This chapter summarizes how the No Build, 4-Lane, and 6-Lane Alternatives are expected to affect the project area. We discuss the varying effects on transportation mobility among the alternatives and options. It also shows that the project would have both positive and adverse effects on the environment.

Chapter 4: Comparison of the Alternatives

The first three chapters of this Draft EIS have described the background and context of the SR 520 project, the history and present conditions of the project area, and the alternatives WSDOT is considering. In this chapter, we begin to examine how each of the project alternatives would affect the built and natural environments. Chapter 4 allows readers to compare alternatives across the Seattle, Lake Washington, and Eastside project areas—the "big picture" view of project effects. It provides a full discussion of the effects that would be similar among the build alternatives, plus a more abbreviated discussion of those effects that would differ among alternatives.

The next three chapters focus in greater detail on the effects that differ in each area: Chapter 5 discusses Seattle; Chapter 6 discusses Lake Washington; and Chapter 7 discusses the Eastside. Chapter 8 provides information on how WSDOT would construct the project and how construction activities would affect traffic, communities, and ecosystems. In Chapter 9, we look at other effects of the project—including indirect and cumulative effects—and identify areas of controversy, along with several project effects that cannot be mitigated.

This chapter describes the effects of the SR 520 project in three main sections:

- The first section compares how well the transportation system would operate with and without the project in the planning year (2030) and briefly addresses traffic flow during construction. This transportation information focuses on changes on SR 520 itself. Conditions on local streets and intersections near SR 520 are addressed in less detail because they are described more fully in Chapters 5 and 7.
- The second section of this chapter describes project-related environmental effects that would be similar among the build alternatives and options. These effects are discussed fully in this chapter, and are not discussed in Chapters 5 through 7 so as to avoid duplication.

NOTE TO READER

Before reading this chapter, you may want to read the description of how the project will be built in Chapter 8. The description will help you understand the construction effects that are summarized in this chapter.

- The third section describes environmental effects that would differ among the alternatives and options, including construction effects. These effects are covered in less depth in this chapter than they are in Chapters 5 through 8.

How do the alternatives compare in their ability to move people and goods?

By 2030, population and employment growth in the project area and throughout the Puget Sound region will cause a sizable increase in the number of people who want to use SR 520 to cross Lake Washington. This growth in demand will affect traffic volumes and operation both on SR 520 and on nearby local streets. This section shows how traffic would change with and without the project between now and 2030.

How is traffic in the SR 520 corridor predicted to grow?

Planners estimate that in 2030, traffic demand on the SR 520 corridor will grow to 8,490 vehicles and 16,380 people during each hour of the peak period—an increase of 12 percent in vehicles and 28 percent in people compared to today. Because congestion will continue to worsen, nearly 20 percent of the people and vehicles that want to cross the lake will not be able to complete the trip within the peak period because they will remain backed up on SR 520, adjacent highways, and local side streets. On a daily basis, 127,900 vehicles would cross the lake, compared to 113,300 now.

Under the No Build Alternative, the time it takes to drive from I-5 to 124th Avenue Northeast will double due to congestion, increasing from 13 to 27 minutes in the general-purpose lanes and from 11 to 23 minutes in the HOV lanes. More than twice as many people—25 percent, compared to 11 percent today—will use some form of transit for the trip; 9 percent will carpool; and 66 percent will drive alone. Because more people will be using transit, the average number of passengers per vehicle will rise from 1.68 to 1.9. Traffic congestion points will mainly be at the same locations as they are now, but at many of these locations, the duration and intensity of congestion will increase. *Exhibit 4-1* indicates how much traffic is predicted to increase by 2030 at various locations along SR 520.

In most cases, traffic operations at the local intersections near the SR 520 ramps will be similar to what they are today. In Seattle, the heavy congestion on SR 520 will discourage some people from using the highway, and the increased use of transit will reduce the overall numbers of vehicles at the intersections. On the Eastside, more vehicles will use the local intersections, but not enough to cause any substantial decline in traffic operations.

DEFINITION

Peak Period and Peak Hour

Throughout this Draft EIS, we use the terms peak period and peak hour when referring to the results of the transportation analysis. For the freeway analysis, the SR 520 corridor peak periods are 6 a.m. to 9 a.m. and 3 p.m. to 6 p.m., and refer to traffic flow on the highway. For the local traffic analysis, the peak hour refers to traffic conditions on local arterial streets and intersections around the SR 520 interchanges during the highest 15-minute freeway traffic flows of the peak period, combined with the peak hour volumes on local streets. To simplify, we use peak period when referring to freeway operations and peak hour when referring to street and intersection operations near the freeway.

Planners estimate that in 2030, vehicle demand on SR 520 will increase by 12 percent compared to today.

Exhibit 4-1. **Predicted Change in SR 520 Morning and Afternoon Traffic by 2030** (No Build Alternative compared to current conditions)

	Westbound		Eastbound	
Traffic Location	**Morning Peak Period**	**Afternoon Peak Period**	**Morning Peak Period**	**Afternoon Peak Period**
Approaching I-5	+1%	+9%	+10%	+1%
On-ramp (interchanges between I-5 and Lake Washington)	0	0	0	0
Off-ramp (interchanges between I-5 and Lake Washington)	+12%	+36%	+15%	+21%
Bridge traffic	+4%	+20%	+14%	+8%
On-ramp (interchanges between Lake Washington and I-405)	+1%	+43%	+40%	+14%
Off-ramp (interchanges between Lake Washington and I-405)	+56%	+14%	0	+29%
Traffic approaching I-405	+24%	+8%	+3%	+13%

While travel demand will grow regardless of the alternative selected, several major factors will affect how SR 520 and local streets would operate under the No Build and build alternatives. These include:

- The level of traffic congestion at either end of the SR 520 project area on I-5 and I-405, which limits the number of vehicles that can reach SR 520
- The presence or absence of continuous HOV lanes through the project area
- The tolls charged for use of the Evergreen Point Bridge with the build alternatives compared to the lack of tolls with the No Build Alternative

The following sections compare how the alternatives would affect various aspects of the transportation system in 2030. These include SR 520 traffic volumes and travel times; surrounding neighborhood traffic and parking; transit, bicycle, and pedestrian connections; and marine navigation—issues that will affect a wide variety of travelers in the project area. Also addressed are the expected effects of construction on traffic flow.

Traffic Congestion and Travel Times

Under the No Build Alternative, travel times across SR 520 will double due to congestion. All the build alternatives and options would reduce congestion and improve travel time on SR 520 compared to the No Build Alternative. The 6-Lane Alternative would carry 21 percent more people than the 4-Lane Alternative and 26 percent more than the No Build Alternative in the same amount of time. It would provide the most improved travel times in the SR 520 corridor compared to the No Build Alternative. The Pacific Street Interchange option would have the greatest benefit for local traffic in the Montlake/University of Washington area, reducing travel times along Montlake Boulevard by as much as 20 minutes.

How would the project affect freeway traffic?

How many people and vehicles can SR 520 carry in 2030?

For all the alternatives, the number of people who want to use SR 520 in 2030 would grow substantially from current conditions, as *Exhibit 4-2* illustrates. However, our analyses found that the number of people who would actually be able to cross Lake Washington during a given time period would be limited by the amount of congestion

on SR 520, I-5, and I-405. The number of people and vehicles that want to cross the lake is referred to as "demand," while the number of people and vehicles that would actually be able to cross the lake on SR 520 during a particular time period is referred to as "throughput." *Exhibit 4-3* shows that demand would be greater than throughput for the No Build and build alternatives in 2030, as is true now. However, the degree of imbalance between demand and throughput would vary among the alternatives. The No Build Alternative would be the least effective at moving traffic in 2030 because the existing SR 520 is simply not designed to handle the growing traffic demand. Both of the build alternatives would improve traffic flow on SR 520 over No Build, but the 6-Lane Alternative would carry many more people than the 4-Lane Alternative. The Pacific Street Interchange option would provide the greatest improvement to traffic flow.

Under No Build conditions, approximately 28 percent more people and 12 percent more vehicles would want to cross SR 520 in 2030. Because of the congestion on SR 520, I-5, and I-405, using transit or HOV would save several minutes compared to driving a one- or two-occupant vehicle. The average vehicle crossing the lake in 2030 would carry 1.9 passengers, compared to 1.68 passengers today *(Exhibit 4-2)*.

The 4-Lane Alternative would provide some improvement in traffic flow and reliability over No Build because it would include

Exhibit 4-2. Vehicles and Persons Using SR 520 Today and in 2030

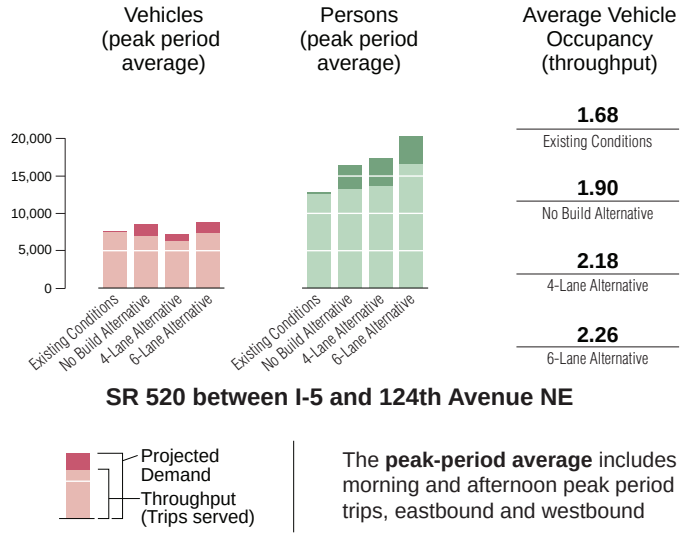
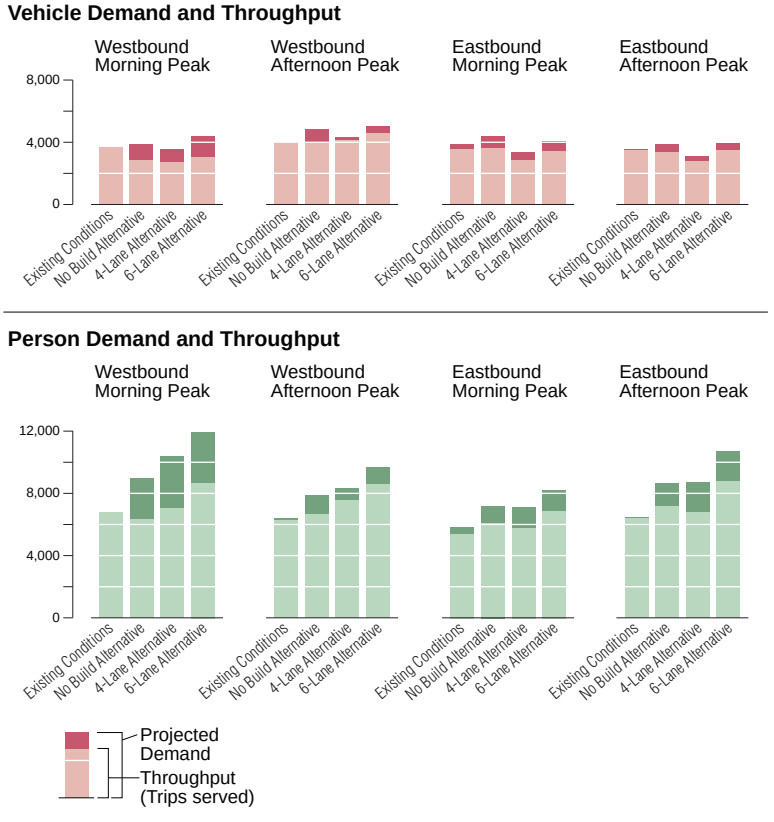


Exhibit 4-3. Traffic Demand and Throughput During Morning and Afternoon Peak Period Today and in 2030



adequate shoulders, but it would not add new lane capacity. As shown in *Exhibit 4-3,* it would carry fewer vehicles than the No Build Alternative for eastbound travel during both morning and afternoon peak periods, although more people would use the corridor westbound because the addition of tolls on SR 520 would cause a shift in travel modes and travel routes. Approximately 5 percent more people would want to use SR 520 than under No Build conditions, but the number of vehicles on the highway would be about 16 percent less because the toll would provide an incentive for people to shift from one- and two-occupant vehicles to buses and carpools. Because of congestion, throughput would still be less than demand. Vehicles crossing the lake would carry an average of 2.18 passengers *(Exhibit 4-2).*

Under the 6-Lane Alternative, the addition of HOV lanes would allow substantially more people to use SR 520, as shown in *Exhibit 4-3.* The 6-Lane Alternative would also carry as many or more vehicles than the No Build Alternative under all conditions except during the eastbound morning peak hour. The time savings with the new lanes, combined with the toll, would provide an incentive to use transit and HOV, resulting in an average vehicle occupancy of 2.26 people *(Exhibit 4-2).* Because of congestion throughout the transportation system, demand would continue to exceed throughput, but the 6-Lane Alternative would meet more of the demand than either of the other alternatives. Adding the HOV lanes would allow SR 520 to serve about 21 percent more people than the 4-Lane Alternative and about 26 percent more than the No Build Alternative. SR 520 would operate much more efficiently than under No Build; the 26 percent increase in people using the corridor (equivalent to approximately 30,000 people) would use only 3 percent more vehicles to make the trip.

The 6-Lane Alternative options would affect travel demand in different ways. With the Second Montlake Bridge option, the amount of traffic on SR 520 between I-5 and Montlake would be very similar to the 6-Lane Alternative *(Exhibit 4-4).* However, the Pacific Street Interchange option

DEFINITION

Person-Trips, Travel Demand, and Throughput

Since cars, buses, and other vehicles can carry varying numbers of people, transportation planners often use the term "person-trips" to describe how efficiently a roadway's capacity is being used. Person-trips represent the number of people who use the roadway in a given period of time, regardless of how many vehicles they are traveling in. To illustrate the concept, consider that 10 buses carrying 30 people each represent 10 vehicle trips, but 300 person-trips.

"Travel demand" is a term used to refer to the number of people or vehicles that want to use a given roadway during a particular time period. Throughput refers to the number of people or vehicles that the roadway can actually carry during that period—a number influenced by the road's physical features (such as the number of lanes) and the level of traffic congestion. When transportation planners say that demand exceeds throughput, it's simply a technical way of saying that a roadway has more traffic than it can handle. Drivers will either have to wait longer to get through the congestion, or find alternate routes.

A Morning in the Life of a Commuter

On a typical weekday morning in 2006, a Seattle resident driving alone at 7:45 a.m. is one of 6,810 people who want to cross the Evergreen Point Bridge into Redmond during a single hour of the peak period. If there are no accidents or stalled vehicles, she will probably experience just a little bit of traffic congestion as she crosses the bridge. Traveling at about 40 mph, it takes her about 13 minutes to get from I-5 to 124th Avenue Northeast.

