to HOV and transit travel as compared to the No Build Alternative (see Exhibits 10-8 and 10-9).

Given the anticipated increase in congestion in the future, it is reasonable to assume that travelers would shift to HOV and transit because of the reliability and savings in travel times and to avoid the added expense of tolls. A larger shift of travelers to HOV modes would occur with the 6-Lane Alternative compared to the 4-Lane Alternative due to the designated HOV lane that would be implemented for the entire length of the corridor with this alternative (Exhibits 10-9 and 10-11).

As presented in Exhibits 10-8 through 10-11, when comparing the cumulative effects scenarios directly with their counterpart project alternatives, HOV/transit travel in the cumulative effects scenario would decrease on SR 520 while increasing on I-90. The HOV/transit shift to I-90 is likely due to the addition of two-way HOV lanes on that facility. The net results for cross-lake travel across both bridges for both the 4-Lane and 6-Lane Alternatives would be a substantial increase in HOV and transit trips for both the project alternatives and the cumulative effects scenarios. However, the increase in HOV/transit travel across the lake would be less for the cumulative effects scenarios than for the project alternatives.

What conclusions can be drawn?

Several conclusions are apparent in comparing the cumulative effects scenarios to the project alternatives.

- The cumulative effects scenarios are expected to result in slightly fewer trips across Lake Washington on SR 520 compared with the project alternatives. This means that the analysis conducted for the SR 520 Bridge Replacement and HOV Project EIS represents a conservatively high estimate of traffic and associated traffic effects. In other words, if the regional projects assumed in the cumulative effects scenarios are implemented in conjunction with the SR 520 Bridge Replacement and HOV Project, traffic conditions within the project corridor are expected to be similar or better than those estimated and documented in the EIS.

Exhibit 10-8. 2030 Cross-Lake Daily Vehicle-Trips (GP and HOV)

Project Alternative			Cumulative Effects Scenario		
SR 520 Trips					
No Build	GP	124,300	No Build	GP	124,700
	HOV	3,560		HOV	2,830
	Total	127,860		Total	127,530
4-Lane	GP	91,480	4-Lane	GP	93,770
	HOV	13,950		HOV	10,400
	Total	105,430		Total	104,170
6-Lane	GP	101,910	6-Lane	GP	97,450
	HOV	17,760		HOV	12,640
	Total	119,670		Total	103,480
I-90 Trips					
No Build	GP	192,490	No Build	GP	188,070
	HOV	12,020		HOV	13,470
	Total	204,510		Total	201,540
4-Lane	GP	205,590	4-Lane	GP	199,820
	HOV	7,940		HOV	8,330
	Total	213,530		Total	208,150
6-Lane	GP	204,550	6-Lane	GP	202,120
	HOV	6,540		HOV	7,080
	Total	211,090		Total	209,200
Combined SR 520 and I-90 Trips					
No Build	GP	316,790	No Build	GP	312,770
	HOV	15,580		HOV	16,300
	Total	332,370		Total	329,070
4-Lane	GP	297,070	4-Lane	GP	293,590
	HOV	21,890		HOV	18,730
	Total	318,960		Total	312,320
6-Lane	GP	306,460	6-Lane	GP	299,570
	HOV	24,300		HOV	19,720
	Total	330,760		Total	312,680

Exhibit 10-9. 2030 Cross-Lake Daily Person-Trips (GP and HOV)

Project Alternative			Cumulative Effects Scenario		
SR 520 Trips					
No Build	GP	154,790	No Build	GP	155,150
	HOV	45,290		HOV	43,300
	Total	200,080		Total	198,450
4-Lane	GP	112,270	4-Lane	GP	115,750
	HOV	86,360		HOV	70,910
	Total	198,630		Total	186,660
6-Lane	GP	125,370	6-Lane	GP	120,330
	HOV	103,530		HOV	78,820
	Total	228,900		Total	199,150
I-90 Trips					
No Build	GP	243,580	No Build	GP	235,990
	HOV	78,990		HOV	83,300
	Total	322,570		Total	319,290
4-Lane	GP	259,370	4-Lane	GP	250,370
	HOV	63,420		HOV	62,270
	Total	322,790		Total	312,640
6-Lane	GP	257,680	6-Lane	GP	253,700
	HOV	56,900		HOV	57,590
	Total	314,580		Total	311,290
Combined SR 520 and I-90 Trips					
No Build	GP	398,370	No Build	GP	391,140
	HOV	124,280		HOV	126,600
	Total	522,650		Total	517,740
4-Lane	GP	371,640	4-Lane	GP	366,120
	HOV	149,780		HOV	133,180
	Total	521,420		Total	499,300
6-Lane	GP	383,050	6-Lane	GP	374,030
	HOV	160,430		HOV	136,410
	Total	543,480		Total	510,440

Exhibit 10-10. Cross-Lake P.M. Peak Period Vehicle-Trips (GP and HOV)

Project Alternative			Cumulative Effects Scenario		
SR 520 Trips					
No Build	GP	29,100	No Build	GP	29,070
	HOV	720		HOV	180
	Total	29,820		Total	29,250
4-Lane	GP	22,420	4-Lane	GP	23,490
	HOV	3,460		HOV	2,240
	Total	25,880		Total	25,730
6-Lane	GP	24,990	6-Lane	GP	24,360
	HOV	4,870		HOV	3,210
	Total	29,860		Total	27,570
I-90 Trips					
No Build	GP	45,990	No Build	GP	44,210
	HOV	3,020		HOV	4,110
	Total	49,010		Total	48,320
4-Lane	GP	47,590	4-Lane	GP	46,640
	HOV	2,150		HOV	2,750
	Total	49,740		Total	49,390
6-Lane	GP	47,650	6-Lane	GP	46,400
	HOV	1,650		HOV	2,160
	Total	49,300		Total	48,560
Combined SR 520 and I-90 Trips					
No Build	GP	75,090	No Build	GP	73,280
	HOV	3,740		HOV	4,290
	Total	78,830		Total	77,570
4-Lane	GP	70,010	4-Lane	GP	70,130
	HOV	5,610		HOV	4,990
	Total	75,620		Total	75,120
6-Lane	GP	72,640	6-Lane	GP	70,760
	HOV	6,520		HOV	5,370
	Total	79,160		Total	76,130

Exhibit 10-11. Cross-Lake P.M. Peak Period Person-Trips (GP and HOV)

