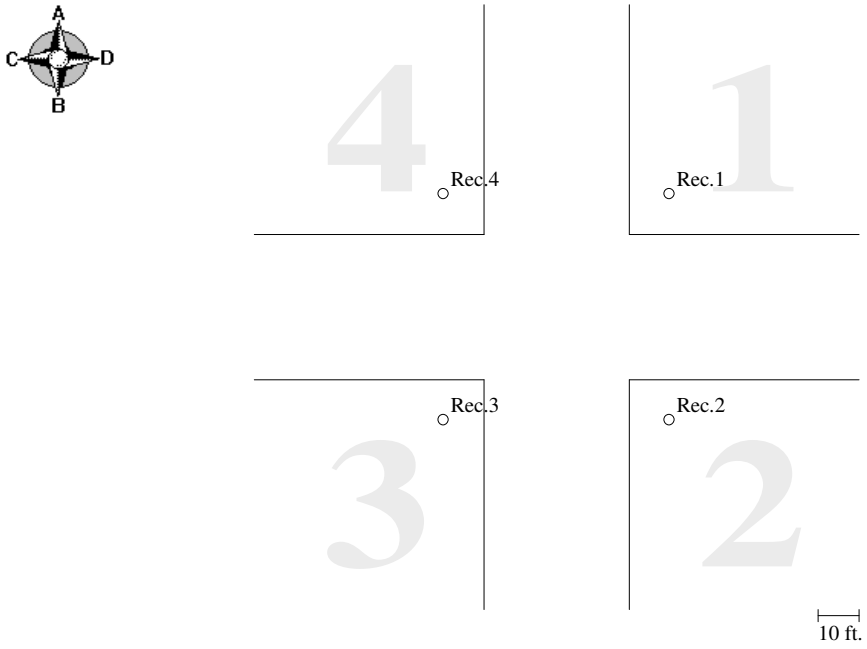
Description: **302 WB onramp and 108th Ave NE 2030 Build**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **Four-Way Intersection, 2 x 2 w/4 Lt Turns**

Street Names: **A-B: A-B Street C-D: C-D 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	5.2	4.5	Pass
2	2	10	10	4.9	4.3	Pass
3	3	10	10	5.2	4.5	Pass
4	4	10	10	5.4	4.7	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 **3.0** 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

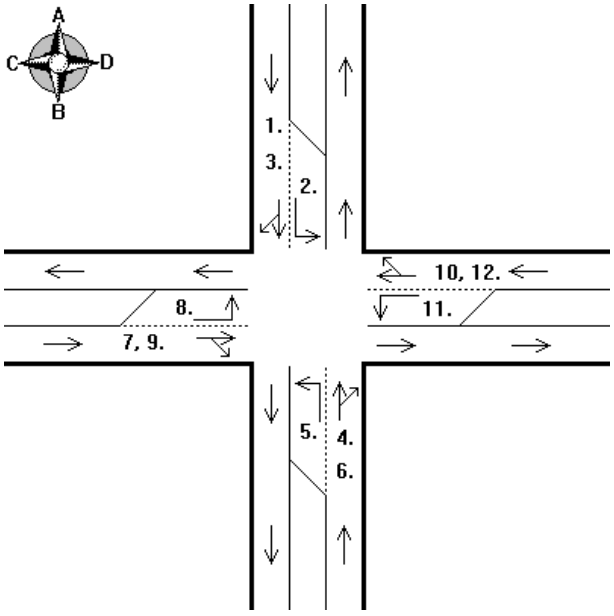
SR 520 Hotspot Modeling

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1030
2	A-D Left Turn	2
3	A-C Right Turn	150
4	B-A Thru	530
5	B-C Left Turn	110
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	110
9	C-B Right Turn	60
10	D-C Thru	2
11	D-B Left Turn	950
12	D-A Right Turn	720



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): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**102**
Leg C Thru & Rt	**84**
Leg C Left Turn	**102**
Leg D Thru & Rt	**84**
Leg D Left Turn	**102**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

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Washington State Intersection Screening Tool 1.0