In 20 years, however, a commute along the same route will be very different. Regardless of whether or not the SR 520 Bridge Replacement and HOV Project is built, the number of people who want to use the bridge will increase and so will the level of congestion. Unless our commuter chooses to ride the bus or carpool, she will experience a commute that is twice as long as today. Her travel time will increase to 27 minutes under No Build conditions and 21 minutes under the 4-Lane and 6-Lane Alternatives. If our commuter decides to ride the bus or carpool however, her travel time during the peak period will be shorter. It will take her 23 minutes under No Build conditions, 18 minutes under 4-Lane Alternative conditions, and 12 minutes under the 6-Lane Alternative conditions. The Pacific Street Interchange option would reduce her commute to 10 minutes—a minute less than it is today.

would noticeably affect travel demand because it would allow local traffic headed to areas north and northeast of the University District to bypass I-5 congestion. Westbound traffic destined for these areas would exit at the new interchange, resulting in fewer trips across the Portage Bay Bridge than the 6-Lane Alternative. Buses bound for I-5, north or south, would remain on SR 520 and comprise a higher proportion of total traffic, so the average vehicle occupancy on SR 520 between I-5 and Montlake Boulevard would increase to 2.49 people with this option.

Exhibit 4-4. **Predicted Change in SR 520 Afternoon Traffic by 2030** (6-Lane Alternative and Options Compared to the No Build Alternative)

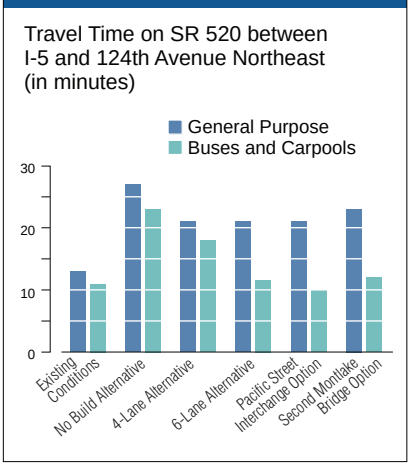
	Westbound			Eastbound		
Traffic Location	**6-Lane Alternative**	**Pacific Street Interchange Option**	**Second Montlake Bridge Option**	**6-Lane Alternative**	**Pacific Street Interchange Option**	**Second Montlake Bridge Option**
Approaching I-5	+11%	+3%	+14%	+1%	-6%	0
On-ramp (interchanges between I-5 and Lake Washington)	+24%	+25%	+25%	+24%	+25%	+25%
Off-ramp (interchanges between I-5 and Lake Washington)	-1%	+22%	-6%	+16%	+38%	+22%
Bridge traffic	+4%	+4%	+4%	+2%	+2%	+2%
On-ramp (interchanges between Lake Washington and I-405)	-6%	-6%	-6%	-7%	-7%	-7%
Off-ramp (interchanges between Lake Washington and I-405)	-7%	-7%	-7%	+28%	+28%	+28%
Traffic approaching I-405	+6%	+6%	+6%	+15%	+15%	--

How long will it take to travel from one end of the project corridor to the other?

Driving across Lake Washington between I-5 and 124th Avenue Northeast currently takes, on average for either peak period, about 13 minutes in a single-occupant vehicle and 11 minutes in a bus or 3+ person carpool *(Exhibit 4-5).* (Buses and carpools travel faster because the westbound HOV lane east of the Evergreen Point Bridge allows them to bypass congestion in the general-purpose lanes.) Under free-flow traffic conditions, the trip would only take about 8 minutes.

As shown in *Exhibit 4-5,* growing traffic volumes are expected to increase travel time considerably by 2030. Under the No Build Alternative, vehicles using the existing bridges would see their crossing times double from today's times. Of course, if the Evergreen Point Bridge and/or the

Exhibit 4-5. **Travel Times Today and in 2030**



Portage Bay Bridge collapsed (the Catastrophic Failure Scenario), the crossing time would be much longer as traffic detoured to I-90 or around Lake Washington.

Compared to the No Build Alternative, both the 4-Lane and 6-Lane Alternatives would allow travelers to move faster through the corridor even though SR 520 would be carrying more people. Although the 4-Lane Alternative would not add new roadway capacity, its wider lanes and full shoulders would improve traffic flow and reliability, and increased use of transit would allow more people to cross the lake. By adding HOV lanes, the 6-Lane Alternative would reduce HOV travel time and make transit and carpool travel more reliable. It would provide a substantial benefit to transit users, who would be able to cross the lake in less time than they do today and in far less time than non-transit users.

As shown in *Exhibit 4-5,* travel times for the Pacific Street Interchange and Second Montlake Bridge options would differ slightly from those for the 6-Lane Alternative. With the Second Montlake Bridge option, general-purpose travel through the corridor would be slightly slower (23 minutes versus 21 minutes with the 6-Lane Alternative) because of an increase in traffic on the Portage Bay Bridge during the evening peak period. With the Pacific Street Interchange option, there would be fewer overall trips through the corridor, thereby allowing HOVs to make the trip slightly faster (10 minutes versus 12 minutes with the 6-Lane Alternative). Travel time for general-purpose trips would be the same as with the 6-Lane Alternative (21 minutes) because the congestion on the Portage Bay Bridge is related to congestion on I-5. The South Kirkland Park-and-Ride Transit Access options would create an additional benefit, providing a 15-minute travel time savings for transit riders between I-405 and 92nd Avenue Northeast. The transit travel time represents the amount of time it would take a bus to travel between I-405 and 92nd Avenue Northeast and serve the park-and-ride. The travel time would decrease because buses could exit directly to 108th Avenue Northeast and bypass congestion on Bellevue Way and Northup Way.

Calculating Travel Time

To provide a consistent measurement for comparing alternatives, this Draft EIS discusses travel time through the SR 520 corridor in terms of peak-period bidirectional (both directions) average values. This means the average of all travel times, both eastbound and westbound, in the morning and afternoon peak periods. In other words, if you recorded the amount of time it took you to drive on SR 520 from I-5 to 124th Avenue Northeast and back every morning and every afternoon for a month, and then calculated the average time for all those trips—that average would tell you your peak period bidirectional average time. For more information on SR 520 travel times by direction and time of day, see Appendix R, Transportation Discipline Report.

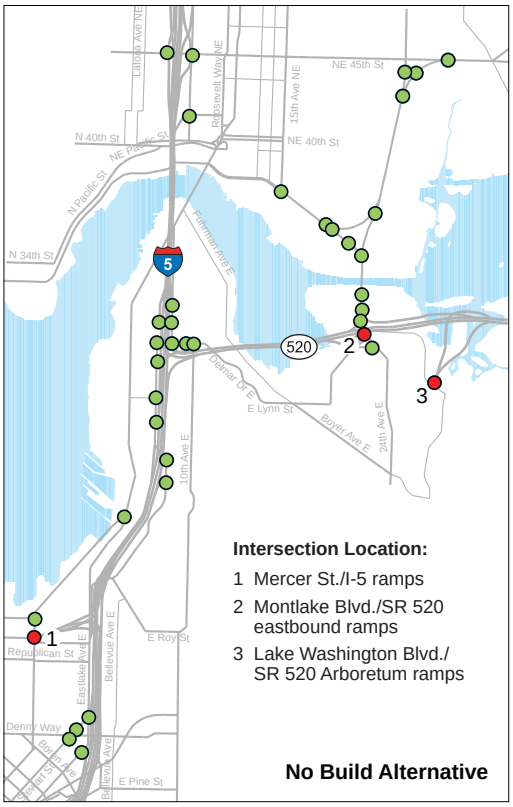
How would the project affect neighborhood traffic and parking?

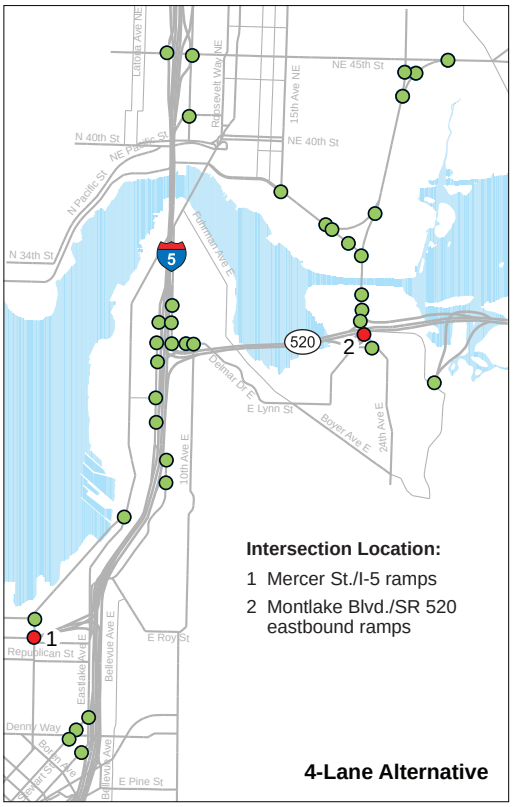
Like the regional highway system, local streets and intersections near SR 520 are expected to see changes in traffic conditions by 2030. In Seattle and on the Eastside, the 4-Lane Alternative and the 6-Lane Alternative would result in modest changes in traffic levels at local intersections; as would be expected, the levels of service would change at a few.

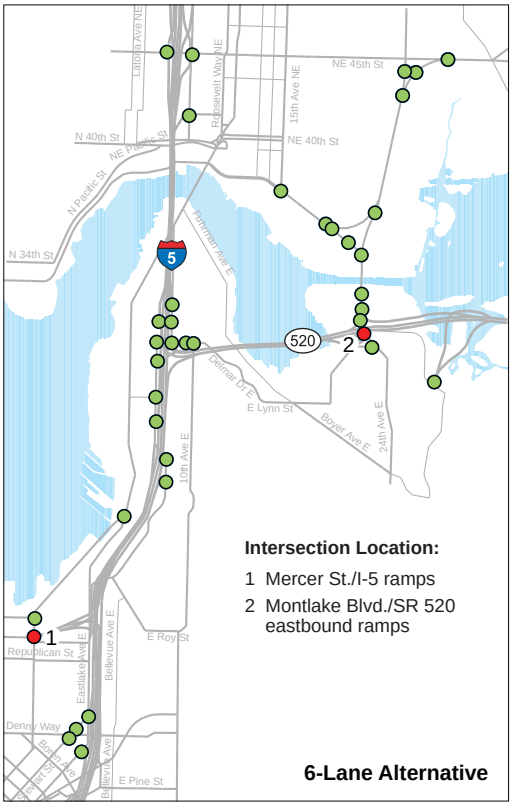
In Seattle, only 2 of the 38 intersections studied would be negatively affected by the 6-Lane Alternative *(Exhibit 4-6a and b),* while traffic operations would improve from severely congested to congested at five Seattle intersections under one or both alternatives. Two additional intersections

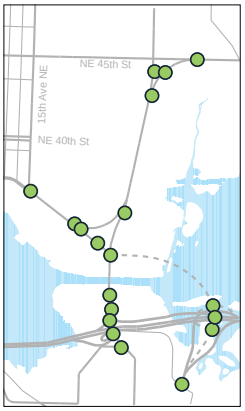
Like the regional highway system, local streets and intersections near SR 520 are expected to see changes in traffic conditions by 2030.

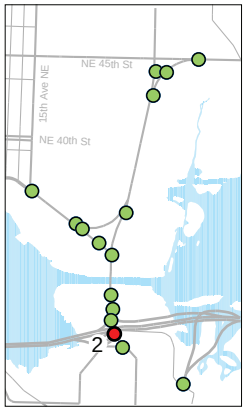
Exhibit 4-6a. **Traffic Congestion at Seattle Project Area Intersections, 2030 Morning Peak Hour**








Pacific Street Interchange Option


Second Montlake Bridge Option

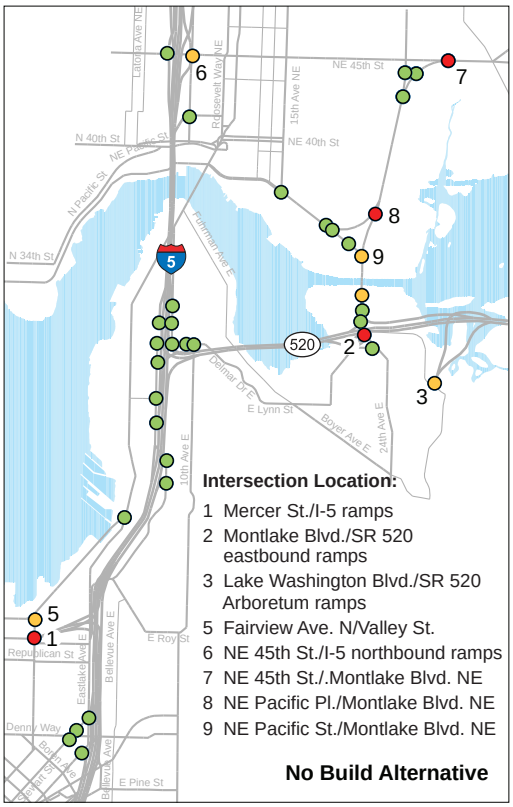
Intersection Location:

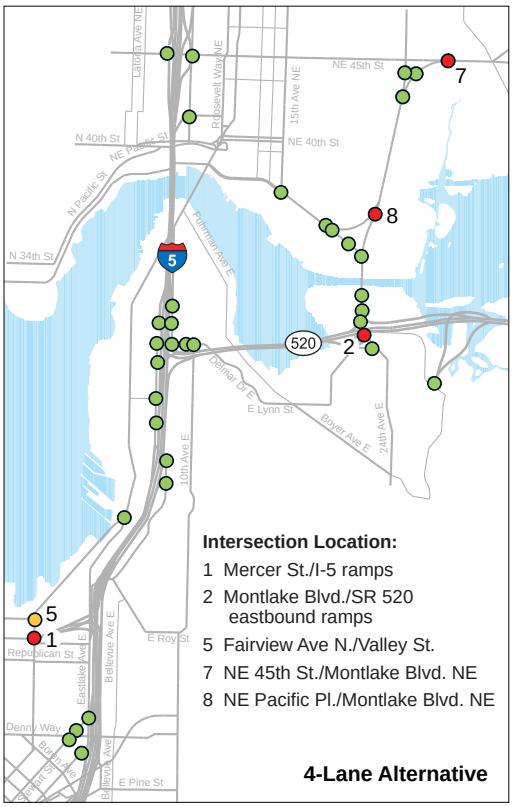
2 Montlake Blvd./SR 520 eastbound ramps

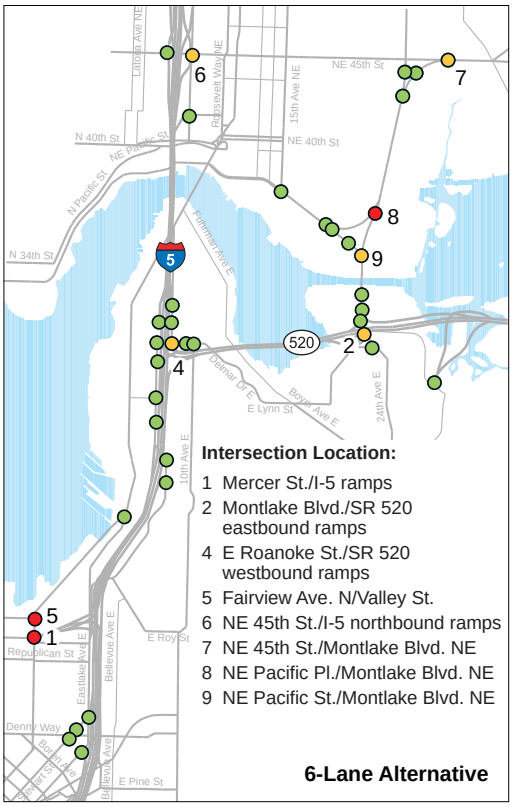
NORTH

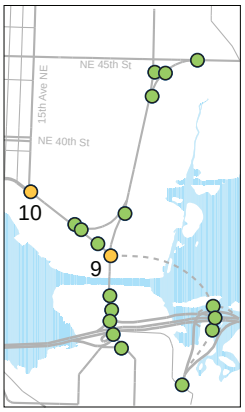
- Low to moderate congestion (LOS A through D)
- Congested (LOS E)
- Severely congested (LOS F)

Exhibit 4-6b. **Traffic Congestion at Seattle Project Area Intersections, 2030 Afternoon Peak Hour**



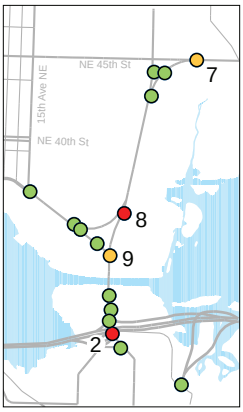






Pacific Street Interchange Option

Intersection Location:
9 NE Pacific St./ Montlake Blvd. NE
10 15th Ave. NE/ NE Pacific St.