Project Alternative			Cumulative Effects Scenario		
SR 520 Trips					
No Build	GP	37,190	No Build	GP	37,110
	HOV	15,860		HOV	14,360
	Total	53,050		Total	51,470
4-Lane	GP	28,480	4-Lane	GP	29,950
	HOV	28,250		HOV	21,980
	Total	56,730		Total	51,930
6-Lane	GP	31,750	6-Lane	GP	31,050
	HOV	33,280		HOV	25,320
	Total	65,030		Total	56,370
I-90 Trips					
No Build	GP	59,420	No Build	GP	56,820
	HOV	24,040		HOV	27,150
	Total	83,460		Total	83,970
4-Lane	GP	61,300	4-Lane	GP	59,900
	HOV	19,920		HOV	21,330
	Total	81,220		Total	81,230
6-Lane	GP	61,370	6-Lane	GP	59,620
	HOV	17,900		HOV	19,360
	Total	79,270		Total	78,980
Combined SR 520 and I-90 Trips					
No Build	GP	96,610	No Build	GP	93,930
	HOV	39,900		HOV	41,510
	Total	136,510		Total	135,440
4-Lane	GP	89,780	4-Lane	GP	89,850
	HOV	48,170		HOV	43,310
	Total	137,950		Total	133,160
6-Lane	GP	93,120	6-Lane	GP	90,670
	HOV	51,180		HOV	44,680
	Total	144,300		Total	135,350

- In general, screenline volumes in the cumulative effects scenario are relatively consistent across all alternatives. In other words, the additional transportation capacity improvements in the cumulative effects scenarios have little effect on relative results between the project alternatives.
- A considerable increase in carpool/transit demand would occur with the 4-Lane and 6-Lane Alternatives as compared to the No Build Alternative along SR 520. A sizeable increase is also projected in the cumulative effects scenarios with the 4-Lane and 6-Lane Alternatives compared to the No Build Alternative. However, the increase would not be as large with the project alternatives alone.
- Total cross-lake travel with the cumulative effects scenario would be slightly lower for both the 4-Lane and 6-Lane Alternatives compared to just the project alternatives. The reduction in HOV trips is projected to be higher than the reduction in GP trips.
- Internal traffic circulation on the Eastside would improve and more trips would likely remain on the Eastside due to capacity improvements along regional corridors such as I-405, SR 167, and SR 522. Therefore, the volume across the cross-lake screenline is expected to decrease, while volumes across screenlines on the Eastside are projected to increase.
- An increase in longer-distance north-south through trips is expected to occur in the I-405 corridor under the cumulative effects scenarios due to the additional capacity along I-405 and SR 167. This increase would correspond to a decrease in longer-distance north-south through trips on the west side of the lake.
- On SR 520, total trips would decrease slightly for the 4-Lane Alternative with the cumulative effects scenario compared to the project alternatives; HOV trips would decrease considerably and GP trips increase slightly. However, overall HOV demand would still remain high.
- On SR 520, the 6-Lane Alternative with the cumulative effects scenario would result in a relatively large reduction in total trips compared to just the project alternatives, with a considerably greater reduction (proportionately) in HOV trips than in GP trips. However, overall HOV demand would still remain high, which also indicates that the analysis conducted for this project represents a conservative estimate of traffic and associated traffic impacts.

Chapter 11: Traffic and Parking Mitigation

What is in this chapter?

The first part of this chapter presents guidelines for determining when WSDOT and local jurisdictions would consider traffic and parking mitigation for potential effects of the SR 520 Bridge Replacement and HOV Project. The second part of this chapter presents possible mitigation measures for locations that have been identified for mitigation measures based on the guidelines.

Did you know?

A concurrency threshold specifies the minimum level of traffic operations that need to be maintained within an area.

Exhibit 11-1. **Concurrency Threshold Definition**

To create these guidelines, the transportation discipline team evaluated WSDOT's design standards and Puget Sound Regional Council (PSRC), Seattle, Kirkland, and Bellevue concurrency thresholds (Exhibit 11-1) for local traffic operations and parking policies. Medina, Hunts Point, Yarrow Point, and Clyde Hill do not have guidelines for mitigating traffic and parking effects; therefore, WSDOT design standards for ramp terminals were used as guidelines to identify possible mitigation measures (a ramp terminal is the local street end of an off-ramp).

Did you know?

A **screenline** is an imaginary line across a section of freeway or arterials. Screenlines are often used in traffic analyses to determine how much volume is entering or exiting a particular area.

Exhibit 11-2. **Screenline Definition**

Seattle uses a screenline (Exhibit 11-2) approach while Kirkland and Bellevue evaluate signalized intersection operations within an area. These local concurrency thresholds serve as guidelines to determine if mitigation is warranted. Exhibit 11-3 summarizes the approach used by the local jurisdictions in the project area to measure concurrency.

Exhibit 11-3. **Local Jurisdictions and Concurrency Threshold Approach**

Local Jurisdiction	Concurrency Threshold Approach
Bellevue	Signalized Intersection Operations (within an area)
Kirkland	Signalized Intersection Operations (within an area)
Seattle	Screenline

To ensure that mitigation is appropriate and adequate for the proposed project, WSDOT will coordinate with the affected local jurisdiction.

Some jurisdictions in the study area require that local development projects conform to the jurisdiction's concurrency and maximum operational thresholds. Local development projects include housing, condominium, apartment, and business development that generate various amounts of traffic into the local street network. The SR 520 Bridge Replacement and HOV Project is not considered a local development project because it would not construct any new facilities that generate vehicle-trips within city limits. Therefore, the criteria used for identifying possible mitigation measures for project effects along the corridor does not directly correlate to specific jurisdictions' concurrency thresholds. The concurrency thresholds for local development projects that affect traffic operations and parking will be used to guide and facilitate communications with local jurisdictional representatives to develop project mitigation strategies.

What traffic operational guidelines are used to manage highways?

This section discusses WSDOT design standard guidelines on traffic operational thresholds that are based on level of service (LOS) guidelines. SR 520 is a designated highway of statewide significance (HSS). An HSS has operational thresholds to determine if mitigation is warranted. In the project area, the possibility of mitigation depends on the project's effect on adjacent local street operations and ramp terminal operations. WSDOT manages and operates the SR 520 mainline and ramp terminals using design standards rather than concurrency thresholds to guide design development. WSDOT has acknowledged that meeting design standards for 2030 in an urban environment may be difficult; however, the design standards should be used as first level guidance for the alternative development with the acknowledgement that the final design decisions could be based on agreements between WSDOT and local jurisdictions.

