Chapter 7—Nonmotorized Facilities

What is in this chapter?

This chapter describes current and proposed pedestrian and bicycle facilities, also known as nonmotorized facilities, within or near the I-5 to Medina: Bridge Replacement and HOV Project site. In addition, this chapter identifies effects of the Build Alternative options on nonmotorized facilities identified in this study.

Proposed project improvements would increase mobility options throughout the corridor by creating new connections between local and regional trails, and by improving existing bicycle and pedestrian routes within and around the project site. Public comments on the project have emphasized the benefits of these features to residents in the project vicinity. Improving nonmotorized facilities would simultaneously increase mobility, provide viable commuter and recreational alternatives to driving, and enhance the livability of neighborhoods.

For the draft environmental impact statement (EIS), the transportation discipline team collected data and evaluated the existing nonmotorized facilities in each neighborhood and community. This process involved conducting field investigations, reviewing local bicycle and pedestrian plans, and meeting with bicycle/pedestrian coordinators and trail planners from the communities along the corridor.

Ongoing coordination included review of the most up-to-date local bicycle and pedestrian plans for each neighborhood, as well as current WSDOT design options and standards.

All existing bicycle and pedestrian facilities and connections would be maintained in each of the project options, and, in some cases, new connections would be created, including links to the SR 520 regional bicycle/pedestrian path.

The I-5 to Medina: Bridge Replacement and HOV Project provides connections to the City of Seattle Bicycle Master Plan routes. We expect that bicycle traffic would increase to and from the Burke-Gilman Trail after construction of the SR 520 regional bike/pedestrian path. The connections between SR 520 and the Burke-Gilman Trail could
accommodate the number of vehicles, pedestrians, and bicyclists in the area.

Option A would provide dedicated bike lanes on two Montlake bridges. Options K and L assume Sound Transit will construct wider crosswalks on Montlake Boulevard and include a potential pedestrian bridge option that could separate bicycles and pedestrians.

What are the nonmotorized design elements?

The project includes many design elements to provide the best possible nonmotorized connections. Some of these are common elements, or nonmotorized features that are included in all of the design options. Others are unique to specific options. Both common and unique elements of the project are discussed below.

Common Design Elements

Several common nonmotorized features are included in all of the design options. These features are proposed at the SR 520 Evergreen Point Bridge, Montlake Boulevard and 24th Avenue East lid, I-5/SR 520 interchange lid, and 10th Avenue and Delmar Drive East lid. The paragraphs below describe each of these features as they are currently envisioned.

SR 520 Evergreen Point Bridge

A 14-foot-wide bicycle/pedestrian path designed to comply with the Americans with Disabilities Act (ADA) would be built along the north side of SR 520 and follow the highway’s grade. The SR 520 regional bicycle/pedestrian path would begin at the SR 520/Montlake Boulevard interchange and continue across the Union Bay, west approach, and SR 520 bridges.

Five scenic vantage points with pull-outs would be spaced along the north side of the bicycle/pedestrian path. The bicycle/pedestrian path on the bridge structure would be illuminated by recessed lighting in the bridge barrier. All underpass trails will have a wall separating bicyclists and pedestrians from vehicular traffic.

Montlake Boulevard and 24th Avenue East Lid

A lid over the SR 520 corridor would be provided between Montlake Boulevard and 24th Avenue East over the new Montlake Boulevard
bridge. The exact configuration of the lid varies between design options, as shown in Exhibit 7-1 and described below.

**Option A**

A transverse lid would be designed along SR 520 from McCurdy Park to Montlake Boulevard. The bicycle/pedestrian path would follow an underpass at Montlake and end just west of Montlake to connect with the existing Bill Dawson Trail. An upper-level connection would lead bicyclists and pedestrians to 24th Avenue East. Exhibit 7-1 shows the details of Option A nonmotorized design features.

**Option K**

A new lid in the Montlake vicinity would span from west of Montlake Boulevard to east of 24th Avenue NE. The lid structure will meet Lake Washington Boulevard East at grade to maintain the pedestrian connections between the north and south communities. Exhibit 7-1 shows the details of Option K nonmotorized design features.

**Option L**

Similar to Option K, a new lid would be provided in the Montlake vicinity, spanning from west of Montlake Boulevard to east of 24th Avenue NE. The lid would incorporate new crossing structures at Montlake Boulevard and 24th Avenue NE. A bicycle/pedestrian path would deviate from the vehicular traffic by leading directly under a single point urban interchange (SPUI). Bicyclists and pedestrians would be able to access Lake Washington Boulevard from this lid, like the connections described under Option K. Exhibit 7-1 shows the details of Option L nonmotorized design features.

**I-5/SR 520 Interchange Lid**

A lid over I-5 is proposed at the existing East Roanoke Street crossing over I-5, extending to the north and south. The lid surface and structure clearance over I-5 would be higher in elevation than the existing Roanoke Bridge. The existing Roanoke Bridge would be rebuilt. Pedestrians, cyclists, and emergency vehicles will be able to access the top of the lid for cross connections.

Exhibit 7-1 illustrates how a nonmotorized facility could be included in the design of the I-5/SR 520 interchange lid. Ongoing coordination between project staff, City of Seattle, and the neighborhoods will be used to finalize the route layout and connectivity.
Exhibit 7-1. Future Trail Connectivity: All Options

I-5 to Medina: Bridge Replacement and HOV Project

Source: King County (2008) GIS Data (Streams, Streets and Waterbodies) and CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.
10th Avenue and Delmar Drive East Lid

All three options include a lid that would be constructed over SR 520 between 10th Avenue East and Delmar Drive East. This lid would connect with the new bridge overcrossings and reconnect the communities on both sides of the SR 520 corridor by providing walkways and open spaces above the highway. The proposed lid structure would be between 570 and 600 feet long and include a recreational meandering path that emphasizes the panoramic view eastward.

Exhibit 7-1 shows how a nonmotorized facility could be included in the design of the 10th Avenue and Delmar Drive East lid. Ongoing coordination between project staff, City of Seattle, and the neighborhoods will be used to finalize the layout and connectivity.

Unique Design Elements

The following paragraphs discuss the design elements that are unique to each project option.

Montlake Boulevard and Pacific Street Intersection

Option A

Several design enhancements were added to Option A during the mediation process. The design enhancements for nonmotorized travel include:

- New Montlake bascule bridge, which would have a curb and 10-foot-wide sidewalk along the east side of the bridge, as well as a 5-foot-wide bicycle lane northbound along the east side of the bridge.

- Extension of McCurdy Park path under SR 520 to enhance connectivity.

- Potential for added Foster Island path connectivity.

- Pedestrian undercrossings west of, east of, and at Montlake Boulevard, allowing pedestrians and bicyclists to avoid intersection signal delays.

The sidewalk currently on the west side of the original bridge would remain open and the original bridge would be restriped to provide a 5-foot-wide bike lane southbound along the west side of the bridge. The existing sidewalk on the east side of the original bridge would be closed.
Option K

A new grade-separated pedestrian crossing over the lowered intersection would allow pedestrians to have free movement without traffic conflict. The lowered intersection at Pacific Street and Montlake Boulevard would be covered by either a full or partial lid designed to maintain pedestrian/bicyclist connectivity between important activity centers. A partial lid would provide a ring of walkways around the intersection, leaving the center area uncovered. A full lid would allow diagonal crossings across the lid in addition to the edge connections. Bicyclists and pedestrians would gain full access to the lid by pathways stemming from all directions. The Montlake Bridge itself would retain the existing sidewalk, commonly used by bicyclists.

This design would allow movement between potentially expanded bus zones, the light rail station, and the University of Washington (UW) Medical Center without changing grades. The lid in this option would provide pedestrian connections over NE Pacific Street and Montlake Boulevard NE. The lid design and layout would be confirmed through continued coordination with the University of Washington, the City of Seattle, and neighborhoods. See Chapter 8, Transit Operations, of this report for further discussion of the light rail station and pedestrian bridge.

Option K would reduce a substantial amount of vehicle traffic south of the Montlake Cut from Montlake Boulevard. This traffic reduction would improve the experience of cyclists and pedestrians using that roadway to travel between areas south of SR 520.

Option L

The grade-separated NE Pacific Street and Montlake Boulevard NE intersection builds on the Rainier Vista concept plan (discussed in more detail later in this chapter), which lowers NE Pacific Place and the Burke-Gilman Trail and provides a lid to establish an integrated landscape that can accommodate pedestrians and bicyclists moving to and from the main UW campus. The lid in this option would provide pedestrian connections over NE Pacific Street and Montlake Boulevard NE. This concept includes an opportunity to expand transit facilities on NE Pacific Place.

The bicycle/pedestrian study area extends as far north as the University Village under Option L (Options A and K end at the Montlake Triangle).
The lowered intersection at Pacific Street and Montlake Boulevard would be covered by either a full or partial lid designed to maintain pedestrian/bicyclist connectivity between important activity centers. A partial lid will provide a ring of walkways around the intersection, leaving the center area uncovered. A full lid will allow diagonal crossings across the lid in addition to the edge connections. Bicyclists and pedestrians would gain full access to the lid by pathways stemming from all directions. The Montlake Bridge itself would retain the existing sidewalk, commonly used by bicyclists.

**Lake Washington Boulevard**

**Option K**

Two short lids would be built over the ramps between Lake Washington Boulevard and SR 520 to provide pedestrian and bicyclist connections between the neighborhoods and the Arboretum. This design would also provide a separate roadway parallel to the ramps that is designated for local residents, cyclists, and pedestrians. This design feature would reduce the potential for pedestrian and bicycle conflicts with motorized vehicles.

**Option L**

A bicycle/pedestrian path would briefly cross under Lake Washington Boulevard, both at the SR 520 ramp and further south as Lake Washington Boulevard leads through the Arboretum area. This design also maintains a connection between the neighborhoods and the Arboretum, as well as reducing potential for pedestrian and bicycle conflicts with motorized vehicles.

**Suboption: Foster Island Land Bridge**

Options A, K, and L each has a land bridge suboption at Foster Island to increase/maintain connectivity of regional trails to the Washington Park Arboretum. The SR 520 roadway would be lowered at the land bridge, and pedestrian/bicyclist access from the south side of Foster Island would be possible along a new path that follows the surface of the new land bridge. Short retaining walls would be constructed around the new land bridge north of SR 520. The land bridge would be built to design standards, including Americans with Disabilities Act (ADA) compliance and emergency vehicular access capability.
What are the existing nonmotorized characteristics of the study area?

The Cascade Bicycle Club counted 400 bicyclists crossing the Montlake Bridge during a weekday morning peak period in 2008 (WSDOT 2008f). This compares to a count of 427 bicyclists on the Burke-Gilman Trail at Stone Way North in July 2001 documented by the Seattle Department of Transportation (City of Seattle 2007).

King County Metro provided quarterly manual counts in 2002, observing bicycles on buses during both morning and afternoon peak periods. The highest total daily bicycle volumes occurred in the summertime, including 118 bicyclists at the Evergreen Flyer Stop, 90 at the Montlake Boulevard Freeway Transfer Station, and 50 at the Montlake Boulevard bus stop.

The SR 520 bridge poses a considerable challenge for cyclists and pedestrians traveling between Seattle and the Eastside communities. Because of the limited shoulder widths, no pedestrian or bicycle traffic is allowed on the bridge. Bicyclists wishing to cross the lake via SR 520 must board a bus equipped with a bicycle-carrying rack. Bicyclists and pedestrians can reach the SR 520 corridor in Seattle via a combination of paths and on-street bicycle lanes.

To support additional bicycle crossings over the SR 520 bridge, King County Metro implemented a bicycle demonstration program in 2008 that allowed bicyclists to load their bikes onto out-of-service buses for free. This program increased the availability of bicycle racks for those crossing the bridge and has been continued through at least 2009 due to its success.

Additionally, Microsoft’s Connector system runs a bicycle shuttle, which can transport 12 bikes across the SR 520 bridge at a time. No counts are currently available from this program.

Bicyclists who commute 3 or more days per week may park their bicycles in one of 54 reserved King County Metro locker spaces at the Montlake Boulevard Freeway Transfer Station on the north side of the bridge. This bicycle locker provides the largest number of spaces in the King County Metro system, and is likely used most by weekday commuters. A King County Metro bicycle rack capable of holding 53 bikes is also available at the Montlake Boulevard

Did you know?

Class I bicycle facilities are paved and have exclusive rights-of-way for the principal use of bicycles, pedestrians, and other nonmotorized means of travel and they are required to be at least 10 feet wide.

Class II bicycle facilities are established within the paved area of arterials for preferential use of bicycles. These paved bicycle areas, or bike lanes, are striped in widths varying between 4 and 12 feet and are signed as designated bikeways.

Class III bicycle facilities are located along existing arterials (without striping) and are intended to provide continuity within the bikeway system.
Freeway Transfer Station on a first-come/first-served basis. Bicycle parking information can also be found in the Social Elements Discipline Report (WSDOT 2009f).

The Westside project vicinity comprises steep terrain, a large water body (Portage Bay), and a dense urban grid of streets of all types. Residential communities, schools, parks, and commercial areas abut the highway. Both the I-5/SR 520 interchange and the bridge over the Montlake Cut are busy, important crossroads serving several transportation modes that link the Roanoke/Portage Bay, Capitol Hill, Eastlake, Montlake, and University District neighborhoods.

Nonmotorized trails that could potentially be affected by the project are described below and shown in Exhibit 7-2. For more detailed information on regional trails, refer to the *King County Bicycling Guide Map* (King County Department of Transportation 2009), which provides a comprehensive overview of the region’s bicycle system. For details regarding off-roadway trails in the project study area, see the Recreation Discipline Report (WSDOT 2009g).

The Burke-Gilman Trail is the only Class I bicycle facility in the project study area. Other Class I facilities in the region include the Elliott Bay Trail, the I-90 trail, the SR 520 regional bicycle/pedestrian path, and the Sammamish River Trail. The Burke-Gilman Trail is a paved, shared-use path and extends 27 miles from west of Gas Works Park in Seattle, around the north end of Lake Washington, to Marymoor Park in the City of Redmond.

According to a 1995 user count, the Burke-Gilman Trail had 2,239 daily bicyclists in the vicinity of the UW. By 2005, the same UW portion of the Burke-Gilman Trail experienced an increase of 918 (41 percent) trail users.

There are several other local trails in the project study area that may be affected by the project. At the Washington Park Arboretum, the Waterfront Trail to Foster Island is 0.5 mile long and Azalea Way is 0.75 mile. It is less than 0.5 mile between the northern tip of Foster Island to the Graham Visitors Center and Azalea Way. Round trip from the Museum of History and Industry to Azalea Way is approximately 3 miles.

Below are detailed descriptions of current nonmotorized locations, which are organized by interchange within the above-mentioned neighborhoods.
Exhibit 7-2. Class 1 Bicycle Paths

I-5 to Medina: Bridge Replacement and HOV Project

Source: King County (2008) GIS Data (Streams, Streets and Water Bodies) and CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.
Exhibits 7-3 and 7-4 show pedestrian volumes taken at several key locations in the project study area. The volumes indicate the relative amount of pedestrian activity between the intersection locations.
The Montlake Triangle refers to the triangular intersection of NE Pacific Street, NE Pacific Place, and Montlake Boulevard NE. There is currently substantial pedestrian and bicycle activity around the SR 520/Montlake Boulevard interchange as people travel to, from, or through the University District and the UW. This interchange area currently provides the following functions for pedestrians and bicyclists:
• A key stop and transfer point for local and regional bus service to and from the University District, including the UW, via the NE Pacific Street bus stops. This point serves 3,500 riders per day based on a 2008 traffic count by the SR 520 Project Team.

• A link between the Burke-Gilman Trail and Seattle destinations, especially those to the south.

• Access between the UW Medical Center, the Triangle Parking Garage, UW main campus, and the UW parking area.

• Pedestrians use a traffic island at the corner of the Montlake Triangle to travel between the UW E-11 parking lot east of Montlake Boulevard and the UW Medical Center. Pedestrians also cross the Triangle to travel between the UW Central Campus and the UW Medical Center and Husky Stadium facilities.

There are six pedestrian facilities located north of the Montlake Triangle:

• Two pedestrian bridges across NE Pacific Street between Montlake Boulevard NE and 15th Avenue NE

• Three pedestrian bridges across Montlake Boulevard—one that connects the UW Main Campus to the Bank of America Arena at Hec Edmundson Pavillion and two others that reach the Montlake parking lot

• One pedestrian tunnel under Pacific Street that connects the Triangle Garage to the UW Medical Center

Bicyclists cross the Montlake Triangle as they travel between areas south of the Montlake Bridge and the UW Medical Center to the main campus and the Burke-Gilman Trail.

The sidewalks, crosswalks, and asphalt path across the Triangle are designated regional trail connections in the Seattle nonmotorized plan. Approximately 6 percent of students and staff bicycle to campus, many who come from the south and cross Montlake Boulevard NE, NE Pacific Street, and NE Pacific Place (UW 2001).

There are currently no dedicated bicycle facilities from north of the Montlake Bridge to the Burke-Gilman Trail and the Lake Washington Bike Loop. However, cyclists have been observed using sidewalks and arterial streets along this route to travel to the Montlake Freeway Transit Station and other destinations to the north and south.
Pedestrian and bicycle trails in the vicinity of the SR 520/Montlake Boulevard interchange are shown on Exhibit 7-5. Pedestrian volumes along the SR 520/Montlake Boulevard interchange intersections are shown in Exhibits 7-3 and 7-4.

Montlake Boulevard is one of three north-south connections across SR 520 in the Montlake interchange area. Another north-south connection is the Bill Dawson Trail, which runs under SR 520 along the west side of Montlake Boulevard and connects the Montlake Playfield (south of SR 520 on Portage Bay) and the NOAA Northwest Fisheries Science Center Building (north of SR 520).

A third crossing is the 24th Avenue East Bridge, which connects Lake Washington Boulevard to East Montlake Park. This crossing is part of a proposed City of Seattle Master Bicycle Plan bicycle boulevard that begins at East Shelby Street and East Hamlin Street along 24th Avenue East. The proposed bicycle boulevard continues south on 25th Avenue East and 26th Avenue East before connecting to the Lake Washington Loop and destinations farther south. Bicyclists and pedestrians can access the SR 520/Montlake Boulevard interchange area from the Lake Washington Loop, Arboretum, and Burke-Gilman trails.

**SR 520/I-5/E Roanoke Street Interchange**

Sidewalks are provided throughout the SR 520/I-5/East Roanoke Street interchange area. Boylston Avenue East, Harvard Avenue East, and East Roanoke Street have sidewalks on only one side of the street where they are adjacent to I-5, except in areas that provide access to bus stops. There are currently no marked pedestrian crossings on the north or west legs of the East Roanoke\Harvard Avenue East intersection, or the north or east legs of the Roanoke\Boylston Avenue East intersection.

Bicyclists share the roads with vehicle traffic and there are no designated bicycle lanes in the immediate area. Harvard Avenue East, East Roanoke Street, and 10th Avenue East are identified in the Seattle Bicycling Guide Map (City of Seattle 2008) as "arterial streets commonly used by bicyclists."

Pedestrian volumes along the SR 520/I-5/East Roanoke Street interchange intersections are shown in Exhibits 7-3 and 7-4.
Exhibit 7-5. SR 520/Montlake Interchange Area Bicycle and Pedestrian Paths

I-5 to Medina: Bridge Replacement and HOV Project

Source: King County (2008) GIS Data (Streams, Streets and Waterbodies) and CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.
I-5/Mercer Street Interchange

Sidewalks are provided throughout the I-5/Mercer Street interchange area. Pedestrians using Fairview Avenue North must travel on the west side of the street between Roy and Mercer Streets because of the on- and off-ramps from I-5. Pedestrians also cannot cross the west leg of the Valley Street\Fairview Avenue North intersection.

Bicyclists share the roads with vehicle traffic and there are no designated bicycle lanes in the immediate area. A dedicated pedestrian and bicycle pathway located just north of Valley Street connects to other streets commonly used by bicyclists to travel to the Fremont and University District neighborhoods.

Pedestrian volumes along the I-5/Mercer Street interchange intersections are shown in Exhibits 7-3 and 7-4.

I-5/Stewart Street Interchange

Sidewalks are provided throughout the I-5/Stewart Street interchange area. Sidewalks are limited to the west side of Eastlake Avenue East between Mercer and Howell Streets.

Bicyclists share the roads with vehicle traffic and there are no designated bicycle lanes in the immediate area. Eastlake Avenue East and Howell Street are identified in the Seattle Bicycling Guide Map (City of Seattle 2008) as “arterial streets commonly used by bicyclists.”

Pedestrian volumes along the I-5/Stewart Street interchange intersections are shown in Exhibits 7-3 and 7-4.

I-5/NE 45th Street Interchange

Sidewalks are provided throughout the I-5/NE 45th Street interchange area. A sidewalk is located on the west side of 5th Avenue NE within the interchange area. Pedestrians can use sidewalks on both sides of NE 45th Street within the interchange area. Sidewalks are on both sides of 7th Avenue NE except at the I-5 northbound off ramp area. Pedestrians currently cannot cross the south leg of the NE 42nd\7th Avenue NE\I-5 express lanes ramp intersection.

Bicyclists share the roads with vehicle traffic; however, there are no designated bicycle lanes in the immediate area. West of I-5, NE 45th Street is identified in the Seattle Bicycling Guide Map (City of Seattle 2008) as an “arterial street commonly used by bicyclists.”
Pedestrian volumes along the I-5/NE 45th Street interchange intersections are shown in Exhibits 7-3 and 7-4.

**How are the project’s nonmotorized facilities being designed?**

Two of the primary considerations when designing a bicycle/pedestrian path are personal safety and comfort on the path. A few of the bicycle/pedestrian path attributes that determine safety and comfort are visibility, paving, grade or slope, signage, and protective barriers.

The WSDOT Design Manual (WSDOT 2009d) includes standards and specifications that address safety and comfort for all aspects of trail design. This project adheres to those standards, as do most regional trails throughout the Puget Sound. The WSDOT Design Manual defines a shared-use path as “…used by pedestrians and bicyclists” (Section 1025, p. 13).

Standards that specify sight distance, drainage, traffic signals, bollards, and structures (overpasses, underpasses, bridges, etc.) are established in the WSDOT’s Design Manual section on Bicycle Facilities and the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities (AASHTO 1999).

During one of several community and stakeholder collaborative design events, representatives of communities along the SR 520 corridor declared that “the ability to walk and ride bicycles around the neighborhood to parks, community facilities, and commercial areas is important. Safety should be addressed and walkways and trails enhanced.” Additional information about existing and proposed bicycle/pedestrian facilities can be found in the SR 520 Bridge Replacement and HOV Project: Nonmotorized Planning and Design Report (WSDOT 2004). After hearing public concerns about the existing nonmotorized network, the state has worked to proactively address concerns for newly constructed nonmotorized facilities and thereby achieve maximum benefit as part of a planned interconnected system.
How did project changes after the Draft EIS influence the nonmotorized elements?

After the DEIS was published, Engrossed Substitute Senate Bill (ESSB) 6099 was passed, directing the state to hire a mediator to facilitate an agreement among stakeholders on the bridge design. The mediation participants were defined through interviews with a broad range of stakeholders, including those identified in the legislation and others who had been actively involved with the SR 520 project. During 2007, the mediation participants provided input into the development of the 6-Lane Alternative options proposed for the SDEIS.

ESSB 6099 also called for UW, WSDOT, Sound Transit, King County Metro, and the City of Seattle to jointly develop a multimodal transportation plan that ensures that bus and rail services are coordinated throughout the SR 520 corridor. This plan was developed during 2008 and published as the High Capacity Transit (HCT) Plan (WSDOT 2008a).

An important feature of the HCT Plan included visions for a Montlake Multimodal Center (the Center). The Center would encompass the property known as the Montlake Triangle. The design of the Center would improve pedestrian and bicycle connections between light rail and bus, and destinations like the UW main campus, the UW Medical Center, Husky Stadium, the Bank of America Arena in Hec Edmondson Pavilion, and intra- and inter-collegiate athletic facilities.

The bicycle/pedestrian path options studied in Appendix W, Madison Park Bicycle/Pedestrian Path Options Technical Memorandum, of the Draft EIS (WSDOT 2006a) were reviewed and dropped from further consideration in response to public comments.

Other than the main bicycle/pedestrian path along the floating bridge itself, all proposed nonmotorized connections in the Draft EIS have been altered as a result of the mediation discussions.

How was the Montlake Triangle considered?