Second Montlake Bridge Option

Intersection Location:
2 Montlake Blvd./SR 520 eastbound ramps
7 NE 45th St./Montlake Blvd. NE
8 NE Pacific Pl./Montlake Blvd. NE
9 NE Pacific St./Montlake Blvd. NE

NORTH

- Low to moderate congestion (LOS A through D)
- Congested (LOS E)
- Severely congested (LOS F)

would improve from being congested to having low to moderate congestion. The most notable improvement would be at the Lake Washington Boulevard ramp intersection, where replacement of the existing stop signs with a signal would change 2030 conditions from severe congestion to almost none during both morning and afternoon peak hours.

Because of the changes the Pacific Street Interchange and Second Montlake Bridge options would create in traffic patterns, these options would differ in their effects on local intersections. Overall, the roadway capacity these options would add would improve traffic at Montlake area intersections that are congested today. This is especially true for the Pacific Street Interchange option. The new intersections associated with the Pacific Street interchange would all operate with low to moderate levels of congestion. Compared to the 6-Lane Alternative, levels of service would improve at three additional intersections with the Pacific Street Interchange option and at one additional intersection with the Second Montlake Bridge option.

The improved access and levels of service in the Montlake area would translate to travel time benefits under the 6-Lane Alternative and the Pacific Street Interchange option. During the afternoon peak hour, it currently takes about 25 minutes for traffic to make the short journey southbound between 25th Avenue Northeast and the Montlake interchange. The 6-Lane Alternative would reduce this travel time by about 10 minutes during the peak hour, and the Pacific Street Interchange option would reduce it by about 20 minutes. The Pacific Street Interchange option would also offer a 10-minute time savings on this route during the off-peak hour. The Second Montlake Bridge option would not offer any appreciable travel time benefits—and in some cases could increase travel times—because it would draw more traffic to Montlake Boulevard. By relocating freeway-related traffic to the interchange, the Pacific Street Interchange option would allow Montlake Boulevard to function effectively as a local arterial again. This would also be good for transit, as described in the following section.

On the Eastside, both build alternatives would improve the 2030 conditions from severely congested to congested at the intersection of Bellevue Way and Northup Way during the afternoon peak hour. However, both alternatives would negatively affect the 92nd Avenue Northeast/SR 520 westbound off-ramp intersection during the morning peak hour. This intersection has a stop sign for off-ramp traffic only. The increased congestion would back up traffic on the ramp, but would not affect traffic flow on the freeway.

The 4-Lane and 6-Lane Alternatives would affect the parking supply similarly at most locations. Because of its wider footprint, the 6-Lane Alternative would result in a greater loss of parking stalls at two locations: the NOAA Northwest Fisheries Science Center lot in the Montlake

DEFINITION

Traffic Levels of Service

Level of service (LOS) measurements rate how well traffic operates on a given transportation facility. The rating scale uses the letters A through F, similar to grading scales used in the education system, where A is the best grade and F the worst. The letter grades are assigned based on the levels of delay that drivers experience at an intersection. The letter A represents the least delayed conditions, while the letter F represents the most delayed conditions. For this Draft EIS, level of service results are presented in the following terms:

- Low to moderate congestion (LOS A through D)
- Congested (LOS E)
- Severely congested (LOS F)

The full results of the level of service analysis are presented in Appendix R, Transportation Discipline Report.

Boulevard area and a WSDOT parking lot east of the Evergreen Point Park-and-Ride. Both the Pacific Street Interchange option in Seattle and the South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast option would affect more parking spaces when included in the 6-Lane Alternative. The Pacific Street Interchange option would affect parking at the University of Washington's E-11/E-12 parking lot and along Montlake Boulevard.

How would the project affect transit?

Bus Transit

The No Build and 4-Lane Alternatives include an existing partial HOV lane (westbound on the Eastside) that allows transit vehicles to bypass congestion along a section of SR 520 from Redmond to the Evergreen Point Bridge. However, because the HOV lanes would not extend continuously throughout the corridor, transit vehicles would operate in the general-purpose lanes along with other vehicles and the transit benefits would be less than those of the 6-Lane Alternative.

The 6-Lane Alternative's continuous HOV lanes would allow transit vehicles to bypass traffic congestion throughout the corridor. As a result, the 6-Lane Alternative would move people more efficiently than either the No Build or 4-Lane Alternatives. Transit service along the SR 520 corridor would be more reliable under the 6-Lane Alternative because of the HOV lanes. The lanes would be on the inside of the freeway, which would reduce existing conflict points where traffic entering or exiting SR 520 must merge into the outside HOV lane. *Exhibits 4-7a and 4-7b* show the projected increases in carpool and bus riders that would result with the 4-Lane and 6-Lane Alternatives.

Under all the alternatives and options in 2030, SR 520 is expected to carry more people in fewer vehicles. This reflects a shift from one- and two-occupant vehicles to buses and carpools as traffic congestion worsens. Today, approximately 11 percent of people crossing the Evergreen Point Bridge ride buses during an average peak period; by 2030, that number is predicted to rise to 25 percent under the No Build Alternative *(Exhibit 4-7b)*. To meet the additional demand, the 4-Lane Alternative would require 30 percent more peak period bus trips than the No Build Alternative, and the 6-Lane Alternative and its options would require 31 percent more peak period bus trips. Assuming 65 passengers per bus, almost twice the level of bus service currently forecast for 2030 would be required to serve the predicted demand across Lake Washington. This projected increase in bus service is not funded in current transit agency plans. Chapter 7 of the Transportation Discipline Report also includes additional information on the following:

KEY POINTS

Transit

Both build alternatives would substantially increase the demand for transit service, allowing SR 520 to carry more people with greater efficiency. The 6-Lane Alternative would allow transit vehicles to move faster and more reliably than the No Build or 4-Lane Alternatives; however, bus service would need to be expanded from planned levels to meet this demand.

The configuration of SR 520 today does not support transit reliability and speed, which prevents transit vehicles from moving efficiently through the corridor.

- Travel demand forecasting model
- Bus routes and riders currently using the freeway transit stops
- Existing and projected frequency of service for all affected bus routes
- Projected increase in passengers for each bus route by alternative
- Projected passenger and vehicle demand for buses crossing Lake Washington for all alternatives

WSDOT is committed to working with Sound Transit, Metro Transit, and Community Transit through project planning and implementation to determine how to meet these increased needs for transit. If the needs are met, the number of people who could move through the corridor in a given time (person throughput) would improve over the results currently shown in this analysis. Any increases in service over currently planned levels would result in costs to the transit service providers.

At the Montlake Freeway Station, riders are currently able to catch one of several routes for many destinations, giving them more route options and a high frequency of service. Removing the freeway station under either the Pacific Street Interchange or the No Montlake Freeway Transit Stop options would divide transit service to serve two destinations—the University District and downtown Seattle—and would reduce the options available to riders to reach their destinations. This would require riders to plan their trips with close reference to the bus schedules. People who currently use bus service that comes from I-5 and transfer at the Montlake Freeway Station would be particularly affected by this change in routing. There are currently two bus routes that serve the I-5 corridor north of SR 520 and then travel east on SR 520. Riders using these bus routes to access the University of Washington via the Montlake Freeway Station would have to use a different local bus route when the freeway station is removed.

In developing the Pacific Street Interchange option, the project team assumed that, with the closure of the Montlake Freeway Station, riders traveling eastbound across SR 520 would be required to catch the bus at a new location. In the University District, riders would continue to board buses near the intersection of Montlake Boulevard and Pacific Street (at the existing University transfer point). People who now board at the Montlake Freeway Station to travel east or west on SR 520 could also be affected; they could have to walk farther to access transit, or they may need to transfer.

The Pacific Street Interchange option would make transit to and from SR 520 more reliable in the vicinity of the University Link light rail station at Husky Stadium. Buses to and from SR 520 would be able to bypass congestion on Montlake Boulevard and would not need to wait for Montlake Bridge openings during off-peak hours. Local bus service would also benefit from reduced congestion on Montlake Boulevard. With the Pacific Street Interchange option, bus travel times to and from eastbound SR 520 would improve by approximately 10 minutes for buses traveling from the 15th Avenue Northeast/Northeast Pacific Street intersection dur-

Exhibit 4-7a. **Number of Daily Trips by Bus or Carpool in 2030**

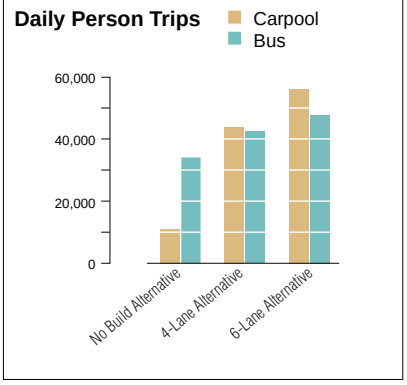
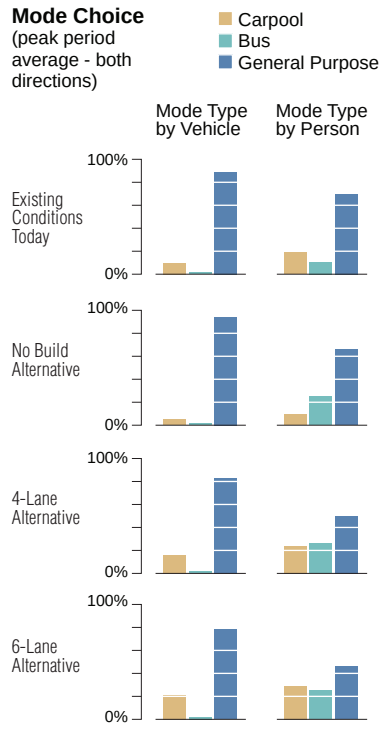


Exhibit 4-7b. **Percentage of Daily Trips by Travel Mode, Today and in 2030**



ing the p.m. peak hour. Relocating freeway traffic to the new Pacific Street interchange would cause traffic volumes and traffic congestion to decrease on Montlake Boulevard south of the Montlake Cut. With improved operations on Montlake Boulevard, there would also be less congestion on Northeast Pacific Street.

During the off-peak hours, buses traveling to and from SR 520 using the new Union Bay Bridge would not have to stop for Montlake Bridge openings. Bridge openings average about 5 minutes and result in about 10 minutes of delay. Although local buses traveling across the Montlake Cut would continue to be delayed by bridge openings, their travel times would also improve over No Build conditions because, with the decrease in traffic volumes across the Montlake Bridge, congestion on Montlake Boulevard would dissipate more quickly after the bridge was closed.

Based on Sound Transit's current schedule for University Link, WSDOT anticipates that the University of Washington station will be in place at or near the time when the SR 520 project is completed. This light rail service will provide improved access between downtown Seattle, Capitol Hill, and the University District. Bus riders on SR 520 would choose between taking a direct bus to their destination or a bus to Pacific Street, near the light rail station, to make connections to these areas.

Sound Transit, Metro Transit, and the Seattle Department of Transportation have been involved in discussions with WSDOT throughout the development of the 6-Lane Alternative options; however, the project team understands that additional work will be required by all four agencies to determine how to address the travel needs of transit riders affected by the removal of the Montlake Freeway Station, if that option is chosen. While the new light rail service proposed by Sound Transit will meet some of this need, this restructuring of bus service is likely to result in additional costs for transit service providers.

The Montlake Freeway Station under Montlake Boulevard allows bus riders to catch one of several routes for many destinations.

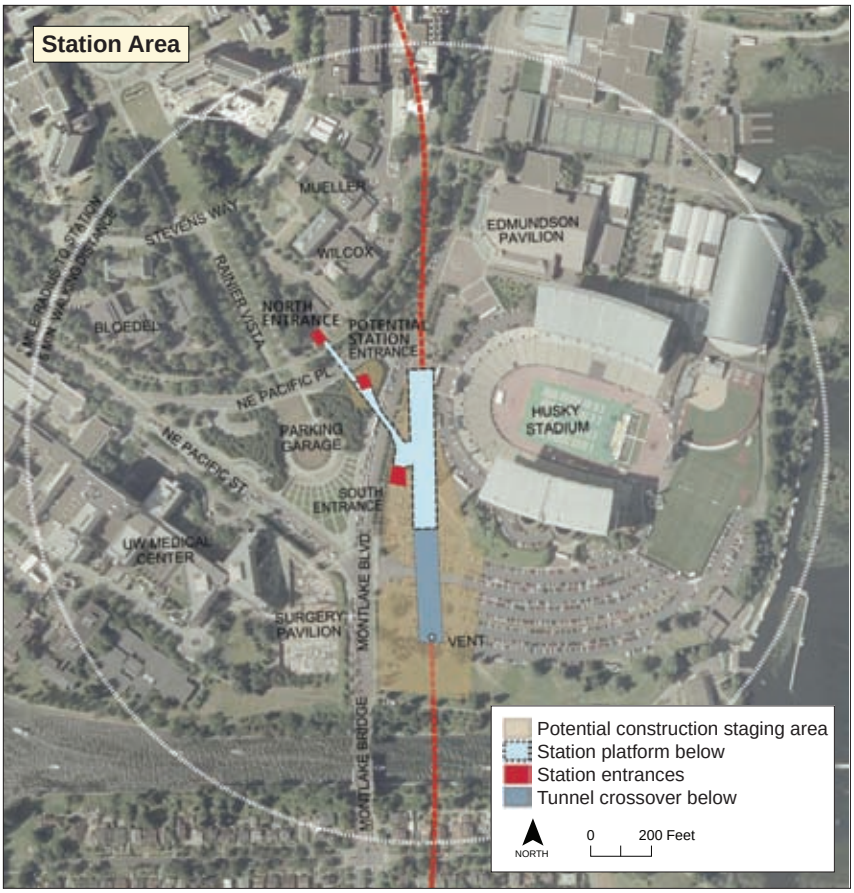
Transit reliability is affected by the opening of the Montlake Bridge.

Light Rail Transit

The Seattle portion of the project area is slated for future development of the University Link segment of Sound Transit's North Link light rail project, a high-capacity transit line that will extend from downtown Seattle to Northgate. The Sound Transit Board selected the University Link portion of North Link to be constructed as part of the Central Link light rail project on April 27, 2006. University Link includes a University of Washington station located at Husky Stadium. Although no direct multimodal connections (facilities such as park-and-rides or drop-off points) are proposed as part of the SR 520 project, all of the SR 520 alternatives and options would improve access to the new station because they would improve trip reliability in the project area. Because the 6-Lane Alternative would substantially enhance SR 520's people-moving capacity, it would provide greater benefits to rail transit users than the 4-Lane Alternative.