What are WSDOT's traffic operational guidelines for highways?

Mainline

WSDOT uses an LOS standard of D as the minimum operational standard for an HSS corridor. This standard recommends that LOS D or better is the preferred operating condition for highways in urban areas. WSDOT recognizes that in the design year of 2030, traffic operations on SR 520 may not operate at this level, but the design threshold serves as a guideline for discussion and consideration of other criteria.

Ramp Terminals

WSDOT recommends that mitigation be considered if ramp terminals operate at LOS E or worse. WSDOT would consider additional mitigation if queue spillback from an on-ramp or off-ramp were to exceed the available storage. Consideration should also be given to the local jurisdictions' design standards and concurrency thresholds.

WSDOT coordinates with local jurisdictions to determine if mitigation for the project is necessary and how mitigation measures would be implemented.

What are the local jurisdictions' guidelines to mitigate traffic effects?

The comprehensive plans for Seattle and Kirkland contain their operational thresholds for concurrency. Bellevue's operational thresholds are in the Bellevue Traffic Standards Code. Listed below are the similarities among these three jurisdictions' policies on traffic:

- Volume-to-capacity (V/C) ratios are used to determine program-level operational thresholds (Exhibit 11-4). The V/C ratios are based on each jurisdiction's p.m. peak transportation demand model.
- An average V/C ratio is used for a group of intersections (subarea or screenline). A screenline is an imaginary line across a section of freeway or arterials that is used to determine

Did you know?

Measuring intersection V/C ratios helps traffic engineers to highlight operational constraints at intersections and identify the most effective improvements.

A V/C ratio compares the amount of traffic on a roadway (the traffic volume) to the roadway's available capacity. If the V/C ratio is greater than 1.0, it means that the traffic volumes exceed the roadway capacity. Conversely, if the V/C ratio is less than 1.0, it means that roadway is carrying less than its full capacity. For example, a V/C ratio of 1.07 means that traffic volumes exceed the roadway capacity by 7 percent. A V/C ratio over 1.0 is not sustainable and will ultimately result in the roadway or intersection experiencing congestion in the form of stop-and-go traffic and queued intersections.

Exhibit 11-4. **Volume-to-Capacity Definition**

how much traffic crosses over the line (see Exhibit 11-2). It is used to calculate the threshold.

- Regional plans and policies are adhered to.
- Mobility targets are in place to reduce single-occupant vehicle (SOV) use and promote transit, pedestrian, and bicycle activity.

The effects of the project would be measured using a local jurisdiction's operational thresholds from V/C ratios.

Exhibit 11-5 presents the project's guidelines for determining if mitigation is necessary at a local level. These guidelines were developed as a part of the transportation methodology report for the project.

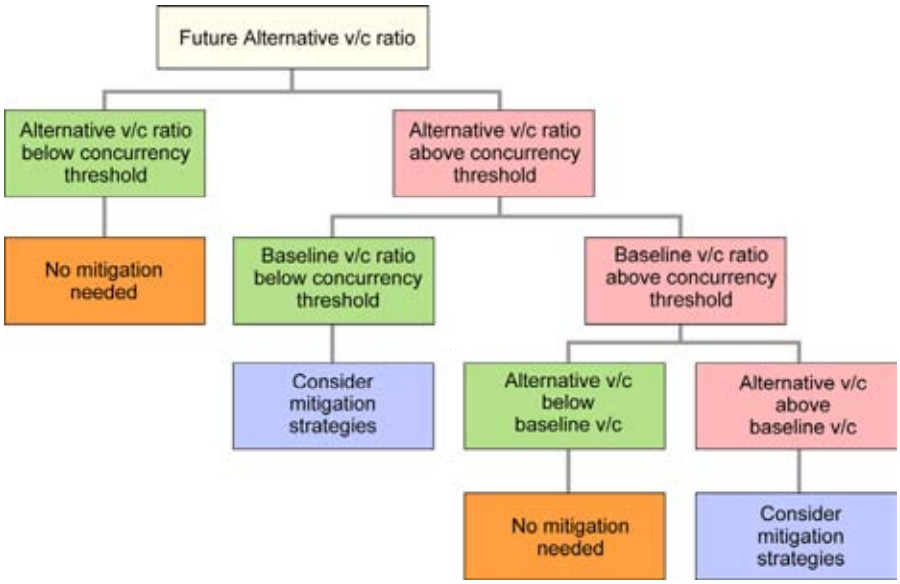

Exhibit 11-5. **Guidelines for Considering Mitigation Strategies for Local Jurisdictions**

WSDOT will discuss the results of the project analysis with each of the local jurisdictions to ensure that the various proposed mitigation strategies would effectively reduce substantial effects of the project on local traffic. Mitigation strategies may include (but are not limited to) the following:

- Implementing intersection improvements
- Implementing time-of-day parking restrictions on congested corridors
- Optimizing signal timing

- Adding center turn lanes or turn lane pockets
- Limiting or restricting permitted left-turns along congested arterial corridors
- Implementing transit/HOV capacity and facility improvements
- Adding transit/HOV queue bypasses
- Adding arterial transit/HOV lanes
- Adding arterial intelligent transportation system (ITS) (surveillance and advanced signal controllers)
- Implementing commute trip reduction programs
- Implementing travel demand management techniques

Seattle Mitigation Guidelines

Seattle's Comprehensive Plan: Toward a Sustainable Seattle (City of Seattle 2003b) subdivides the city into more than 20 subareas for which average screenline traffic operations were measured. To determine whether a project meets or exceeds Seattle's concurrency thresholds, the forecast project's V/C ratio is compared to Seattle thresholds for a nearby city screenline that the project may affect. Comprehensive Plan Policy T24, *Complying with Level-of-Service Standards*, states that "when the calculated LOS for a screenline approaches the LOS standard for that screenline, pursue strategies to reduce vehicular travel demand across the screenline and/or increase the operating capacity across the screenline." Exhibit 11-6 shows the screenline areas for Seattle that are within the project area. Seattle measures operational thresholds from V/C ratios at screenlines; the affect of the project would be measured using similar capacity assumptions within the study corridor.