07-20-09

01:06 PM

SR520 Hotspot Modeling

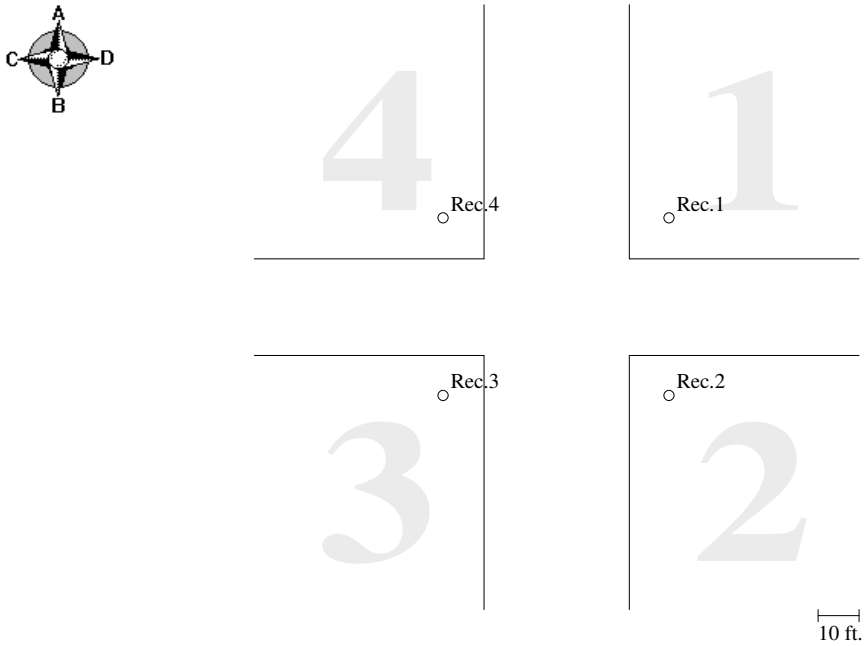
Description: **302 WB onramp and 108th Ave NE 2030 No Build**

Performed by: **JF - CH2M Hill**

916-286-0345 - jfrohnin@ch2m.com

Intersection Type: **One-way Streets, 2 x 2 w/1 Lt Turn**

Street Names: **A-B: A-B Street C-D: C-D 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**	**5.6**	**4.8**	**Pass**
2	2	10	10	5.4	4.7	Pass
3	3	10	10	5.4	4.7	Pass
4	4	10	10	5.3	4.6	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 **3.0** 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

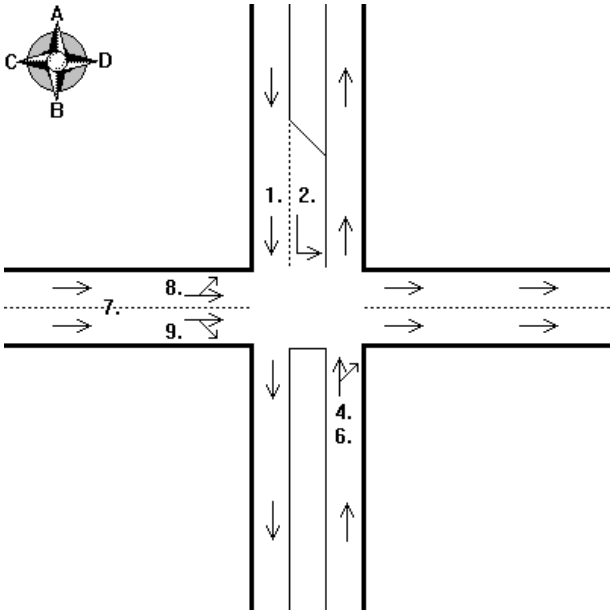
SR520 Hotspot Modeling

Intersection Data:

Predominant Surroundings: **Single Family Residential**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	470
2	A-D Left Turn	90
3	A-C Right Turn	-----
4	B-A Thru	1030
5	B-C Left Turn	-----
6	B-D Right Turn	350
7	C-D Thru	2
8	C-A Left Turn	910
9	C-B Right Turn	690
10	D-C Thru	-----
11	D-B Left Turn	-----
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	**30**	**9.55**
Leg B	**30**	**9.55**
Leg C	**30**	**9.55**
Leg D	**---**	**-----**

***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	**84**
Leg A Left Turn	**102**
Leg B Thru & Rt	**84**
Leg B Left Turn	**---**
Leg C Thru & Rt	**84**
Leg C Left Turn	**---**
Leg D Thru & Rt	**---**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

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