ST2

Sound Transit is in the process of developing ST2, a plan for the next phase of high-capacity transit investments in the region. A candidate project for SR 520 proposes to evaluate high-capacity transit modes and routes. The study would provide information that would be useful for Sound Transit to implement a potential future phase of high-capacity transit on SR 520.



Proposed University Link light rail station at Husky Stadium

The effects of the Pacific Street Interchange option would differ considerably from those of other alternatives and options because the new Pacific Street ramp would pass above the southern portion of the light rail station area. If the SR 520 project were built after the station was completed, conflicts could occur between the two projects' design features, including the rail station's north vent, tunnel facilities, station plaza, and entrance structures. There could be a need to relocate bus stops and layover/transit facilities as a result of lowering the Montlake Boulevard/Pacific Street intersection. This could negatively affect access to the station. In addition, there could be visual obstructions that might affect Link patrons looking for the station.

How would the project affect bicycle and pedestrian traffic?

Both the 4-Lane and the 6-Lane Alternatives, including the options, would improve capacity, circulation, and travel times for bicyclists and pedestrians by providing a continuous bicycle/pedestrian path from west of the Montlake Boulevard interchange to Northeast Points Drive in Kirkland. This path would add a key element to the regional nonmotorized

KEY POINTS

Bicycle/Pedestrian Path

Both build alternatives would add a regional bicycle/pedestrian path along SR 520, which would provide an additional route across the lake for bicyclists and pedestrians.

Bicyclists in the SR 520 corridor currently use buses to cross the lake.

transportation system by providing another link across Lake Washington. Bicyclists in the SR 520 corridor would no longer have to wait for a bus to cross the lake.

The project would enhance bicycle/pedestrian access near the Washington Park Arboretum by providing new connections to existing pathways and trails. In addition, the 6-Lane Alternative would create new bicycle/pedestrian access across the lids at 10th Avenue East/Delmar Drive, Montlake Boulevard, Evergreen Point Road, 84th Avenue Northeast, and 92nd Avenue Northeast.

How would the project affect navigation channels?

The 4-Lane and 6-Lane Alternatives would change the options available for large recreational and commercial vessels to reach points in Lake Washington south of the Evergreen Point Bridge. Both build alternatives would eliminate the midspan navigation channel and change the height of the east and west channels. The new east navigation channel would be higher, with a 70-foot vertical clearance above high water. This would provide 13 more feet of vertical clearance than the existing span, matching the height of the clearance at the I-90 east channel bridge. The new west navigational channel would be 25 feet high—19 feet lower than the existing west channel, which is now 44 feet high. All but the smallest sailboats would have to use the east navigation channel to reach the south side of the bridge. Based on consultation with marina and commercial vessel operators, as well as research into the types of vessels now used on Lake Washington, the proposed navigation channels appear to be adequate to allow passage of all vessels currently using the lake south of SR 520.

The Pacific Street Interchange option would place a new bridge across Union Bay that would span the navigation channel east of the Montlake Cut with a vertical clearance of 110 feet. This clearance was selected because there are no vessels taller than 110 feet that travel regularly into the lake north of SR 520. To improve safety for traffic on the new Union Bay Bridge, WSDOT may request that the U.S. Coast Guard establish a new governing clearance of 70 feet for this area. With either a 110-foot or a 70-foot clearance, the bridge columns would be placed just outside the navigation channel to avoid blocking boat traffic.

How would construction affect traffic flow and transit operations?

SR 520 would remain open with four lanes of traffic—two in either direction, like today—during peak weekday traffic periods throughout the 7- to 8-year construction timeline. WSDOT would ensure continuous traffic flow and transit operations across the lake during construction by building work bridges in Union Bay and a detour bridge in the Arboretum area. The new Portage Bay Bridge would be built in halves. The north

KEY POINTS

Navigation

The vertical clearance of the navigation channels for large recreational and commercial vessels would change with both build alternatives. The east channel would increase from a 57-foot clearance to a 70-foot clearance, the midspan drawbridge would be eliminated, and the west channel would change from a 44-foot clearance to a 25-foot clearance.

The west channel of the Evergreen Point Bridge is currently 44 feet high.

KEY POINTS

Road Closures

The SR 520 mainline would remain open throughout the construction period with two travel lanes in each direction during peak weekday traffic periods. There would be four major closures during construction:

- The Lake Washington Boulevard ramps (3 to 5 years)
- The east end of Pacific Street under the Pacific Street Interchange option (up to 1 year)
- The Delmar Drive bridge (9 to 12 months)
- The westbound HOV lane on the Eastside (up to 2 years)

half of the new bridge would be constructed while traffic uses the existing bridge. When completed, all traffic would be switched to the north half of the new bridge so that the existing bridge can be taken down, and the south half of the new bridge can be built. When finished, the entire bridge would be opened to traffic. New bridges for local streets that cross SR 520 would be built with only brief temporary closures, except that the Delmar Drive crossing would close for 9 to 12 months.

With these measures in place to ensure continued traffic flow, the most substantial effects of construction would be the closure of the westbound HOV lane on the Eastside for approximately 2 years and the closure of the Lake Washington Boulevard ramps in Seattle for 3 to 5 years. The HOV lane closure would increase SR 520 congestion on the Eastside, while the ramp closure would add more congestion at the Montlake interchange. If the Pacific Street Interchange option were chosen, reconstructing the existing Montlake Boulevard/Pacific Street intersection would also require closing the east end of Pacific Street for up to 12 months, adding to congestion in this area. Traffic would be rerouted onto Montlake Boulevard and Pacific Place.

All of the closures—particularly the westbound SR 520 HOV lane and the Pacific Street closure, which would affect the eastbound Pacific Street HOV lane to Montlake Boulevard—would negatively affect transit operations and would result in delays for transit riders. WSDOT will work with Metro Transit and Sound Transit to determine ways to avoid or minimize these adverse effects on transit service during project construction, including evaluating alternatives to the HOV lane closure and/or ways to provide priority access for transit. Full closure is evaluated here as a "worst-case" scenario, consistent with the intent of NEPA.

Construction of the SR 520 project also has the potential to affect the University Link light rail station at Husky Stadium. All build alternatives could affect transit access to the station area if construction increases traffic congestion in the Montlake area. In addition, proposed work near the Hop-In Market would need to avoid the University Link vent facility proposed for this location. Effects would be greater for the Pacific Street Interchange option, which could conflict with construction of the light rail station if the two projects were built concurrently; for example, shifting lanes east and west on Montlake Boulevard as it was being widened would affect Sound Transit's proposed replacement parking area at the Triangle garage and its proposed staging area just west of Husky Stadium. If the station were complete by the time of SR 520 construction, there could be conflicts with pedestrian access to the station area, such as sidewalk closures and entrance remodeling, while the Montlake Boulevard/Pacific Street intersection is expanded and reconstructed. WSDOT is working with Sound Transit to identify and avoid potential design and construction conflicts between the two projects so they can be coordinated smoothly. Chapter 8 provides a detailed discussion of construction effects.

What environmental effects would be similar for the 4-Lane and 6-Lane Alternatives?

The project's effect on a number of the environmental elements studied would not differ substantially between the build alternatives. However, both build alternatives would result in changes from No Build conditions. This section summarizes the predicted changes between the No Build Alternative and the build alternatives in 2030 for environmental effects that would be similar among the build alternatives.

How would the project affect geology and soils?

The greatest project effect on geology and soils would be the use of 1.1 million to 1.6 million net tons of soil and rock to construct the roadway foundations and embankments. This amounts to between 1 and 2 percent of the annual production of aggregate in Washington state. In addition, 52,000 to 114,000 cubic yards of soil that is currently within the project right-of-way would need to be disposed of at an offsite location, either because it would not be suitable for reuse during project construction or because it would be excavated at a time and place that would make its reuse impractical.

The topography of the project area would change somewhat through the construction of new embankments and the excavation of some areas. However, these changes would be relatively small because the widened roadway would follow the same corridor as the existing roadway, much of the roadway is on bridges, and the footprint has been kept as small as possible by the use of retaining walls. The Pacific Street Interchange option would have slightly greater effects on topography because it would lower Montlake Boulevard at its intersection with Pacific Street.

For both build alternatives, project designers would include a number of features to reduce potential geologic hazards. Areas where soils are liquefiable and/or prone to settlement or landslide—for example, the eastern end of the Portage Bay Bridge, the Evergreen Point Bridge west approach structure, and the Bellevue Way interchange area—would be stabilized during project design. These measures could include supporting the roadway on columns, improving soils beneath bridge columns, designing bridge columns to withstand seismic motion, or excavating areas of vulnerable soil and replacing them with stronger material. As described in Chapter 2, many of the existing bridges in the SR 520 corridor have a strong probability of being damaged during an earthquake; the new bridges would be designed to handle an earthquake without substantial damage, as required by current WSDOT standards. Under the No Build Alternative, geologic hazards would continue to threaten SR 520's integrity and the safety of motorists.

KEY POINTS

Geology and Soils

The project would use 1.1 million to 1.6 million tons of rock and soil for construction.

WSDOT would design the roadway and structures to reduce risks from geologic hazards like soil liquefaction and landslides, substantially improving safety compared to existing conditions.

Many of the existing bridges in the SR 520 corridor have a strong probability of being damaged during an earthquake; the new bridge would be designed to handle and earthquake without substantial damage.

Would air quality change as a result of the project?

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 become diluted and mix into the atmosphere. This is especially true for mobile sources of pollutants, such as the motor vehicles using the roads affected by this project. Exhaust from these vehicles is released throughout the entire trip, affecting air quality for as many miles as the vehicle travels.

As air quality regulations become more stringent, emissions from individual vehicles are expected to decline over time. This decline is reflected in the computer models that were used to predict total vehicle emissions related to the project and to assess whether air quality at existing high-traffic locations would become worse under future conditions.

Both build alternatives, as well as the 6-Lane Alternative options, would have a positive long-term effect on air quality compared to the No Build Alternative. The project would increase the traffic-carrying capacity of SR 520, which would reduce congestion and increase travel speeds. This, in turn, would improve air quality because moving vehicles operate more efficiently than vehicles that are idling or moving slowly in stop-and-go traffic. As a result, the total emissions of three primary pollutants produced by motor vehicles—carbon monoxide, volatile organic compounds, and nitrogen oxides—would be lower for both build alternatives than the No Build Alternative. The lids in the 6-Lane Alternative would also improve localized air quality because they would limit the transport of particulates and diesel exhaust.

Carbon monoxide is a pollutant that can affect air quality in localized areas with high traffic congestion and unfavorable air circulation. To make sure that the project would meet air quality standards for carbon monoxide, even in especially congested areas, the project team evaluated several "hot spots" at intersections where traffic is expected to experience the longest delay. This type of analysis is required for compliance with the State Implementation Plan for air quality. These intersections are:

- Mercer Street and the I-5 ramps in Seattle
- Montlake Boulevard and Lake Washington Boulevard in Seattle
- 108th Avenue Northeast and Northup Way in Bellevue

As required, the hot-spot analysis was done for both the design year of 2030 and an opening year of 2016. The analysis showed that there would be a decreasing trend in carbon monoxide concentrations over time. In both 2016 and 2030, none of the alternatives or options would violate the National Ambient Air Quality Standards at any of the intersections, even though all of these intersections exceed the standards now. Improvements proposed by the project would enhance traffic flow and reduce idling time at these intersections—thus reducing motor vehicle emissions overall. Construction would cause temporary, localized emissions of dust and

KEY POINTS

Air Quality

All build alternatives and options would improve air quality compared to the No Build Alternative by reducing congestion and increasing travel speeds. This, in turn, would reduce emissions of air pollutants.

Vehicles idling or moving slowly operate less efficiently and produce higher emissions than vehicles moving at higher speeds.

exhaust, but these would be controlled by best management practices and are not expected to affect overall air quality in the region.

In addition to the air pollutants to which the National Ambient Air Quality Standards apply, EPA also regulates mobile source air toxics (MSATs), which are a subset of the 188 air toxics defined by the Clean Air Act. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. MSATs also result from engine wear or from impurities in oil or gasoline.

Based on FHWA guidance, WSDOT qualitatively assessed how the emission of air toxics would differ between each alternative.[1] The air toxics emitted would be directly proportional to traffic volumes, assuming that other variables (such as the proportion of different types of diesel-burning vehicles) are the same for each alternative. Because of the proposed tolls, average traffic volumes estimated for the build alternatives in 2030 are slightly lower than those for the No Build Alternative. This decrease would lead to lower air toxic emissions for the build alternatives along the SR 520 corridor. Increased speeds associated with the 6-Lane Alternative could also result in lower air toxics emissions, since emissions of all of the key air toxics except for diesel particulate matter decrease as speed increases. Regardless of the alternative, emissions will likely be lower in the design year than present levels as a result of the EPA's national control programs described in the sidebar to the right.

Automobiles also emit "greenhouse" gases, primarily carbon dioxide, that may contribute to global warming. Carbon dioxide emissions are proportional to fuel consumption. Passenger cars emit on average 225 grams carbon dioxide per kilometer traveled (0.8 pound per mile); SUVs and light trucks emit about 50 percent more carbon dioxide (1.2 pounds per mile). Because carbon dioxide emissions are directly proportional to fuel consumption, they vary with speed and are lowest at a speed of approximately 45 mph, where most automobiles are most fuel-efficient. This emissions pattern relative to vehicle speed is similar to that of carbon monoxide; consequently, carbon dioxide emissions would vary among the alternatives in a similar pattern to carbon monoxide emissions.

Mobile Source Air Toxics (MSATs)

EPA is the lead federal agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. EPA recently issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources under its authority in Section 202 of the Clean Air Act. In its rule, EPA examined the impacts of programs to control mobile sources of air toxics, including its reformulated gasoline program, its national low emission vehicle standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to control MSATs.

Vehicle Miles Traveled

Although both the 4-Lane and 6-Lane Alternatives would both result in more people wanting to use the SR 520 corridor than the No Build Alternative, these people would primarily travel in buses and carpools. This higher use of HOV and transit means that annual vehicle miles traveled would be less than the No Build Alternative. With the 6-Lane Alternative, there would be slightly more annual vehicle miles traveled than with the 4-Lane Alternative; however, this amount is so small that it is not reflected in the daily projected emissions.

[1] To date, neither National Ambient Air Quality Standards MSATs nor national project-level guidelines to study MSATs under various climatic and geographic situations have been developed. This makes the study of MSAT concentrations, exposures, and health effects difficult and uncertain. Therefore, accurate and reliable estimates of human health or environmental effects from transportation projects and MSATs are not possible at this time. In addition, EPA has not established toxicity factors for diesel particulate matter, but one study states that it accounts for a large portion of MSAT health risk in certain situations. Without the necessary standards and tools, the effects of this project cannot be analyzed in any meaningful way.

How could the project affect hazardous materials?

The project team searched government databases and other information sources to learn whether the project might affect any sites containing hazardous materials or wastes. *Exhibits 4-8 and 4-9* show the locations of all the potentially affected sites. Most are underground tanks used to store petroleum products. There are also three former municipal landfill sites that could be disturbed during construction: the Montlake

KEY POINTS

Hazardous Materials

Depending on the alternative, the project would disturb between 9 and 15 sites that are known or suspected to be contaminated with hazardous materials. WSDOT will define and minimize potential hazards through additional site investigations and comprehensive planning for contingencies involving hazardous substances.