Each of the screenlines shown in Exhibit 11-6 have a V/C ratio threshold of 1.2. The V/C ratio of 1.2 indicates that the traffic demand for crossing the screenline may be no more than 20 percent greater than the capacity; this ratio is tested in both the a.m. and p.m. peak hours.

Montlake Boulevard (also known as SR 513) is an urban arterial connecting the Montlake/Madison Park/Capitol Hill neighborhoods to the University District/Sandpoint/Windermere neighborhoods. Montlake Boulevard is designated as a Non-Highway of Statewide Significance (Non-HSS) by WSDOT and a Regionally Significant State Highway (RSSH) by the PSRC.

N

0 2,500 5,000 Feet

Exhibit 11-6. **Seattle Traffic Screenline Areas**
SR 520 Bridge Replacement and HOV Project

Seattle's Comprehensive Plan states that WSDOT has designated this route as a Non-HSS, and therefore it is incorporated into the screenline threshold approach, which is the primary guideline for determining when mitigation would be considered.

In October 2003, the PSRC classified Montlake Boulevard as a Tier 1 RSSH. Because of this recent classification, the Tier 1 designation is not in the city's adopted comprehensive plan but will be included in future updates.

Although Seattle has not formally adopted PSRC's RSSH LOS thresholds in its comprehensive plan, it should be considered as a secondary guideline for determining when mitigation would be considered by WSDOT.

An RSSH corridor classified as Tier 1 has an LOS threshold of LOS E, which calls for mitigating traffic congestion when the p.m. peak hour LOS falls below LOS E. Simply stated, if traffic operations across the screenline falls below a LOS E, the proposed project needs to consider some level of mitigation.

Eastside Mitigation Guidelines

Medina, Hunts Point, Yarrow Point, and Clyde Hill

Medina, Hunts Point, Yarrow Point, and Clyde Hill do not specifically define an approach for mitigating local traffic and parking impacts. The proposed project could affect intersections in each of these communities at the ramp terminals. WSDOT would apply its standard guidelines for LOS operations at ramp terminals and coordinate with the local jurisdictions to determine if mitigation should be considered.

Kirkland

The City of Kirkland Comprehensive Plan was revised in January 2002. Kirkland uses both the Capital Improvement Program and Capital Facilities Element to determine subarea thresholds for the city. The p.m. peak hour V/C ratio thresholds are projected for year 2012; these thresholds are still applicable for the SR 520 Bridge Replacement and HOV Project design year of 2030, but the difference in design years should be considered if mitigation strategies are considered.

Kirkland's four transportation subareas shown in Exhibit 11-7 are:

- Southwest
- Northwest

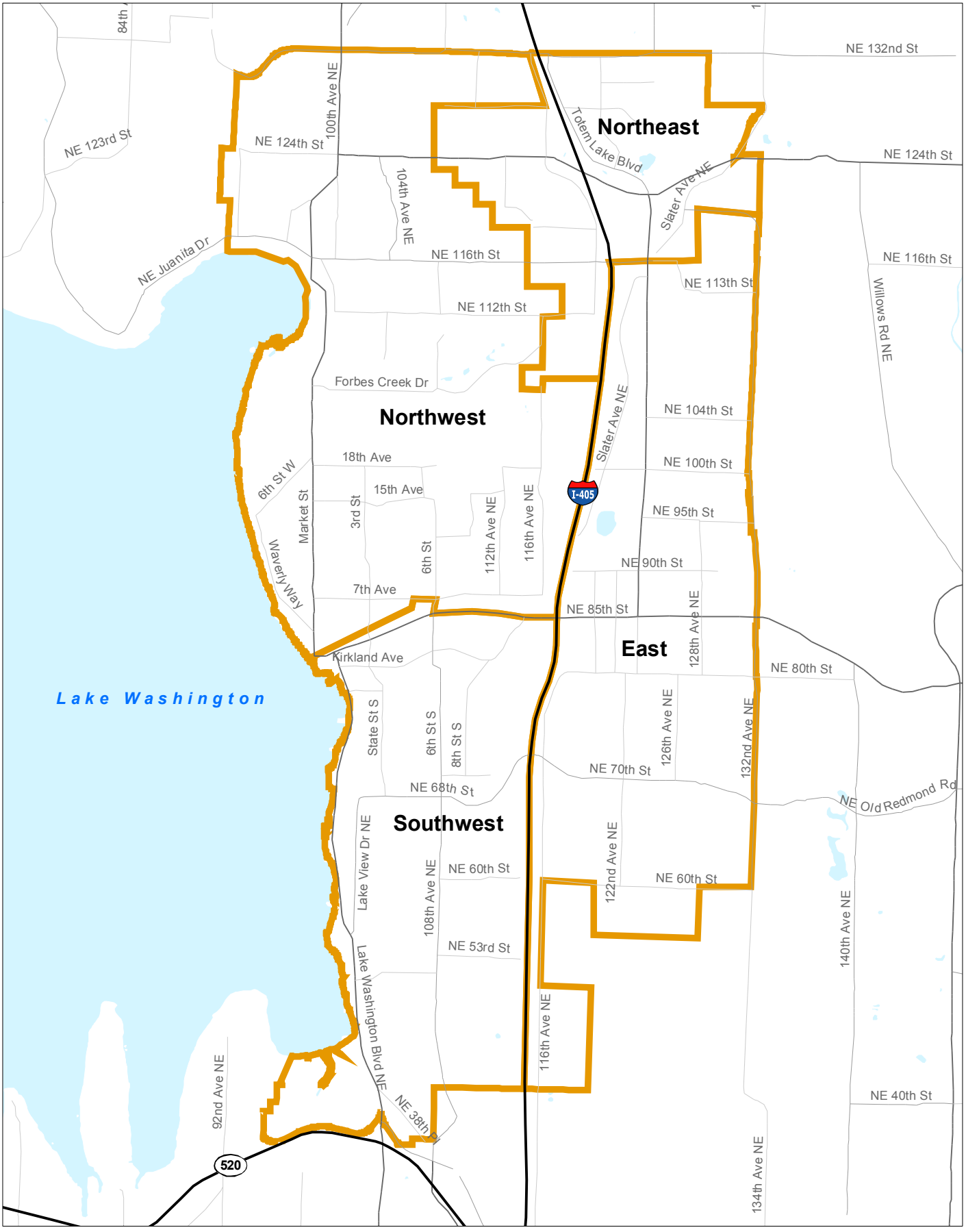

Exhibit 11-7. **Kirkland's Transportation Subareas**

SR 520 Bridge Replacement and HOV Project

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- Northeast
- East

Kirkland has two mitigation V/C thresholds when determining whether the project effects to the local area warrant mitigation. Both thresholds must be met in order to fall within concurrency.