The City of Seattle, King County Metro, Sound Transit, UW, and WSDOT are considering several options to maximize circulation
efficiency at the intersection of Montlake Boulevard NE and NE Pacific Street. The project team is coordinating with these agencies to ensure that the SR 520 project options are compatible with other improvements at this location.

The I-5 to Medina: Bridge Replacement and HOV Project assumes that the Sound Transit University Link light rail station, improved Montlake Boulevard crosswalk, and a potential grade-separated pedestrian connection from the University Link light rail station to the main campus would be constructed separately (see Exhibit 7-6). The University Link light rail station and associated features are part of the University Link project. The station is scheduled to open in 2016.

UW is also considering the Rainier Vista project, which could be integrated with the I-5 to Medina: Bridge Replacement and HOV Project. The Rainier Vista project would include improvements on NE Pacific Place and lowering NE Pacific Place and the Burke-Gilman Trail. Lids would be built over NE Pacific Place and the Burke-Gilman Trail to provide an at-grade pedestrian/bicycle connection directly to the Montlake Triangle.
Under Option A there would be no change compared to No Build conditions. For Options K or L, the proposed lidded intersection at Montlake Boulevard/NE Pacific Street would provide the pedestrian connection between the University Link light rail station and campus.

**How will the project affect nonmotorized transportation?**

All of the design options would meet the project goals of providing transportation and livability benefits to the affected neighborhoods and to the region as a whole. Nonmotorized systems may offer connections and enhancements to communities that cannot come from other sources—specifically, from highway systems. Nonmotorized systems may, if carefully designed, reconnect communities that were isolated by construction of the highway. These features are part of a larger, comprehensive transportation system, including connections to the City of Seattle Bicycle Master Plan routes.

The following project features apply to all design options.

- The bicycle/pedestrian path across the SR 520 bridge is the most obvious connection improvement among all benefits listed in this report. Bicyclists and pedestrians will have the ability to travel directly east and west, an option they do not have today.

- The I-5/SR 520 interchange lid provides indirect yet safer bicycle/pedestrian connections among the University District, Capitol Hill, and downtown neighborhoods than the No Build Alternative.

- On the 10th Avenue and Delmar Drive East lid, intersection connections are improved to provide enhanced safety for bicyclists and pedestrians. The lid surface offers a more aesthetic connection between neighborhoods adjacent to SR 520 and includes a meandering pathway from east to west between 10th Avenue and Delmar Drive.

- Options A, K, and L include an optional land bridge at Foster Island that provides additional connections from the SR 520 bridge to the existing Arboretum trails.

While all of the design options meet the basic project goals, they contain slight differences in their effects on nonmotorized transportation. These
differences are associated with the variations in design features along Montlake Boulevard. As described below, the ease of nonmotorized travel from place to place will be most improved to the east and southwest through Option A. Options K and L provide more improvements to the north, east, and west.

**Montlake Boulevard and 24th Avenue East Lid**

Options A, K, and L allow people to connect via the Montlake and 24th Avenue East lid to the SR 520 bridge path to the east, Burke-Gilman Trail to the northeast and west, Bill Dawson Trail to the southwest, and Lake Washington Boulevard/Arboretum trails to the southeast. Option A offers the most direct access on paths from the SR 520 bridge to Lake Washington Boulevard, the Arboretum, and the Bill Dawson Trail. Options K and L would require users to cross streets to access the same facilities.

With Option L, the elevation differences at the SPUI limit the area of the lid, which may require users to travel along streets to reach their destinations instead of using pathways on the lid.

**Montlake Boulevard and NE Pacific Street Intersection**

Option A would allow bicyclists and pedestrians to connect to other modes of transportation via the Montlake Multimodal Center and University Link light rail station instead of the existing freeway transit station. A roadside bicycle/pedestrian path would be provided along the new Montlake Cut Bridge. Compared to the No Build Alternative, bicyclists will experience fewer conflicts with traffic by using the roadside path.

With Options K and L, the NE Pacific Street lid would provide more seamless nonmotorized connections between local bus services, regional bus services, including SR 520 routes to the Eastside and the University Link light rail station. Bicyclists traveling south of NE Pacific Street on Montlake Boulevard would still be required to use the street, but they would experience fewer conflicts with vehicles as a result of reduced traffic.

**Lake Washington Boulevard**

Option A would reduce vehicular traffic in the Arboretum (up to 900 vph compared to No Build), resulting in improved conditions for bicycle and pedestrian travel.
Option K would provide a lid for bicyclists and pedestrians to connect from the SR 520 bridge exit to the Arboretum pathways via two overpass connections.
Chapter 8—Transit Operations

What is in this chapter?

This chapter describes existing and forecasted transit service and facilities on the SR 520 corridor without and with the project. It describes and quantifies how improving the SR 520 HOV lane system and transit facilities could support WSDOT’s goal of moving more people along the SR 520 corridor and across Lake Washington.

What is the existing HOV lane system like on SR 520?

The existing HOV lane system on the SR 520 corridor is shown in Exhibit 8-1. Westbound SR 520 currently has an outside shoulder HOV lane (three or more people [3+]) on the Eastside between 108th Avenue NE and Evergreen Point Road. There is no eastbound 3+ HOV lane in this section of SR 520.

Between 124th Avenue NE and West Lake Sammamish Parkway, there is an outside HOV lane (2+) in both directions. HOV lanes (2+) are also provided in both directions along I-405, both north and south of the SR 520/I-405 interchange.

In Seattle, an HOV lane is located along short sections of NE Pacific Street (eastbound only) and Montlake Boulevard (southbound only) leading to the Montlake Bridge. The NE Pacific Street HOV lane is for 3+ carpools and transit and the southbound Montlake Boulevard HOV lane is transit only. In addition, the eastbound on-ramp at the SR 520/Montlake interchange contains an HOV bypass lane.

HOV lanes (2+) are also provided in some sections on the I-5 mainline and express lanes. While useful to existing transit services for bypassing congestion points, these HOV facilities are not continuous and transit vehicles are forced to interact with congested general-purpose traffic.
Exhibit 8-1. Existing HOV and Transit Facilities Along SR 520

I-5 to Medina: Bridge Replacement and HOV Project
What is SR 520 transit service like today?

Currently, 23 bus routes serve cross-lake demand on the Evergreen Point Bridge—18 Metro routes, 4 ST Express routes, and 1 route operated by Community Transit. Except for Community Transit Route 424, these bus routes are shown in Exhibit 8-2.

Fourteen routes connect Eastside communities to downtown Seattle; five routes connect to the University District and four connect to north Seattle. All day service is provided between downtown Seattle and Redmond by ST Express Route 545 and between the University District and Bellevue/Issaquah by King County Metro Route 271. In addition, an overlay of peak period service provides additional direct service and connections to the University District, downtown Seattle, and other areas to the north and south. One route provides late-night eastbound service across SR 520.

King County Metro and Sound Transit currently provide approximately 600 bus trips across the Evergreen Point Bridge on an average weekday, and carry almost 16,000 riders. During the morning peak period (6:00 to 9:00 a.m.) there are approximately 5,200 riders crossing the bridge in both directions in 178 bus trips (not including Community Transit service and school bus routes provided by King County Metro), with 70 percent of riders traveling westbound and 30 percent traveling eastbound.

According to Metro’s 2008 ridership counts, there are approximately 5,000 riders crossing the bridge in both directions in 169 bus trips during the afternoon peak period (3:00 to 6:00 p.m.), with 30 percent of riders traveling westbound and 70 percent traveling eastbound. Transit trip origins and destinations are discussed in the Destinations and Ridership section of this chapter.

Service Frequencies

Frequencies for individual routes serving SR 520 reach as high as one bus every 7 minutes during peak periods, with midday service provided at 15- to 30-minute frequencies. The combined frequency of all routes using SR 520 to cross the lake provides a scheduled bus trip...
All routes provided by King County Metro unless otherwise noted

Downtown Seattle
250 Redmond – PEAK
252 Kingsgate – PEAK
255 Brickyard – P&R
256 Overlake Transit Center – REVERSE PEAK
257 Brickyard P&R – PEAK
260 Finn Hill – PEAK
261 Overlake P&R – PEAK
265 Redmond – PEAK
266 Redmond – PEAK
268 Bear Creek P&R – PEAK
280 Bellevue, Renton – Night Owl
311 Duvall – PEAK
545 Redmond – ST Express

University District
167 South Renton P&R – PEAK
271 Issaquah via Bellevue/Eastgate
272 Eastgate – PEAK
277 Juanita – PEAK
540 Redmond – ST Express

North Seattle
242 Overlake P&R – Northgate PEAK
243 Jackson Park – Bellevue PEAK
555/556 Northgate/Issaquah – ST Express PEAK

Note: Community Transit Route 424 also uses SR 520

Source: King County (2008) GIS Data (Streets, Water Bodies, Routes). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.
that serves the freeway transit stations west of I-405 every 1 to 4
minutes during the morning and afternoon peak periods. Exhibit 8-3
shows the current frequencies for SR 520 routes.

Exhibit 8-3. **SR 520 Existing Transit Routes and Service Frequencies**

<table>
<thead>
<tr>
<th>Route</th>
<th>Service Provider</th>
<th>Name</th>
<th>Peak Headways</th>
</tr>
</thead>
<tbody>
<tr>
<td>167</td>
<td>King County Metro</td>
<td>University-Renton</td>
<td>30</td>
</tr>
<tr>
<td>242</td>
<td>King County Metro</td>
<td>Northgate/Ridgecrest-Overlake</td>
<td>30</td>
</tr>
<tr>
<td>243</td>
<td>King County Metro</td>
<td>Bellevue-Jackson Park</td>
<td>60</td>
</tr>
<tr>
<td>250</td>
<td>King County Metro</td>
<td>Seattle-Redmond</td>
<td>30</td>
</tr>
<tr>
<td>252</td>
<td>King County Metro</td>
<td>Seattle-Kingsgate</td>
<td>15</td>
</tr>
<tr>
<td>255</td>
<td>King County Metro</td>
<td>Seattle-Kirkland/Overlake/Brickyard P&amp;R</td>
<td>30</td>
</tr>
<tr>
<td>255</td>
<td>King County Metro</td>
<td>Express: Seattle-Overlake</td>
<td>15</td>
</tr>
<tr>
<td>256</td>
<td>King County Metro</td>
<td>Seattle-Overlake</td>
<td>45</td>
</tr>
<tr>
<td>257</td>
<td>King County Metro</td>
<td>Seattle-Kingsgate/Brickyard P&amp;R</td>
<td>20</td>
</tr>
<tr>
<td>260</td>
<td>King County Metro</td>
<td>Seattle-Finn Hill</td>
<td>60</td>
</tr>
<tr>
<td>261</td>
<td>King County Metro</td>
<td>Seattle-Overlake</td>
<td>36</td>
</tr>
<tr>
<td>265</td>
<td>King County Metro</td>
<td>Seattle-Redmond</td>
<td>26</td>
</tr>
<tr>
<td>266</td>
<td>King County Metro</td>
<td>Express: Seattle-Redmond Transit Center</td>
<td>20</td>
</tr>
<tr>
<td>268</td>
<td>King County Metro</td>
<td>Seattle-Bear Creek P&amp;R/Redmond</td>
<td>30</td>
</tr>
<tr>
<td>271</td>
<td>King County Metro</td>
<td>University-Issaquah</td>
<td>30</td>
</tr>
<tr>
<td>271</td>
<td>King County Metro</td>
<td>University-Bellevue/Eastgate</td>
<td>45</td>
</tr>
<tr>
<td>272</td>
<td>King County Metro</td>
<td>Express: University-Bellevue/Eastgate</td>
<td>36</td>
</tr>
<tr>
<td>277</td>
<td>King County Metro</td>
<td>University-Juanita</td>
<td>26</td>
</tr>
<tr>
<td>311</td>
<td>King County Metro</td>
<td>Seattle-Duvall/Woodinville</td>
<td>15</td>
</tr>
<tr>
<td>424</td>
<td>Community Transit</td>
<td>Seattle-Snohomish/Monroe</td>
<td>60</td>
</tr>
<tr>
<td>540</td>
<td>Sound Transit</td>
<td>Express: University-Kirkland</td>
<td>30</td>
</tr>
<tr>
<td>540</td>
<td>Sound Transit</td>
<td>Express: University-Kirkland</td>
<td>15</td>
</tr>
<tr>
<td>545</td>
<td>Sound Transit</td>
<td>Express: Redmond-Seattle</td>
<td>9</td>
</tr>
<tr>
<td>555/556</td>
<td>Sound Transit</td>
<td>Express: Northgate-Issaquah</td>
<td>30</td>
</tr>
</tbody>
</table>

Route 280 is a night-owl route with one departure.
In addition to Metro and Sound Transit routes, Microsoft operates its Microsoft Connector service on SR 520, which provides transportation for Microsoft employees between the company’s facilities and Seattle, Bothell, Mill Creek, Issaquah, and Sammamish.

**Destinations and Ridership**

Exhibits 8-4 and 8-5 illustrate the origins and destinations of morning (6:00 to 9:00 a.m.) and afternoon (3:00 to 6:00 p.m.) peak period riders on the bridge. During the morning peak period there are approximately 122 westbound and 56 eastbound bus trips using SR 520, carrying 3,300 and 1,400 riders, respectively. Of those westbound travelers, about 67 percent are destined to downtown Seattle, 26 percent to the University District, 4 percent to Montlake, and the remaining 3 percent to north Seattle. Of the eastbound riders, approximately 50 percent are destined for the Overlake area, 25 percent to downtown Bellevue, 10 percent to Kirkland, 10 percent to Redmond, 4 percent to Eastgate, and 2 percent to Issaquah.

Fewer trips are provided eastbound than westbound during the morning commute. Eight routes provide eastbound morning peak service across SR 520. Sound Transit Route 545 has the greatest number of trips and carries the most riders during that time period.

Transit travel patterns reverse during the afternoon peak period, but passenger volumes tend to be spread over longer periods. There are approximately 52 westbound and 117 eastbound bus trips using SR 520, carrying 1,400 and 3,000 riders, respectively. Of those westbound travelers, approximately 48 percent are destined to downtown Seattle, 21 percent to the University District, 12 percent to Montlake, and the remaining 19 percent to north Seattle. Of the eastbound riders, approximately 11 percent are destined for the Overlake area, 11 percent to downtown Bellevue, 44 percent to Kirkland, 19 percent to Redmond, 3 percent to Eastgate, and 2 percent to Issaquah.

**Travel Times**

General traffic congestion along the SR 520 corridor, combined with frequent and highly unpredictable delays caused by traffic accidents and minor incidents, results in widely varying travel times in both directions throughout much of the day. Recent travel time data reviewed by Metro indicate that actual bus travel times between NE 51st Street in Redmond and the Montlake Freeway Transit Station
Exhibit 8-4. Morning Peak Transit Ridership Destinations
I-5 to Medina: Bridge Replacement and HOV Project

Source: King County (2009) Metro APC Data, King County (2008) GIS Data (Waterbody), and King County (2008) GIS Data (Streams and Streets). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Notes: Westbound estimates are based on screenline data, and eastbound estimates are based on APC data analysis; the morning peak period is 6:00 a.m. to 9:00 a.m., and trips generally represent work trips. Numbers indicate where riders get off, but do not necessarily represent the end of their trip. Destinations represent zones, and therefore include stops in surrounding areas.
Exhibit 8-5. Afternoon Peak Transit Ridership Destinations
I-5 to Medina: Bridge Replacement and HOV Project

Source: King County (2009) Metro APC Data, King County (2008) GIS Data (Waterbody), and King County (2008) GIS Data (Streams and Streets). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Notes: Westbound estimates are based on screenline data, and eastbound estimates are based on APC data analysis; the afternoon peak period is 3:00 p.m. to 6:00 p.m., and trips generally represent work trips. Numbers indicate where riders get off, but do not necessarily represent the end of their trip. Destinations represent zones, and therefore include stops in surrounding areas.
(10 miles) during the morning commute can range from 10 to 30 minutes for westbound as well as eastbound trips, with most trips (more than 90 percent) taking an average of 16 minutes for either direction.

During the afternoon commute, eastbound transit travel times are similar to the morning, taking an average of 16 minutes. However, westbound travel times between the Montlake Freeway Transit Station and NE 51st Street can range from 10 to 55 minutes, with an average of approximately 22 minutes. Approximately 20 percent of the westbound transit trips take over 30 minutes to make this trip (King County Metro 2008).

This high variability means that travelers needing to keep a regular schedule must plan for the worst conditions and expect a relatively long travel time. It also makes transferring between routes and services difficult and adds substantially to the cost of providing bus service.

What transit facilities and services are on or near SR 520 today?

Between I-5 and the bridge, there is only one freeway transit station on SR 520, located at the SR 520/Montlake interchange in Seattle. Montlake Boulevard and NE Pacific Street are the two primary transit streets in this interchange area, both of which have been identified in the City of Seattle’s Transit Plan as links in the Urban Village Transit Network (UVTN). This network represents the backbone of the Seattle transit network, carrying the majority of Seattle transit system riders.

There is also a major transfer point at the bus stops located on NE Pacific Street/NE Pacific Place in front of the University of Washington Medical Center. These facilities and their associated service are discussed in the following sections. Exhibit 8-6 shows the existing transit facilities in the Montlake area.

Montlake Freeway Transit Station

The Montlake Freeway Transit Station consists of eastbound and westbound bus platforms and shelters on the shoulders of SR 520 near the SR 520/Montlake interchange. Bus riders access the eastbound platform via stairs on the Montlake overpass, while passengers using the westbound platform access the station using a sidewalk.
Exhibit 8-6. Existing Transit and HOV Facilities within Montlake Area
I-5 to Medina: Bridge Replacement and HOV Project
The existing station provides four functions:

1. It allows westbound riders originating on the Eastside to use downtown Seattle-bound buses to access the University District, Montlake area, or other neighborhoods via a transfer to local buses, walking, or bicycling.

2. It allows westbound riders originating in Seattle to access direct service to downtown Seattle.

3. It allows eastbound riders originating in Seattle neighborhoods (University District, Shelby-Hamlin, Capitol Hill, Rainier Valley) to access Eastside destinations by transferring from local buses, walking, bicycling, or being dropped off.

4. It allows eastbound riders originating from downtown Seattle to access the Montlake area.

Montlake has the highest use of all freeway stations in the corridor, with approximately 1,660 riders per day in 2009 (King County Metro 2009). Westbound and eastbound daily and peak period use of the Montlake interchange is summarized in Exhibit 8-7. Transit service at the Montlake Freeway Transit Station is provided by King County Metro, Sound Transit, and Community Transit.

In the morning, the eastbound station is the busiest, with approximately 220 passenger boardings and 40 passenger alightings over a 3-hour period. Approximately 90 percent of the people using the eastbound Montlake Freeway Transit Station in the morning are traveling to work. Approximately 60 percent of these people arrive by bus while another 20 percent arrive by bicycle (EnviroIssues 2005). At the freeway transit station, they transfer to SR 520 express buses for the trip to the Overlake area or other Eastside destinations.

In the afternoon, approximately 65 percent of the people using the eastbound station are traveling from the University of Washington. Approximately 60 percent of these people arrive by bus while almost the entire remaining 40 percent walk to the station (EnviroIssues 2005).
The westbound Montlake Freeway Transit Station has more activity in the morning than in the evening, with approximately 50 passenger boardings and 130 passenger alightings over a 3-hour period. The alightings represent Eastside residents commuting to the University of Washington by riding downtown-bound SR 520 buses and then transferring at the Montlake Freeway Transit Station to local service, or walking or riding bicycles across the Montlake Bridge to the campus (Envirolissues 2005).

**University Transfer Point at NE Pacific Street (Montlake Triangle)**

This transfer point is located in front of the University of Washington Medical Center on NE Pacific Street, just northwest of the Montlake Boulevard/NE Pacific Street intersection. This transfer point provides access to the University Medical Center, medical and health sciences academic buildings, the main campus, and Husky Stadium. Transit service at is provided by King County Metro and Sound Transit.

These two stops (one eastbound and one westbound) combined have 3,800 boardings/alightings every weekday. There is slightly more boarding and alighting at the westbound stop, with 56 percent (2,132) of the total daily activity. The westbound stop is served by 11 routes—3 local and 8 SR 520 routes. The eastbound stop is served by 13 routes—4 local and 9 SR 520 routes. SR 520 routes account for 30 percent of boarding/alighting at the westbound stop and 35 percent at the eastbound stop. On a daily basis and during the morning peak period, local buses account for between 60 to 80 percent of bus trips for both stops, except for at the eastbound stop during the afternoon peak period. At this stop, SR 520 buses account for 60 percent of the bus trips during the afternoon peak period.

**Montlake Triangle Area**

In addition to the bus stops described above, there are transit layover spaces on the southeast curb of NE Pacific Place and a driver comfort station on the Montlake Triangle. Overhead electric bus wires (trolley wires) are located along NE Pacific Street, the eastbound lane of NE Pacific Place, and the southbound outside lane of Montlake Boulevard (between NE Pacific Place and NE Pacific Street). There are also trolley wires on Montlake Boulevard NE south of NE Pacific Street, across the
Montlake Bridge, 24th Avenue, and 10th Avenue East (in Capitol Hill/Roanoke neighborhood). Trolley wire power substations are located in these areas.

**Montlake Overpass Bus Stops**

There are two stops on the Montlake overpass that allow transit riders to transfer between regional and local transit services. The northbound stop is located just south of the SR 520 westbound off-ramp and the southbound stop is located at the entrance to the SR 520 eastbound on-ramp (Exhibit 8-6). The northbound bus stop serves three local bus routes with approximately 190 daily bus trips, 250 passenger boardings, and 100 passenger alightings per day. The southbound bus stop serves three local and seven SR 520 bus routes with 290 daily bus trips, approximately 350 passenger boardings, and 420 passenger alightings per day.

**HOV Facilities in the SR 520/Montlake Interchange Area**

Because the Montlake area is highly congested, HOV improvements have been made on NE Pacific Street eastbound and Montlake Boulevard southbound lanes to facilitate bus and carpool access to SR 520. Preferential signalization on the eastbound leg of the NE Pacific Street/Montlake Boulevard intersection allows buses and carpools to bypass long traffic queues that form at the north end of the Montlake Bridge due to heavy traffic, bridge openings, or both. When the buses reach the intersection of Montlake Boulevard and Lake Washington Boulevard, they are able to make a signal-protected right turn directly into the HOV bypass lane on the eastbound SR 520 on-ramp. These treatments have proven helpful in reducing congestion-related delays and reliability impacts of bridge openings for eastbound SR 520 bus routes and carpools.

**What transit facilities and services were assumed in the No Build Alternative?**

**Transit Facilities**

It was assumed that the Medina to SR 202: Eastside Transit and HOV Project would be completed by 2016 and, therefore, was included in the No Build Alternative definition for the I-5 to Medina: Bridge Replacement
and HOV Project. The following elements of the Medina to SR 202: Eastside Transit and HOV Project were assumed to be in place:

- Inside HOV (3+) lanes in both directions between Lake Washington and SR 202
- HOV direct access ramps to and from the west at the 108th Avenue NE interchange
- Inside transit stops at 92nd Avenue NE and Evergreen Point Road
- A regional bicycle and pedestrian path between 108th Avenue NE and Evergreen Point Road
- New interchange configurations at 84th Avenue NE, 92nd Avenue NE, Bellevue Way, and 108th Avenue NE

The No Build Alternative was assumed to be untolled for all vehicles.

**Transit Service Network**

Based on coordination with transit agencies, it was assumed that transit operators would continue to provide service to and from major activity centers on both sides of the lake via SR 520 in the morning and afternoon, with most routes providing morning service to Seattle and afternoon service from Seattle. These assumptions are consistent with the transit agencies’ current routes and services as well as their planning efforts regarding future service and operational improvements.