Exhibit 4-8. **Hazardous Material Sites in the Seattle Project Area**

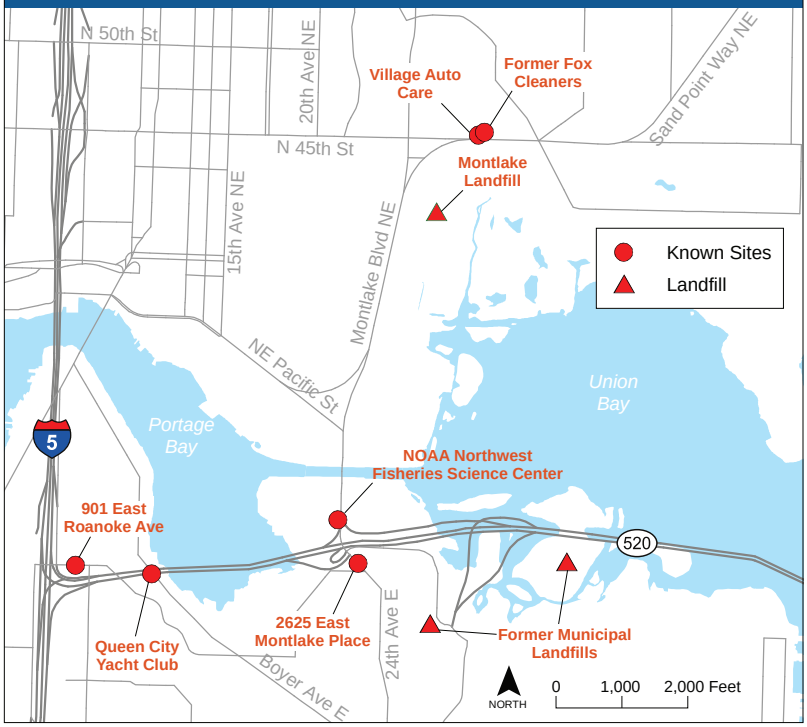
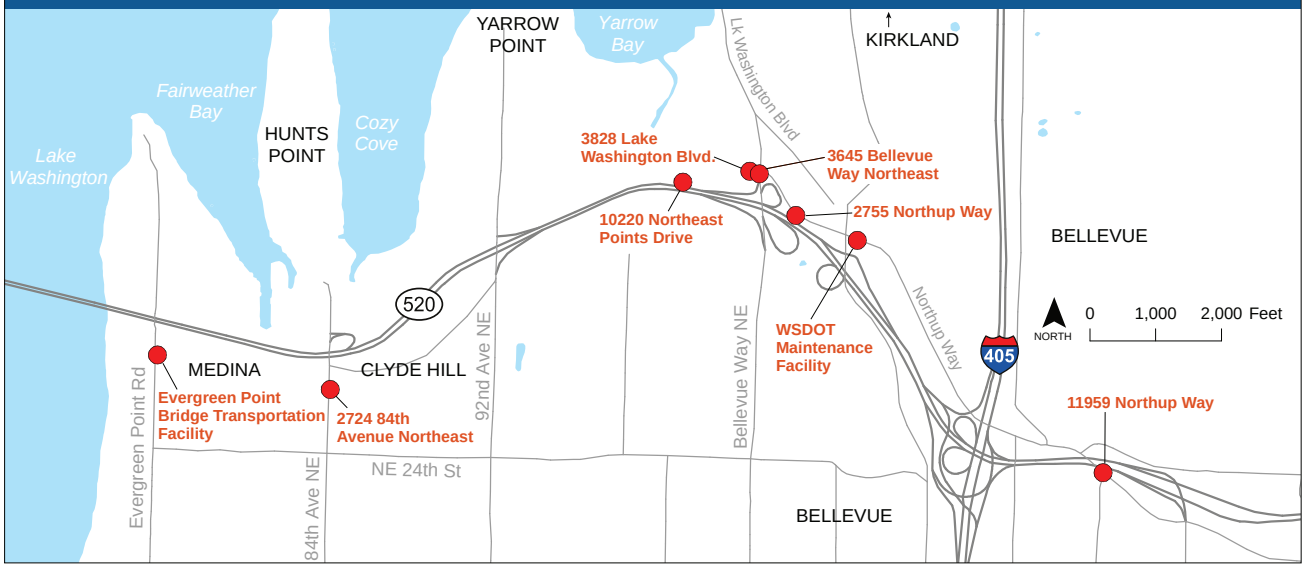


Exhibit 4-9. **Hazardous Material Sites in the Eastside Project Area**



Landfill (east of Montlake Boulevard and north of Husky Stadium) and two abandoned landfill sites south of SR 520, one beneath the Washington Park Arboretum and the other adjacent to Lake Washington Boulevard. Older buildings or structures demolished because of the project could also contain hazardous building materials such as asbestos or lead-based paint.

Both build alternatives would permanently affect a number of sites that may be, or have been in the past, contaminated with hazardous materials. The 4-Lane Alternative would disturb four known sites in the Seattle project area and five known sites on the Eastside; the 6-Lane Alternative would disturb the same four sites in the Seattle project area and eight sites on the Eastside. The Pacific Street Interchange option could affect three additional contaminated sites along Montlake Boulevard. The No Build Alternative would not disturb or alter any of these sites, and therefore would have no effects.

Although there is some risk that the project could disturb unknown or incompletely cleaned-up contaminants, WSDOT would take a number of steps to minimize potential hazards. These include:

- Conduct additional studies and building surveys before demolition and construction to confirm the presence or absence of contamination.
- Locate underground storage tanks and associated piping. If necessary, underground storage tanks would be removed prior to construction.
- Design stormwater treatment facilities to protect water quality if contaminant sources that could affect stormwater are expected to remain present in groundwater or soil after construction.
- Comply with Section 620.08 of WSDOT's Environmental Procedures Manual, which provides standard protocols for dealing with hazardous materials during construction.
- Prepare a comprehensive contingency and hazardous substances management plan; worker health and safety plan; spill prevention, control, and countermeasures plan; and stormwater pollution prevention plan.
- Manage and dispose of hazardous or contaminated materials in accordance with applicable requirements.

What effects would the project have on the local and regional economy?

Building the SR 520 Bridge Replacement and HOV Project could benefit the project area economy in several ways. Investment in transportation infrastructure would benefit businesses and consumers to the extent that it would improve access and reduce travel times. These improvements, in turn, would help allow the region to meet its economic development goals. The 6-Lane Alternative would provide more economic benefit than the 4-Lane Alternative because it would be much more effective in moving people through the SR 520 corridor. During construction, the employ-

KEY POINTS

Local and Regional Economy

All build alternatives would slightly reduce revenues from property taxes. The 6-Lane Alternative would provide a long-term economic benefit by improving regional access and increasing the people-moving capacity of SR 520.

ment of workers and the acquisition of materials would add many millions of dollars to the local economy over a period of several years.

In addition to these positive economic effects, the build alternatives would have localized negative effects because of the need to acquire additional right-of-way for SR 520. The NOAA Northwest Fisheries Science Center and the Queen City Yacht Club would each lose a portion of their existing facilities, which could make it more difficult for them to remain economically viable. However, WSDOT would work with them to find solutions to replace the facilities at their current locations. Although several businesses would require complete relocation, WSDOT would provide compensation and relocation assistance to these businesses, so no permanent effects are expected.

Converting taxable property to freeway right-of-way would reduce annual property tax revenues by up to $5,400 in Seattle and $5,800 on the Eastside. The Pacific Street Interchange and Second Montlake Bridge options would have a smaller effect in Seattle (revenue reductions of $1,600 and $3,500, respectively). The South Kirkland Park-and-Ride Transit Access options would have a slightly lower effect on the Eastside, with a revenue reduction of $5,500. These effects are less than might be expected because a good deal of the land that would be acquired is publicly owned and not subject to property taxes. In all cases, the decrease in tax revenue would be less than 0.013 percent of the overall property tax collections for the affected municipalities.

How would the project affect public services and utilities?

Overall, the project would enhance local agencies' ability to provide public services such as police, fire, and emergency medical. This is because the widened shoulders (under both alternatives) and HOV lanes (under the 6-Lane Alternative) would allow additional space for emergency vehicles to bypass traffic and reach the scene of an emergency. Under the No Build Alternative, there would be no additional space, and emergency vehicles would continue to be delayed in traffic as they are today. Reduced travel times in the corridor would also improve emergency response, and both alternatives would provide a number of enforcement areas along SR 520 where vehicles could be positioned to respond more quickly to accidents, stalls, and other incidents. The 6-Lane Alternative would improve emergency response time more than the 4-Lane Alternative because traffic would be moving faster through the corridor. Additional beneficial effects of the build alternatives would be reduced travel time for school buses and lower noise levels at community facilities, including the Montlake Community Center and the Bellevue Christian School/Three Points Elementary.

As shown in *Exhibits 4-10 and 4-11,* a number of utilities are located within the footprint of the project. Many of these utilities would have to be relocated and/or protected during construction to prevent damage and

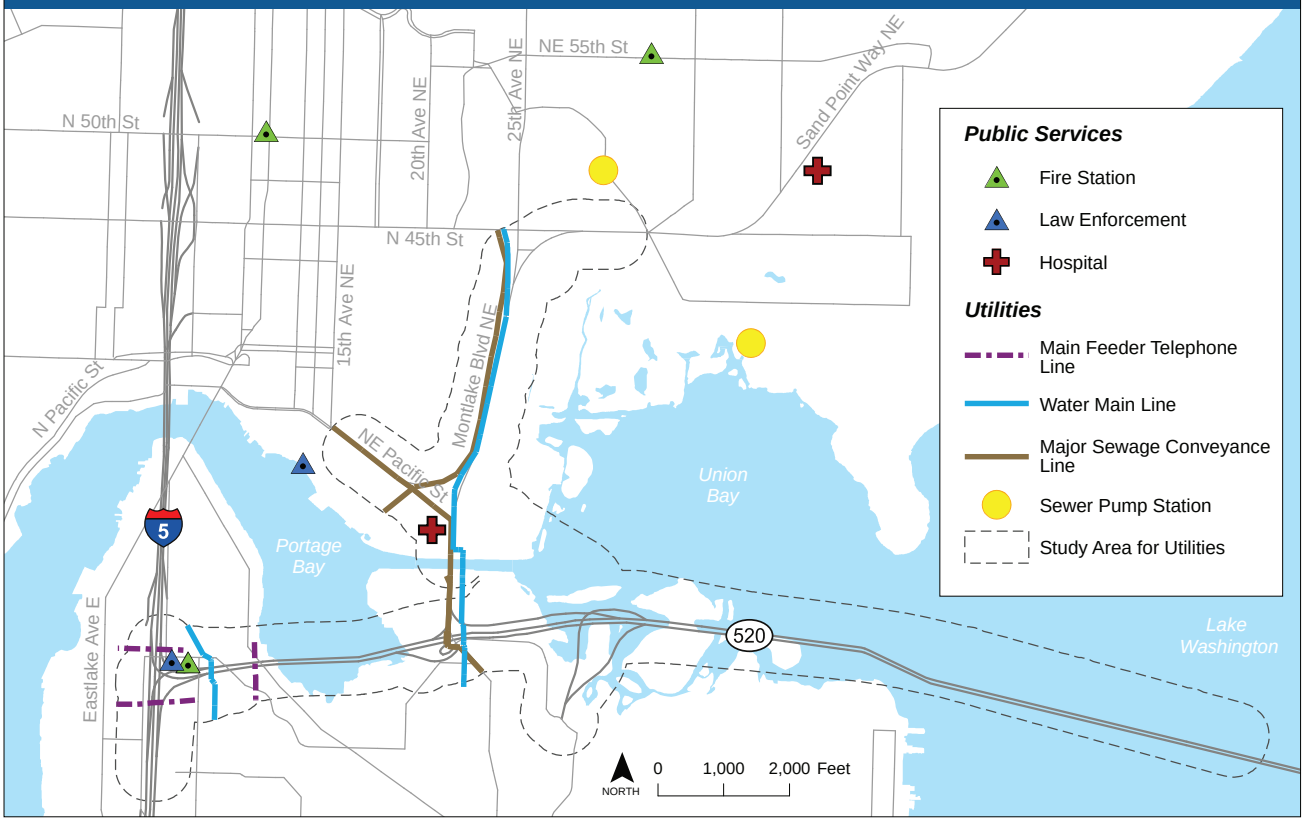
KEY POINTS

Public Services and Utilities

The SR 520 project would enhance the provision of public services like police, fire, and emergency medical by reducing traffic congestion.

Many utilities would need to be protected or relocated during construction, but no permanent effects would result.

Exhibit 4-10. **Public Services and Utility Locations in the Seattle Project Area**



SOURCES: City of Seattle (2003) GIS Data (Sewer, Water, and Public Services); King County (2003) GIS Data (Public Services); Qwest (2002) Data (Telephone Lines).

allow for future access. Because the 6-Lane Alternative is wider than the 4-Lane Alternative, more utilities would need to be moved or protected. The exact locations of all known utilities would be confirmed during the final design stage to determine relocation and protection needs.

During construction, some service disruption could occur if major utilities needed to be moved. Temporary closure of streets could result in the need to provide detours for emergency vehicles. WSDOT would work closely with affected utility and service providers to ensure that they are notified of potential disruptions and closures as soon as possible and that plans are in place for alternative access and service where necessary. No permanent effects on utility service would result from the project.

What are the energy needs of the project?

Vehicles driving on SR 520 consume energy by burning gasoline and diesel fuel. The amount of fuel used depends on the number of vehicles in the corridor and the efficiency with which those vehicles use fuel. Traffic congestion reduces fuel efficiency; excessive idling and stop-and-go conditions cause a dramatic decline in fuel economy. Under current conditions—and to a much greater extent under No Build conditions—there are many

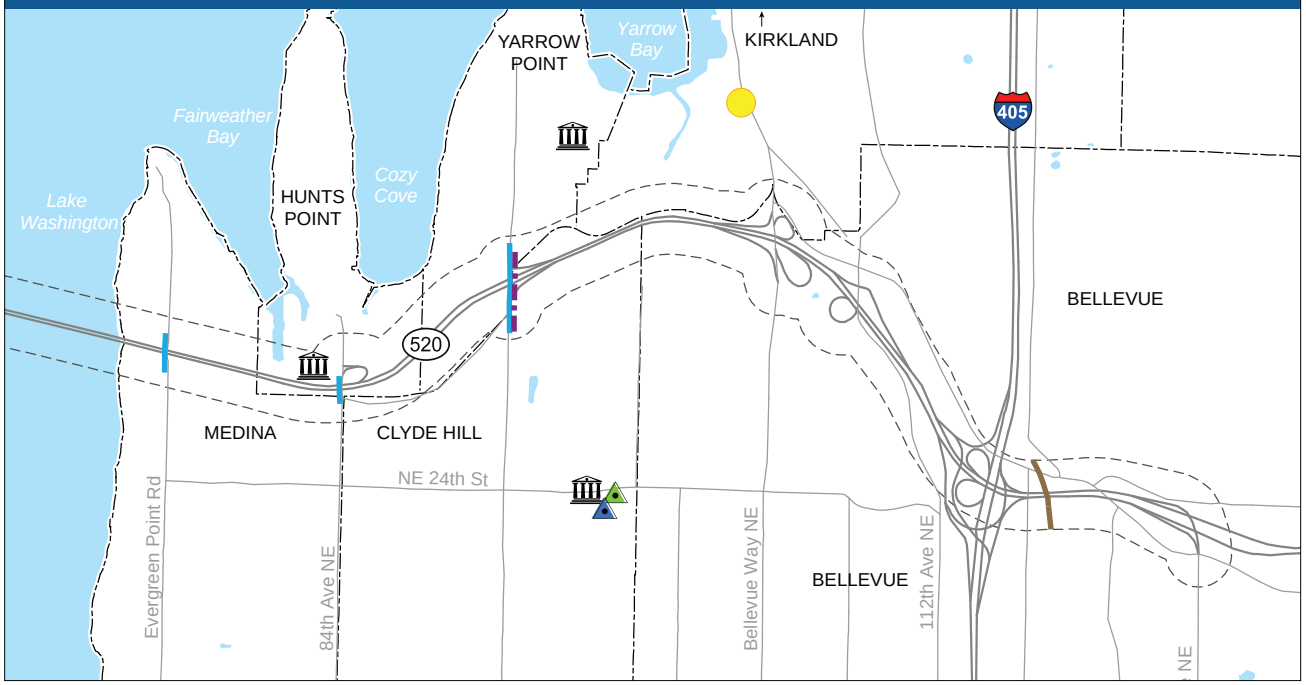
KEY POINTS

Energy

Improved traffic flow on SR 520 with the build alternatives would increase fuel efficiency and reduce energy use compared to No Build.