1. Maximum allowed subarea average V/C for signalized system intersections in each subarea may not exceed the values listed in Exhibit 11-8.

2. No individual signalized intersection in the Kirkland subarea system may have an average V/C greater than 1.40.

Exhibit 11-8 shows the maximum allowed average V/C ratios for each transportation subarea in Kirkland.

Exhibit 11-8. **Maximum Average V/C Ratios for Kirkland Transportation Subareas**

Use as Maximum Allowed Average V/C after January 1	2002	2003	2004	2005	2006
Forecast for Year	**2007**	**2008**	**2009**	**2010**	**2011**
Kirkland Subarea	**Average V/C Ratio**				
Southwest	0.99	1.00	1.01	1.02	1.03
Northwest	1.16	1.18	1.20	1.23	1.25
Northeast	0.98	1.01	1.04	1.07	1.10
East	1.08	1.09	1.10	1.11	1.13

Source: City of Kirkland (2002).

Kirkland's concurrency thresholds, along with their design standards for signalized intersections, would serve as the guidelines for determining if mitigation strategies should be considered.

In Exhibit 11-8, the first row (Use of Maximum Allowed Average V/C after January 1) is the year of the concurrency threshold analysis (opening year of project). The second row (Forecast for Year) contains a set of forecast thresholds that should be used given the forecast year of the project (design year). Because the proposed project would analyze concurrency thresholds in 2004 and the project is forecast to 2030, using 2011 as the forecast year is recommended. This recommendation should be confirmed with Kirkland.

Bellevue

The Bellevue Transportation Code designates 15 transportation subareas, which are referred to as mobility management areas. Similar to Kirkland, Bellevue has two threshold requirements, both of which must be met for concurrency. These are:

1. The future alternative "area average LOS" must lie at or below the threshold set by the city for a particular mobility management area for the p.m. peak period.
2. The future alternative must not exceed the "congestion allowance" for each mobility management area. The congestion allowance is the maximum number of intersections permitted to exceed the threshold V/C ratio (p.m. peak period) for that subarea.

The project transportation study area falls into mobility management area 1, referred to as Area 1-North Bellevue. Exhibit 11-9 shows Area 1-North Bellevue, and Exhibit 11-10 lists the project area intersections in Area 1-North Bellevue.

Exhibit 11-11 lists the threshold service for Area 1-North Bellevue, along with the corresponding congestion allowance.

What are the local jurisdictions' guidelines to mitigate parking effects?

All of the communities in the project area have parking policies in place. Most parking policies focus on reducing the number of SOVs on the road by promoting other travel demand management strategies. However, each jurisdiction acknowledges the importance of providing enough parking to sustain economic vitality in commercial areas. The parking mitigation guidelines are not as clearly defined as they are for traffic operations. Rather, the emphasis is to encourage implementation of strategies that are consistent with parking policies, such as increasing transit use.

The parking policy approach provides the opportunity for discussion with the local jurisdictions on the type of mitigation warranted when parking is affected. Effects on undesignated use of public right-of-way for parking would not be mitigated.

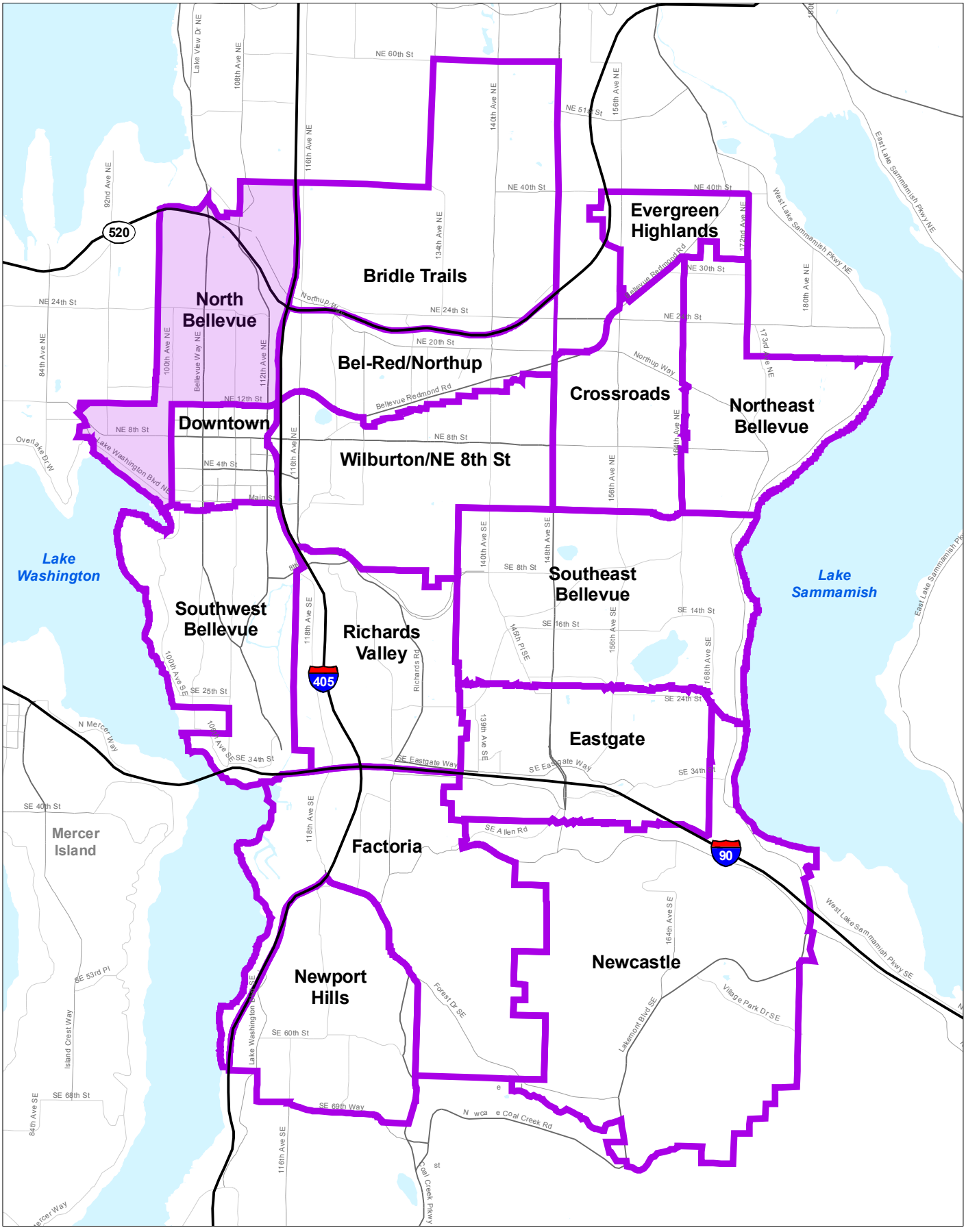

Exhibit 11-9. **Bellevue's Transportation Subareas (Mobility Management Areas)**

SR 520 Bridge Replacement and HOV Project

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Exhibit 11-10. **Area 1 - North Bellevue Intersections**