There are currently four routes that provide all-day service on SR 520, with the remaining 18 routes providing peak period or specialized service between the major transit destinations on the west and east sides of Lake Washington (see Exhibits 8-4 and 8-5). For the SDEIS transportation analysis, it was assumed that this general service structure would continue into the future, but with improved service frequencies and additional bus routes during peak and off-peak periods. Bus routes were routed on the HOV lanes available under the Build Alternative. Exhibit 8-8 shows existing and projected (year 2030) frequencies for SR 520 routes.
## Exhibit 8-8. SR 520 Comparison of Existing and 2030 Transit Routes and Service Frequencies

<table>
<thead>
<tr>
<th>Route</th>
<th>Name</th>
<th>2008</th>
<th>2030</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>167</td>
<td>University-Renton</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>242</td>
<td>Ridgecrest-Overlake</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>243</td>
<td>Bellevue-Jackson Park</td>
<td>60</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>Seattle-Redmond</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>252</td>
<td>Seattle-Kingsgate</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>255</td>
<td>Seattle-Kirkland/Overlake/Brickyard P&amp;R</td>
<td>30</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>255</td>
<td>Express: Seattle-Overlake</td>
<td>15</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>256</td>
<td>Seattle-Overlake</td>
<td>45</td>
<td>NA</td>
<td>Route deleted and replaced by upgraded service on Route 255</td>
</tr>
<tr>
<td>257</td>
<td>Seattle-Kingsgate</td>
<td>20</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>260</td>
<td>Seattle-Finn Hill</td>
<td>60</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>261</td>
<td>Seattle-Overlake</td>
<td>36</td>
<td>NA</td>
<td>Route deleted for Rapid Ride</td>
</tr>
<tr>
<td>265</td>
<td>Seattle-Redmond</td>
<td>26</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>266</td>
<td>Express: Seattle-Redmond Transit Center</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>268</td>
<td>Seattle-Redmond/Fall City</td>
<td>30</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>271</td>
<td>University-Issaquah</td>
<td>30</td>
<td>NA</td>
<td>Route no longer travels east of Eastgate</td>
</tr>
<tr>
<td>271</td>
<td>University-Eastgate</td>
<td>45</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>272</td>
<td>Express: University-Bellevue</td>
<td>36</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>277</td>
<td>University-Juanita</td>
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<td>NA</td>
<td>Route deleted</td>
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<tr>
<td>311</td>
<td>Seattle-Duvall/Woodinville</td>
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<td>10</td>
<td></td>
</tr>
<tr>
<td>424</td>
<td>Seattle-Snohomish/Monroe</td>
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<td>45</td>
<td></td>
</tr>
<tr>
<td>540</td>
<td>University-Kirkland/Redmond</td>
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<td>NA</td>
<td>Kirkland-Redmond segment deleted February 2008</td>
</tr>
<tr>
<td>540</td>
<td>Express: University-Kirkland</td>
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<td>30</td>
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</tr>
<tr>
<td>545</td>
<td>Express: Redmond-Seattle</td>
<td>9</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>555/556</td>
<td>Express: Northgate-Issaquah</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

Route 280 is a night-owl route with one departure.
The transit network and operating plan assumptions for the 2030 No Build Alternative are consistent with those identified for other corridor projects in the region and include:

- King County Metro Transit Now and RapidRide programs
- Sound Transit’s light rail service between Sea-Tac and Northgate
- Seattle streetcar service between South Lake Union and the Seattle Waterfront

These projects are described below.

**King County Metro’s Transit Now**

Transit service in the SR 520 corridor is projected to grow through Metro’s *Transit Now* investments and other service expansion opportunities. *Transit Now* will add service to two core routes, Route 271 and Route 255, across the Evergreen Point Bridge, primarily in the midday and on weekends.

*Transit Now* investments will also create an Eastside *RapidRide* route along the NE 8th Street corridor, improving transit service between Bellevue and Redmond Road and the Crossroads area. This *RapidRide* route will provide high-frequency transit service between Bellevue and Redmond 7 days per week, approximately 18 hours per day or more. With a projected initial ridership of 3,500 daily riders when the route is launched in 2011, the *RapidRide* line will make the cross-lake services more accessible by providing fast, reliable connections.

**Sound Transit Light Rail and Express Bus Routes**

For the No Build and 6-Lane Alternative transportation analyses, it was assumed that by 2030 light rail service would be in place between Sea-Tac Airport, downtown Seattle, the University of Washington, and Northgate. These projects have been approved by voters as a part of Sound Move and environmental documentation has been completed and approved. The transportation analysis also
assumed the improvements to Express Bus service identified in Sound Transit’s 2008 Service Implementation Plan.

A 14-mile segment of light rail between downtown Seattle and the Tukwila International Boulevard Station opened in July 2009 and an extension to Sea-Tac Airport will be complete in December 2009. Sound Transit also initiated construction of the University Link, or U-Link, segment of light rail between downtown Seattle and the University of Washington station near Husky Stadium in 2009. U-Link and the University of Washington station are expected to open in 2016.

The University of Washington Station (shown in Exhibit 8-9) will provide access to the campus and UW Medical Center, nearby sports venues, and surrounding neighborhoods. A potential grade-separated pedestrian bridge between north of the Burke-Gilman Trail and the Montlake Triangle could provide direct access to the upper campus for transit riders, and minimize conflicts between pedestrians and bicyclists using the trail. Sound Transit is also evaluating additional crossings.

Exhibit 8-9. Rendering of Sound Transit’s University of Washington Station Entrance with Pedestrian Bridge (opening in 2016)
The No Build and 6-Lane Alternative transportation analyses did not include transit improvements identified in the ST2 Plan. When the update to the transportation analysis for the SDEIS began in 2006, the ST2 Plan had not yet been approved by voters and was unfunded. After the ST2 Plan was approved by voters in November 2008, ST2 Plan components were incorporated in the Cumulative Effects transportation analysis, which is discussed in Chapter 11 of this report.

**Transit Service Hours**

Based on discussions with King County Metro, it was assumed that the increases in transit service planned for the Transit Now program would account for growth between 2006 and 2016. A 1 percent per year increase in service hours was assumed between the year 2016 and 2030.

For Sound Transit, total transit service hours were assumed to increase approximately 1/2 percent a year between the base year (2006) and approximately year 2013. This is consistent with Sound Transit’s 2008 Service Implementation Plan.

**What transit facilities and services were assumed in the 6-Lane Alternative?**

**Transit Facilities**

This section summarizes the transit facilities and service assumed in the transportation analysis. Project effects are discussed in the next section: “How would the project affect transit connections?”

The I-5 to Medina: Bridge Replacement and HOV Project’s 6-Lane (Build) Alternative would result in the following changes to transit and HOV facilities in the SR 520 corridor. All three options (A, K, and L) and their suboptions would include:

- Inside HOV lanes (3+) in both directions across the SR 520 bridge to I-5
- An HOV direct connection to I-5 express lanes that would operate westbound-to-southbound in the morning and northbound-to-eastbound in the afternoon
- HOV bypass lanes on all on-ramps at the Montlake interchange
- Removal of the Montlake Freeway Transit Station
Transit service and facility changes specific and unique to each of the 6-Lane Alternative options are described below.

**Option A**

In addition to the HOV facilities listed above, Option A would include a westbound transit-only direct access off-ramp to northbound Montlake Boulevard. A westbound bus stop would also be included at the end of the ramp (refer to Chapter 6, Exhibit 6-19). The southbound bus stop on the Montlake overpass (Exhibit 8-6), which serves eastbound SR 520 and local buses, would be reconstructed near where it is today at the entrance to the SR 520 eastbound on-ramp. The northbound bus stop, which serves three local bus routes, may be replaced as an in-lane stop or removed.

The existing HOV priority treatments on NE Pacific Street and Montlake Boulevard NE southbound would be maintained as they are today.

Bus stops, layover space, and trolley wires at the Montlake Triangle would remain in the same locations as they are today.

**Suboption A**

In addition to the changes described in Option A, Suboption A would add an eastbound direct access ramp for 3+ carpools and transit between Montlake Boulevard southbound and SR 520. As a result, the HOV lane on the SR 520 eastbound loop ramp would be removed and the bus stop located at the top of the ramp would serve southbound local buses only. SR 520 buses would be re-routed to the new direct access ramp. Transit riders would connect to SR 520 eastbound bus service at the NE Pacific Street bus stops near Montlake Triangle.

**Options K and L**

Options K and L would include HOV (3+ carpool and transit) direct access ramps to and from the east at the new SR 520 single point urban interchange (SPUI) east of Montlake Boulevard. SR 520 bus routes traveling to the University District would use the new SR 520 interchange and roadway connection to the Montlake Boulevard NE/NE Pacific Street intersection.
The northbound bus stop on Montlake Boulevard NE just south of East Shelby Street was assumed to be removed because this stop serves SR 520 bus routes only.

The eastbound HOV bypass lane on NE Pacific Street would be removed because of right-of-way constraints. A dedicated right turn lane would be provided.

The current dedicated right turn lane on Montlake Boulevard NE southbound is accommodated in the current design and HOV lane designation could be added.

Bus stops and layover at the Montlake Triangle would remain in the same locations as they are today, with the exception of the northbound bus stop on Montlake Boulevard NE that serves King County Metro Route 243. With the new configuration at the Montlake Boulevard NE/NE Pacific Street intersection, this stop would be removed. According to King County Metro 2008 traffic counts, this stop currently serves 3 p.m. peak hour bus trips and, on average, has four daily boarding/alightings. Most passengers on this route are continuing to destinations in the north. The next closest stop is approximately 1,200 feet north.

**Transit Service Hours**

Transit service hours for the 6-Lane Alternative options were the same as for the No Build Alternative.

**Transit Service Network**

As with the No Build Alternative, it was assumed that the current general service structure would continue into the future, but with improved service frequencies and additional bus routes during peak and off-peak periods. WSDOT—along with Sound Transit, King County Metro, and the University of Washington—has developed a separate High Capacity Transit Plan to identify incremental strategies for meeting cross-lake travel demand on the SR 520 corridor. The strategies included three primary elements: 1) bus rapid transit, 2) Montlake Multimodal Center, and 3) light rail. The Final High Capacity Transit Plan (WSDOT 2008a) provides more information about this work.

The primary change in the transit service network for the 6-Lane Alternative was removal of the Montlake Freeway Transit Station. Replacing the Montlake Freeway Transit Station to serve the inside...
SR 520 HOV lanes would result in a wider highway cross-section through the Montlake area, affecting the footprint of the roadway and bridge structures west across Portage Bay and east through the Arboretum.

Based on discussions with Montlake area residents and the 2008 mediation process, it was decided that the Montlake Freeway Transit Station would not be rebuilt so the footprint of SR 520 through the Montlake neighborhood could be narrowed. The section below discusses how removing the Montlake Freeway Transit Station would affect transit connections.

**How would the project affect transit connections?**

With the 6-Lane Alternative, the HOV improvements to the SR 520 corridor would improve transit reliability and travel times on the freeway. All of the 6-Lane Alternative options would also improve capacity across the Montlake Cut. Therefore, connections between transit services and other transportation modes would also improve in many instances. This section first describes the effects of removing the Montlake Freeway Transit Station because it is common to all options. Changes in transit connections specific to each option are then described.

Once design options are selected, more detailed transit planning and intersection design will be required to determine whether existing bus stops would need to be replaced, relocated, or removed.

**Replacing the Functions of the Montlake Freeway Transit Station**

All options would remove the Montlake Freeway Transit Station. Buses destined for or originating from I-5 would continue on SR 520 without exiting at the SR 520/Montlake Boulevard interchange. University District bus routes would continue to operate with direct service as they do today. Bus passengers traveling to and from downtown Seattle from areas east of Lake Washington would realize a travel time savings with the removal of the Montlake Freeway Transit Station.

Without the Montlake Freeway Transit Station, access to SR 520 bus service in the Montlake interchange area would be reduced and relocated to the Montlake Triangle area. The relocation of transit connections to the Montlake Triangle would be an advantage for riders
coming from the north and those using light rail transit, but a disadvantage for those riders coming from the south.

Riders who currently use the Montlake Freeway Transit Station would have their transit trip changed as described below.

**Westbound Transit Passengers**

- Riders who currently use downtown Seattle buses to access the Montlake and University District areas would no longer have this option. These riders would need to use those routes providing direct service to the University District. Riders could transfer to University District buses at either the 92nd Avenue NE or Evergreen Point Freeway Transit Station. Future frequencies, as evaluated for the SDEIS, will be about 4 minutes (compared to 1.5 minutes today) during the morning peak period and about 20 minutes (compared to 4 minutes today) during the afternoon peak period. These estimated frequencies do not include new ST route 542 between Redmond and the University District.

- Riders who currently walk, bus, or bike to the Montlake Freeway Transit Station to board a bus to downtown Seattle could use the same mode to access light rail at the Montlake Triangle or find an alternative transit route. This would either lengthen or shorten a rider’s trip by a half mile. Light rail service is expected to run every 5 to 15 minutes (Sound Transit 2006).

- With Option A, a westbound transit stop would be located at the termination of the westbound transit-only direct access ramp on the Montlake overpass, allowing people to make connections in the Montlake area.

- With Options K or L, the first Seattle transit stop for SR 520 bus service would be at the Montlake Triangle. This would mean some out-of-direction travel for people destined for areas south of the Montlake Cut.

- Riders who currently transfer between routes at the Montlake Freeway Transit Station could transfer at the Evergreen Point or 92nd Avenue NE Freeway Transit Station.

**Eastbound Transit Passengers**

- With Option A, riders who currently walk, bus, or bike to the Montlake Freeway Transit Station could board an SR 520 eastbound bus at the traffic island located at the entrance to the eastbound
SR 520 on-ramp and, if required, transfer at Evergreen Point Freeway Transit Station for a bus to their final destination. Future frequencies, as evaluated for the SDEIS, will be about 20 minutes (compared to 4 minutes today) during the morning peak period and about 4 minutes (compared to 1.5 minutes today) during the afternoon peak period. These estimated frequencies do not include new ST route 542 between Redmond and the University District.

- With Suboption A, riders who walk, bus, or bike to the Montlake Freeway Transit Station could board an SR 520 eastbound bus at the Montlake Triangle. This would mean some additional travel time for riders from the south. Bicyclists would have the option of riding across the SR 520 bridge.

- With Options K or L, riders who currently transfer between local and SR 520 buses could continue north on Montlake on an SR 520 bus to the Montlake Triangle, then transfer to an eastbound SR 520 bus at the NE Pacific Street stop. This would add approximately 1 to 3 minutes\(^1\) of travel time for people originating from areas south of the Montlake Cut by bus, or approximately 10 to 15 minutes\(^2\) for those who walk.

- Under all options, some passengers would transfer at the Evergreen Point Freeway Transit Station to reach their final destinations.

- Riders starting their trip in downtown Seattle and getting off at the Montlake Freeway Transit Station to walk, bus, or bike to other destinations could take light rail to the University of Washington Station or find alternative routes.

- With Option K or L, bus stops on or near the SR 520/Montlake overpass would likely be retained in order to maintain access to the local routes using Montlake Boulevard NE. All transfer activity to SR 520 bus routes would occur at the Montlake Triangle.

Some bus riders who use the Montlake Freeway Transit Station are bike riders. With the project, these people would have the option of riding across the SR 520 bridge, which is likely to reduce delay. According to King County Metro’s 2002 ridership counts, bike riders are often

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\(^1\) Distance of 0.50 mile between the northbound bus stop on Montlake Boulevard (near the westbound off-ramp) and the westbound bus stop on NE Pacific Street (at the Triangle). Assumes an average speed of 10 mph.

\(^2\) Assumes an average walk speed of 4 feet per second.
delayed because of full bike racks, sometimes waiting up to 30 to 40 minutes for a bus with bike rack space. The project would make their trip more reliable by providing a cross-lake bicycle path and eliminating the need to take a bus.

Many of the transit riders using the Montlake Freeway Transit Station are walking to the University area, which ranges from 10 to 15 minutes to reach the UW Medical Center and longer for other UW destinations. With the project, bus passengers could experience similar, or even shorter, total trip travel times compared to the No Build Alternative. Even with a forced Eastside transfer to University District buses, a transit commuter’s total trip time could be the same or better because they would no longer have the walk time and because the project would improve HOV lane reliability and travel times on SR 520 between Redmond and Seattle.

**University District Service**

With relocation of the HOV lanes and freeway transit stations to the inside of SR 520, King County Metro routes 261 and 271 would no longer be able to access the Evergreen Point Freeway Transit Station. These routes use the SR 520/84th Avenue NE interchange, which, with the project, would prevent them from being able to access and serve riders using the new median transit station at Evergreen Point. A route change to an SR 520 interchange east of 84th Avenue NE would allow these routes to use this stop.

On weekdays, westbound transit riders using the Evergreen Point Freeway Transit Station would have direct all-day service to the University District on ST Route 540 and peak period service on King County Metro Routes 167, 243, 272, 277, and ST 555/556. Future frequencies, as evaluated for the SDEIS, will be about 4 minutes (compared to 1.5 minutes today) during the morning peak period and about 20 minutes (compared to 4 minutes today) during the afternoon peak period.

Eastbound transit riders in the Montlake and University District that want to cross the SR 520 bridge would have fewer routes to choose from with the removal of the Montlake Freeway Transit Station. Future frequencies for University District bus service, as evaluated for the SDEIS, will be about 20 minutes (compared to 4 minutes today) during the morning peak period and about 4 minutes (compared to 1.5 minutes today) during the afternoon peak period.
These estimated frequencies do not include new ST route 542 between Redmond and the University District. Additional weekday peak service would be provided by Sound Transit’s new Redmond-University District route (Route 542). This route was funded through Sound Transit 2 and service is planned to start as early as September 2010, with peak period service between about 6:00 a.m. and 10:00 a.m. and 2:00 pm to 7:00 p.m. Year 2010 bus service is planned to be every 15 minutes (Sound Transit 2009).

On weekends, no University District bus service would be accessible from the new median transit station at Evergreen Point Road under today’s transit service and route structure.

The next sections discuss the changes in transit connections that are specific to each 6-Lane Alternative option.

**Option A**

Westbound SR 520 bus riders wanting to transfer to southbound local bus service would exit the bus at the end of the transit-only direct access ramp and walk to the bus stop located at the SR 520 eastbound on-ramp. The distance to this stop would be shorter than it is today and under the No Build Alternative.

Connections to northbound local bus service at the Montlake overpass bus stop are expected to decrease with or without the Montlake Freeway Transit Station. U-Link service will decrease the number of transfers that occur between eastbound SR 520 buses and local buses. When the Montlake Freeway Transit Station is removed, there will be even fewer transfers.

Under these circumstances, the northbound bus stop located on Montlake Boulevard just south of the SR 520 westbound off-ramp could be replaced as an in-lane stop near its current location. Alternatively, this bus stop could be removed, with transit riders using the Montlake Boulevard bus stop just south of East Roanoke Street.

**Suboption A**

Suboption A would add a Montlake Boulevard southbound-to-SR 520 eastbound 3+ carpool and transit direct access ramp to the new Montlake interchange design. Therefore, SR 520 buses would no longer use the existing transit stop at the entrance to the SR 520 eastbound on-ramp. The HOV lane on the SR 520 eastbound loop ramp would be
removed and the bus stop located at the top of the ramp would serve southbound local buses.

Passenger access on eastbound SR 520 buses would occur at the Montlake Triangle. It is expected that many of these boardings and alightings would relocate to the NE Pacific Street stop, with riders originating in Rainier Valley, Capitol Hill, and downtown Seattle switching to light rail.

**Option K or L**

With Option K or L, SR 520 buses would rerouted to the new 3+carpool and bus direct access ramps associated with the new interchange. Buses would use the new tunnel or bridge between the new SR 520 interchange and the Montlake Boulevard/NE Pacific Street intersection to connect to the University District. The first westbound and last eastbound Seattle bus stop for University District service would be the NE Pacific Street stops near the Montlake Triangle and UW Medical Center.

Once preferred design options are selected, more detailed transit planning and intersection design will be conducted in coordination with transit agencies to determine whether existing bus stops would need to be replaced, relocated, or removed.

**How would the project affect transit travel times and reliability in the SR 520 corridor?**

The I-5 to Medina: Bridge Replacement and HOV Project would complete the HOV system and corridor upgrade, improving traffic operations for all users of the corridor—especially transit and HOV users. The project would provide the necessary infrastructure to:

- Meet more of the regional cross-lake travel demand
- Improve travel time and reliability for transit and carpools
- Improve cross-lake connectivity between major Seattle and Eastside activity centers and to existing and planned transit networks
- Expand the transit network to include the ultimate development of an SR 520 high capacity transit system, which may include exclusive, dedicated transit facilities in the corridor
Today and with the year 2030 No Build Alternative, there are no HOV lanes between I-5 and Medina, requiring HOVs to travel in the general-purpose lanes. Afternoon westbound travel times between Medina and I-5 are slightly longer because of congestion approaching the I-5/SR 520 interchange. Eastbound travel times are slightly higher in the morning because of the congestion between I-5 and the Lake Washington Boulevard ramps. In the afternoon, this congestion typically does not occur.

Travel times without and with the project are discussed below in terms of “average” and “maximum” travel times between I-5 and SR 202. Both the average and maximum travel times are included to capture how the variation in congestion throughout the 3-hour peak period can affect travel time. The maximum travel time represents “the peak of the peak,” or the peak hour of the 3-hour peak period.

**Freeway Traffic – Morning Peak Period**

**No Build Alternative**

Exhibit 8-10 shows west and eastbound HOV travel times during the morning peak period on SR 520 between I-5 and SR 202 for the No Build (NB) and 6-Lane Alternative (6L). Without the project, year 2030 travel times between I-5 and SR 202 would be similar to today. In the eastbound direction, congestion that currently exists on SR 520 between the west transition span and the Lake Washington Boulevard on-ramp merge (near the Arboretum) would remain.

![SR 520 AM Peak Period Travel Times (minutes) I-5 to SR 202](image)

No Build Alternative travel times for general-purpose and HOV traffic would be similar to today for this section of SR 520 because it is at capacity. The increases in traffic volumes and congestion expected between now and the year 2030 would add to the northbound I-5
congestion for traffic exiting to SR 520. Westbound HOV travel would be 4 to 6 minutes faster than general-purpose travel because the Medina to SR 202: Eastside Transit and HOV Project would be completed.

**6-Lane Alternative**

With the project, the SR 520 mainline would be improved and HOV lanes would be added between I-5 and Medina, improving both general-purpose and HOV travel times. The eastbound congestion between I-5 and the west bridge approach (near the Arboretum) would be substantially reduced because of the project improvements. As a result, eastbound general-purpose travel times in this section of SR 520 would be reduced by 7 to 9 minutes and HOV travel times by 8 to 11 minutes compared to the No Build Alternative. Eastbound HOV travel would be 1 or 2 minutes faster than general-purpose travel, which is a similar benefit to that provided by the No Build Alternative.

Westbound travel time reductions would not be as great as eastbound because this section of SR 520 would not be as congested. Westbound HOV travel would be 4 to 5 minutes faster than general-purpose travel because the Medina to SR 202: Eastside Transit and HOV Project would be completed and a direct connection would be added from the HOV lane to the I-5 express lanes. This is a similar benefit to that provided by No Build Alternative.

**Freeway Traffic – Afternoon Peak Period**

**No Build Alternative**

Exhibit 8-11 shows afternoon peak period travel times on SR 520 between I-5 and SR 202 both without and with the project. By the year 2030, congestion on the I-405 mainline would back up onto SR 520, affecting both westbound and eastbound general-purpose travel times.

During the afternoon commute, westbound general-purpose travel times on SR 202 and I-5 would increase 17 to 26 minutes due to I-405 mainline congestion spilling back onto SR 520. For this same reason, eastbound general-purpose travel times would increase by 5 to 64 minutes, with 64 minutes representing travel during the worst of congestion.
With the 6-Lane Alternative, westbound HOV travel times would be reduced slightly (4 to 6 minutes) because of the Medina to SR 202: HOV and Transit Improvement Project, which was assumed to be a part of the year 2030 No Build Alternative. With completion of the inside HOV lane between SR 202 and Medina, westbound HOVs would be able to bypass general-purpose congestion, making HOV travel 29 to 44 minutes faster than general-purpose travel.

On average, eastbound HOV travel times would be similar to today. However, when I-405 congestion is at its worst, SR 520 HOV travel times could increase by 33 minutes because of I-405 traffic backing up onto SR 520 as far east as the floating bridge. When this occurs, HOV traffic would not be able to bypass congestion under the No Build Alternative because the HOV lanes would not begin until near 84th Avenue NE. Until then, HOV traffic would be stuck in the same congestion as general-purpose traffic. However, once reaching the start of the HOV lanes on the east side, HOV traffic would be able to bypass the general-purpose congestion related to I-405, making HOV travel approximately 10 to 30 minutes faster than general-purpose travel.

**6-Lane Alternative**

With the project, the SR 520 HOV lanes would be completed between Medina and I-5, allowing buses and carpools to reliably bypass general-purpose congestion in both directions. Average westbound general-purpose travel times would be reduced slightly (about 5 minutes) because of improvements to the SR 520 mainline and HOV lanes.
However, when I-405 congestion is at its worst, westbound SR 520 general-purpose travel times would be the same as the No Build Alternative because the project is generally not adding general-purpose capacity. Westbound HOV travel times would be reduced by 4 to 6 minutes and be 28 to 50 minutes faster than general-purpose travel.