Construction of the project would consume enough energy to meet the needs of 23,400 homes (4-Lane Alternative) or 27,400 homes (6-Lane Alternative) over the 7- to 8-year construction period.

Exhibit 4-11. **Public Services and Utility Locations in the Eastside Project Area**



Public Services

- City Hall
- Fire Station
- Law Enforcement
- Study Area For Utilities

Utilities

- Main Feeder Telephone Line
- Water Main Line
- Major Sewage Conveyance System
- Sewer Pump Station
- City Limits

SOURCE: King County (2003) GIS Data (Public Services); Qwest (2002) Data (Telephone Lines).

NORTH 0 1,000 2,000 Feet

times throughout the day when the corridor is congested and vehicles are operating at inefficient speeds. Because the annual vehicle miles traveled would be lower with the 4-Lane and 6-Lane Alternatives, they would use less energy than the No Build Alternative. The Pacific Street Interchange and Second Montlake Bridge options would use slightly less energy than the 6-Lane Alternative because they would increase travel speeds and fuel efficiency. *Exhibit 4-12* compares the alternatives and options in terms of fuel consumption.

Constructing the project would require substantial amounts of energy to produce construction materials, transport them to the site, and operate construction equipment. Energy consumption is generally proportional to project costs. The 6-Lane Alternative would consume about 20 percent more energy during construction than the 4-Lane Alternative. Energy consumed during construction would be enough to meet the energy needs of between 23,400 homes (4-Lane Alternative) and 27,400 homes (6-Lane Alternative) for the duration of the construction period.

Exhibit 4-12. **Regional Fuel Consumption Estimates for 2030 by Alternative**

Alternative or Option	Annual Vehicle Miles Traveled (millions)	Average Speed (mph)	Fuel Consumption Rate (mpg)	Gallons/ Year (millions)	MBtus/Year (millions) [a]	% Change versus No Build 2030
No Build Alternative	39,071	26	30.7	1,272.7	159	--
4-Lane Alternative	38,696	27	31.0	1,248.3	156	-1.9%
6-Lane Alternative	38,842	26	30.7	1,265.2	158	-0.6%
Pacific Street Interchange Option	38,798	27	31.0	1,251.6	156	-1.7%
Second Montlake Bridge Option	38,807	27	31.0	1,251.8	156	-1.6%

Source: U.S. Department of Energy and U.S. Environmental Protection Agency. 2004. Fueleconomy.gov:Driving more efficiently. http://www.fueleconomy.gov/feg/drivehabits.shtml, accessed on March 16, 2004.

[a] 1 gallon of gasoline = 0.125 MBtu (million British thermal unit)

What environmental effects would differ between the 4-Lane and 6-Lane Alternatives?

For some of the environmental elements studied, the project would have notably different effects from one build alternative to the other and/or from one geographic area to another. The sections below summarize the effects of each alternative across the entire SR 520 corridor for these environmental elements. Chapters 5, 6, 7, and 8 provide more detailed descriptions of the differences between the alternatives, including visual simulations of major project features.

What would the project area look like after the SR 520 project is completed?

Under either build alternative, the appearance of SR 520 would change noticeably throughout the project area. The two largest contributors to the change would be the wider footprint of the roadway and the sound walls that would line it on either side throughout most of the corridor. During construction, the work and detour bridges in Portage Bay and Lake Washington would be prominent visual features.

In Seattle, views would change substantially both for users of SR 520 and for people looking at the highway and bridges from other locations. Most affected would be:

- Views in the vicinity of the Portage Bay Bridge, where the new bridge would be similar in construction to the existing bridge but larger, with sound walls on both sides
- Views in the Montlake area, where the freeway would be widened to the north and thus remove buildings, parking, shoreline vegetation, and landscaping

SR 520 in the vicinity of the Portage Bay Bridge would be similar to the existing bridge but larger, with sound walls on both sides.

KEY POINTS

Visual Quality

Key visual effects of the SR 520 project would result from the following project elements:

- Wider roadway
- Continuous sound walls on both sides of the highway throughout Seattle and the Eastside
- Higher, more open structures through the Arboretum would improve visibility across the water
- New bridge over Union Bay (Pacific Street Interchange option) or Montlake Cut (Second Montlake Bridge option)
- New roadway and intersection configuration in the Husky Stadium area (Pacific Street Interchange option)

- Views in the Washington Park Arboretum, which would experience both negative effects (as a result of the wider structures over Foster Island and the surrounding open-water areas) and positive effects (as a result of the structures' greater height and column spacing and the removal of the R.H. Thomson Expressway Ramps, which would create more open views for park users at ground and water level)
- Views of and from the southeast part of the University of Washington campus with the Pacific Street Interchange option, which would place a prominent new bridge across Union Bay
- Views for motorists throughout the SR 520 corridor in Seattle, which would change dramatically because the sound walls would block existing vistas of the water and the Cascade Mountains

Across Lake Washington, the new Evergreen Point Bridge would float about 14 feet higher than the existing bridge, and there would be no steel truss structures atop the west and east highrises. These changes would be somewhat noticeable from shoreline neighborhoods, but would remain a small element in the distance. A 10-foot-high sound wall would run along the south side of the west approach to the bridge, limiting motorists' views somewhat. However, bicyclists and pedestrians would have panoramic views to the north, and the five vantage points on the bridge would allow them to stop and enjoy the scenery.

On the Eastside, views would be affected throughout the SR 520 corridor, but the changes would be most apparent to people using the roadway and adjacent bicycle/pedestrian path. The northward shift and widening of SR 520 would remove a substantial amount of vegetation on the north side of the highway. The 6-Lane Alternative would have greater effects than the 4-Lane Alternative, but would also add landscaped open space on the three new lids over the highway. Sound walls from 8 to 20 feet high would be constructed on either side of SR 520, which would change the highway's appearance from a vegetated corridor to a wide, walled roadway. Tree screens that now protect houses close to the right-of-way would be replaced by sound walls. These walls would be screened with trees and shrubs in areas where there is sufficient right-of-way.

WSDOT has committed to a number of actions to reduce the project's visual effects. These include establishing design guidelines for visual unity and consistency; revegetating, where possible, with compatible landscaping; constructing aesthetically pleasing walls, particularly in residential areas; and landscaping the 6-Lane Alternative lids to ensure a unified visual appearance.

On the Eastside, views would be affected throughout the SR 520 corridor, but the changes would be most apparent to people using the roadway and adjacent bicycle/pedestrian path.

How noisy would the project area be under each alternative? Who would be affected?

The sound walls that are part of the project design would dramatically reduce noise throughout most of the SR 520 corridor—a very positive effect

KEY POINTS

Noise

Sound walls included in the project design would reduce noise dramatically throughout most of the SR 520 corridor.

of the project. As *Exhibit 4-13* shows, under the 4-Lane Alternative, nearly two-thirds of the 409 residences along the corridor that now approach or exceed the FHWA noise abatement criteria would have their noise levels reduced substantially after the project is built. Under the 6-Lane Alternative and options, the benefit would extend to about 69 percent of residences currently affected by noise. The percent reduction would be even greater compared to the No Build Alternative because higher background noise levels by 2030 would increase the number of residences approaching or exceeding the noise abatement criteria from 409 to 442.

Exhibit 4-13. **Number of Residences That Would Approach or Exceed Noise Abatement Criteria** (Today Compared to 2030)

Alternative/Option	Seattle	Eastside	Total	% Change
Existing Conditions	274	135	409	--
No Build Alternative	288	154	442	+ 6%
4-Lane Alternative	127	24	151	- 64%
6-Lane Alternative	109	18	127	- 70%
Pacific Street Interchange Option	103	18	121	- 71%
Second Montlake Bridge Option	112	18	130	- 69%

The reductions in noise levels would range from 3 to 18 decibels. (When we mention decibels in this Draft EIS, we are referring to A-weighted decibels; note that a 10-decibel reduction reduces the noise level by half.) In addition to residences, the Washington Park Arboretum would experience reduced noise levels in comparison to the No Build Alternative. These reductions would range from a noticeable 5 decibels to a substantially lower 24-decibel reduction. Just 4 percent of residences under the 4-Lane Alternative and 2 percent under the 6-Lane Alternative would have a noticeable increase (3 to 5 decibels) in noise levels. These increases would generally be due to increased noise from sources other than SR 520, such as I-5 and busy local streets.

Within Seattle, the differences between the alternatives would largely be the result of the 6-Lane Alternative lids replacing existing bridges. The lids would block more noise, thereby causing a greater reduction. The greatest noise reduction benefits in Seattle would be in the Arboretum and Madison Park, followed by North Capitol Hill and Montlake.

Noise levels for the 6 Lane Alternative options would differ only slightly from the 6-Lane Alternative. No noise-sensitive locations on the University of Washington campus would approach or exceed the noise abatement

criteria. The traffic that would use the Pacific Street interchange would result in a slight increase of 2 to 3 decibels along Lake Washington Boulevard south of SR 520 that under the 6-Lane Alternative would experience a 1 to 2 decibel increase. The increase from the 6-Lane Alternative would not be heard, but the increase from the Pacific Street Interchange option might be slightly noticeable.

On the Eastside, 135 residences currently have noise levels that exceed the noise abatement criteria. This would improve dramatically with either of the build alternatives. The sound walls included in the project design would reduce noise to below the noise abatement criteria at all but 24 residences under the 4-Lane Alternative and all but 18 residences under the 6-Lane Alternative—a reduction of up to 86 percent. As in Seattle, the differences between the alternatives would largely be the result of the lids, which would provide more complete shielding than the sound walls at intersections near the bridges.

During construction, people living and working near the construction areas would be affected by noise from a variety of activities and equipment. The loudest construction-related activities are pile-driving and demolition of existing structures. State regulations restrict the noise from construction activities by imposing different noise limits, depending on type of activity and time of day. WSDOT would require contractors to abide by these regulations and to mitigate noise in other ways, such as limiting hours of construction near residential areas, installing temporary sound barriers where feasible, and requiring mufflers on all engine-powered equipment.

Because the No Build Alternative Continued Operation Scenario would leave the existing highway in place, there would be no new sound walls. Existing levels of noise would rise slightly in many areas as a result of increased traffic, and noise would continue to be a dominant characteristic of the project area. The Catastrophic Failure Scenario could result in dramatic noise reductions if portions of SR 520 were so damaged as to be unusable; which areas would experience reduced noise would depend on the location and extent of the damage.

Quieter Pavement to Reduce Highway Noise

The noise generated by traffic is partly a result of the friction of tires against pavement. Differences in pavement types can affect the noise levels near a highway. WSDOT is reviewing quieter pavement types, including rubberized asphalt, as part of an agency-wide study to determine whether it can be used as a noise mitigation measure for projects, including SR 520.

In addition to reviewing literature and other studies, WSDOT is conducting its own testing of quieter pavement materials. WSDOT has already identified two testing sites for hot mixed asphalt and is also looking to identify a test site location for a Portland cement concrete pavement or white pavement test site. The SR 520 project team is following all of this work closely, since we know that community members in the project corridor are very interested in reducing noise levels.

To begin using any type of quieter pavement as noise mitigation, WSDOT would need at least 5 years of successful testing, along with approval from FHWA and a commitment to regularly replacing the pavement to retain noise benefits. FHWA currently does not consider quieter pavement a noise mitigation option, so it is not included in this Draft EIS. This does not mean that WSDOT has excluded this mitigation option. It only means that in order to meet federal noise mitigation requirements, we need to use today's approved mitigation methods.

How would the project affect surrounding neighborhoods and communities?

The project has the potential to affect Seattle neighborhoods and Eastside communities in a number of different ways, including effects on community cohesion; recreation; land use; regional and community growth; and bicyclist, pedestrian, and transit facilities. Each of these areas of potential effect is discussed briefly below for neighborhoods in the Seattle and Eastside project areas.

Community Cohesion

As described in Chapter 2, SR 520 divides neighborhoods in Seattle and communities in the Eastside project areas. The build alternatives would not further isolate or physically separate the project area's neighborhoods and communities. In fact, the 6-Lane Alternative would partially reconnect the communities by providing lids where bridges now exist at 10th Avenue East and Delmar Drive, Montlake Boulevard, Evergreen Point Road, 84th Avenue Northeast, and 92nd Avenue Northeast. The lids would enhance connections across the highway, especially for bicyclists and pedestrians. In addition to carrying local streets over SR 520, these lids would create landscaped open space with paths across the highway and places for small groups to gather.

The project would not affect neighborhood population distribution. In Seattle, a maximum of three residences would be displaced; on the Eastside, a maximum of two would be displaced. Both alternatives would improve air quality and reduce noise levels and traffic congestion in project area communities. Over time, the project could have a very slight effect on regional population distribution by changing large-scale patterns of access within the project area, although it would not create additional growth.

The alternatives would not displace affordable housing or community facilities, nor would they create physical impediments that would make it more difficult for people to reach community facilities or affordable housing. Both build alternatives would demolish the MOHAI building; however, the museum is currently scheduled to move before the project would be constructed.

The No Build Alternative would not affect neighborhood connections, community facilities, or population distribution. However, it also would not provide any measures to reconnect severed neighborhoods (as the 6-Lane Alternative would), nor would it improve air quality, reduce noise, or decrease traffic congestion.

Recreation

In the Seattle project area, all build alternatives and options would require WSDOT to purchase portions of Bagley Viewpoint, McCurdy Park, East Montlake Park, and the Washington Park Arboretum. *Exhibit 4-14* summarizes the project's effects related to acquisition of park lands.