Intersection No.	North-South Street	East-West Street
69	Bellevue Way Northeast	Northeast 24th Street
74	Bellevue Way Northeast	Northup Way Northeast
78	108th Avenue Northeast	Northup Way Northeast
93	Lake Washington Boulevard	Northeast 1st/Northeast 10th

Exhibit 11-11. **Average LOS Thresholds and Congestion Allowances**

Mobility Management Area Number	Mobility Management Area	Area Average LOS Threshold (Maximum V/C Ratio)	Congestion Allowance
1	North Bellevue	0.85	3

The rest of this chapter identifies areas affected by the project and presents proposed mitigation measures. The state and local jurisdictions will need to discuss these proposed mitigation measures in order to identify, design, and implement the final mitigation measures.

What has the project done to avoid or minimize the negative effects from traffic?

With an understanding that mitigation would be integral to and inseparable from each alternative's definition, the transportation discipline team worked to identify locations where the project would have an effect on traffic and proposed the mitigation for inclusion in each alternative definition; these are discussed below.

4-Lane Alternative

The 4-Lane Alternative forecasts for traffic volumes across the Evergreen Point Bridge are less than for the No Build Alternative. Despite these forecasts, some modifications to the SR 520 corridor are proposed to help alleviate congestion and improve safety.

The existing and No Build Alternative westbound off-ramp terminates at Montlake Boulevard as an unsignalized right-turn lane that adds a lane to Montlake Boulevard. This design forces people who want to travel south on Montlake Boulevard to make a u-turn at the East

Hamlin Street intersection located 250 feet north of the ramp terminus. The 4-Lane Alternative proposes to convert the ramp terminus to a signalized intersection that allows left-turn movements from the westbound off-ramp onto southbound Montlake Boulevard (see Exhibit 11-12). The new design would also allow northbound traffic on Montlake Boulevard to turn left onto the westbound SR 520 on-ramp.

At the same interchange, we propose to provide a pedestrian/bicycle tunnel that crosses under Montlake Boulevard (see Exhibit 11-12). This tunnel would reduce the number of at-grade pedestrian crossings that occur along Montlake Boulevard. This tunnel would improve pedestrian/bicycle safety at the Montlake interchange.

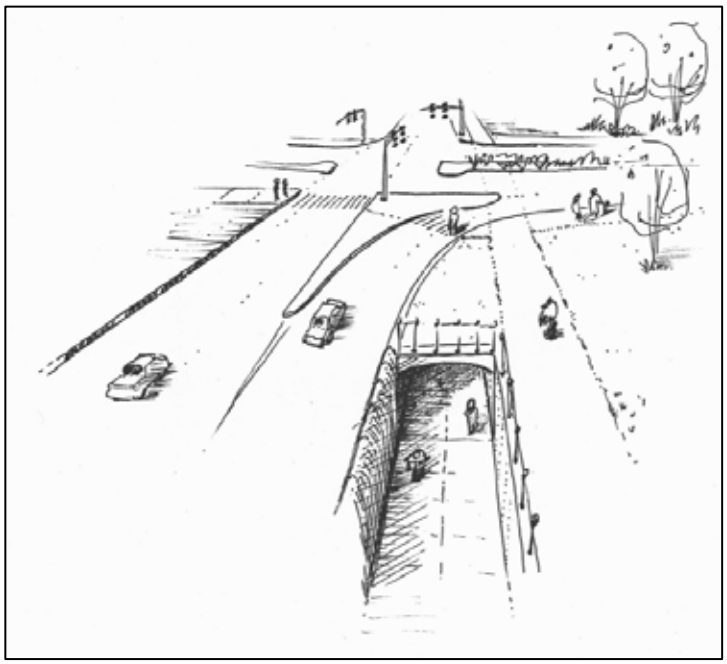

Exhibit 11-12. **Conceptual Sketch of Bicycle/Pedestrian Tunnel Proposed Under the 4-Lane Alternative**

We propose a new traffic signal at the intersection of Lake Washington Boulevard and the SR 520 ramps near the Arboretum. This signal would provide the needed capacity for westbound and eastbound traffic on Lake Washington Boulevard.

The project would construct an auxiliary lane on westbound SR 520 between the Montlake Boulevard on-ramp and the northbound I-5 off-ramp. The proposed westbound SR 520 lane configuration would have three lanes crossing the Portage Bay Bridge. Traffic destined for northbound I-5 would have a dedicated lane, while traffic destined for southbound I-5 would have two dedicated lanes.

6-Lane Alternative

Forecast traffic volumes for the 6-Lane Alternative would be slightly higher than the No Build Alternative. The growth in traffic volume would not distribute into any specific neighborhood but would instead be distributed throughout the project area. Because the local growth in traffic volume compared to the No Build Alternative would not be

extensive, the same modifications to the local streets identified for the 4-Lane Alternative were proposed for the 6-Lane Alternative.

The westbound auxiliary lane on westbound SR 520 between the Montlake Boulevard on-ramp and northbound I-5 off-ramp is also included in the 6-Lane Alternative.

Two other freeway modifications are proposed as part of the 6-Lane Alternative. The first modification is an auxiliary lane on eastbound SR 520 between the northbound I-5 on-ramp and the Montlake Boulevard off-ramp (see Exhibit 11-13). This auxiliary lane would allow traffic from I-5 to enter the SR 520 corridor without merging as vehicles round the curve on the ramp. It would also provide additional capacity necessary for the complex traffic maneuvers to occur between I-5 and Montlake Boulevard, thus resulting in fewer conflicts than with the No Build Alternative.