On average, eastbound general-purpose and HOV travel times would be similar to the No Build Alternative. During the worst of congestion, eastbound general-purpose travel times would be reduced by 37 to 55 minutes with the 6-Lane Alternative options because of improvements to the SR 520 corridor and addition of an HOV lane between I-5 and Medina. The eastbound HOV lane allows HOVs to bypass the queue, reducing congestion in the eastbound general-purpose lanes.

Eastbound HOV travel times would be reduced by nearly 40 minutes with the 6-Lane Alternative options because the HOV lane between I-5 and Medina would be completed. The 6-Lane Alternative options have very similar eastbound travel times because changes specific to each option are localized and do not substantially affect total corridor transit travel times.

Eastbound buses would be able to use the I-5/SR 520 express lanes during the afternoon commute period. During the worst of congestion, eastbound HOV travel would be 16 to 30 minutes faster than general-purpose traffic.

**Local Arterial Traffic**

This section describes how changes in local arterial traffic operations associated with each option would affect transit service. This discussion reflects afternoon peak hour local traffic operations because that is when congestion is highest and most affects transit operations. While the morning peak period is typically the peak for transit service, local traffic operations during the morning peak period are substantially better.

Local arterial traffic operations along Montlake Boulevard NE and NE Pacific Street would improve with all options compared to the No Build Alternative, except for Montlake Boulevard northbound approaching NE Pacific Street under Options K and L. This is discussed in more detail below.
SR 520 Legislative Workgroup

Work completed for the SR 520 Legislative Workgroup meetings under ESHB 2211 included additional analysis to determine the effects of the 6-Lane Alternative interchange options on transit travel times.

Average travel times for eastbound SR 520 University District routes would improve with all options compared to the No Build Alternative due to improved operations at the Montlake Boulevard NE/SR 520 eastbound on-ramp intersection. Option K would result in the most reliable travel times for SR 520 buses because they would not be affected by bridge openings.

Average travel times for local buses traveling through the Montlake area would improve with all options compared to the No Build Alternative.

Northbound congestion would improve the most with Option A or its suboption because the Montlake Boulevard NE/NE Pacific Street intersection does not introduce additional corridor congestion. Options K and L would have longer travel times because of increased congestion approaching the Montlake Boulevard NE/NE Pacific Street intersection.

All options could provide off-peak transit travel time benefits for local buses of up to 5 minutes because of the increased capacity across the Montlake Cut.
Option A

Local traffic operations along Montlake Boulevard NE and NE Pacific Street would improve with Option A compared to the No Build Alternative. Option A adds capacity across the Montlake Cut with a new bascule bridge, and on the SR 520 eastbound on-ramp with the addition of a second general-purpose lane. As a result, local and SR 520 buses would benefit over the No Build Alternative by reduced congestion and delay on both directions of Montlake Boulevard NE between East Roanoke Street and NE Pacific Street.

At the Montlake Boulevard/Lake Washington Boulevard intersection, northbound traffic operations would improve from 19 percent over capacity with the No Build Alternative to 11 percent over capacity with Option A. While still over capacity, congestion and delays would decrease, improving transit travel times compared to the No Build Alternative.

Southbound Montlake operations would improve even more, from 21 percent over capacity in the No Build Alternative to 4 percent under capacity with Option A, or a 25 percent reduction. Chapter 6, Local Traffic Operations, describes the intersection improvements at this location in more detail.

At the Montlake Boulevard/East Shelby Street intersection, northbound and southbound traffic operations would improve from nearly 35 percent over capacity with the No Build Alternative to 20 percent under capacity with Option A. The additional capacity provided by the new bascule bridge would remove a bottleneck.

The HOV priority treatments on NE Pacific Street eastbound and Montlake Boulevard NE southbound would be retained with this option and continue to benefit transit by allowing buses to bypass traffic queues associated with off-peak openings of the Montlake Bridge.

Suboption A

Arterial operations with Suboption A would be similar to Option A, but with less congestion in the SR 520/Montlake Boulevard interchange area because the Lake Washington Boulevard ramps would be retained, reducing traffic volumes on Montlake Boulevard. As result, transit travel times would be better than both the No Build Alternative and Option A.
The Montlake Boulevard southbound-to-SR 520 eastbound 3+ carpool and transit direct access ramp would allow buses to avoid signal delay at the SR 520 eastbound on-ramp/Montlake Boulevard intersection. With this ramp, eastbound buses would also enter directly into an inside HOV lane, reducing delay associated with lane changes across the general-purpose lanes that would occur in Option A.

**Option K**

With Option K or its suboption, the HOV direct-access ramps at the new interchange would allow buses to bypass general-purpose traffic congestion on the SR 520 ramps and mainline. Transit operations for SR 520 buses would benefit from the new tunnel between SR 520 and the Montlake Boulevard NE/NE Pacific Street intersection. SR 520 buses would be able to bypass the Montlake Bridge and its associated off-peak openings.

Delay for local northbound buses would worsen, however, because of increased congestion at the Montlake Boulevard NE/NE Pacific intersection. Northbound through lanes at this intersection would be 12 percent over capacity with the No Build Alternative and 46 percent over capacity with Option K. Through traffic would back up and block the northbound left turn lanes, delaying local buses.

Eastbound traffic operations on NE Pacific Street approaching Montlake Boulevard NE would improve from 30 percent over capacity with the No Build Alternative to 6 percent over capacity with Option K. The current HOV bypass lane and transit signal priority on NE Pacific Street would be removed due to right-of-way constraints. A dedicated right-turn-only lane would be retained, and local buses continuing to Montlake Boulevard NE southbound would use this lane. Bus travel times would be affected by Montlake Bridge openings during the off-peak because eastbound buses would no longer be able to bypass congestion on NE Pacific Street.

Once on Montlake Boulevard southbound, local traffic operations would improve substantially, especially at the Montlake Boulevard/Lake Washington Boulevard intersection. The southbound approach would improve from 21 percent over capacity with the No Build Alternative to just under capacity with...
Option K. This would improve travel times for local buses.

**Option L**

Option L effects on transit travel times would be similar to Option K. However, with Option L, SR 520 buses would continue to be delayed by off-peak bridge openings because the new roadway between the new interchange and the Montlake Boulevard NE/NE Pacific Street intersection would include a bascule bridge.

**What would transit demand be without and with the project?**

Transit demand for the 6-Lane Alternative was compared with the No Build Alternative to determine the effects of completing the HOV lanes, improving corridor design and interchanges, and tolling. Overall, the 6-Lane Alternative would result in approximately a 14 percent increase in transit person-trip demand. Chapter 4, Transportation Forecasts and Operations Analysis Methodology, provides a summary list of background projects that were included in the analysis.

Transit person trip demand without and with the project in the year 2030 is summarized in Exhibit 8-12. With the No Build Alternative, daily transit person trips would increase by approximately 8,150 people, or 51 percent, between now and the year 2030. Similar percent increases would occur during both commute periods. This increase in ridership is attributed to:

1) growing population and employment expected along the corridor over the next 20 years, and
2) travel mode choice changes in response to improved transit service and connectivity, increased congestion, climate change concerns, and other societal factors.

The 6-Lane Alternative would increase transit person-trip demand by approximately 3,450 per day, or 14 percent, over the No Build Alternative. This increase reflects the effect of tolls on mode choice, the benefit of completing the HOV lanes in both directions across the bridge, the reversible connection to the I-5 express lanes, and other corridor improvements. There are similar percent increases during both morning and afternoon commute periods.

There is no difference in transit person-trip demand among the 6-Lane Alternative Montlake area interchange options. This is because the
roadway changes are localized at the Montlake area and therefore do not substantially affect total transit travel times on the SR 520 corridor (as shown in Exhibits 8-8 and 8-9). Additionally, future transit service was the same for all of the options. Without substantial differences in corridor transit travel times or transit service, transit demand is expected to be similar.

Would there be enough bus service to meet Build Alternative demand?

Assuming that westbound morning transit service remains the peak direction of travel and transit travel patterns remain similar to today, there would be approximately 5,700 westbound transit riders during the 3-hour morning commute in the year 2030. Assuming a mix of articulated and standard buses, there could be approximately 6,800 seats available for these riders. This means that the system would be running at 84 percent of capacity over the entire 3-hour peak.

In order to determine what the peak of the peak might be for westbound transit service, the SR 520 transportation team assumed peak hour demand would be 130 percent of the 3-hour average rate. Based on this assumption, westbound transit service could be approximately 7 percent over capacity during the peak hour of the 3-hour morning commute. Some riders would potentially be limited to standing room only on some routes.

While not assumed in the transportation analysis, additional buses and service might also be provided through the Urban Partnership Agreement (UPA) to help meet this demand. In addition, the latest draft of Sound Transit’s Service Implementation Plan provides for a new route between Redmond and the University District. Route 542 is scheduled to be operating in September 2010. This route, along with UPA buses, would improve frequencies and quality of SR 520 transit service.

3 Assumes travel patterns are similar to today, with approximately 70 percent of morning peak period bus trips and transit riders traveling westbound in the morning. Based on information from King County Metro, it was assumed that 65 percent of bus trips would use standard buses (42 seats) and 35 percent would use articulated buses (58 seats). This is a conservative estimate because there are expected to be more articulated buses in the future, especially as bus rapid transit service is deployed in the corridor. It was assumed that within the peak 3 hours, demand might peak at 130 percent of the 3-hour average rate. Estimate developed using 2008-2009 information provided and confirmed by King County Metro.
As the environmental process proceeds, the SR 520 Program will continue to coordinate with transit providers in order to understand the effects of the project alternatives on transit service along the SR 520 corridor.
Chapter 9—Parking Supply

What is in this chapter?

This chapter describes the current parking supply, demand, and utilization, including how each project option would affect parking supply in the study area. The study area includes designated public and private parking lots adjacent to the I-5 to Medina: Bridge Replacement and HOV Project. Exhibit 9-1 shows the location of these lots, including existing parking supply and potential effects of the proposed Build Alternative design options (A, K, and L).

This parking analysis updates the transportation discipline report for the SR 520 Draft EIS based on design refinements to the Build Alternative options and additional parking facilities that were identified after the original analysis. Affected parking facilities addressed in this analysis include:

- Bagley Viewpoint Lot
- National Oceanic Atmospheric Administration (NOAA) Northwest Fisheries Science Center
- East Roanoke Street (on-street)
- 76 Gas Station
- Hop-In Market (West)
- Hop-In Market (East)
- 24th Avenue East (on-street)
- Museum of History and Industry (MOHAI)
- Husky Stadium E11 Lot
- Husky Stadium E12 Lot
- Arboretum Lot off of Lake Washington Blvd

The following sections discuss these parking lots, potential changes to each lot, and effects of these changes on parking supply.
I-5 to Medina: Bridge Replacement and HOV Project

Exhibit 9-1. Potentially Affected Parking Areas

Source: King County (2008) GIS Data (Streams, Streets and Waterbodies) and CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.
How was parking supply information collected?

The SR 520 Draft EIS analysis considered existing parking supply, planning-level designs, field observations, and discussions with the project designers to estimate the number of affected parking spaces for each design option. The team collected supply and demand field data for each parking area expected to be affected by one or more of the Build Alternative options. Parking demand was determined based on a field survey that measured hourly parking utilization at each lot during the peak periods for a single weekday in February 2004.

This update to the Draft EIS is based on data collected during previous efforts and did not include field verification. Parking lots that were not identified in the Draft EIS were added to this update, and supply and utilization field data were not available at those locations. Instead, supply and utilization rates were obtained from other sources or estimated using aerial photography. This method is consistent with the method used in the Draft EIS because spot surveys based on either aerial photography or field visits are similar.

How would the project affect parking in the corridor?

This section describes the parking lots that would be affected and summarizes how each design option would affect the parking supply. Photo exhibits are included to provide a general sense of character at each parking area.

With the exception of the lot at Bagley Viewpoint near I-5, all of the affected lots are in the Montlake area. Exhibit 9-2 lists the existing parking supply, average number of spaces in use, estimated utilization rate, and the number of spaces expected to be affected by each design option under the Build Alternative.
Exhibit 9-2. **Estimated Effects on Parking Supply in the Westside Area**

<table>
<thead>
<tr>
<th>Location</th>
<th>Existing/ No Build Parking Supply</th>
<th>Average Number of Spaces in Use</th>
<th>Utilization Rate</th>
<th>Spaces Affected by Build Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot at Bagley Viewpoint</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Utilization rate obtained by hourly field surveys in 2004.

*Utilization rate estimated from multiple aerial photographs.

*Utilization rate provided by the University of Washington updated to reflect post-Sound Transit build condition.

**Lot at Bagley Viewpoint (Delmar Drive East and East Roanoke Street)**

**Existing and No Build Conditions**

This lot, located in Bagley Viewpoint Park, is just east of the Delmar Drive overpass and north of SR 520. It currently has 10 parking stalls, but only one is used on average. Exhibit 9-3 shows the existing parking area, looking north.

**Parking Effects**

All three design options would affect the existing lot in its entirety. However, eliminating all 10 parking stalls at the viewpoint would have a negligible effect on park access for the community because this lot receives so little use. Nonetheless, recent project plans include a park space and new parking on the proposed lid. The number of spaces has not yet been identified.
NOAA Northwest Fisheries Science Center
(2725 Montlake Boulevard East)

Existing and No Build Conditions

The National Oceanic Atmospheric Administration has a parking lot on the south side of its NOAA Northwest Fisheries Science Center building, located south of East Hamlin Street and west of Montlake Boulevard East. Some of the parking stalls in this lot are beneath the SR 520 bridge structure, and the column sections are too low to allow cars to park between them. The lot currently has approximately 148 parking stalls. Exhibit 9-4 shows current parking beneath the SR 520 structure, looking southeast.

Parking Effects

Option A has a much wider footprint and would extend SR 520 approximately 120 feet north of its current location. Options K and L would extend the structure only 20 to 30 feet north. Current designs for the three options indicate that parking could still be accommodated under the new structure. Thus, the only permanent parking losses would result from placement of additional support columns. Parking under the bridge and adjacent to the construction zone would be temporarily lost during construction.

Column placements for Option A indicate that roughly 12 spaces may be eliminated from the portion of the parking lot that is not under the existing structure. For parking spaces currently under the SR 520 structure, the project design of column placements indicates that the same number of parking spaces may be accommodated for all three options after construction. Any changes to column placements could affect parking spaces, as could changes in agency plans to accommodate the same level of parking after construction.

In summary, there are no anticipated parking effects for Options K and L, although Option A would result in a loss of approximately 12 parking spaces. However, a maximum demand of 136 parking spaces was identified in the Draft EIS, and removal of 12 spaces would equal this maximum demand.
East Roanoke Street On-Street Parking (East Roanoke Street and West Montlake Place East)

Existing and No Build Conditions
There are six parking spaces on the north side of East Roanoke Street as it meets West Montlake Place East. Between these six spaces is a fire hydrant, where no parking is allowed. Exhibit 9-5 shows the on-street parking spaces looking west.

Parking Effects of Build Options
Option A would not affect these six spaces. However, Options K and L both propose to extend West Montlake Place East to the intersection of Montlake Place East and East Lake Washington Boulevard. This extension would eliminate all six parking spaces in both options because the new intersection between West Montlake Place East and East Roanoke Street would be located there. Because these spaces currently appear to be used frequently, removal of on-street parking at this location would affect local parking conditions.

76 Gas Station (2645 East Montlake Place)

Existing and No Build Conditions
The 76 Gas Station on 22nd Avenue East and East Lake Washington Boulevard currently has five parking stalls located on the north side of the Hop-In Market building.

Parking Effects of Build Options
Options K and L would preserve the gas station and its associated parking spaces. However, Option A would eliminate the gas station, its entire parking lot, and thus all five parking spaces. It should be noted, though, that because the gas station itself would be removed, the associated demand to park in this lot would also be eliminated. Therefore, there would be no effect on the community by removing the lot itself.
Hop-In Market (West Side) (2605 22nd Avenue East)

Existing and No Build Conditions
The back parking lot on the west side of the Hop-In Market is situated southwest of East Lake Washington Boulevard, north of East Roanoke Street, and west of 22nd Avenue East. The lot currently has 17 parking stalls. Exhibit 9-6 shows the existing parking area, looking south.

Parking Effects of Build Options
The grocery store is expected to be preserved under all three options. Options K and L would also preserve all existing parking spaces. Option A would take land to expand the ramps to and from eastbound SR 520 at Montlake, resulting in a loss of nine spaces along the northwest side of the lot.

While an average of nine parking stalls are currently used at this lot, it often experiences a demand of up to 15 stalls between 12 p.m. and 1 p.m. Thus, the loss of nine parking spaces could affect the grocery store and the community.

Hop-In Market (East Side) (2605 22nd Avenue East)

Existing and No Build Conditions
Parking is available in the front lot on the east side of the Hop-In Market, located southwest of East Lake Washington Boulevard, north of East Roanoke Street, and on both sides of 22nd Avenue East. There are currently 10 parking stalls at this location. Exhibit 9-7 shows the existing parking area, looking west.

Parking Effects of Build Options
Similar to the west parking lot, Options K and L would preserve all parking spaces in the east lot. However, Option A would eliminate all 10 stalls from the front of the Hop-In Market. Since the market would remain under all three options, parking demand at the store is
expected to remain at its current level. Between 12 p.m. and 1 p.m., demand for parking in this lot can reach 90 percent. Therefore, removal of all parking spaces in this lot could affect the business and the community.

The combined losses in both the west and east lots for Option A represent over 70 percent of the available parking at the Hop-In Market. The remaining parking in the west lot would be insufficient to accommodate the displaced demand. However, additional parking spaces may become available if the 76 Gas Station is removed under Option A. This would create additional parking on the north side of the market and provide parallel parking on the northwest side of the west lot.

24th Avenue East On-Street Parking (East Hamlin Street and 24th Avenue East)

Existing and No Build Conditions

There are five on-street parking stalls located just west of the Museum of History and Industry on the west side of 24th Avenue East, just south of East Hamlin Street. Exhibit 9-8 shows a portion of the parking area looking south.

Parking Effects of Build Options

Options A and L would not affect these parking spaces. Option K would potentially eliminate one space. The removal of one parking space is not expected to affect the community given the low utilization of these spaces.

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

Existing and No Build Conditions

MOHAI’s parking lot surrounds the museum on all but the south side. The museum is located in both McCurdy Park and East Montlake Park, just east of 24th Avenue E. The lot currently has 150 parking stalls. Exhibit 9-9 shows the lower parking lot at MOHAI.
Parking Effects of Build Options

Each of the three options would eliminate all 150 parking spaces in this lot due to construction of stormwater detention ponds on the site. In addition, Options K and L would include a new Pacific Street intersection and extension of Pacific Street to the east, crossing the ship canal and connecting with SR 520 in this area. Therefore, the location would be occupied by the new roadway.

Because of right-of-way needed to construct the stormwater facilities and roadway, MOHAI and its parking lot would need to be moved to a different location. MOHAI has identified a site for relocation and is in the planning stages of developing the site for its use.

Access from this area to East Montlake Park and the Washington Park Arboretum would be maintained, and parking would be provided for park users. The number of replaced spaces depends on negotiations with the Seattle Parks and Recreation Department.

Husky Stadium (3800 Montlake Boulevard)

Existing and No Build Conditions

Parking spaces on the south and west sides of Husky Stadium are separated into two lots, with an access road from NE Pacific Place running between the two. The lots on the west side of the drive contain 398 parking spaces and are grouped into lot E11. The lots to the east of the access drive (south of the stadium) contain 882 parking spaces and form lot E12. Both lots are 100 percent utilized. Lots E11 and E12 are shown in Exhibit 9-10, looking southwest.

It is expected that the Sound Transit University Link University of Washington Station (which will be constructed prior to the I-5 to Medina: Bridge Replacement and HOV Project) will affect parking in these lots. Current plans for final restoration after construction of the light rail station would have the following effects:

- The access drive between the two lots will be moved to the east, effectively expanding lot E11 and reducing the size of lot E12.

- Lot E11 will also expand southward, gaining an additional 31 parking spaces to contain a total of 429 spaces.
Lot E12 will lose approximately 136 parking spaces due to relocation of the access road to the east and will be reduced to approximately 746 spaces.

Overall, the final effects of the light rail station will result in removal of approximately 105 parking spaces between the two lots. This restored condition serves as the No Build condition for the I-5 to Medina: Bridge Replacement and HOV Project.

**Parking Effects of Build Options**

Option A would not affect parking in either the E11 or E12 Husky Stadium lots. However, Options K and L would provide a new access to SR 520 through the stadium lots as part of the single point urban interchange (SPUI). Option K provides this access through a tunnel under the Montlake Cut. The final configuration of Option K would result in a loss of approximately 20 parking spaces in lot E11 and no spaces in lot E12.

The extension of NE Pacific Street in Option L would result in a loss of approximately 114 parking spaces in lot E11 and 57 spaces in lot E12, assuming the lots are reconfigured in the manner noted above following construction of the light rail station. Given the high utilization of these lots, the potential effects to the UW and the surrounding community are substantial.

Options K and L would affect the Husky Stadium lots substantially during construction. See Chapter 10, Construction Effects, for details about effects on parking during construction.

**WSDOT Public Lot (Lake Washington Boulevard East)**

**Existing and No Build Conditions**

This parking lot contains 24 spaces and is located just east of Lake Washington Boulevard East at East Miller Street. The lot accesses a trail that connects to the Arboretum. Exhibit 9-11 shows this lot looking northeast.

**Parking Effects of Build Options**

Options A and L would preserve all the parking spaces in this lot. However, Option K would eliminate the
entire parking lot to provide a new access between Lake Washington Boulevard and SR 520. This lot appears to be highly utilized as an access to area trails and parks.

**What are the conclusions of this parking analysis?**

Parking effects for each option on the Westside are summarized in Exhibit 9-12. Option L would have the greatest overall effect due to construction of the NE Pacific Street extension to the SPUI interchange. The most substantial parking effects of Option L would occur at the Husky Stadium lots.

Option A would have a slightly higher parking effect in the Montlake area than Options K or L, including a loss of 70 percent of parking at the Hop-In Market. All three options would completely eliminate the parking at MOHAI; however, MOHAI is planning to relocate to a new facility in 2012.

**Exhibit 9-12. Summary of Estimated Affected Parking Spaces by Option**

<table>
<thead>
<tr>
<th>Option</th>
<th>Westside Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Build</td>
<td>0</td>
</tr>
<tr>
<td>Option A</td>
<td>196</td>
</tr>
<tr>
<td>Option K</td>
<td>211</td>
</tr>
<tr>
<td>Option L</td>
<td>337</td>
</tr>
</tbody>
</table>

Many of the affected parking spaces include removal of the facility that requires the parking spaces; therefore, there would be no net effect on parking supply at these locations. This includes MOHAI, which is the location with the most affected parking spaces for both the A and K options.
Chapter 10—Construction Effects

What is in this chapter?

The chapter identifies how construction activities for the proposed project could affect traffic on SR 520 and adjacent local streets west of Lake Washington. The analysis included the effects of construction-related truck travel on traffic operations, as well as the effects of potential road and ramp closures to roadways, transit, and parking.

As described in Chapter 1, the 6-Lane Alternative has three design options (A, K, and L) between I-5 and the floating portion of the Evergreen Point Bridge, and each design option has a set of suboptions. Options K and L suboptions would have identical or similar effects as the options themselves. Therefore, the construction effects analysis includes only the suboption to Option A (Suboption A).

This chapter discusses the construction effects analysis in relation to:

- Potential haul routes for construction traffic
- Estimates of the potential effect on local street and regional highway traffic resulting from construction staging scenarios, potential haul routes, and associated construction vehicle volumes
- Potential road closures and effects of those closures
- Estimates of construction duration
- Parking effects during construction
- Estimates of potential effects on transit systems and pedestrian/bicycle access and access to the University of Washington, University of Washington Medical Center, and public park entrances as a result of construction staging scenarios

The potential effects of construction were assessed quantitatively for the critical travel periods, which are the times of day when most commuting occurs during the typical work week (Monday through Friday). The effects during noncritical travel periods were assessed qualitatively.
How were construction effects evaluated?

Transportation analysts used preliminary construction staging plans to evaluate how construction activities would potentially affect traffic on SR 520 and adjacent local arterials west of Lake Washington. The construction staging plans in the Conceptual Engineering Plans (January 2009) were used to identify changes to local streets and roadways during construction. Construction process assumptions were obtained from the SR 520 Westside Construction Techniques Technical Memorandum (WSDOT 2009c) and further developed based on team discussions.