Of the affected parks, only Bagley Viewpoint would have the potential to become completely unusable as a result of project construction under all build alternatives; WSDOT would replace the viewpoint at a new location. The viewpoint could be relocated onto the landscaped lid at 10th Avenue East as part of the 6-Lane Alternative. The Arboretum would actually see a slight gain in area with the 4-Lane Alternative because the northward shift of the roadway would free up land on Foster Island that is currently

KEY POINTS

Community Cohesion

Project effects on neighborhoods include the following:

- The 6-Lane Alternative would partially reconnect neighborhoods by providing five lids where bridges over SR 520 now exist.
- Sound walls included in the project design would reduce noise dramatically in most neighborhoods along the corridor.
- The bicycle/pedestrian path would add a key element to the regional transportation system by providing another link across Lake Washington.
- The 6-Lane Alternative would outperform the 4-Lane Alternative in terms of transit circulation, travel time, and access because it would have continuous eastbound and westbound HOV lanes from I-5 to Bellevue Way.

KEY POINTS

Recreation

Project effects on recreation include the following:

- The build alternatives would require the acquisition of portions of Bagley Viewpoint, McCurdy Park, East Montlake Park, and the Washington Park Arboretum.
- Larger roadways would affect views from Seattle parks, particularly the Arboretum.
- Noise levels in the Arboretum would decrease substantially.

The build alternatives would improve views at the water level; remove the visual clutter of unused freeway ramps; and create higher, wider bridge structures with high sound walls.

Exhibit 4-14. **Parks and Recreational Area Land Permanently Acquired by Build Alternatives**

	Park Land Permanently Acquired (acres)		
Alternative/Option	**Seattle**	**Eastside**	**Total Land**
4-Lane Alternative	1.96	--	1.96
6-Lane Alternative	3.67	--	3.67
Pacific Street Interchange Option	3.86	--	3.86
Second Montlake Bridge Option	2.94	--	2.94

being used as right-of-way. As described earlier in this chapter, the build alternatives would have both positive and negative effects on views in the Arboretum. These alternatives would open up Foster Island, improve views at the water level, and remove the visual clutter of unused freeway ramps, but would also create higher, wider bridge structures with sound walls.

In the Eastside project area, the 4-Lane Alternative would not result in the acquisition of any park property. The 6-Lane Alternative would temporarily affect a combined 0.3 acre of Fairweather and Wetherill Parks during construction, but this area would be returned to park land after the project is built. Both alternatives would necessitate relocation and reconstruction of the Points Loop Trail in certain locations; reconstruction of the trail would enhance safety and reduce noise on the trail because it would be located behind the sound walls along SR 520.

Noise, air quality, and water quality would improve under the 4-Lane and 6-Lane Alternatives at Seattle and Eastside project area parks. Neither build alternative would make it more difficult to reach recreational facilities in the project area. WSDOT would work with the local jurisdictions to develop mitigation for project effects.

Parks and recreational properties, as well as certain historic resources, are also protected by a regulation known as Section 4(f), which applies to federally sponsored or funded transportation projects. Each of the parks described above is a Section 4(f) resource. Chapters 5 and 7 describe the effects on these parks in greater detail. Appendix P contains the full Draft Section 4(f) Evaluation for the SR 520 project.

The No Build Alternative would have no effects on recreation.

What is Section 4(f)?

Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966, 49 USC 303 provides that the proposed use of any land from a significant publicly owned park, recreational area, wildlife and waterfowl refuge, or NRHP-eligible historic site, will not be approved by the USDOT unless a determination is made that there is no feasible and prudent alternative to the use of land from that property. The Act also requires that the proposed action include all possible planning to minimize harm that may result from such use.

Land Use

How would the project directly affect land use?

Within the project area, land now used for other purposes would be converted to right-of-way for the widened SR 520. *Exhibit 4-15* summarizes these effects for the build alternatives, including the 6-Lane Alternative options, whose effects would differ from those of the 6-Lane

KEY POINTS

Land Use

Project effects on land use include the following:

- The SR 520 project would convert up to 31.6 acres of land in Seattle and on the Eastside to highway right-of-way. In Seattle, most of the land would be from parks and/or public facilities; on the Eastside, most would be from residential properties.
- The project would displace a maximum 16 structures.
- Five new lids for the 6-Lane Alternative would restore and enhance community connections.
- Land not needed for right-of-way could be used for parks or other community purposes.

Exhibit 4-15. **Land Acquisition Requirements for Build Alternatives**

	Land Acquired (acres)			Number of Parcels Affected		
Alternative/Option	**Seattle**	**Eastside[a]**	**Total**	**Seattle**	**Eastside**	**Total**
4-Lane Alternative	12.6	2.6	15.2	21	43	64
6-Lane Alternative	14.1	4.8	18.9	23	67	90
Pacific Street Interchange option	26.8	4.8	31.6	19	67	86
Second Montlake Bridge option	13.5	4.8	18.3	26	67	93

[a]Eastside acreage shown for 6-Lane Alternative assumes the South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast option. Without this option, the total would be 0.02 acre less, and six fewer parcels would be affected.

Alternative. The 6-Lane Alternative would require 3.7 acres more land than the 4-Lane Alternative because of its greater width. This would affect additional properties and/or result in some parcels being fully acquired under the 6-Lane Alternative that would only be partially acquired under the 4-Lane Alternative.

The 4-Lane Alternative would displace 16 structures to make way for project construction: two residences, four businesses, one dock at the Queen City Yacht Club, eight buildings at the NOAA Northwest Fisheries Center, and MOHAI. The 6-Lane Alternative would displace the same number and types of structures as the 4-Lane Alternative—the only difference being one additional residence on the Eastside and one fewer residence in Seattle. In Seattle, most of the land would come from the affected parks, while right-of-way on the Eastside would come mainly from residential properties.

Effects of the Pacific Street Interchange and Second Montlake Bridge options, as shown in *Exhibit 4-15,* would be greater than those of the 6-Lane Alternative. The Pacific Street Interchange option would require 31.6 acres of new right-of-way, nearly half of it from the University of Washington campus. It would affect four fewer parcels than the 6-Lane Alternative and would displace one less business. The Second Montlake Bridge option would require slightly less land (18.3 acres) than the 6-Lane Alternative, but it would displace two more residences just south of the existing Montlake Bridge. The South Kirkland Park-and-Ride Transit regional space access – 108th Avenue Northeast option would require only 0.02 more acre than the 6-Lane Alternative; this amount has been included in the 6-Lane Alternative totals shown in *Exhibit 4-15* to provide a conservative estimate.

WSDOT would mitigate property acquisition and relocations in accordance with the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Property owners would

The Pacific Street Interchange option would require new right-of-way from the University of Washington campus south of Husky Stadium.

receive compensation for their properties at fair market value, and relocation resources would be available to all displaced residents and business owners without discrimination. WSDOT would work closely with all displaced residents and businesses to find suitable replacement properties to accommodate their needs.

Would the project be consistent with regional and local land use plans and policies?

Both the 4-Lane and the 6-Lane Alternatives support the Puget Sound Regional Council's Vision 2020 and King County's countywide planning policies regarding transportation system continuity, the use of alternative transportation modes, and the concentration of growth in urban centers. The 6-Lane Alternative would go further toward meeting these goals because it would provide a continuous HOV system from I-5 to I-405 and would be more effective in improving circulation between the urban centers in the study area. The 4-Lane Alternative option without space for future high-capacity transit would not be consistent with numerous regional and local policies that encourage the development and use of transit.

Both alternatives would also be generally consistent with the policies of the Seattle Comprehensive Plan and the Comprehensive Plans of Medina, Hunts Point, Clyde Hill, Yarrow Point, Kirkland, and Bellevue. The 6-Lane Alternative would support the policies of the Eastside local plans more closely than the 4-Lane Alternative because it would increase HOV and transit facilities and their use, and it would provide lids across SR 520. The 6-Lane Alternative would do more than the 4-Lane Alternative to promote transit and ridesharing, a goal of Seattle's Comprehensive Plan. It would also be consistent with policies stating that Seattle supports completion of the HOV lane system in the Puget Sound region and that freeway capacity expansion should primarily be limited to accommodating non-single-occupant-vehicle users.

Regional and Community Growth

The SR 520 project would not affect the number or demographic characteristics of people living in the project area. The minor displacements that the project would cause are not enough to change the populations in their respective communities or neighborhoods. In addition, the alternatives and options would not negatively affect the quality of life in the project area; in fact, they would create long-term improvements in noise levels, air quality, and traffic compared to existing conditions. Overall, the project area contains owner-occupied, high-value housing, as evidenced by the high median home values. Given the few displacements and the improvements in quality of life, the composition of the project area's communities and neighborhoods would not change.

The indirect effects of the project on regional growth are also likely to be minor. Forecasts for 2030 indicate that population and employment

in the project area would fluctuate only marginally from the No Build Alternative to the build alternatives and options. Changes in population and employment distribution with and without the project would vary by 1 percent or less.

Bicyclist and Pedestrian Facilities and Transit

Both the 4-Lane and the 6-Lane Alternatives and the options would improve capacity, circulation, and travel times for bicyclists and pedestrians by providing a continuous bicycle/pedestrian path from west of the Montlake Boulevard interchange to Northeast Points Drive in Kirkland. The 6-Lane Alternative would provide additional pedestrian/bicyclist facilities by creating new access across the lids in Seattle and on the Eastside. These new connections would increase accessibility to paths throughout the project area and neighborhoods.

The 6-Lane Alternative's continuous HOV lane would allow transit vehicles to bypass traffic congestion through much of the corridor. The benefits of this lane could affect neighborhoods by providing an incentive to use transit and increasing pedestrian activity.

The options that close the Montlake and Evergreen Point Freeway Stations could affect neighborhoods by requiring bus riders who live in the area to walk or travel farther than today to access SR 520 transit service.

Construction Effects

In both Seattle and Eastside neighborhoods, construction could result in traffic congestion and changes in access, increased noise and dust, decreased visual quality, and the loss of on-street parking. In Seattle, the Roanoke/Portage Bay and Montlake neighborhoods would experience noise from construction activities, including pile-driving for construction of the Portage Bay Bridge and the Evergreen Point Bridge west approach. Along with the North Capitol Hill neighborhood, these neighborhoods also would experience dust during demolition of the bridges at Delmar Drive and 10th Avenue East, as well as the Portage Bay Bridge.

On the Eastside, construction effects would be greatest in neighborhoods near the Evergreen Point Bridge and the bridges over SR 520. This is because construction activities would be most extensive in these areas—for example, pile-driving for the east approach of the Evergreen Point Bridge and the demolition and reconstruction of the bridges over SR 520. Among the Eastside communities, Medina would experience the most effects. As in Seattle, the long duration of construction activities could have an effect on community cohesion if traffic congestion, noise, and reduced access to community and service facilities affect the interaction of neighborhood residents.

Would the project affect environmental justice populations?

"Environmental justice" refers to the concept that minority and low-income populations should not suffer disproportionately high and adverse effects from federal projects. Executive Order 12898 (see sidebar on next page) requires all federal agencies to evaluate their projects to identify potential effects on environmental justice. WSDOT conducted its environmental justice analysis using a wide variety of public outreach strategies to identify and inform minority, low income, and limited English proficiency populations in the study area. In addition to using data from the 2000 U.S. Census, the project team translated project publications, advertised in newspapers published for minority audiences, and contacted community service providers. Appendix B, Agency Coordination and Public Involvement, contains more detail on the project's outreach strategies.

The project team evaluated two potential types of environmental justice effects: local and regional. Local effects would result if constructing the project affected environmental justice populations in a disproportionately high and adverse way. That is, for example, that low income or minority populations are moved, suffer from increased pollution, or lose services at a significantly higher level than the rest of the general population during construction. We define these as local effects because people living adjacent or near the project area are usually the only ones that experience direct effects during construction.

Regional effects would be those effects experienced by the wider population that use SR 520 after construction is completed. After construction, tolling would be the one project element that could have a wide adverse affect on people using SR 520. Therefore, we looked into whether low-income or minority populations might suffer a disproportionately high and adverse effect from tolling the new Evergreen Point Bridge.

The other potential regional effect we identified is the possibility that the project could affect fish habitat and, therefore, the productivity of Lake Washington fisheries. This, in turn, could affect Native American tribes who have treaty rights to fish in their usual and accustomed fishing areas in the lake and its tributary streams.

When we evaluated the potential local effects, we identified the Seattle and Eastside neighborhoods that the project could affect, and found that only the University District, South Lake Union, and Crossroads have relatively high percentages of minority residents. The University District and South Lake Union neighborhoods in Seattle also have relatively high percentages of low-income populations. However, the analysis show that these neighborhoods are too far away to experience local effects from the project, and they would not experience displacements, increased pollution, or other project effects.

KEY POINTS

Environmental Justice

We found that construction and operation of the new SR 520 facility will not have disproportionately high adverse effects on minority or low-income populations. Construction does not take place close to any environmental justice populations. Regionally, low-income bus riders would benefit greatly from improved transit travel times.

What is Environmental Justice?

To comply with Executive Order 12898, entitled Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, the USDOT has developed policies and procedures for all projects that want to remain eligible for federal funding to follow. USDOT requires that projects adhere to these guiding principles:

- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

To determine whether the SR 520 toll would have a disproportionately high and adverse effect on low-income people when compared to the general population, the project team reviewed past studies,[1] evaluated the results of the public outreach conducted for this project, and talked to service providers for low-income populations. We also evaluated the benefits of the new SR 520 facility to low-income users when compared with the current facility. In addition, we had to consider the fact that, unless the bridge is replaced, eventually there will be no Evergreen Point Bridge available for anyone to use. Tolling revenue is essential to the funding plan to allow this replacement. Finally, we considered alternatives to using the new facility, allowing drivers to avoid the toll.

WSDOT conducted its environmental justice analysis using a wide variety of public outreach strategies.

We found that the new facility would provide a major benefit to bus riders, and a substantial number of bus riders have low incomes. We know that without the facility, everyone will suffer from increased travel times and decreased air quality. And finally, there are several viable choices for avoiding the toll entirely, including riding in a bus or taking an alternative route around the lake.

Balanced against these benefits is the fact that, because the toll is the same for all users, low-income people paying the toll would have to spend a higher proportion of their income on transportation than non-low income people paying the toll. The toll does have an adverse effect on low-income populations.

However, in light of the overall benefits to low-income populations from substantially decreased transit travel times, we have concluded that the project would not result in disproportionately high and adverse effects on minority and/or low-income populations.

[1] FHWA, 2001, 1995 Nationwide Personal Transportation Survey Databook, Based on Data from the 1995 Nationwide Personal Transportation Survey. Department of Transportation, Federal Highway Administration, Washington, D.C.

King County Department of Transportation, 2004, 2003 Rider/Non-Rider Survey Findings. Transit Division, Seattle, Washington, February.

Murakimi (FHWA) and Jennifer Young (University of Knoxville), 1997, Daily Travel by Persons with Low Income, Paper for Nationwide Personal Transportation Survey Symposium, Bethesda, Maryland, October 29-31.

USDOT, 2004, CTPP 2000 Status Report, *http://www.fhwa,dot.gov/ctpp/sr0804.thm,* last updated August 2004, U. S. Department of Transportation, Federal Highway Administration, Bureau of Transportation Statistics, and Federal Transit Administration.