Exhibit 11-13. **Auxiliary Lane on Eastbound SR 520 Proposed Under the 6-Lane Alternative**

The other modification to the SR 520 corridor is the addition of an auxiliary lane on eastbound SR 520 between the northbound I-405 on-ramp and the 124th Avenue Northeast off-ramp. This auxiliary lane would provide the needed capacity for high-volume on-ramp/off-ramp traffic movement. This lane is proposed only under the 6-Lane Alternative because this alternative moves the location of the HOV lane from the outside to the inside, thereby affecting a partial lane of capacity.

What conclusions can be drawn about traffic and parking mitigation?

How could the project mitigate traffic effects above the mitigation criteria?

The transportation discipline team reviewed the operational results for the various signalized intersection networks presented in *Chapter 5: Local Traffic Operations* to determine if mitigation is warranted. Based on the jurisdictional criteria, the V/C ratios across a screenline or within a subarea must be below a defined threshold. Because the analysis focused on groups of individual intersections, the jurisdictional level of information was not prepared. As a conservative complement to the jurisdictions' methods, the team looked at the average of the maximum intersection V/C ratios for the evaluated intersections. Exhibit 11-14 shows the results from that comparison.

Exhibit 11-14 shows that there are only two locations that warrant consideration of mitigation based on the V/C comparisons. These locations include the Mercer Street interchange area and the 108th Avenue Northeast interchange area. Further investigation into these two interchange areas identified where the mitigation might take place; the findings are shown in Exhibit 11-15 along with a proposed strategy for mitigation.

The following mitigation sections provide more information about the possible intersection mitigation.

Seattle Traffic Mitigation

Coordination between the City of Seattle and WSDOT to develop a plan of action for the Fairview Avenue/Valley Street intersection is the only mitigation proposed. This intersection already includes a double northbound left turn lane, and the eastbound/westbound through movement lane widths are at a reasonable maximum. The change in traffic volume due to minor shifts in trip distribution is forecast to be between 2 percent and 5 percent as a result of the project alternatives. This level of traffic volume change is considered a small increase overall. Seattle is currently working on the Mercer Corridor Project to improve traffic operations near the Mercer Street/I-5 interchange. That project could have positive effects on the final operations near the I-5 corridor that have not been included in this EIS because the project has not completed the EIS stage nor was it included in Seattle's Capital Improvement Projects list.

Exhibit 11-14. **Average Maximum V/C Ratios for Interchange Areas**

Interchange	Time Period	Year 2030 Alternative			Comments
		No Build	4 Lane	6 Lane	
Stewart Street	A.M.	0.96	0.99	0.99	
	P.M.	0.84	0.84	0.83	
Mercer Street	A.M.	0.90	0.92	0.97	Slight increase in V/C for 6-Lane Alternative
	P.M.	1.23	1.22	1.25	Mercer Corridor Project planned
Roanoke/Harvard	A.M.	0.64	0.63	0.63	
	P.M.	0.64	0.64	0.68	
NE 45th Street	A.M.	0.70	0.70	0.72	
	P.M.	0.83	0.83	0.93	
Montlake Boulevard	A.M.	0.86	0.88	0.90	
	P.M.	0.92	0.86	0.88	
Lake Washington Blvd	A.M.	2.46	0.72	0.77	New signal improves capacity
	P.M.	1.04	0.78	0.82	
84th Ave NE	A.M.	0.60	0.54	0.55	
	P.M.	0.69	0.49	0.65	
92nd Ave NE	A.M.	0.63	0.73	0.68	
	P.M.	0.53	0.59	0.56	
104th Ave NE	A.M.	0.92	0.80	0.84	
	P.M.	1.34	1.22	1.29	Build V/C ratios are better than No Build
108th Ave NE	A.M.	0.92	0.91	0.89	Signal at 108th Ave NE/Eastbound
	P.M.	0.92	0.99	0.97	SR 520 on-ramp would improve capacity

Exhibit 11-15. **Affected Intersections and Potential Mitigation**

Intersection	Alternative	Reason for Problem	Potential Mitigation
Fairview Avenue/ Valley Street	6-Lane	LOS E to LOS F Close proximity to I-5	Coordination with the City of Seattle to develop a mitigation plan
108th Avenue NE/SR 520 Eastbound On-ramp	4-Lane	Northbound left turn fails	Signalize intersection

Eastside Traffic Mitigation

The 108th Avenue Northeast/SR 520 eastbound on-ramp intersection in Bellevue operates as an uncontrolled intersection under existing conditions and the No Build Alternative. Traffic volume distributions would change as a result of the two build alternatives and send more trips through this intersection. This increase in traffic would result in a failing northbound left turn that would queue beyond the left turn lane and could block northbound through traffic volumes. Because of this change in traffic volume, a signalized intersection is proposed as mitigation to provide additional time for vehicles in the northbound left turn to be protected from oncoming traffic. When this report was prepared, signal warrants had not yet been prepared. Upon agreement between the City of Bellevue and WSDOT as to the level of mitigation, a signal warrant will be pursued.

How could the project mitigate adverse parking effects?

Guidelines for identifying the parking effects of the project and potential mitigation within the jurisdictions are not as clearly defined as traffic operations. Several areas that are identified as adversely affected would not be mitigated due to a shortage of space to replace parking in kind. To determine the actual mitigation measure, coordination and discussion between the state and local jurisdictions must occur. In most areas, parking effects would be similar for each build alternative; however, if there is a difference, it is noted in the mitigation description.

Seattle Parking Mitigation

Several areas within Seattle would lose parking with implementation of the 4-Lane or 6-Lane Alternatives.

Bagley Viewpoint (Delmar Drive East and East Roanoke Street)

The Bagley Viewpoint parking area (10 parking spaces) would be affected by the build alternatives. Currently, there is an approximately 10 percent use rate in this parking area. Given the low use rate and the loss of the park itself, and limited space for mitigation, we propose that the loss of parking spaces not be mitigated.

Museum of History and Industry (2700 24th Avenue East)

Both the 4-Lane and 6-Lane Alternatives' footprints would displace MOHAI and its parking lot. This report assumes that MOHAI would be relocated; therefore, parking mitigation at its current location would not

be warranted. In the event that planning and negotiations between the WSDOT and Seattle Parks and Recreation were to result in a new building in East Montlake Park, sufficient parking facilities would be included.