After identifying construction sequencing for each design option, transportation analysts assessed the potential effects that construction would have on traffic operations. For local roadways, detour routes and construction haul routes were identified. Volumes of detoured vehicles were estimated based on existing conditions and were re-distributed to likely detour routes resulting from road closures during construction.

Construction hauling truck trips and traffic volumes were developed based on estimates for quantities of earthwork and concrete pouring, as well as on other construction activities. Local intersections along the proposed detour routes and construction haul routes were analyzed to estimate the effects of detours and hauling on traffic operations. Analysts evaluated local arterials using the morning and afternoon peak-hour volumes for the base year (2008).

Analysts used the Highway Capacity Software (HCS) to evaluate ramp closures expected along SR 520 during construction. As with local operations, volumes of detoured freeway traffic were estimated using existing condition peak-period volumes and redistributed to reflect changes in the transportation network for each scenario. The number of freeway lanes during weekday daytime would remain the same as it is today, with two general-purpose lanes in each direction.

The construction parking analysis was based on information from current design documents and parking supply and utilization rates obtained from the University of Washington. This information was used to determine what effect construction staging activities would have on parking in the construction area.
Transit route and ridership data from King County Metro were used to analyze construction effects on transit and estimate the number of buses that may be affected by permanent closure of the Montlake Freeway Transit Station and temporary closure of the Evergreen Point Freeway Transit Station.

**What assumptions were made about project construction?**

Transportation analysts made several assumptions regarding duration and sequencing of construction activities, roadway closures, construction staging areas, and construction traffic and haul routes. The following general assumptions guided the analysis of effects:

- It was assumed that funding would be available to allow construction of all project elements simultaneously. If construction is phased, the effects on traffic operations would be less than estimated in this report, but the duration of effects would be longer.

- Construction would typically occur 6 days per week and daily construction durations would be 16 hours. Most construction hauling (transporting materials to and from the site) would last 10 hours each day. The contractor would have access to the site 24 hours a day.

- Analysis of the peak periods provides the worst-case scenario for construction effects. No analysis was performed for off-peak periods.

- The Sound Transit University Link Station at the University of Washington would be constructed before construction begins on the I-5 to Medina: Bridge Replacement and HOV Project.

- The Evergreen Point and Montlake Freeway Transit Stations would not be closed at the same time.

The following sections describe the conditions that are expected in the study area during construction.

**Construction Durations and Sequencing**

WSDOT has organized the project into several major elements to simplify planning of the many detailed construction activities that will be required to build the project. Each element consists of work activities
that are related to each other by their location on the project site. The elements are typically referred to by location and the physical feature of the project that they represent, such as a bridge or tunnel.

The project elements are listed with their estimated durations in Exhibit 10-1. These elements are defined in the SR 520 Westside Construction Techniques Discipline Report (WSDOT 2009c). These elements may be refined and modified as the project is further developed. However, the magnitude of effects to traffic and the relative differences between design options will not change substantially unless the project description itself is changed.

Exhibit 10-1. Estimated Construction Durations for 6-Lane Alternative Options A, K, and L

<table>
<thead>
<tr>
<th>Element</th>
<th>Option A (Montlake interchange with bascule bridge across Montlake Cut)</th>
<th>Option K (Depressed SPUI with twin tunnels under Montlake Cut)</th>
<th>Option L (Elevated SPUI with bascule bridge across Montlake Cut)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-5/SR 520 Interchange</td>
<td>21 months</td>
<td>21 months</td>
<td>21 months</td>
</tr>
<tr>
<td>10th Ave &amp; Delmar Lids</td>
<td>27 months</td>
<td>27 months</td>
<td>27 months</td>
</tr>
<tr>
<td>Portage Bay Bridge (north half - 4 lanes)</td>
<td>30 months</td>
<td>30 months</td>
<td>30 months</td>
</tr>
<tr>
<td>Portage Bay Bridge (south half – widen to 6 lanes, including demolition of existing structure)</td>
<td>42 months</td>
<td>42 months</td>
<td>42 months</td>
</tr>
<tr>
<td>Montlake Interchange &amp; Lid</td>
<td>45 months</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Single Point Urban Interchange (SPUI), Montlake Lid, Lake WA Blvd South of SR 520</td>
<td>Not Applicable</td>
<td>78 months</td>
<td>60 months</td>
</tr>
<tr>
<td>Pacific Street/Montlake Boulevard Intersection with Lid</td>
<td>Not Applicable</td>
<td>18 months</td>
<td>18 months</td>
</tr>
<tr>
<td>New Bascule Bridge</td>
<td>27 months</td>
<td>Not Applicable</td>
<td>30 months</td>
</tr>
<tr>
<td>Tunnel from SR 520 to Pacific Ave/Montlake Boulevard East</td>
<td>Not Applicable</td>
<td>45 months</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>West Approach (north half - 4 lanes, includes work in Union Bay)</td>
<td>30 months</td>
<td>54 months (Includes Foster Island lid)</td>
<td>30 months</td>
</tr>
<tr>
<td>West Approach (south half – widen to 6 lanes, includes demolition of existing structure)</td>
<td>30 months</td>
<td>30 months</td>
<td>30 months</td>
</tr>
<tr>
<td>Floating Bridge &amp; East Approach (includes towing, outfitting, and installing pontoons for a 6-lane bridge)</td>
<td>54 months</td>
<td>54 months</td>
<td>54 months</td>
</tr>
<tr>
<td>Bridge Maintenance Facility</td>
<td>24 months</td>
<td>24 months</td>
<td>24 months</td>
</tr>
</tbody>
</table>

Source: WSDOT (2009)

\(^1\)Construction durations include testing of new systems and facilities. However, they do not include mobilization or closeout activities. Mobilization includes material procurement, preparing construction staging areas, and moving equipment to the site. Closeout includes demobilization of staging areas and final roadside planting.
One sequencing plan was analyzed for each design option assuming all project elements would be constructed concurrently. Exhibits 10-2 and 10-3 show how the elements could be sequenced and constructed simultaneously during the project timeline. This construction sequence would be similar for Options A, K, and L and Suboption A. The effects of Options K and L would occur for a longer period regardless of sequencing due to the amount of time required to build the tunnel and single point urban interchange (SPUI). The total time of construction would be approximately 7 years for all options.

**Roadway Closure Assumptions**

Four lanes on SR 520 (two eastbound and two westbound) would remain open during peak periods and for most of construction. Mainline lane closures would be limited to nights and weekends, when roadway volumes are typically lower than during peak travel periods.

All ramp connections on SR 520 at the I-5 interchange and at Montlake Boulevard would remain open during peak periods and for most of construction. Traffic using the Montlake Boulevard on- and off-ramps would be shifted during reconstruction as needed. The Lake Washington Boulevard ramps would be closed permanently under Option A and during portions of construction with Suboption A and Options K and L.

Various lane closures are expected on SR 520 and its ramps during nights and on weekends throughout the project duration. Closure hours and dates would be restricted based on special events and coordinated with closures on other freeways.

There would be two long-term roadway closures within the project study area for Option A and Suboption A. Options K and L would have three long-term roadway closures. Exhibit 10-4 shows closure locations and potential detour routes. Closures and detour routes on local streets would be coordinated with and approved by the City of Seattle. In addition, WSDOT would work with King County Metro and Sound Transit to discuss and finalize any detours used during construction.

The following sections describe closure assumptions for the Lake Washington Boulevard ramps, Delmar Drive, and NE Pacific Street.
### Exhibit 10-2. Potential Construction Sequencing: Option A and Suboption A

#### Option A

<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Road Closures</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-5/SR 520 Interchange</td>
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<tr>
<td>10th Ave &amp; Delmar Lid</td>
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<tr>
<td>Portage Bay Bridge</td>
<td>Delmar Drive E C O</td>
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<tr>
<td>Montlake Interchange &amp; Lid</td>
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<td>24th Avenue E Bridge</td>
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<tr>
<td>New Bascule Bridge</td>
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<tr>
<td>West Approach</td>
<td>LWB Westbound Ramp C</td>
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<tr>
<td>Bridge Maintenance Facility</td>
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</table>

#### Option A with Lake Washington Blvd Ramps (Suboption A)

<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Road Closures</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-5/SR 520 Interchange</td>
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<tr>
<td>10th Ave &amp; Delmar Lid</td>
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<tr>
<td>All Options</td>
<td>Delmar Drive E C O</td>
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<tr>
<td>Portage Bay Bridge</td>
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<td>Montlake Interchange &amp; Lid</td>
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<tr>
<td>All Options</td>
<td>24th Avenue E Bridge C</td>
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<tr>
<td>West Approach</td>
<td>LWB Westbound Ramp C</td>
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<td>Bridge Maintenance Facility</td>
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</tbody>
</table>

Notes:

- Traffic that currently uses the Lake Washington Boulevard ramps would be detoured to use the ramps at the Montlake interchange. Temporary capacity improvements to the Montlake Boulevard interchange would be made to accommodate these shifts in traffic.
- Under Options K and L, a partial closure of Montlake Boulevard would occur, resulting in traffic detours around construction.
- green = construction duration; blue = time period closed; C = Close roadway to traffic; O = Reopen to traffic (includes traffic that would reopen on a lid)
Exhibit 10-3. Potential Construction Sequencing: Options K and L

### Option K

<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Road Closures</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-5/SR 520 Interchange</td>
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<td>10th Ave &amp; Delmar Lid</td>
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</tr>
<tr>
<td>Delmar Drive E Closed</td>
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<tr>
<td>Portage Bay Bridge</td>
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<td>Tunnel, SR 520 to Pacific St</td>
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<tr>
<td>NE Pacific Street/Montlake Boulevard intersection with lid</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>NE Pacific Street</td>
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</tr>
<tr>
<td>LWB Westbound Ramp</td>
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<td>C</td>
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<td>O</td>
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<tr>
<td>LWB Eastbound Ramp</td>
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<td></td>
</tr>
<tr>
<td>Floating Bridge &amp; East Approach</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Bridge Maintenance Facility</td>
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</tbody>
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### Option L

<table>
<thead>
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<th>Construction Activity</th>
<th>Road Closures</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
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<tr>
<td>I-5/SR 520 Interchange</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10th Ave &amp; Delmar Lid</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Delmar Drive E Closed</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Portage Bay Bridge</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SPUI &amp; Montlake Lid</td>
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<tr>
<td>24th Avenue E Bridge Closed</td>
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<td>Tunnel, SR 520 to Pacific St</td>
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<td></td>
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<td></td>
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<tr>
<td>NE Pacific Street/Montlake Boulevard intersection with lid</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE Pacific Street</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>West Approach</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>LWB Westbound Ramp</td>
<td></td>
<td>C</td>
<td></td>
<td>O</td>
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<tr>
<td>LWB Eastbound Ramp</td>
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<td></td>
</tr>
<tr>
<td>Floating Bridge &amp; East Approach</td>
<td></td>
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<td>Bridge Maintenance Facility</td>
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</tbody>
</table>

Notes:
Traffic that currently uses the Lake Washington Boulevard ramps would be detoured to use the ramps at the Montlake Interchange. Temporary capacity improvements to the Montlake Boulevard interchange would be made to accommodate these shifts in traffic.
Under Options K and L, a partial closure of Montlake Boulevard would occur, resulting in traffic detours around construction.
green: construction duration; blue = time period closed; C = Close roadway to traffic; O = Reopen to traffic (includes traffic that would reopen on a lid)
Options K and L only: NE Pacific St closed. Traffic will be detoured to NE Pacific Place.

All Options: Delmar Drive E closed. Traffic would detour to Boyer Ave E or 10th Ave E.

All Options: Lake Washington Blvd ramps closed. Existing trips will either turn on Boyer Ave or continue to use Lake Washington Blvd to access Montlake ramps.

Options: NE Pacific St closed. Traffic will be detoured to NE Pacific Place.

Potential Detour Route

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

Exhibit 10-4. Potential Detour Routes

I-5 to Medina: Bridge Replacement and HOV Project
Lake Washington Boulevard Ramps

The first long-term construction roadway closure that would substantially affect weekday peak period traffic operations is the closure of the Lake Washington Boulevard ramps. Construction of the Evergreen Point Bridge west approach would require the use of temporary work bridges; the Lake Washington Boulevard ramps would be closed to accommodate these temporary bridges. The duration of closure would be for different for Option A, Suboption A, and Options K and L. Exhibits 10-2 and 10-3 illustrate the proposed durations of the Lake Washington Boulevard ramp closures during construction.

Under Options A, K, and L, the existing Lake Washington Boulevard eastbound on-ramp and westbound off-ramp, as well as the existing ramps from the R.H. Thomson Expressway, would be removed. The Montlake area would likely absorb most of the detour traffic from the ramp closure. During the first year of construction, several capacity improvements would be made to the intersections and ramps along Montlake Boulevard before closing the Lake Washington Boulevard ramps. These improvements would help offset the effects of the Lake Washington Boulevard ramp closure. The proposed changes in the Montlake area include the following:

- Add capacity on the westbound off-ramp at Montlake by providing two dedicated turn lanes. In addition, a signal would be added to the intersection of Montlake Boulevard/SR 520 westbound ramp termini.

- Add capacity on Montlake Boulevard across SR 520 to create a 7-lane section, including two northbound through lanes, three southbound through lanes, and southbound right-turn and left-turn lanes.

- Include dual northbound left-turn lanes from Montlake to the SR 520 eastbound on-ramp.

- Add an additional southbound lane on Montlake from Lake Washington Boulevard to approximately 1,000 feet south of Roanoke Street.

- Add an additional general-purpose lane on the SR 520 eastbound on-ramp at Montlake.
- Add a westbound lane on Lake Washington Boulevard at the intersection with Montlake Boulevard.

- Relocate the transit stops on Montlake Boulevard at SR 520.

**Delmar Drive**

The second long-term construction roadway closure would be the Delmar Drive bridge over SR 520. Delmar Drive would be closed temporarily under all options to accommodate construction on SR 520 under Delmar Drive, as well as construction of 10th Avenue and the Delmar lid. All options and Suboption A may require closure of the Delmar Drive bridge for approximately 12 months.

**NE Pacific Street**

A third long-term construction closure that would substantially affect traffic operations is the closure of a portion of NE Pacific Street. This closure would occur under design Options K and L only. The portion of NE Pacific Street from Montlake Boulevard to just west of the University of Washington Hospital access driveway would be closed for 9 to 12 months. This temporary closure would accommodate the lowering of the NE Pacific Street/Montlake Boulevard intersection, proposed under Options K and L.

**Construction Staging Area Assumptions**

The contractor would likely utilize as much available space within WSDOT right-of-way as possible. Contractors may also seek additional staging areas not identified in the construction staging plans and not addressed in this analysis. In most cases, local agencies would have jurisdiction over granting such requests. However, contract provisions can require the contractor to perform additional traffic impact analysis for off-site staging areas.

The location of on-site staging areas varies between Options A, K, and L; however, all three options have proposed staging areas in the following locations: the Museum of History and Industry (MOHAI) site, which is assumed to be acquired for the project; portions of the E-12 parking lot on the University of Washington campus; the unused R.H. Thompson Express Way ramps; and the closed Lake Washington Boulevard ramps. The largest construction staging area for all three options is near the ramp terminal of the closed Lake Washington Boulevard ramps.
The construction staging areas would be used for a variety of activities, including:

- Ingress/egress to construction sites
- Location of construction office and storage trailers
- Parking for contractors’ employees and agents
- Storage of equipment needed for construction activities

Exhibit 10-5 shows the locations of potential construction staging areas for Options A, K, and L.

**Construction Traffic and Haul Route Assumptions**

Potential construction haul routes, shown in Exhibit 10-6, include both local and regional roadways. Some of the haul routes would use roads that the City of Seattle classifies as “major truck streets.” Major truck streets proposed to be used as part of this project include Montlake Boulevard between SR 520 and NE Pacific Street and NE Pacific Street between Montlake Boulevard and 15th Avenue NE. A few residential streets would also need to be used for truck haul routes due to the location of proposed construction activities and the lack of available arterial routes immediately adjacent to construction sites. Haul routes would require approval of WSDOT and hauling on local streets would require review and approval by the City of Seattle.

Residential streets proposed to be used for truck haul routes include 11th Avenue East between Delmar Drive and East Miller Street, East Miller Street between 11th Avenue East and 10th Avenue East, East Shelby Street east of Montlake Boulevard, and East Hamlin Street east of Montlake Boulevard.

Where possible, the construction sites would include direct access from SR 520 to limit the amount of truck hauling on local streets. Gaps in the roadside barriers would provide direct access for trucks to the work bridges by the west approach bridge and Portage Bay Bridge. Additionally, construction access ramps may be provided directly into and out of the construction zone from the SR 520 westbound Montlake off-ramp.
Lake Washington Boulevard ramps would be closed during construction.

Temporary Work Bridge

Staging Areas Adjacent to Freeway

Detour Bridge

Exhibit 10-5. Potential Construction Staging Areas - All Design Options

I-5 to Medina: Bridge Replacement and HOV Project

Source: King County (2008) GIS Data (Streams, Streets and Water Bodies), CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.
Exhibit 10-6. Potential Haul Routes

Source: King County (2008) GIS Data (Streams, Streets and Water Bodies), CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.
Providing temporary construction access directly from the Montlake westbound off-ramp would reduce the volume of construction trucks on East Shelby and East Hamlin Streets, which are residential roadways. Barges may also be considered for transporting excavated soil away from the construction site, reducing truck hauling on local streets. However, for this analysis it was assumed that trucks would be used for all hauling.

**What are the anticipated effects on the freeways?**

Only one construction activity (hauling) is expected to have potential effects on the regional freeway system. The freeway mainline channelization would remain the same as it is today during peak traffic periods on Monday through Friday. Two general-purpose lanes and one HOV lane in each direction would remain in operation on the east side of Lake Washington; two general-purpose lanes in each direction would remain in operation on the west side. Therefore, a substantial shift in traffic from SR 520 to other regional corridors on weekdays due to freeway lane closures is not expected.

The following sections discuss the effects of construction truck trips, all potential ramp closures, and freeway lane closures.

**Construction Truck Trips**

Exhibit 10-7 summarizes the average number of truckloads per day for each option, as well as the number of truckloads expected during peak construction. During peak construction, such as concrete pours or excavation and fill, more trucks would be expected on regional and local roadways.

It was assumed that during peak construction, peak truck haul activity would occur simultaneously at five different project elements, such as the Portage Bay Bridge, SPUI, west approach bridge, and others. Given this conservative assumption, 455 to 725 truck trips per day are estimated during peak construction activity.
### Exhibit 10-7. Summary of Effects of Truck Traffic in Seattle

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Construction Duration (Months)</th>
<th>Haul Routes</th>
<th>Truckloads/Day</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-5</td>
<td>SR 520 Mainline</td>
<td>27</td>
<td>* SR 520 to I-5 southbound/northbound</td>
<td>5 5 5</td>
<td>60 60 60</td>
</tr>
<tr>
<td>10th and Delmar Lid</td>
<td>10th &amp; Delmar Lid</td>
<td>21</td>
<td>* West on Roanoke to South on Boylston to I-5 southbound</td>
<td>11 11 11 80</td>
<td>80 80 80 Assumed staged construction that allows continual access across 10th Avenue.</td>
</tr>
<tr>
<td>Portage Bay Bridge</td>
<td>SR 520 Mainline</td>
<td>70</td>
<td>* South Boyer to North 24th to East SR 520</td>
<td>11 10 10 50 50</td>
<td>50 50 50 Could potentially use barges</td>
</tr>
<tr>
<td>Montlake Interchange &amp; Lid</td>
<td>SR 520 Mainline, Montlake Structure, Montlake Lid</td>
<td>33</td>
<td>* Eastbound SR 520 to I-405 southbound/northbound</td>
<td>5 5 5</td>
<td>50 50 50 Could potentially use barges</td>
</tr>
<tr>
<td>Union Bay Bridge</td>
<td>SR 520 Mainline</td>
<td>46</td>
<td>* Westbound SR 520 to I-5 southbound/northbound</td>
<td>4 4 6</td>
<td>100 100 100 Could potentially use barges</td>
</tr>
<tr>
<td>2nd Montlake Bridge</td>
<td>Bridge over Montlake cut</td>
<td>26</td>
<td>* Westbound SR 520 to I-5 southbound/northbound</td>
<td>1 n/a</td>
<td>2 40 n/a</td>
</tr>
<tr>
<td>Location</td>
<td>Description</td>
<td>Construction Duration (Months)</td>
<td>Haul Routes</td>
<td>Truckloads/Day</td>
<td>Notes</td>
</tr>
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<td>--------------------------------------------</td>
</tr>
<tr>
<td>Tunnel to Pacific</td>
<td>Tunnel from SR 520 to Pacific St/Montlake Blvd</td>
<td>A 44 L n/a</td>
<td>• Northbound Park to westbound Shelby to south Montlake to westbound SR 520 to I-5 southbound/northbound</td>
<td>A 50 L 50 A</td>
<td>Assume multiple shifts during peak</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Northbound Park to westbound Shelby to south Montlake to eastbound SR 520 to I-405 southbound/northbound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Southbound Montlake (over bridge) to SR 520 to I-5 southbound/northbound</td>
<td>n/a 17 L 12 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Southbound Montlake (over bridge) to SR 520 to I-405 southbound/northbound</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>x Northbound Park to westbound Shelby to South Montlake to westbound SR 520 to I-5 northbound</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Eastbound SR 520 to I-405 southbound/northbound</td>
<td>12 12 12 175</td>
<td>Could potentially use barges. Assume multiple shifts during peak</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>x Southbound Montlake (over bridge) to SR 520 to I-405 southbound/northbound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPUI</td>
<td>Interchange at SR 520</td>
<td>A 45 L 33</td>
<td>• Northbound Park to westbound Shelby to south Montlake to westbound SR 520 to I-5 southbound/northbound</td>
<td>A 50 L 50 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Northbound Park to westbound Shelby to South Montlake to westbound SR 520 to I-405 southbound/northbound</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Lake Wa Blvd to SR 520 to I-405</td>
<td>n/a 13 L 300</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>• Lake Wa Blvd to SR 520 to I-5</td>
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<td></td>
<td></td>
<td></td>
<td>x Northbound Park to westbound Shelby to South Montlake to westbound SR 520 to I-405 northbound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Approach</td>
<td>Westbound SR 520 Mainline and Lake Washington Boulevard Structures</td>
<td>55 55 55</td>
<td>• Westbound SR 520 to I-5 southbound/northbound</td>
<td>12 12 12 175</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Westbound SR 520 to I-5 southbound/northbound</td>
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</table>
### Exhibit 10-7. Summary of Effects of Truck Traffic in Seattle

<table>
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<tr>
<th>Location</th>
<th>Description</th>
<th>Haul Routes</th>
<th>Truckloads/Day</th>
<th>Notes</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Average</td>
<td>Peak</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Option</td>
<td>Option</td>
</tr>
<tr>
<td>East Approach</td>
<td></td>
<td></td>
<td>A</td>
<td>K</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>• Westbound SR 520 to I-5 southbound/northbound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Eastbound SR 520 to I-405 southbound/northbound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>• Westbound SR 520 to I-5 southbound/northbound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Eastbound SR 520 to I-405 southbound/northbound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total number of peak truckloads per day</td>
<td>455</td>
<td>725</td>
</tr>
</tbody>
</table>
Exhibit 10-8 summarizes the potential number of haul route trips on SR 520, I-5, I-405, and arterials expected during peak construction. The following sections discuss haul route effects on the major roadways in the project vicinity.

**Exhibit 10-8. Potential Effects on Regional Freeway Traffic**

<table>
<thead>
<tr>
<th>Regional Freeway</th>
<th>Estimated Number of Peak Period Haul Route Trips</th>
<th>Per Day</th>
<th>Per Hour</th>
<th>Effect on Traffic</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>K</td>
<td>L</td>
</tr>
<tr>
<td>SR 520</td>
<td>350 620 420</td>
<td>44</td>
<td>69</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Option A: Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option K: Moderate to Substantial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option L: Moderate to Substantial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-5</td>
<td>268 403 303</td>
<td>34</td>
<td>53</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Option A: Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option K: Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option L: Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-405</td>
<td>187 323 222</td>
<td>20</td>
<td>37</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Option A: Minimal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option K: Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option L: Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*No effects are expected on I-90.

*Based on 10-hour haul day for most activities.