WSDOT will consider mitigation measures to reduce the adverse effects of the toll including:

- Providing inclusive and early outreach on the increased costs of choosing to drive across Lake Washington, the technology used to collect tolls, and how to receive transportation assistance through existing programs and organizations
- Providing support to providers of transportation services (Hopelink, Metro Transit, Sound Transit, and others) in the form of HOV lane access, toll subsidies, or other assistance
- Developing methods, systems, and policies that allow electronic tolling methods to be accessible to people at all income levels and to those without credit cards or bank accounts
- Monitoring requests for assistance to determine whether the measures listed above are effective

The project would have both short-term and long-term effects on the aquatic environment. It is possible that construction activities in Lake Washington and Portage and Union bays for a period of several years, as well as permanent changes to the size of nearshore structures, could affect fish productivity at least temporarily. WSDOT will continue to work with the Muckleshoot Tribe and the Yakama Nation to assess the likelihood of effects on fish production and identify ways to mitigate them. With mitigation measures in place, including measures described in the ecosystems sections of the Draft EIS, the project will not cause disproportionately severe and adverse effects on Native American fishing in the project area.

How would effects on cultural and/or historic resources compare between the alternatives?

Under the 4-Lane Alternative, two historic resources considered eligible for listing on the National Register of Historic Places (NRHP) would be demolished: one Eastside residence and the floating portion of the Evergreen Point Bridge. Under the 6-Lane Alternative, only the floating bridge would be demolished. The Second Montlake Bridge option would displace two additional residences that are part of the Montlake Historic District, which is potentially eligible for listing on the NRHP. All the build alternatives and options would displace MOHAI, which—although not eligible for the NRHP—is a contributing element of the Montlake Historic District. (Note that determinations of NRHP eligibility are still in process; the Final EIS will include the final determinations of eligibility for each property and district.)

In addition to these direct effects, the proximity of the project to a number of historic resources would affect their setting in both positive and negative ways. The positive effects would generally result from decreased noise in the vicinity of historic properties because of the sound walls. In some instances, the roadway would also shift away from the historic

KEY POINTS

Cultural and Historic Resources

Project effects on cultural and historic resources include the following:

- The build alternatives would have both positive effects (sound reduction) and negative effects (demolition or visual intrusion) on up to 11 historic properties and historic districts in Seattle and on the Eastside. All of these properties and districts are on or believed to be eligible for the National Register of Historic Places.
- Neither build alternative would affect any known archaeological or ethnographic sites. WSDOT is continuing its studies to determine whether the project could affect previously undiscovered sites.

properties. Negative effects would result either from the removal of land or buildings or from visual intrusion caused by more prominent roadway and bridge structures. The No Build Alternative would have no effects on historic properties, unless the Evergreen Point Bridge were lost under the Catastrophic Failure Scenario. *Exhibit 4-16* summarizes effects on historic properties, which are described more fully in Chapters 5 and 7.

In planning and developing projects that may affect historic resources, WSDOT must comply with two key regulations—Section 106 of the National Historic Preservation Act and Section 4(f) of the U.S. Department of Transportation Act. Section 106 requires federal agencies to identify and assess the effects of federally assisted undertakings on historic resources, archaeological sites, and traditional cultural properties, and to consult with the State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation to determine the best methods of avoiding or mitigating unavoidable effects on historic resources. Resources protected under Section 106 are those that are listed in or are eligible for listing in the NRHP. Section 4(f) protections extend to NRHP-eligible and listed properties. Section 4(f) emphasizes avoidance of the use of such sites and minimization of effects. Chapters 5 and 7 of this Draft EIS describe Section 4(f) in greater detail, and Appendix P contains the Draft Section 4(f) Evaluation for the SR 520 project.

WSDOT would mitigate any unavoidable loss of eligible or listed properties or structures under the terms of a Section 106 Memorandum of Agreement, which is expected to be completed by the time of the Final EIS.

Neither build alternative would permanently affect any known archaeological or ethnographic sties. Because Native Americans are known to have used many parts of the project area, particularly near the shorelines and creek mouths, it is possible that previously undiscovered sites could be discovered during additional subsurface testing. WSDOT is currently conducting subsurface testing in archaeological high probability areas within the project area to determine whether buried archaeological deposits are present and, if so, whether they are eligible for listing as historic properties for purposes of Section 106 of the National Historic Preservation Act. This testing will be completed in 2006, and the Final EIS will incorporate its results.

WSDOT will develop an inadvertent discovery plan to address what steps would be taken if construction areas contain unexpected cultural resources. In accordance with the plan, if it is not possible to avoid affecting the resources discovered, WSDOT would work with the affected Tribes, FHWA, and the SHPO to identify mitigation measures to be incorporated into Section 106 agreements.

Cultural and Historic Resource Effects under Section 106

Section 106 of the National Historic Preservation Act says that an adverse effect occurs "when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion on the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association." State and local registers have similar definitions of what constitutes an adverse effect.

Exhibit 4-16. **Effects of Build Alternatives on Historic Properties in the Project Area**

Historic Property	NRHP Eligible?	4-Lane Alternative	6-Lane Alternative and Options
Mason House (2524 Boyer Avenue East)	Yes (determination pending)	Reduced noise and visual intrusion.	Similar to 4-Lane Alternative.
Roanoke Park Historic District	Yes (determination pending)	Increased visual intrusion, but lower noise levels as a result of SR 520 sound walls.	Similar to 4-Lane Alternative, but fewer visual effects and greater benefits with new 10th Avenue East/Delmar Drive lid.
Montlake Historic District	Yes (determination pending)	Acquisition of NOAA Northwest Fisheries Science Center property and demolition of MOHAI. Sound walls would reduce noise from SR 520.	Would acquire land from same properties as 4-Lane Alternative; similar proximity effects. Pacific Street Interchange option would increase visual intrusion but reduce noise and improve connectivity of Montlake Boulevard. Second Montlake Bridge option would increase visual intrusion and noise and remove two contributing houses.
Montlake Cut	NRHP Listed	No effect	Pacific Street Interchange and Second Montlake Bridge options would increase visual intrusion.
Montlake Bridge	NRHP Listed	No effect	Negative effect under Second Montlake Bridge option through construction of adjacent bridge within right-of-way; Pacific Street Interchange option would negatively affect views of bridge.
University of Washington Canoe House	NRHP Listed	No effect	Pacific Street Interchange option would negatively affect historic setting and feeling; Second Montlake Bridge would have a lesser visual effect.
University of Washington Club	Yes (determination pending)	No effect	Pacific Street Interchange option would negatively affect views from the property.
Floating portion of Evergreen Point Bridge	Yes (determination pending)	Demolition of historic structure	Same as 4-Lane Alternative
2851 Evergreen Point Road	Yes (determination pending)	Property acquisition and demolition of historic structure	Positive effect (noise reduction and view improvement) through construction of landscaped lid at Evergreen Point Road.
2891 Evergreen Point Road	Yes (determination pending)	Increased visual intrusion because of vegetation removal and shift of bridge toward property, but substantially lower noise levels.	Similar to 4-Lane Alternative.
Bellevue Christian School/ Three Points Elementary	Yes (determination pending)	Positive effect (noise reduction). Acquisition of 3,436 square feet of property	Positive effect (noise reduction). Acquisition of 4,884 square feet of property

What effects would the alternatives have on project area ecosystems?

The 4-Lane and 6-Lane Alternatives and the 6-Lane Alternative options would affect ecosystem conditions and functions in a number of ways. Some of the effects would be beneficial—for example, removing unused highway ramps, replacing culverts to eliminate blockages for fish, providing stormwater treatment facilities where none now exist, and adding sound walls. Some, such as filling or shading wetlands, would be negative. Compared to the 4-Lane Alternative, the 6-Lane Alternative would have slightly more effects because of its larger footprint. The No Build Alternative would not affect project area ecosystems because there would be no new roadway facilities, but it also would not achieve the benefits of the build alternatives in terms of stormwater treatment, noise reduction, and removal of barriers to fish passage.

Analysis completed for this project and discussions with federal resource agencies (NOAA Fisheries and the U.S. Fish and Wildlife Service) indicate that the project could cause negative effects on fish listed under the Endangered Species Act (ESA) and other aquatic species. These effects could result from wider but higher bridges adjacent to the existing corridor, and fewer but larger-diameter bridge support columns occupying a greater amount of lake bottom. Most of these columns would be in the shallow areas occupied by aquatic vegetation (Eurasian milfoil and white water lily). The project also would create new impervious surface, which would generate additional stormwater runoff that would be treated and, where necessary, detained before being discharged to surface waters. The Pacific Street Interchange option's Union Bay Bridge over the navigation channel in Union Bay would have support columns that could provide additional habitat for northern pikeminnows (a predator of juvenile salmon) along the migration corridor where all juvenile salmon pass out of Lake Washington. This high bridge would produce additional overwater coverage in the navigation channel. The Second Montlake Bridge option would create new shading in the Montlake Cut adjacent to the shadow of the existing Montlake Bridge.

Construction of new bridges and approach structures could also affect aquatic habitat for up to 5 years. To safely construct the 4-Lane and 6-Lane Alternatives, WSDOT would build temporary work bridges next to the Portage Bay Bridge and a detour bridge in Union Bay and the Arboretum area. These temporary bridges would be supported by numerous steel or untreated wood piles. The Pacific Street Interchange option's Union Bay Bridge would be constructed without a temporary work bridge. These temporary bridges would be supported by numerous steel or untreated wood piles.

KEY POINTS

Ecosystems

The project would affect ecosystems in a variety of ways:

- Improved water quality through the addition of new stormwater facilities
- Fewer columns in Portage Bay and Union Bay
- Higher, more open structures through the Arboretum, resulting in less shade intensity over water and wetlands
- Removal of eight fish passage barriers from Eastside streams
- Filling and shading of wetlands and buffers; removal of upland habitat
- New bridge within major fish migration route in Union Bay (Pacific Street Interchange option) or over the Montlake Cut (Second Montlake Bridge option)

As presented in *Exhibit 4-17,* both build alternatives would involve filling or shading of wetlands and wetland buffer. In Seattle, these effects would occur to high-quality, lake fringe wetlands, primarily in the Arboretum/ Foster Island area. This wetland type is rare in the Lake Washington watershed. The overall area of permanent fill would be small; shading of wetlands would be a larger effect for both build alternatives in Seattle. On the Eastside, most of the affected wetlands would be smaller, lower-quality wetlands of types that are relatively common in the area.

The Pacific Street Interchange option in Seattle and the South Kirkland Park-and-Ride Transit Access –108th Avenue Northeast option on the Eastside would each have more wetland and buffer effects than the 6-Lane Alternative. These options could be added to the 6-Lane Alternative together or separately. The Pacific Street Interchange option would fill the same amount of wetland, but more buffer, compared to the 6-Lane Alternative (5.3 acres of buffer, compared to 3.8 acres). It would add 1.1 acres of wetland shading to the total shown for the 6-Lane Alternative in *Exhibit 4-17.* The South Kirkland Park-and-Ride Transit Access option would place fill in an additional 1.4 acres of wetland and 1.1 acres of buffer. The Bicycle/Pedestrian Path to the North option would reduce Eastside wetland effects compared to the 6-Lane Alternative. The other 6-Lane Alternative options would not affect wetlands or buffers differently than the 6-Lane Alternative.

Construction of either build alternative would also permanently remove existing upland habitat—a total of 32.13 acres for the 4-Lane Alternative, 46.3 acres for the 6-Lane Alternative, and 47.7 acres for the South Kirkland Park-and-Ride Transit Access –108th Avenue Northeast option. These areas of upland habitat are relatively rare in the urban environment that is characteristic of the project vicinity. Effects of project development on wildlife in these areas would vary according to existing habitat quality. Some of the affected uplands currently consist of low-quality, small, fragmented patches dominated by non-native shrubs and grasses, while other areas are contiguous, with large patches of native, mature trees and native shrubs. Decreased noise and generally improved water quality would be beneficial effects of project development. All build alternatives would create some additional habitat by removing the unused R.H. Thomson Expressway Ramps from the Arboretum area.

The project would extend the length of some Eastside culverts under SR 520 and remove riparian vegetation in certain areas. It would also add new impervious surface to the drainage basins in the project area. It would, however, improve water quality because discharges from stormwater treatment facilities would meet or exceed federal and state water quality standards. This would be a distinct improvement over current conditions, where the water flows directly into streams and wetlands, carrying pollutants from the roadway surface. Where necessary, the proposed stormwater

What is WSDOT doing to comply with the Endangered Species Act?

Section 7C of the Endangered Species Act (ESA) requires that projects with federal funding or federal permits consult with the appropriate federal resource agencies to determine whether the project could harm ESA-listed species or their habitat. The consultation process occurs during the NEPA process, but it is separate. The federal agencies with jurisdiction over endangered species in our project area are the NOAA Fisheries (responsible for protecting Chinook and steelhead salmon) and the U.S. Fish and Wildlife Service (responsible for protecting bald eagle and bull trout).

When WSDOT has identified a preferred alternative, the project team will prepare a Biological Assessment (BA) that evaluates effects on listed species in detail. The BA will incorporate more specific design information that will be developed on the preferred alternative, along with descriptions of the potential effects of proposed construction techniques. After reviewing the BA, NOAA Fisheries and the U.S. Fish and Wildlife Service will each issue a "biological opinion" with terms and conditions designed to minimize adverse effects on the species. The results of the ESA consultation process will be documented in the Final EIS and the Record of Decision.

Exhibit 4-17. **Wetland and Buffer Effects**

	Fill		Shading[a]	
Alternative/ Option	**Wetland**	**Buffer**	**Wetland**	**Buffer**
Seattle Project Area				
4-Lane Alternative	0.2	2.0	4.5	2.3
6-Lane Alternative	0.2	3.8	6.7	2.2
Pacific Street Interchange Option[b]	0.2	5.3	7.8	1.3
Eastside Project Area				
4-Lane Alternative	3.2	5.5	-	-
6-Lane Alternative	6.4	11.6	-	-
South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast Option	7.8	12.7	-	-
Bicycle/Pedestrian Path to the North Option	4.9	10	-	-

[a] Number represents the maximum area shaded; actual shading may be substantially less.
[b] Other Seattle options would not differ from the 6-Lane Alternative.

system would release treated water into streams and wetlands at a controlled rate, which would help to sustain flows while minimizing erosion. These changes would help to improve the physical structure of these Eastside streams. The project also would replace or improve up to eight Eastside culverts that currently block fish passage, opening new areas of upstream habitat to salmon and other species.

All negative effects on ecosystems, as well as on ESA-listed and other aquatic species, would be fully mitigated to comply with applicable laws and with WSDOT's policy of causing no net loss in wetland functions and values.

WSDOT would compensate for adverse effects using methods approved by federal, state, and local regulatory agencies with jurisdiction over wetlands, water quality, wildlife, and fisheries. An overall mitigation strategy would be developed with these agencies after a preferred alternative is identified. Specific details would be developed when WSDOT consults with, or submits permit applications to, these agencies. General approaches to mitigation include:

- Water quality—WSDOT would treat and control stormwater runoff from the roadway.
- Wetlands—Where damage cannot be avoided, WSDOT would create new wetlands and/or restore or enhance degraded wetlands, as well as enhance and preserve wetland buffers.

- Fish habitat—WSDOT would restore affected habitat by enhancing wetlands and shorelines after construction. Culverts blocking fish passage would be replaced to improve fish access upstream.
- Wildlife habitat—WSDOT would create new or restore degraded wetlands or plant diverse vegetation in stream corridors and shoreline areas, which would improve habitat and benefit project area wildlife. Habitat affected by construction would be replanted where possible.

Please refer to Chapters 5 and 7 for more information about potential mitigation measures for ecosystems effects.