76 Station (2645 East Montlake Place)

Under the build alternatives, the 76 station and a portion of the parking lot would be eliminated. Because the gas station would be removed, there would be no need to replace its parking. Portions of the station's parking lot could be used to mitigate the loss of parking at the adjacent Hop-In Market.

Hop-In Market (2605 22nd Avenue East)

The Hop-In Market currently has 10 parking spaces for its customers on the east side and 17 parking spaces on the west side of the building. With the build alternative designs, all of the parking spaces on the east side of the market and almost half the spaces on the west side of the market would be affected (approximately 19 spaces). We propose that the excess space on the acquired 76 station lot be used to mitigate the loss of parking spaces to a level consistent with demand. On average, 40 percent and 53 percent of the spaces on the east side and west side of the store are used, respectively. This percentage of use shows a need for 13 to 15 parking spaces. The number of parking spaces that could be accommodated on the acquired 76 station lot would be determined with the completion of additional design work for the alternatives.

NOAA Northwest Fisheries Science Center (2725 Montlake Boulevard East)

The 4-Lane Alternative would affect 8 to 16 parking spaces and the 6-Lane Alternative would affect 20 to 40 parking spaces. Given the limited available space, one potential mitigation strategy would be to construct a parking structure on site.

Eastside Parking Mitigation

Parking would be affected in some Eastside communities under the build alternatives. The following discusses those areas and suggests mitigation.

Evergreen Point Park-and-Ride (SR 520 and Evergreen Point Road, Medina)

The 4-Lane and 6-Lane Alternatives design would affect 5 to 7 parking spaces at the Evergreen Point park-and-ride. On average, the park-and-ride has a use rate of 88 percent. The proposed bicycle/pedestrian path

design in that location could be shifted within the current right-of-way to reduce the effect on parking spaces. No mitigation is proposed for the affected parking spaces in the park-and-ride lot; however, further discussions with King County Metro would occur to confirm the final plans.

State Exempt Lot (SR 520 near Evergreen Point Road, Medina)

Under the 4-Lane and 6-Lane Alternatives, the existing State Bridge Maintenance Facility and associated parking (currently located within the SR 520 right-of-way) would be relocated to a site under and integral to the east approach to the Evergreen Point Bridge. Because the entire facility would be relocated, mitigation would not be required.

By-the-Way Espresso and Closed Business (Northeast Points Drive and Lake Washington Boulevard Northeast, Kirkland)

This report assumes that this private property would be acquired to locate a stormwater treatment wetland on it; therefore, no parking mitigation is needed.

Chapter 12: References

AASHTO (American Association of State Highway and Transportation Officials). 1999. *Guide for the Development of Bicycle Facilities.*

City of Kirkland. 2002. *City of Kirkland Comprehensive Plan: Charting a Future Course*. Kirkland, Washington.

City of Seattle, Department of Parks and Recreation. 2001. *Washington Park Arboretum Proposed Master Plan*. May.

City of Seattle Bicycle and Pedestrian Program. 2003a. Seattle Bicycling Guide Map.

City of Seattle. 2003b. *Seattle's Comprehensive Plan: Toward a Sustainable Seattle*. http:// www.ci.seattle.wa.us/dpd/Planning/ Seattle's_ Comprehensive_Plan/DPD_001178.asp. Updated January 2003. Department of Planning and Development, Seattle, Washington.

FHWA (Federal Highway Administration). CORSIM Microsimulation Software, Version 5.1

King County Department of Transportation. King County Bicycling Guide Map.

King County Metro. 2002. Metro Trasit System Map. September.

Kittelson & Associates, Inc. 1999. *Transit Capacity and Quality of Service Manual*. Prepared for the Transit Cooperative Research Project. January.

NCHRP (National Cooperative Highway Research Program). 1982. Highway Traffic Data for Urbanized Area Project Planning and Design, Report 255, Chapter 8.

SR 520 Project Team. 2000a. Purpose of and Need for the Action, Trans-Lake Washington Project. Prepared for the SR 520 Bridge Replacement and HOV Project. June 14.

SR 520 Project Team. 2000b. Trans-Lake Washington Project Summary of Community Design Workshops – Identification of Community Values, December 18, p. 3-2.

SR 520 Project Team. 2002. Trans-Lake Washington Project Travel Forecasting Model Validation Report for Base Year 1998. Prepared for the SR 520 Bridge and HOV Replacement Project. February 11.

SR 520 Project Team. 2003. Final Year 2030 No-Action Definition Memorandum. Prepared for the SR 520 Bridge Replacement and HOV Project. July 9.

SR 520 Project Team. 2004a. Travel Forecasting Analysis Results Technical Memorandum. Prepared for the SR 520 Bridge Replacement and HOV Project (PB). January 23.

SR 520 Project Team. 2004b. Final Submittal of Freeway and Local Traffic Forecasts and Operations. Prepared for the SR 520 Bridge Replacement and HOV Project. March 5.

SR 520 Project Team. 2004c. Final Submittal of Freeway and Local Traffic Forecasts and Operations Technical Memorandum. Prepared for the SR 520 Bridge Replacement and HOV Project. March 30.

SR 520 Project Team. 2004d. Data Collection Summary Technical Memorandum. Prepared for the SR 520 Bridge Replacement and HOV Project. April 8.

SR 520 Project Team. 2004e. *Nonmotorized Planning and Design Report*. Prepared for the SR 520 Bridge Replacement and HOV Project. April.

SR 520 Project Team. 2004f. Corridor Construction Sequence Memorandum. Prepared for the SR 520 Bridge Replacement and HOV Project. August 31.

Trafficware. Synchro Traffic Signal Timing Software. Albany, CA. 1993-2003.

Transportation Research Board. 2000. *Highway Capacity Manual*. Transportation Research Board, National Research Council, Washington D.C.

WSDOT (Washington State Department of Transportation). 1996. *Washington State Highway Annual Collision Summary Report*.

WSDOT (Washington State Department of Transportation). 2001. *Bicycle Facilities Design Guidance*. May.

WSDOT (Washington State Department of Transportation). 2003. *I-405 Congestion Relief & Bus Rapid Transit Projects: Implementation Plan*. October.

WSDOT (Washington State Department of Transportation). 2004. SR 520 Accident Data (January 2000 through December 2002).

WSDOT (Washington State Department of Transportation). 2004a. *Design Manual*. May.