*Minimal = 1 truck every 3 (or more) minutes, Moderate = 1 truck every 1 to 2 minutes, Moderate to Substantial = 1 truck less than every minute

**SR 520**

If the peak number of trips is used as a conservative estimate, approximately 75 to 85 percent of daily construction truck trips would use SR 520. A total of 350 to 620 truck trips per day—or one truck trip every 1 to 2 minutes—is expected along SR 520 during construction. Given the anticipated peak period congestion levels on SR 520, this would have a moderate to substantial effect on traffic flow, depending on the option selected. Option K would have a greater effect on SR 520 traffic operations compared with Option A or Option L due to its higher volume of truck trips estimated during construction.

**I-5**

An estimated 55 percent to 60 percent of the haul routes during construction would use I-5. A total of 268 to 403 truck trips per day—or one truck trip every 1 to 2 minutes—is expected along I-5 during construction. While peak congestion on I-5 is expected to be high, the relatively low volume of trucks related to the SR 520 construction is anticipated to result in a moderate effect on I-5 traffic operations. Option K would have a greater effect on I-5 traffic operations compared with Option A or Option L due to its higher volume of truck trips estimated during construction.
I-405

Approximately 35 percent to 40 percent of haul trips would use the I-405 corridor. A total of 187 to 323 truck trips per day—or one truck trip every 1.5 to 3 minutes—is expected along I-405 during construction. The overall effect on I-405 traffic operations with this level of truck traffic would be minimal to moderate. Option K would have a greater effect on I-405 traffic operations compared with Option A or Option L due to its higher volume of truck trips estimated during construction.

I-90

Haul routes and truck traffic resulting from project construction are not expected to affect I-90.

Closure of Freeway Ramps

Closure of the Lake Washington Boulevard ramps is not expected to have a substantial effect on SR 520 operations; ramp closures would mostly affect local street operations.

Traffic that currently uses the Lake Washington Boulevard ramps would be detoured to use the ramps at Montlake. Detoured volumes would be the same under all design options. Operations on the SR 520 mainline would remain similar to existing conditions with the closure of the Lake Washington Boulevard ramps. The congestion and queuing that occur under existing conditions would remain during construction of the project.

Under all design options, only the volumes on the Montlake eastbound on-ramp, Montlake westbound off-ramp, and the mainline section along eastbound SR 520 between the Montlake on-ramp and Lake Washington Boulevard on-ramp would differ substantially from existing conditions. Construction truck volumes are expected on SR 520 and on the Montlake ramps. However, by direction and segment, the construction truck volumes would range from 11 to 19 vehicles per hour and not have substantial effects on any one segment or ramp analyzed.

Exhibit 10-9 shows existing and expected construction-related changes in traffic volumes on SR 520 due to closure of the Lake Washington Boulevard ramps through year 5 of construction. Exhibit 10-10 shows the changes between existing and expected levels of service through year 5 of construction.
Exhibit 10-9. Change in Volumes on SR 520 due to Closure of Lake Washington Boulevard Ramps

<table>
<thead>
<tr>
<th>Freeway Segment</th>
<th>Existing/Year 1(^a) (All Options)</th>
<th>Years 2-3 (All Options)</th>
<th>Years 4-5 (Options A, K &amp; L)</th>
<th>Years 4-5 (Option A Suboption)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM Peak</td>
<td>PM Peak</td>
<td>AM Peak</td>
<td>PM Peak</td>
</tr>
<tr>
<td>SR 520 mainline west of Montlake eastbound on-ramp</td>
<td>3,520</td>
<td>3,220</td>
<td>same as existing</td>
<td>4,150</td>
</tr>
<tr>
<td>Eastbound Montlake on-ramp</td>
<td>840</td>
<td>900</td>
<td>same as existing</td>
<td>1,470</td>
</tr>
<tr>
<td>Eastbound Lake Washington Blvd on-ramp</td>
<td>630</td>
<td>350</td>
<td>same as existing</td>
<td>0</td>
</tr>
<tr>
<td>Westbound Lake Washington Blvd off-ramp</td>
<td>340</td>
<td>440</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Westbound Montlake off-ramp</td>
<td>670</td>
<td>750</td>
<td>1,010</td>
<td>1,190</td>
</tr>
</tbody>
</table>

\(^a\) Year 1 construction volumes would be the same as the existing condition.

Exhibit 10-10. Effects of Lake Washington Boulevard Ramp Closures on SR 520 During Construction

<table>
<thead>
<tr>
<th>Freeway Segment</th>
<th>Existing/Year 1(^a)</th>
<th>Years 2-3</th>
<th>Years 4-5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOS</td>
<td>Density (pc/mi/ln)(^b)</td>
<td>LOS</td>
</tr>
<tr>
<td><strong>Eastbound – AM Peak Hour</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR 520 mainline west of Montlake EB off-ramp</td>
<td>D</td>
<td>31.8</td>
<td></td>
</tr>
<tr>
<td>EB Montlake off-ramp</td>
<td>D</td>
<td>29.8</td>
<td></td>
</tr>
<tr>
<td>SR 520 mainline east of Montlake EB off-ramp</td>
<td>C</td>
<td>24.8</td>
<td></td>
</tr>
<tr>
<td>EB Montlake on-ramp</td>
<td>D</td>
<td>31.0</td>
<td></td>
</tr>
<tr>
<td>SR 520 mainline east of Montlake EB off-ramp</td>
<td>D</td>
<td>32.5</td>
<td></td>
</tr>
<tr>
<td>EB LWB on-ramp</td>
<td>E</td>
<td>35.9</td>
<td></td>
</tr>
<tr>
<td>SR 520 mainline east of LWB EB on-ramp</td>
<td>E</td>
<td>39.9</td>
<td></td>
</tr>
<tr>
<td><strong>Eastbound – PM PEAK HOUR</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR 520 mainline west of Montlake EB off-ramp</td>
<td>D</td>
<td>30.9</td>
<td></td>
</tr>
<tr>
<td>EB Montlake off-ramp</td>
<td>D</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>SR 520 mainline east of Montlake EB off-ramp</td>
<td>C</td>
<td>21.5</td>
<td></td>
</tr>
<tr>
<td>EB Montlake on-ramp</td>
<td>C</td>
<td>28.6</td>
<td></td>
</tr>
<tr>
<td>SR 520 mainline east of Montlake EB off-ramp</td>
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<td>29.7</td>
<td></td>
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<tr>
<td>EB LWB on-ramp</td>
<td>D</td>
<td>31.5</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Year 1 construction volumes would be the same as the existing condition.
### Exhibit 10-10. Effects of Lake Washington Boulevard Ramp Closures on SR 520 During Construction

<table>
<thead>
<tr>
<th>Freeway Segment</th>
<th>Existing/Year 1&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Years 2-3</th>
<th>Years 4-5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOS</td>
<td>Density (pc/mi/ln)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>LOS</td>
</tr>
<tr>
<td>SR 520 mainline east of Lake WA Blvd EB on-ramp</td>
<td>D</td>
<td>33.0</td>
<td></td>
</tr>
<tr>
<td><strong>Westbound – AM Peak Hour</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR 520 mainline east of Lake WA Blvd WB off-ramp</td>
<td>E</td>
<td>40.0</td>
<td></td>
</tr>
<tr>
<td>WB Lake WA Blvd off-ramp</td>
<td>E</td>
<td>36.1</td>
<td>Ramp Closed</td>
</tr>
<tr>
<td>WB Montlake off-ramp</td>
<td>D</td>
<td>33.1</td>
<td>E</td>
</tr>
<tr>
<td>SR 520 mainline west of Montlake WB off-ramp</td>
<td>D</td>
<td>29.1</td>
<td></td>
</tr>
<tr>
<td>WB Montlake on-ramp</td>
<td>D</td>
<td>33.4</td>
<td></td>
</tr>
<tr>
<td>SR 520 mainline west of Montlake WB on-ramp</td>
<td>E</td>
<td>35.0</td>
<td></td>
</tr>
<tr>
<td><strong>Westbound – PM Peak Hour</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR 520 mainline east of Lake WA Blvd WB off-ramp</td>
<td>E</td>
<td>36.5</td>
<td></td>
</tr>
<tr>
<td>WB Lake WA Blvd off-ramp</td>
<td>D</td>
<td>33.8</td>
<td>Ramp Closed</td>
</tr>
<tr>
<td>WB Montlake off-ramp</td>
<td>D</td>
<td>30.1</td>
<td>E</td>
</tr>
<tr>
<td>SR 520 mainline west of Montlake WB off-ramp</td>
<td>C</td>
<td>25.4</td>
<td></td>
</tr>
<tr>
<td>WB Montlake on-ramp</td>
<td>D</td>
<td>32.5</td>
<td></td>
</tr>
<tr>
<td>SR 520 mainline west of Montlake WB on-ramp</td>
<td>D</td>
<td>33.8</td>
<td></td>
</tr>
</tbody>
</table>

EB = eastbound    WB = westbound    LOS = level of service

<sup>a</sup> No ramp closures during Year 1 of construction. Year 1 SR 520 LOS and density would be equal to existing conditions during peak hours.

<sup>b</sup> Density (pc/mi/ln) = passenger cars/mile/lane

<sup>c</sup> WB Lake Washington Boulevard Ramp OPEN in Years 4 and 5 under Suboption A – LOS same as existing.

The HCS analysis performed for this evaluation did not take into account construction-related events that would potentially affect traffic, such as constrained roadway sections or drivers slowing down to look at construction activities. To estimate the worst-case scenario, the analysis assumed no diversion of traffic to other roadways.

The following sections describe effects on eastbound and westbound traffic operations on SR 520, including ramp queuing.
Operations on Eastbound SR 520

When the Lake Washington Boulevard eastbound on-ramp is closed, traffic would be detoured to the Montlake Boulevard eastbound on-ramp under all options. Level of service (LOS) during the morning peak hour would be similar to existing conditions. During the afternoon peak hour, LOS is expected to degrade from C to D on the Montlake eastbound on-ramp due to the detoured volumes.

LOS on the SR 520 eastbound mainline between the Montlake Boulevard and Lake Washington Boulevard on-ramps would worsen due to the increase in traffic volumes from the Lake Washington Boulevard ramp detour.

Operations on Westbound SR 520

There would be no substantial changes in westbound traffic operations during construction except at the Montlake Boulevard westbound off-ramp. During closure of the Lake Washington Boulevard westbound off-ramp, traffic would be detoured to the Montlake Boulevard westbound off-ramp. Performance of this ramp is mostly controlled by intersection operations at Montlake Boulevard and the ramp termini. With the Lake Washington Boulevard off-ramp detour in place, improvements made to the Montlake Boulevard westbound off-ramp during the first year of construction under all options would allow operations to remain the same as existing conditions (LOS E) during both the morning and afternoon peak hours.

Ramp Queuing

When the Lake Washington Boulevard westbound off-ramp is closed, queues on the Montlake westbound off-ramp would not affect mainline SR 520 operations under any of the options. Queues would be 200 feet long in the morning peak hour and 300 feet long in the afternoon peak hour.

Prior to closing the Lake Washington Boulevard westbound off-ramp, the Montlake westbound off-ramp would be widened to include dual left-turn lanes in addition to the existing right-turn lane. The ramp terminus with Montlake Boulevard would be signalized. These improvements would help accommodate the detoured volumes from the closed Lake Washington Boulevard westbound off-ramp.

There would also be capacity improvements to the eastbound Montlake on-ramp and the intersection of Montlake Boulevard/SR 520 eastbound
ramps/Lake Washington Boulevard. The eastbound Montlake on-ramp would be widened to include two general-purpose lanes and one HOV bypass lane. The intersection of Montlake Boulevard/SR 520 eastbound ramps/Lake Washington Boulevard would be widened to include dual northbound left-turn lanes, increased capacity on the SR 520 eastbound on-ramp, an additional westbound lane, and an additional southbound through-lane. These improvements would help accommodate the detoured volumes from the closed Lake Washington Boulevard westbound off-ramp.

Due to the proposed improvements at the intersection of Montlake Boulevard/SR 520 eastbound ramps/Lake Washington Boulevard, queuing onto local streets from the SR 520 eastbound ramp would remain similar to today’s conditions, with the exception of the northbound through movement on Montlake Boulevard and westbound movement on Lake Washington Boulevard. Queuing for the northbound through movement on Montlake Boulevard would increase by approximately 60 to 100 feet during both the morning and afternoon peak hours. Westbound queues on Lake Washington Boulevard would increase by approximately 50 to 100 feet during the morning and afternoon peak hours.

**Freeway Lane Closures**

Periodic lane closures on SR 520 would be required for construction throughout the project duration. An example of a construction activity that would require lane closures is placement of precast girders for the new lids over SR 520. Portions of SR 520 and its ramps would be closed at night (between the hours of 9 p.m. and 5 a.m.) and on weekends to accommodate this portion of construction.

Specific closure details cannot be determined at this stage in the planning process because they depend on the contractor’s work plan and variable conditions during construction. The project team assumed that standard requirements for traffic maintenance would be established for construction activities. These requirements would be incorporated into the project contract to make sure that the desired level of mobility is maintained throughout the project duration. The project work plan would include restricted closure hours and dates based on special events, and those closures would be coordinated with closures on other freeways.
When full closure of SR 520 is required, construction activities for the I-5 to Medina: Bridge Replacement and HOV Project would use the closure plan that WSDOT developed for the annual SR 520 bridge maintenance and inspection. The plan closes SR 520 from Montlake Boulevard on the west side of Lake Washington to 92nd Avenue on the east side of the lake. The designated detour route for closure of SR 520 is the I-90 bridge.

**What are the anticipated effects on local arterials?**

The effects of construction truck trips, closures of specific local streets, and closure of Lake Washington Boulevard ramps on local streets were evaluated as part of this analysis. Each of these project elements is described below.

**Construction Truck Trips**

Many of the trucks required for construction must use local roads in addition to freeways to access work sites. Exhibits 10-7 and 10-8 show the effect of construction truck trips on the roadway system, including local arterials. The following local Seattle streets might be used as part of a haul route:

- Montlake Boulevard
- East Shelby Street
- East Hamlin Street
- 24th Avenue East
- Boyer Avenue East
- East Roanoke Street
- Harvard Avenue East
- 10th Avenue East
- 11th Avenue East
- East Miller Street
- Boylston Avenue East
- NE Pacific Street
- 15th Avenue East
- NE 45th Street
- Fuhrman Avenue East
- Eastlake Avenue East

With average construction activity, truck trips would range from 1 to 2 trips per hour under Options A and L and 1 to 5 trips per hour under Option K. During peak construction periods, truck trips would range from 2 to 8 trips per hour under Option A, 2 to 20 trips per hour under Option K, and 2 to 12 trips per hour under Option L.

Most construction truck trips on local streets would use Montlake Boulevard to access SR 520. Few other arterials would be affected, and the estimated number of truck trips along these arterials would be relatively low compared to overall arterial volumes, with the exception of East Shelby Street and East Hamlin Street. Peak-hour truck volumes on these two streets during peak construction times would be approximately 5 to 20 trucks per hour, depending on which option is selected.

Peak-hour traffic volumes on East Shelby and East Hamlin Streets are currently low—approximately 40 to 50 vehicles per hour during the morning and afternoon peak hours. Construction truck volumes would increase traffic by approximately 10 to 40 percent on these streets during peak construction periods.

**Local Arterial Effects of Lake Washington Boulevard Ramp Closure**

Traffic volumes from the Lake Washington Boulevard ramps would be detoured to the Montlake area. Approximately 340 vehicles during the morning peak hour and 440 vehicles during the afternoon peak hour would be detoured from the Lake Washington Boulevard westbound off-ramp. Approximately 630 vehicles during the morning peak hour and 350 vehicles during the afternoon peak hour would be detoured from the Lake Washington Boulevard eastbound on-ramp. The contractor selected to construct the proposed project would need to work with the city and the state to finalize any detours used during construction.

**Montlake Boulevard Improvements**

The Montlake Boulevard improvements would allow traffic operations along Montlake Boulevard to remain similar to existing conditions
when traffic volumes from the Lake Washington Boulevard ramps are detoured to Montlake. If these improvements were not in place prior to closing the Lake Washington Boulevard ramps, delays and queuing would be worse than existing conditions.

During construction of the improvements, traffic signal timing and the lane configurations along Montlake Boulevard would be similar to existing conditions. Some intersections would be realigned, particularly at Montlake Boulevard/SR 520 eastbound ramps/Lake Washington Boulevard, to accommodate construction activity and widening of Montlake Boulevard.

During construction of the improvements on Montlake Boulevard, congestion is expected to worsen due to slowing that typically occurs in work zones. Drivers may choose other routes or adjust their schedules to avoid the increased congestion and delay. Regardless, congestion could increase at other locations or occur over a longer period of time on Montlake Boulevard.

**Closure of Lake Washington Boulevard Westbound Ramp**

When the Montlake Boulevard improvements are completed and the Lake Washington Boulevard westbound off-ramp is closed, drivers could expect the same level of congestion that currently occurs during the morning and afternoon peak hours. Exhibit 10-11 shows expected intersection operations in the Montlake area.

Compared to existing conditions, traffic operations at the intersections of Montlake Boulevard/Hamlin Street and Montlake Boulevard/SR 520 eastbound ramps/Lake Washington Boulevard would actually improve during the afternoon peak hour for all design options due to modifications in signal timing.

The intersection of Montlake Boulevard/Hamlin Street would improve from LOS D to C during the afternoon peak hour. The intersection of Montlake Boulevard/SR 520 eastbound ramps/Lake Washington Boulevard would also improve compared to existing conditions from LOS F in the existing afternoon peak hour to LOS E during the afternoon peak hour for all design options due to capacity improvements, specifically the additional southbound lane on Montlake Boulevard.
Exhibit 10-11. Intersection Operations During Closure of Lake Washington Boulevard Westbound Ramp

I-5 to Medina: Bridge Replacement and HOV Project

Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Park).

Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Signalized Intersection
Unsignalized Intersection
Signalized Intersection with Project

LEVEL OF SERVICE

A-C No Little Congestion
D Moderate Congestion
E Heavy Congestion
F Severe Congestion/Over Capacity

Option A
Existing
Suboption A
Option K
Option L

A.M. Peak Hour
AM A A A A
PM A A A A

P.M. Peak Hour
AM A A A A
PM A A A A

Existing Conditions
During Construction (existing volumes)

Intersections that would be signalized under the 4-Lane and 6-Lane alternatives

Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.
Closure of both Lake Washington Boulevard Ramps

When both Lake Washington Boulevard ramps are closed in Options A, K, and L, drivers could expect the same level of congestion that currently occurs during the morning and afternoon peak hours. Exhibit 10-12 illustrates Montlake area LOS findings for all design options.

Under Option A and Suboption A, intersection modifications would improve traffic operations at the intersection of Montlake Boulevard and Lake Washington Boulevard during the afternoon peak hour. This intersection would continue to operate at LOS F during the afternoon peak hour with Options K and L, similar to existing conditions. The difference in operations would be caused by the volume of construction truck traffic required to construct Options K and L.

Detoured traffic volumes from the closure of the Lake Washington Boulevard eastbound on-ramp and westbound off-ramp would affect operations at two study area intersections. The 24th Avenue East/Boyer Street intersection would degrade during the morning peak hour and operations at Lake Washington Boulevard/Boyer Street would improve under Options A, K, and L.

Under Options A, K, and L, the 24th Avenue East/Boyer Street intersection would degrade from LOS D to E during the morning peak hour. There would be no changes in LOS during the afternoon peak hour at this intersection. The intersection would operate similar to existing conditions under Suboption A because the new Lake Washington Boulevard westbound off-ramp would reopen when the Lake Washington Boulevard eastbound on-ramp is closed. Therefore, less traffic would be detoured through the intersection.

Traffic diversions to the 24th Avenue East/Boyer Street intersection would reduce vehicle volumes through the unsignalized intersection of Lake Washington Boulevard/Boyer Street. Options A, K, and L would improve traffic operations at the Lake Washington Boulevard/Boyer Street intersection. This intersection would operate similar to existing conditions under Suboption A.

Conditions Near Project Completion

During years 6 and 7 of construction, the SPUI proposed in Options K and L would be opened, providing access to Lake Washington Boulevard. Operations with Options K and L would be similar to final build conditions. Under Option A and Suboption A, channelization and
## Exhibit 10-12. Intersection Operations During Closure of both Lake Washington Boulevard Ramps

### I-5 to Medina: Bridge Replacement and HOV Project

#### LEVEL OF SERVICE:

- A-C: No/Little Congestion
- D: Moderate Congestion
- E: Heavy Congestion
- F: Severe Congestion/Over Capacity

#### Source:

King County (2008) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Park).

Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.
capacity near SR 520 along Montlake Boulevard would match the final build condition. Drivers could expect the same level of congestion that currently occurs during the morning and afternoon peak hours.

Exhibit 10-13 illustrates the Montlake area LOS that would exist for Option A and Suboption A. Compared to existing conditions, traffic operations would improve at the intersection of Montlake Boulevard/SR 520 eastbound ramps/Lake Washington Boulevard during both the morning and afternoon peak hours. This is due to an additional lane that would be added to the eastbound off-ramp. The additional lane would improve operations at this intersection from LOS E/F to LOS D.

Under Option A, operations at the intersection of 24th Avenue East/Boyer Street would be worse in the morning peak hour than existing conditions (LOS E compared to LOS D). This change would be due to the continued closure of both Lake Washington Boulevard ramps. Under Suboption A, this intersection would operate similar to existing conditions because both of the new Lake Washington Boulevard ramps would be opened to traffic. Traffic would no longer be detoured to Montlake Boulevard, so there would be less traffic in the general Montlake vicinity compared to early construction stages.

In the afternoon peak hour, the intersection of Lake Washington Boulevard/Boyer Street would continue to operate better than existing conditions because traffic volumes would be detoured away from this intersection with closure of the Lake Washington Boulevard ramps.

**Closure of Delmar Drive East**

Construction of the Delmar lid is estimated to last up to 2 years. Traffic operations would be affected only when Delmar Drive East is closed. Delmar Drive East would be closed between Roanoke Street and 11th Avenue East in all design options for approximately 12 months. Detour routes would be provided during construction of the new lid.

A goal of the proposed project is to minimize the duration of these detours. To the extent possible, the detour routes would use arterial streets; however, it may be necessary to use some residential streets in the area. WSDOT would work with appropriate local jurisdictions to finalize any detour plans.
Exhibit 10-13. Intersection Operations near Project Completion

Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Park).
Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.
Closure of NE Pacific Street

Construction at the intersection of Montlake Boulevard NE and NE Pacific Street is proposed only under Options K and L. Thus the following discussion of construction effects related to the closure of NE Pacific Street relates only to these two options. Construction would last up to 2 years, and a closure of NE Pacific Street would be required for up to 12 months.

During construction at the intersection of Montlake Boulevard NE and NE Pacific Street, existing levels of traffic flow in the through lanes along Montlake Boulevard NE would be maintained. There would be some increase in morning and afternoon peak hour traffic due to construction-related trips (such as trucks and employee vehicles traveling to and from the site). However, these volumes are expected to be minor compared to the overall morning and afternoon peak hour traffic on the surrounding streets.

Prior to and throughout the entire construction period, WSDOT would coordinate with the City of Seattle, University of Washington, King County Metro, and Sound Transit to maximize the effectiveness of construction traffic management and minimize construction effects on weekday traffic. WSDOT would also coordinate with University of Washington event traffic and the University of Washington Medical Center.

Sound Transit is constructing the underground UW Station at Husky Stadium for its University Link light rail segment on the east side of Montlake Boulevard. Based on current construction schedules, excavation for the station and light rail tunnels is expected to be complete before closure of NE Pacific Street would occur. If excavation is not complete, closure of NE Pacific Street would have a substantial effect on construction hauling activities for the University Link station. Station construction may be ongoing at the time of closure and some Sound Transit construction traffic is expected. Coordination with Sound Transit would be required to minimize project conflicts and unnecessary cumulative construction effects. This coordination is already underway and will be further developed as plans for the I-5 to Medina: Bridge Replacement and HOV Project are refined. Coordination would continue throughout construction.

The traffic operation effects of closing NE Pacific Street are shown in Exhibit 10-14. Specifically, Exhibit 10-14 identifies the existing peak-
hour intersection levels of service and delay in the area of NE Pacific Street and compares them with estimated conditions during construction of Options K and L during years 1 through 5.

When NE Pacific Street is closed, vehicle delays at the intersection of NE Pacific Place/Montlake Boulevard NE would increase substantially. If priority at this intersection is given to through traffic on Montlake Boulevard, much of the increased delay would be incurred by vehicles turning to and from Montlake Boulevard and NE Pacific Place.

Exhibit 10-14. Peak-Hour Intersection Operations Near NE Pacific Street – Options K and L

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Existing</th>
<th>Year 1</th>
<th>Years 2-3</th>
<th>Years 4-5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOS</td>
<td>Delay</td>
<td>LOS</td>
<td>Delay</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(seconds/vehicle)</td>
<td></td>
<td>(seconds/vehicle)</td>
</tr>
<tr>
<td>AM Peak Hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montlake Boulevard NE/NE Pacific Street</td>
<td>C</td>
<td>25</td>
<td>B</td>
<td>18</td>
</tr>
<tr>
<td>Montlake Boulevard NE/NE Pacific Place</td>
<td>A</td>
<td>9</td>
<td>B</td>
<td>13</td>
</tr>
<tr>
<td>NE Pacific Street/NE Pacific Place</td>
<td>B</td>
<td>18</td>
<td>B</td>
<td>18</td>
</tr>
<tr>
<td>PM Peak Hour</td>
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</tr>
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<td>20</td>
<td>C</td>
<td>21</td>
</tr>
<tr>
<td>NE Pacific Street/NE Pacific Place</td>
<td>C</td>
<td>25</td>
<td>C</td>
<td>29</td>
</tr>
</tbody>
</table>

**Temporary Widening of Montlake Boulevard**

Under Options K and L, a temporary grade-separated pedestrian crossing would be constructed on the south leg of the Montlake Boulevard NE/NE Pacific Street intersection during the first year of construction. Montlake Boulevard NE would be temporarily widened north and south of NE Pacific Street. Capacity along Montlake Boulevard NE, NE Pacific Street, and NE Pacific Place would be similar to existing conditions.
Construction on East Side of Montlake Boulevard

During years 2 and 3 of construction, the eastern half of the Montlake Boulevard NE/NE Pacific Street intersection would be lowered and the eastern half of the Pacific Street lid would be constructed. The eastbound travel lanes on NE Pacific Place would be increased from one lane to two lanes. The existing northbound travel lanes on Montlake Boulevard NE would be closed and traffic would be shifted to the west.

The number of lanes and the channelization of the travel lanes along Montlake Boulevard NE would remain the same as they are today except the southbound transit-only, right-turn lane would be removed during construction. The eastbound transit-only right turn lane on NE Pacific Street would also be removed.

Construction on West Side of Montlake Boulevard

During years 4 and 5 of construction, the western half of the Montlake Boulevard NE/NE Pacific Street intersection would be lowered and the western half of the Pacific Street lid would be constructed. The travel lanes on Montlake Boulevard NE between the Montlake Cut and NE Pacific Place would shift to the completed northbound lanes. NE Pacific Street between the University of Washington Medical Center emergency entrance and Montlake Boulevard NE would be closed and traffic would be detoured onto NE Pacific Place. The Medical Center emergency entrance would remain open at all times.

When NE Pacific Street is closed, approximately 1,430 vehicles would use the detour route during the morning peak hour and approximately 1,690 vehicles would use the detour route during the afternoon peak hour. To accommodate construction, the following three intersections would be temporarily reconfigured:

- Montlake Boulevard NE/NE Pacific Street
- Montlake Boulevard NE/NE Pacific Place
- NE Pacific Street/NE Pacific Place

Montlake Boulevard NE/NE Pacific Street Intersection

With the partial closure of NE Pacific Street, traffic that previously turned right from this street onto Montlake Boulevard NE would be rerouted onto NE Pacific Place to turn right at the Montlake Boulevard NE/NE Pacific Place intersection. Traffic that previously turned left from Montlake Boulevard NE onto NE Pacific Street would be rerouted
to the Montlake Boulevard NE/NE Pacific Place intersection. Traffic destined for the University of Washington E-12 parking lot would also be rerouted through the Montlake Boulevard NE/NE Pacific Place intersection. This intersection would accommodate only northbound and southbound traffic. With these modifications, traffic would operate at LOS A during construction because there would be no conflicting movements.

**Montlake Boulevard NE/NE Pacific Place**

Northbound traffic that previously turned left from Montlake Boulevard NE onto NE Pacific Street would be temporarily rerouted to NE Pacific Place. Dual northbound left-turn lanes from Montlake Boulevard NE to NE Pacific Place would be temporarily needed to accommodate this detoured traffic. A southbound left from Montlake Boulevard NE into the University of Washington E-11/E-12 parking lot would also be temporarily needed.

The NE Pacific Place leg of the intersection would be reconfigured to provide two right-turn lanes onto Montlake Boulevard NE; this reconfiguration would be required to accommodate the traffic rerouted from NE Pacific Street. Modifications to the existing signal at this intersection would be needed to accommodate the new turning movements. With these modifications, this intersection would temporarily operate at LOS F during the morning and afternoon peak hours. Long eastbound queues are expected on NE Pacific Street. This stage of construction would likely be completed during the summer, which would reduce the effect on traffic.

When the Montlake Boulevard NE/NE Pacific Street intersection is constructed, it would no longer include the northbound left-turn pockets. However, the southbound left-turn pocket may be retained. The transit-only, right-turn lane would be restored from NE Pacific Place onto Montlake Boulevard NE.

**NE Pacific Street/NE Pacific Place**

NE Pacific Place would be widened to four lanes (two lanes in each direction). This reconfiguration would be necessary to accommodate the two northbound left-turn lanes from Montlake Boulevard NE and the two right-turn lanes to Montlake Boulevard NE. After NE Pacific Place is widened, a second eastbound left-turn pocket would be added on NE Pacific Street. A westbound left-turn pocket from NE Pacific Place to the University of Washington Medical Center/NE Pacific Street
would also be added to accommodate emergency vehicles and other hospital visitors.

With these modifications, this intersection would operate at LOS B during the morning peak hour and LOS C during the afternoon peak hour. During peak times, queues from the Montlake Boulevard NE/NE Pacific Place intersection could affect traffic turning left from NE Pacific Street onto NE Pacific Place.

When the Montlake Boulevard NE/NE Pacific Street intersection is completed, the NE Pacific Street/NE Pacific Place intersection would be returned to its previous configuration. The westbound left-turn pocket from NE Pacific Place to the University of Washington Medical Center/NE Pacific Street would be removed.

**What are the anticipated construction effects on transit?**

Construction would affect several transit stations and associated bus operations along SR 520, as well as several bus stops on local streets in the construction zone. Road closures, lane shifts, and intersection modifications will affect existing transit facilities and require service adjustments or other accommodations to maintain operations.

An important transit consideration is the electric trolley system operated by King County Metro. Metro operates several electric trolley bus lines throughout Seattle, including highly utilized routes on Montlake Boulevard and 10th Avenue East. The trolley buses receive power from fixed aerial wires mounted over the travel lanes of the roadway.

Road closures on routes served by trolley buses would require that the transit equipment be modified to continue providing service on a detour route. Modifications could include construction of temporary trolley wire, including providing new switches and poles along the detour route or adding diesel powered buses to the service fleet. Changes in lane alignment and modifications of intersections may also require realignment of the overhead wires to maintain operation of the trolley buses.

The most substantial differences between the design options would occur near the NE Pacific Street/Montlake Boulevard NE intersection. The effects in that area are described below followed by the effects that
are common to all options, including removal of the Montlake Freeway Transit Station.

**Options K and L**

The effects of construction on transit facilities would be similar for all Options at I-5, the Delmar Lid, and the SR 520/Montlake Boulevard interchange. However reconstruction of the Montlake Boulevard NE/NE Pacific Street intersection under Options K and L would have much greater negative effects to transit facilities and operations.

**Bus Stops near the Montlake Triangle**

Under Options K and L, several bus stops on NE Pacific Street and Montlake Boulevard NE would need to be temporarily relocated during construction of the NE Pacific Street/Montlake Boulevard NE intersection. During the closure of NE Pacific Street, buses would be rerouted to use the temporary detour on NE Pacific Place.

There is a major University of Washington transfer point located on NE Pacific Street, just northwest of Montlake Boulevard NE, in front of the University of Washington Medical Center. This transfer point provides access to the University of Washington Medical Center, the University of Washington campus, and Husky Stadium. This stop is currently served by 12 individual routes. Both the westbound and eastbound stops at this transfer point would need to be relocated during construction when NE Pacific Street is closed. Both stops would be relocated to NE Pacific Place. Transit pull-outs could be provided at these temporary stops to help facilitate traffic flow and reduce congestion; however, pull-outs may also increase transit delays if buses are unable to re-enter congested traffic.

There are two bus stops that serve one bus route (Metro Route 243), and the volume of passengers using these stops is low. The bus stop located on the east side of the intersection of Montlake Boulevard NE/NE Pacific Street would need to be relocated for the duration of construction. The stop could be relocated to the south of NE Pacific Street, which would allow passengers using this site to access the temporary pedestrian bridge across Montlake Boulevard NE.

The other bus stop is located on the west side of Montlake Boulevard NE, just north of NE Pacific Street, and would need to be relocated for the duration of construction. It could probably be relocated to the north of NE Pacific Place.
Transit Facilities and Operations near the Montlake Triangle

The detour of traffic from NE Pacific Street to NE Pacific Place would substantially increase traffic volumes at the intersection of NE Pacific Place and Montlake Boulevard NE. Delays at this intersection would also increase substantially. Improvements at the intersection would help maintain traffic flow on Montlake Boulevard NE, but turning movements at the intersection would be subject to high delays as described earlier in this chapter. This would particularly affect the transit routes that currently make turns to and from Montlake Boulevard and NE Pacific Street.

During reconstruction of the NE Pacific Street/Montlake Boulevard NE intersection, lane shifts on Montlake Boulevard would require closure of transit priority lanes. The eastbound transit-only right turn currently provided on NE Pacific Street and the southbound transit-only lane on Montlake Boulevard NE south of NE Pacific Street would both be removed during construction. Removal of the transit priority lanes would prevent buses from bypassing congestion on Montlake Boulevard.

The existing bus layover space on NE Pacific Place would be removed during construction to allow for roadway widening. This layover space serves important functions, allowing buses a place to wait at the end of a route to depart on schedule for the next route and providing a location where drivers can take a restroom break at the end of a route.

The Montlake Triangle also serves as a turnaround location for buses. This function would be disrupted during construction under Options K and L when the southbound transit-only, right-turn lane from Montlake Boulevard NE to NE Pacific Street would be removed.

One potential method to provide a layover and turnaround location for buses is to route them into the University of Washington E-11/E-12 parking lot using the entrance from Montlake Boulevard NE/NE Pacific Place. After turnaround and layover, buses could then use NE Pacific Place to continue on their routes. This would require coordination with and approval from the University of Washington, and some improvements to the parking area may be needed. Coordination would also be required with construction activities at the University Link light rail station.
The removal of layover and turnaround functions at the Montlake Triangle would include additional effects to trolley bus service. The closure of NE Pacific Street would prevent trolley operation in the current configuration because trolleys layover and turnaround at this location. A detour of the existing trolley routes onto NE Pacific Place would require temporary transit improvements to maintain service. Use of the University of Washington parking lots would require construction of temporary trolley wires, including a turnaround loop, in the parking lot.

**Montlake Freeway Transit Station**

Under all options, the Montlake Freeway Transit Station on SR 520 would be permanently closed soon after construction begins, probably within the first 6 to 12 months of construction. The functions of this station would be permanently relocated under Options A, K, and L and Suboption A.

Removing the Montlake Freeway Transit Station would require riders who originate from the east side of Lake Washington and use the station for access to Montlake, the University of Washington, or the University District to transfer buses at one of the SR 520 freeway transit stations on the east side of Lake Washington. Therefore, sufficient capacity for the additional transfer activity must be available on the Eastside. This function could be served at the Evergreen Point Freeway Transit Station. Closure of the Evergreen Point Freeway Transit Station, when the Montlake Freeway Transit Station is also closed, could substantially affect transit service to the University District.

People who use the Montlake Freeway Transit Station to access buses to downtown Seattle would need to board a different local bus. People who use this transit station to board a bus to the east side of Lake Washington would need to use the NE Pacific Street stops near the University of Washington Medical Center. Some eastbound transit passengers may need to transfer once more than they normally do to reach their destination.

**Bus Stops on Montlake Boulevard at SR 520**

The bus stops on Montlake Boulevard at SR 520 would need to be relocated during construction of all options. Construction of the Montlake lid over SR 520 would require shifting travel lanes and changes in channelization. These changes would reduce or eliminate
space available for the current bus stop locations on the northeast and southwest corners of Montlake Boulevard at SR 520.

It would not be as beneficial to provide bus stops on Montlake Boulevard directly at SR 520 when the Montlake Freeway Transit Station is closed. The function of transferring from the stops on Montlake Boulevard to the transit station below would be removed with its closure. The current bus stop at the Montlake Boulevard/SR 520 westbound ramp termini serving northbound routes would be combined with the existing bus stop at Montlake Boulevard/Shelby Street.

**Evergreen Point Freeway Transit Station**

Under all options, the freeway transit stations at Evergreen Point Road would closed for a period of 4 to 6 months during construction of the east approach bridge. During that time, traffic on SR 520 would shift to the newly constructed westbound east approach bridge while construction continues on the eastbound east approach bridge.

There are approximately 450 westbound and 60 eastbound boarding and alighting passengers in the morning peak period, and 100 westbound and 270 eastbound in the afternoon peak period. Approximately 65 to 75 passengers arrive at this station by walking or being dropped off during the morning peak period and 40 to 50 in the afternoon peak period, which is approximately 11 to 15 percent of current passenger usage during the peak periods. The rest of the passengers arrive by bus or bike or are dropped off.

The Evergreen Point Freeway Transit Station would need to accommodate increased transfer activity when the Montlake Freeway Transit Station is closed as described earlier. If this is not possible, improvements at the 92nd Avenue NE Freeway Transit Station may be required to support the transfer activity.

**Trolley Buses**

Options A, K, and L would all affect trolley bus service during construction on 10th Avenue East and on Montlake Boulevard south of NE Pacific Street. Traffic on 10th Avenue East would be shifted to a temporary bridge for construction of the new 10th Avenue East crossing over SR 520. Similarly, traffic on Montlake Boulevard would be shifted during demolition and re-construction of the existing bridge over SR 520.
Additional minor traffic shifts that could affect trolley buses would occur along Montlake Boulevard during construction. These shifts would require temporary transit improvements, as described above, to maintain service.

**What are the anticipated construction effects on bicyclists and pedestrians?**

Construction of the 6-Lane Alternative, under all design options, would have some effects on bicycle and pedestrian access within the project corridor. In addition to general construction activities that would affect bicycle and pedestrian access, several local streets would be closed during construction.

**Montlake Area**

The Montlake Boulevard bridge is one of three north-south connections for pedestrians and bicyclists across SR 520 in the Montlake neighborhood. Another north-south connection is the Bill Dawson Trail, which runs under SR 520 along the west side of Montlake Boulevard and connects the Montlake Playfield (south of the SR 520 on Portage Bay) and the NOAA Northwest Fisheries Science Center Building (north of SR 520). The final north-south connection is the 24th Avenue east bridge, which connects Lake Washington Boulevard to East Montlake Park.

Under all design options, the 24th Avenue East bridge and the Bill Dawson Trail would be closed to pedestrian and bicycle access during the majority of construction. Montlake Boulevard would remain open to pedestrians and bicycles during construction.

The Bill Dawson Trail is proposed as a temporary construction access road and would be closed to pedestrians and bicycles for the majority of construction. Bicycles and pedestrians would need to use Montlake Boulevard to cross SR 520 during construction.

There is an on-street bicycle route on 24th Avenue East between East Shelby Street and East Lake Washington Boulevard. Under all design options, the 24th Avenue East bridge would be demolished and replaced as part of the Montlake lid. Pedestrians would need to use Montlake Boulevard to cross SR 520 during construction.
Major construction activities are proposed along Montlake Boulevard near SR 520 for all of the design options. Construction methods may restrict bicycle and pedestrian access to one side of Montlake Boulevard over SR 520 during construction. Restrictions would be in place during the entire construction period to prevent the closure of bicycle and pedestrian access on both sides of Montlake Boulevard over SR 520. When traffic is detoured from the Lake Washington Boulevard ramps to the Montlake ramps, bicyclists riding in the street may face increased potential for conflicts with vehicles due to the higher volume of traffic.

Cyclists who board buses to cross the Evergreen Point Floating Bridge would have to travel to NE Pacific Street to board an SR 520 route. The number of available bike racks on cross-lake buses would be reduced because there would be fewer routes to choose from. When the Montlake Freeway Transit Station is closed, the highly utilized bicycle lockers at that location would also be closed but may be relocated near the Montlake Triangle.

**Delmar Drive Bridge**

When Delmar Drive is closed during construction, bicycles and pedestrians would need to use alternative routes. The potential detour routes near the Delmar Drive bridge closure include Boyer Avenue East on the east side of Delmar Drive and 11th Avenue East to 10th Avenue East on the west side of Delmar Drive. Both routes are feasible for bicycle and pedestrian traffic; however, 11th Avenue East is particularly steep. Depending upon the route traveled, the Boyer Avenue East detour could require longer out-of-direction travel.

**NE Pacific Street Area**

During construction of the NE Pacific Street/Montlake Boulevard NE intersection proposed under Options K and L, existing pedestrian and bicycle routes may be modified. Pedestrian access would be maintained on one side of Montlake Boulevard NE within the construction zone at all times during the construction period. Pedestrian crossings would be provided at intersections. When NE Pacific Street is closed and traffic is detoured to NE Pacific Place, pedestrian traffic signals would be required on NE Pacific Place for the existing crossings due to the increased roadway width and vehicular traffic.

A temporary pedestrian overpass would be provided just south of the Montlake Boulevard NE/NE Pacific Street intersection. This temporary...
overpass would help maintain pedestrian access during construction to the east and west sides of Montlake Boulevard.

Bicycle routes along Montlake Boulevard and NE Pacific Place connecting to the Burke-Gilman Trail may be rerouted through or around the construction zone.

**Foster Island and Arboretum**

During construction of the west approach bridge, the portion of the Foster Island Trail that currently travels under the existing SR 520 bridge would be closed. Access to the Foster Island Trail from East Montlake Park would not be affected. However, the parking lot at the trailhead near East Montlake Park is proposed as a construction staging area for all design options, and parking may not be available to the general public.

**What are the expected construction effects on parking?**

Construction would affect parking in the project area, particularly near Husky Stadium. The most substantial effects are described below.

**I-5 Area in Seattle**

The lot at Bagley Viewpoint (Delmar Drive East and East Roanoke Street) is located in Bagley Park, just east of the Delmar Drive overpass and north of the existing SR 520 structure. The lot currently has 10 parking stalls, of which (on average) only 1 is used. All design options would completely eliminate this lot during construction, and parking would not be replaced. The elimination of all 10 parking stalls at the viewpoint would not have a large effect on the community because this lot receives so little use.

**Montlake Boulevard Area**

**Museum of History and Industry**

MOHAI’s parking lot, which has 150 parking stalls, would be needed for construction staging under all design options. The museum is located in both McCurdy Park and East Montlake Park, just east of 24th Avenue East.
All design options would eliminate all spaces in this lot for construction staging and to locate a stormwater treatment wetland. Because of the project limits and right-of-way needed, MOHAI and its parking lot would likely be moved to a different location. Access to East Montlake Park and the Washington Park Arboretum would be maintained during construction, but parking would be limited.

24th Avenue East On-Street Parking
There are five on-street parking stalls located just west of MOHAI on the west side of 24th Avenue East, just south of East Hamlin Street. Construction activities under all design options would eliminate the five stalls at this location. These stalls would not be replaced. The removal of these parking spaces would have minimal effect on the community because the average use is only 20 percent (i.e., one parking space).

Parking near Husky Stadium
There are two parking lots on the south and west sides of Husky Stadium, with an access road from NE Pacific Place running between the two lots. The lot on the west side of the access drive is designated as Lot E-11 and currently contains 398 parking spaces. The lot on the east side of the access drive (south of the stadium) is designated as Lot E-12 and contains 882 parking spaces.

Construction of the Sound Transit University Link Station would begin before the I-5 to Medina: Bridge Replacement and HOV Project is constructed. Current Sound Transit plans indicate that completion of the light rail station would have the following effects:

- The access drive between the two lots would be moved to the east, effectively expanding Lot E-11 and reducing the size of Lot E-12.
- Lot E-11 would also expand southward, gaining 31 spaces to contain a total of 429 parking stalls.
- Lot E-12 would lose approximately 136 spaces due to relocation of the access road to the east, reducing the total to approximately 746 parking spaces.

The Sound Transit light rail U Link Station would ultimately result in removal of approximately 105 parking spaces from both lots. Sound Transit is coordinating with the University of Washington to develop replacement parking or other mitigation for permanent parking loss.
Exhibit 10-15 presents the existing parking supply and utilization of these lots, as well as the anticipated supply after construction of the University Link light rail station. The following sections describe parking effects near Husky Stadium specific to each design option.

Exhibit 10-15. Estimated Parking Supply in the Husky Stadium Parking Lots

<table>
<thead>
<tr>
<th>Location</th>
<th>Existing Supply</th>
<th>Average Number of Spaces in Use</th>
<th>Utilization Rate</th>
<th>Parking Supply after Sound Transit Light Rail Station Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Husky Stadium E-11 Lot</td>
<td>398</td>
<td>394</td>
<td>99%</td>
<td>429</td>
</tr>
<tr>
<td>Husky Stadium E-12 Lot</td>
<td>882</td>
<td>873</td>
<td>99%</td>
<td>746</td>
</tr>
</tbody>
</table>

**Option A and Suboption A**

Unlike Options K and L, Option A and Suboption A do not provide a direct connection to NE Pacific Street. As a result, this design option and suboption have the fewest overall effects, including both temporary construction and long-term effects. A total of 54 spaces in Lot E-11 would be temporarily affected due to construction staging.

**Option K**

Option K would provide a new access to SR 520 via the intersection of NE Pacific Street/Montlake Boulevard NE, which would result in temporary parking effects during construction. A portion of the Montlake Cut tunnel is expected to be constructed using the cut-and-cover method, which would result in sizable temporary parking effects. A maximum of 549 spaces would be affected during construction of the tunnel, though these spaces would likely be taken in phases and not all at once. Most of these spaces would be located in the E-12 lot, including a staging area in the southeast portion of the lot adjacent to the tunnel. During construction, parking access to the remaining spaces would be maintained on the south side of the tunnel.

**Option L**

Similar to Option K, Option L would provide a new access to SR 520 through the stadium lots as part of construction at the NE Pacific Street/Montlake Boulevard NE intersection. During construction, a staging area would be located in Lot E-11 on the south side of the access ramp. Construction of the access ramp and staging area would result in a temporary loss of 211 spaces: 204 in Lot E-11 and the remaining 7 in E-12. The affected spaces would be taken in phases, with access maintained to spaces remaining south of the access ramp.
Construction Employee Parking Considerations

The contractor may provide parking within or near the staging areas or could pursue an option such as operating a shuttle to a remote parking lot. If construction workers do not have designated parking areas, or if the construction parking supply is inadequate, workers would likely seek available long-term parking in the surrounding areas.

It is expected that construction workers would first pursue on-street spaces and then pay lots. However, the use of any on-street parking spaces by construction workers would likely need to be coordinated and approved by the City of Seattle. The city would discourage the use of on-street parking spaces by construction workers. On-street parking spaces are free weekday evenings after 6 p.m. and on Sundays. More specific details regarding construction worker parking will be developed at a later phase of the project design, after preferred design options have been selected.

How will the Phased Implementation scenario affect construction?

This discipline report assumes that funding would allow all elements of the I-5 to Medina: Bridge Replacement and HOV Project to be constructed simultaneously. Revenue sources for the proposed project include allocations from various state and federal sources and from future tolling, but there is still a gap between the estimated cost of the project and the revenue available to build it. Because of these funding limitations, there is a possibility that WSDOT would construct the project in phases over time.

Under the Phased Implementation Scenario, WSDOT would replace those portions of the corridor that are vulnerable to earthquakes and windstorms. These components include the following:

- The floating portion of the Evergreen Point Bridge
- The Portage Bay Bridge
- The west approach of the Evergreen Point Bridge

It is important to note that, while the Phased Implementation Scenario would result in only part of the project being constructed, WSDOT’s intent is to eventually build a complete project that fully meets all aspects of the purpose and need.
Evergreen Point Bridge

The floating span of the Evergreen Point Bridge extends from the west transition span (the connection between fixed and floating bridges), located near Madison Park, to the east transition span, located a short distance west of the Lake Washington shoreline in Medina. If phased, the west and east transition spans would be replaced with new structures that would be built to their ultimate 6-lane width.

Portage Bay Bridge

The Phased Implementation Scenario would include reconstruction of the Portage Bay Bridge to its ultimate width—seven lanes for Option A, six lanes for Options K and L—but striped for an interim capacity of four lanes to mesh with portions of the corridor that will not be widened until later phases (I-5 connection and SR 520/Montlake interchange area). The phased scenario would include a new bridge for Delmar Drive East. The effects of constructing a new Delmar Drive bridge would be similar to what is described in this report for the Build Alternative. This bridge would eventually become part of the 10th and Delmar lid that would be constructed for full buildout.

West Approach

Like the other facilities in the Phased Implementation Scenario, the west approach would be constructed to its ultimate configuration width, but striped for four lanes of traffic. The construction would end just east of 24th Avenue East, and would include the SR 520 mainline. No new ramps or interchanges are currently planned.

The Lake Washington Boulevard ramps would need to be closed during construction of the west approach. Traffic would be detoured to the Montlake area when the Lake Washington Boulevard ramps are closed. The same improvements in the Montlake area described earlier in this report would be necessary to adequately accommodate the volume of detoured traffic. However, no lid construction is proposed for the Phased Implementation Scenario; therefore, the capacity improvements needed along Montlake Boulevard may not be possible.

Improvements to the Montlake area are not proposed for the Phased Implementation Scenario. Therefore, improvements at the Montlake area may take place some time after the Lake Washington Boulevard ramps are closed. In the interim, mitigation would be needed to
accommodate detoured traffic from the Lake Washington Boulevard ramps.

One possible solution would be to provide temporary ramps at 24th Avenue East to replace the function of the Lake Washington Boulevard ramps. A signal at the 24th Avenue East/Lake Washington Boulevard intersection would be necessary to accommodate the volume of traffic detoured from the Lake Washington Boulevard ramps.

A signal at this intersection would operate at LOS D during the morning peak hour and LOS C during the afternoon peak hour. Adding a southbound right-turn pocket on 24th Avenue East would improve the level of service even further to LOS C during the morning peak hour and LOS B during the afternoon peak hour.

Operations along Montlake Boulevard would remain the same as existing conditions during the Phased Implementation Scenario if temporary ramps are built at 24th Avenue East. If ramps are not provided at 24th Avenue East, traffic would be detoured from the Lake Washington Boulevard ramps to the Montlake Boulevard ramps.
Chapter 11—Cumulative Transportation Effects

What is in this chapter?

This chapter summarizes the cumulative transportation effects of project alternatives in combination with other improvements to regional transportation facilities that were not included in the direct effects analyses described in Chapters 5 through 10. Because the analysis year for direct effects was 2030, the results included effects of projects that were planned and programmed to be completed by that time. The cumulative effects analysis also includes transportation projects that are planned to be complete by 2030, but were not programmed or funded at the time of our direct effects analysis. The cumulative effects scenario provides an estimate of travel demand throughout the region—taking into account all other reasonably foreseeable transportation improvement projects that may be constructed during the same time frame as the I-5 to Medina: Bridge Replacement and HOV Project.

Several conclusions can be drawn by comparing projected travel demand and travel patterns from the project alternatives with those from the cumulative effects scenario. This chapter summarizes those conclusions.

The following terms are used throughout this chapter and defined as follows:

- **Cumulative Effects Scenario** — This scenario is used for traffic analysis and assumes future implementation of an extended regional package of transportation capacity improvements in addition to the I-5 to Medina: Bridge Replacement and HOV Project.

- **6-Lane Alternative** — The 6-Lane Alternative, also referred to as the Build Alternative, includes the following elements:
  - A six-lane SR 520 corridor from I-5 to SR 202
  - A new interchange east of Montlake Boulevard East under the SR 520 roadway, with:
Elements of the 6-Lane Alternative include the transportation network assumptions described in other chapters of this report, but do not include the additional regional package of capacity improvements assumed in the cumulative effects scenario. There are actually three options (A, K, and L) for the 6-Lane Alternative. Option K was chosen as the representative build option for comparison in this chapter because it has the potential to result in slightly higher volumes along the SR 520 corridor compared to the other options.

The following sections describe the regional transportation improvements included in the cumulative effects scenarios, as well as how those scenarios were modeled. The results of the analysis are presented primarily in terms of screenline and cross-lake travel demand for both daily and afternoon peak periods. Screenline results include the following major regional corridors: I-5, I-405, I-90, SR 522, and SR 520.

Our evaluation of cross-lake travel specifically compares travel demand and mode choice between SR 520 and I-90. The No Build and 6-Lane Alternatives were evaluated against the cumulative effects scenario for both the screenline and cross-lake travel demand assessments.

The cumulative effects discussed in this chapter show some shifts in transit person trips resulting from the inclusion of the expanded Light Rail Transit service that was part of Sound Transit’s ST2 program. Total vehicle trips across SR 520 showed little change (less than 2 percent) as a result of including the ST2 program. As the environmental process progresses to the Final EIS phase, the ST2 program will be migrated into the baseline conditions of the project alternatives.
What was included in the regional package for the cumulative effects scenario?

WSDOT decided that the transportation system modeled for the year 2030 cumulative effects scenario should include the following:

- Regional high-priority projects, including the I-405 Corridor Congestion Relief and Bus Rapid Transit Projects Implementation Plan (WSDOT 2003)
- High-priority local arterial projects within the study area that have either undergone or are currently undergoing some form of environmental review
- All components of the ST2 program that were approved by the voters in November 2008. Major elements of this program include:
  - Extension of light rail south to Star Lake/Redondo, north to Lynnwood, and east to Overlake Transit Center via I-90.
  - Modifications to some Sound Transit bus routes currently serving the Eastside that will be replaced by the expansion of light rail.
  - Additional service on Sound Transit commuter rail service.

Exhibit 11-1 identifies additional highway projects included in the cumulative effects analysis effort. These projects are currently not funded, but could be completed by 2030. This includes several I-405 projects that are part of the I-405 Master Plan, but are not funded by the 2003 Nickel and 2005 Transportation Partnership Account.

**Exhibit 11-1. Unfunded Highway Projects Included in the SDEIS Cumulative Effects Scenario**

<table>
<thead>
<tr>
<th>Project</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-405 – SR 169 to I-90 – Add two new lanes in each direction</td>
<td>I-405 Master Plan, unfunded</td>
</tr>
<tr>
<td>I-405 – NE 6th Street Extension – Extend HOV direct access across to 120th.</td>
<td>I-405 Master Plan, unfunded</td>
</tr>
<tr>
<td>I-405 – Southbound Braided Ramps – Southbound braided ramps between SR 520 and NE 8th Street, including ramp connections to NE 10th Street</td>
<td>I-405 Master Plan, unfunded</td>
</tr>
</tbody>
</table>
Local Street Network

Exhibit 11-2 identifies local street projects included in the cumulative effects analysis. These projects are currently not funded, but could be complete by 2030.

### Exhibit 11-2. Unfunded Local Street Projects Included in the SDEIS Cumulative Effects Scenario

<table>
<thead>
<tr>
<th>Project</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercer Corridor Improvements</td>
<td>Seattle</td>
</tr>
<tr>
<td>Spokane Street Viaduct Project</td>
<td>Seattle</td>
</tr>
<tr>
<td>118th Avenue NE Road Ext – north of NE 116th (new) to NE 118th Street</td>
<td>Kirkland</td>
</tr>
<tr>
<td>NE 132nd Street Road Improvements – 100th Avenue to 132nd Avenue</td>
<td>Kirkland</td>
</tr>
<tr>
<td>119th Avenue NE Road Ext – NE 128th to NE 130th</td>
<td>Kirkland</td>
</tr>
<tr>
<td>EN 130th Street Road Ext – Totem Lake Boulevard to 120th Avenue NE</td>
<td>Kirkland</td>
</tr>
<tr>
<td>NE 120th Street Road Improvements – extend NE 120th to 120th Place</td>
<td>Kirkland</td>
</tr>
<tr>
<td>120th Avenue NE Road Ext – NE 116th to NE 120th</td>
<td>Kirkland</td>
</tr>
<tr>
<td>NE 4th Street Ext – 116th Avenue NE to 120th Avenue NE – Construct new 3- to 5-lane roadway</td>
<td>Bellevue</td>
</tr>
</tbody>
</table>

Transit Network

Exhibit 11-3 identifies transit projects recommended for the cumulative effects analysis.

Background improvements included during the development of the baseline travel demand modeling network for the SR520 SDEIS were finalized prior to the outcome of the November 2008 vote on Sound Transit’s ST2 program. The decision at that time was to include the ST2 program as a likely future scenario to be considered in the cumulative effects section of the transportation discipline report. This was also consistent with the project methodology, which defines the background projects as those that are planned and programmed (funded).
How was the travel modeling conducted?

The transportation discipline team used the SR 520 travel demand model to analyze potential future cumulative effects throughout the region, and specifically their effect on cross-lake travel demand. The cumulative effects scenario was modeled by providing a background network assumption to match the project description and validating the results against actual data for this corridor. The team then compared the cumulative effects scenario with the No Build Alternative and the 6-Lane Alternative for both daily and peak periods. The primary measures used to make the comparisons included vehicle trips and person trips.

The inclusion of ST2 light rail extension on I-90 from downtown Seattle through downtown Bellevue to the Overlake Transit Center has a substantial effect on transit travel patterns throughout the region. In order to understand the resulting travel behavior, it is necessary to describe a few key factors in demand modeling for transit trips. Key factors included when determining transit trip time include:

- Waiting for the transit vehicle (bus or train) to arrive
- Boarding and alighting times (which differ for buses and trains due to their physical configuration)
- Walk time to the final destination or transfers to different modes

### Exhibit 11-3. ST2 Program Components Currently Included in the SDEIS Cumulative Effects Scenario

<table>
<thead>
<tr>
<th>Project</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST2 – Light rail extension from SeaTac to Redondo/Star Lake (Federal Way)</td>
<td>Included in ST2 Plan, which was approved by the voters in the November 2008 ballot</td>
</tr>
<tr>
<td>ST2 – Light rail extension on I-90 from downtown Seattle to downtown Bellevue and Overlake Transit Center</td>
<td>Same as above</td>
</tr>
<tr>
<td>ST2 – Light rail extension from University of Washington to Northgate and Lynnwood</td>
<td>Same as above</td>
</tr>
<tr>
<td>ST2 – Commuter Rail: 9 additional trips per day</td>
<td>Same as above</td>
</tr>
<tr>
<td>100,000 additional annual hours of ST Express service beginning in 2009, including 49,000 hours that will be implemented in East King County</td>
<td>Same as above</td>
</tr>
</tbody>
</table>
- Travel time (which may or may not be impacted by local street traffic, traffic signals, or congestion depending on route and mode).

Depending on the origin and destination of a trip, one transit mode may travel a longer distance, but the complete travel time (taking into account all these factors) may be lower. The travel modeling process takes all these factors into account along with numerous other components of travel behavior such as population, employment, and parking costs to generate travel demand estimates by mode.

The steps in developing the cumulative effects scenario model runs included the following:

1. The cumulative effects package of other regional projects was added to the project travel demand model with the 6-Lane Alternative and the model was run to obtain output for the scenario.

2. The output results from the transportation model run for the cumulative effects scenario was then compared to the results of the model runs for the Build Alternative.

To compare results from the model runs, the team developed six screenlines at the following locations:

- Screenline 1: Mid-span bridge (Evergreen Point and I-90 bridges, and SR 522)
- Screenline 2: East of I-405 (between SR 520 and I-90)
- Screenline 3: North of SR 520 (between Lake Washington Boulevard NE and 148th Avenue NE)
- Screenline 4: Lake Washington Ship Canal (Fremont Bridge to Montlake Bridge, a combination of Seattle screenlines 5.12, 5.13, and 5.16)
- Screenline 5: South of I-90 (East Marginal Way to Rainier Avenue S, a combination of Seattle screenlines 9.12 and 9.13)
- Screenline 6: South of I-90 (118th Avenue SE, I-405, Factoria Boulevard SE, and 150th Avenue SE)
What are the cumulative effect findings?

The transportation discipline team consolidated and summarized extensive data from travel demand modeling. The results are presented in several formats to provide insight into travel behavior of autos and transit riders under the No Build Alternative, 6-Lane Alternative, and the cumulative effects scenario. Specifically, screenlines were used to compare the differences in cross-lake and north-south travel between the different scenarios. Additional analysis was conducted to isolate the behavior associated with transit transfers and access to park-and-ride facilities.

The following discussion represents results from the screenline data and more specific cross-lake travel trends that the team observed. The vehicle and person demand data reported in this chapter should not be directly compared to the results of operations analysis in other chapters. The cumulative effect results are output from the project travel demand model and are to be used for relative comparison of transportation scenarios at a regional level. For 2030 forecasts of vehicle and person demand, refer to Chapter 5.

Regional Travel Patterns

We developed several exhibits that depict the results of the cumulative effects modeling in comparison to the project alternatives model results. Both daily and afternoon peak period screenlines were developed for vehicle and person trips. Exhibits 11-4 and 11-5 present screenline daily results for vehicle and person trips, respectively. Exhibits 11-6 and 11-7 present afternoon peak period screenline results for vehicle and person trips, respectively.

The screenline exhibits show the different forecasted vehicle and person trips for the 6-Lane Alternative, the cumulative effects scenario, and the No Build Alternative. The No Build Alternative results from the travel demand model were used as a basis of comparison for the project alternative model runs as well as the cumulative effects model run.

General observations are as follows:

- On the Eastside (see screenlines 2 and 6), the increased roadway capacity provided in the cumulative effects scenario would allow both vehicle and person trips to increase. This is particularly true
Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Parks)
Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88

Exhibit 11-4. Screenline Daily Vehicle Trips
I-5 to Medina: Bridge Replacement and HOV Project
Screenline 1
No Build 6-Lane Alternative Cumulative Effects
569,500 595,100 561,800

Screenline 2
No Build 6-Lane Alternative Cumulative Effects
693,800 697,000 720,400

Screenline 3
No Build 6-Lane Alternative Cumulative Effects
522,100 521,300 516,300

Screenline 4
No Build 6-Lane Alternative Cumulative Effects
972,100 932,700 1,000,000

Screenline 5
No Build 6-Lane Alternative Cumulative Effects
932,500 926,600 863,300

Screenline 6
No Build 6-Lane Alternative Cumulative Effects
482,400 486,300 596,300

Source: King County (2006) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Parks).
Horizontal datum for all layers is NAD83(92); vertical datum for layers is NAVD88.

Exhibit 11-5. Screenline Daily Person Trips
I-5 to Medina: Bridge Replacement and HOV Project
**Screenline 1**
- **No Build**: 93,000
- **6-Lane Alternative**: 95,400
- **Cumulative Effects**: 86,700

**Screenline 2**
- **No Build**: 111,600
- **6-Lane Alternative**: 111,400
- **Cumulative Effects**: 114,700

**Screenline 3**
- **No Build**: 82,900
- **6-Lane Alternative**: 82,100
- **Cumulative Effects**: 81,900

**Screenline 4**
- **No Build**: 145,600
- **6-Lane Alternative**: 148,600
- **Cumulative Effects**: 151,400

**Screenline 5**
- **No Build**: 141,800
- **6-Lane Alternative**: 141,400
- **Cumulative Effects**: 132,700

**Screenline 6**
- **No Build**: 72,900
- **6-Lane Alternative**: 73,100
- **Cumulative Effects**: 90,500

Source: King County (2006) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(92); vertical datum for layers is NAVD88.

Exhibit 11-6. Screenline P.M. Peak Period Vehicle Trips
I-5 to Medina: Bridge Replacement and HOV Project
Exhibit 11-7. Screenline P.M. Peak Period Person Trips

I-5 to Medina: Bridge Replacement and HOV Project

Source: King County (2006) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(92); vertical datum for layers is NAVD88.
for north-south trips, and is likely because increased capacity on I-405 and SR 167 would create a more attractive regional north-south route in comparison to I-5.

Cross-lake vehicle and person demand (see screenline 1) would be less in the cumulative effects scenario compared to the direct effects of the project alternatives. Increased north-south capacity on Eastside facilities (e.g., I-405) would improve Eastside traffic circulation and likely shift some cross-lake demand to other routes.

- Seattle screenlines show a mix of results. The screenline south of I-90 (screenline 5) shows a relatively uniform decrease in north-south trips caused by the cumulative effects scenario. This would likely be due to the diversion of trips between south King County and the Eastside away from the I-5/I-90 route. The Seattle screenline north of SR 520 (screenline 4) does not show a similar decrease in north-south trips. It appears that the net effect of the cumulative effects scenario in this area would be relatively small for vehicle trips. Total person trips, however, are higher in this screenline for the cumulative effects scenario because Sound Transit’s light rail line north to Northgate and Lynnwood would be extended.

**Cross-Lake Travel Demand**

The results of cross-lake travel demand on I-90, SR 520, and SR 522 for cumulative effects show similar trends in both vehicle and person trips between the 6-Lane Alternative, No Build Alternative, and the cumulative effects scenario in both the daily and afternoon peak periods. The cumulative effects scenario shows a slight decrease in daily cross-lake vehicle demand compared to the No Build Alternative and the 6-Lane Alternative (about 5 percent and 7 percent, respectively).

This decrease in vehicle trips can primarily be attributed to several regional corridor capacity improvements on the east side of Lake Washington that were included in the cumulative effects scenario. Increased capacity on Eastside roadways would allow some trips to shift from the cross-lake routes to other routes on the Eastside. However, the vehicular demand to use SR 520 would still remain substantial, with or without the added regional corridor improvements.

The same pattern is exhibited for daily person trips when comparing the cumulative effects scenario with the No Build and 6-Lane...
Alternatives. The cumulative effects scenario exhibits lower cross-lake person trips than either the No Build or 6-Lane Alternatives, although the percentage difference is less than it is in vehicle trips.

Another observation that can be made regarding cross-lake travel is a general increase in the ratio of person trips to vehicle trips. The combination of higher 3+ person HOV usage on SR 520 due to the addition of HOV lanes on the bridge and HOV exempt tolling, and transit usage on I-90 with the inclusion of light rail, increases the overall person-carrying efficiency of the two bridges.

The model results suggest that several specific capacity improvements, in combination with tolling on the Evergreen Point Bridge, would encourage some cross-lake trips to remain on the Eastside. The incorporation of the 10- to 15-year Implementation Plan for I-405 assumes an increase in capacity on I-405 between I-5 in Tukwila and SR 522 in Bothell. Additional capacity is also planned for SR 167 (from SE 180th Street to I-405) and SR 522 (bus lane); both regional facilities tie into I-405 and would provide a viable alternative to the cross-lake bridges, given the additional capacity on these facilities and the requirement to pay a toll to cross the SR 520 bridge.

**North-South Travel Demand**

The north-south travel demand screenlines for the cumulative effects scenario show similar trends in both vehicle and person trips during the daily and afternoon peak periods. Exhibits 11-4 through 11-7 show the increase in north-south trips on the Eastside south of I-90 (screenline 6).

The cumulative effects scenario shows daily trips south of I-90 increasing by 26 percent in vehicle trips, and by 23 and 24 percent for daily person trips compared to the No Build and 6-Lane Alternatives, respectively. This reflects the capacity improvements assumed along I-405 and SR 167. I-5 would also be affected by the change in roadway capacity on the Eastside. In fact, given that I-405 would become more attractive with its additional capacity, travel demand on the I-5 corridor south of I-90 would decrease by approximately 8 percent on a daily basis.

The north-south screenline north of SR 520 and east of Lake Washington (screenline 3) shows minimal differences between the No Build Alternative, the 6-Lane Alternative, and the cumulative effects scenario. Differences between the alternatives, both in terms of vehicle trips and person trips, are all less than 2 percent. In general, this is a
reflection of improvements included in the cumulative effects scenario that are primarily located to the south and west of SR 520 and affect travel patterns in those corridors.

East-west demand would increase slightly east of I-405 (screenline 2) in the cumulative effects scenario. The daily increase, compared to either the No Build or 6-Lane Alternatives, would be about 4 percent for both daily vehicle trips and daily person trips. Given the increased attractiveness of the I-405 corridor due to the increased capacity in the cumulative effects scenario and the fact that more trips would remain on the Eastside, an increase in trips along this stretch of SR 520 is reasonable.

What happens to cross-lake mode choice?

The transportation discipline team compared cross-lake travel demand between HOVs, general-purpose vehicles, and transit across the SR 520 and I-90 bridges. The following paragraphs discuss the key findings from that analysis.

When evaluating cross-lake mode choice for the 6-Lane Alternative and the cumulative effects scenario, it is necessary to isolate the effects to cross-lake vehicle demand to avoid erroneous conclusions. Capacity improvements in the SR 167/I-405 corridor contained in the cumulative effects scenario would cause a substantial number of trips that would be traveling along I-5 and I-90 to divert to the I-405 corridor. As a result, the cross-lake vehicular traffic would be substantially less in the cumulative effects scenario than in the No Build and 6-Lane Alternatives. The difference is about 22,000 and 29,000 daily vehicles, respectively. The primary decrease in vehicle trips occurs on I-90, which accounts for about 96 (No Build) and 89 percent (6-Lane Alternative) of the decrease.

Transit ridership changes also are associated with the cumulative effects scenario when compared with the No Build and 6-Lane Alternatives. With the cumulative effects scenario, total cross-lake transit ridership for both HOV and light rail transit (LRT) increases by approximately 13,000 (or 33 percent) passengers daily compared to the No Build Alternative and by about 7,000 (or 16 percent) passengers daily compared to the 6-Lane Alternative. The distribution of this
ridership shifts toward the I-90 corridor with the introduction of LRT service and the accompanying higher frequency of service.

In general, transit ridership on SR 520 under the cumulative effects scenario is about 8,000 daily passengers (about 85 percent) lower than it is under the No Build Alternative and about 13,000 daily passengers (about 55 percent) lower than it is under the 6-Lane Alternative. However, this difference is offset by a 123 to 136 percent increase in transit ridership on I-90 (approximately 21,000 to 22,000 daily transit riders), which would occur when Eastlink light rail is constructed. The increased transit capacity and quality of service on I-90 would attract trips that otherwise would have taken SR 520. Similarly, improved transit capacity and quality of service on SR 520 would result in slightly diminished ridership on SR 522 because some trips would shift to the SR 520 corridor. Even though there is a net decrease in transit ridership on the SR 520 corridor with the cumulative effects scenario, there would still be nearly 10,000 transit riders per day and about the same number of people in carpools who would benefit from a continuous SR 520 HOV lane between I-5 and SR 202.

Exhibits 11-8 through 11-11 show the modeled results for year 2030 cross-lake daily and afternoon peak-period vehicle and person trips.

What are the conclusions of the cumulative effects evaluation?

Several conclusions are apparent in comparing the cumulative effect scenarios to the project alternatives. These are summarized below.

- The cumulative effects scenario is expected to result in fewer person and vehicle trips across Lake Washington on SR 520 compared with the No Build and 6-Lane Alternatives. This means that the analysis conducted for the I-5 to Medina: Bridge Replacement and HOV Project SDEIS represents a conservatively high estimate of traffic and associated traffic effects. If the regional projects assumed in the cumulative effects scenario are implemented in conjunction with the I-5 to Medina: Bridge Replacement and HOV Project, traffic conditions within the project corridor are expected to be similar or better than those estimated in the SDEIS.

- Because the SR 520 Program completes the HOV lane system between Redmond and Seattle, and assuming carpools and transit would not be required to pay a toll, a considerable increase in HOV
demand would occur along SR 520 with the 6-Lane Alternative compared to the No Build Alternative. The combination of reduced travel time and cost avoidance is a powerful incentive for carpool and transit use. A sizeable increase in carpool/transit demand is also projected in the cumulative effects scenario compared to the No Build Alternative. However, the increase over the No Build Alternative would not be as large as with the 6-Lane Alternative.

### Exhibit 11-8. 2030 Cross-Lake Daily Vehicle Trips

<table>
<thead>
<tr>
<th>Roadway Facility</th>
<th>2030 No Build</th>
<th>2030 6-Lane Alternative</th>
<th>2030 Cumulative Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Daily Vehicle Volumes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Non-HOV</td>
<td>HOV (3+)</td>
<td>Total</td>
</tr>
<tr>
<td>SR 522 (west of 61st Ave NE)</td>
<td>69,240</td>
<td>1,020</td>
<td>70,260</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
<td>132,650</td>
<td>2,350</td>
<td>135,000</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>I-90 (West Bridge)—GP Lanes</td>
<td>191,990</td>
<td>120</td>
<td>192,110</td>
</tr>
<tr>
<td>I-90 (West Bridge)—HOV Lanes</td>
<td>—</td>
<td>7,780</td>
<td>7,780</td>
</tr>
<tr>
<td><strong>Total Cross-Lake</strong></td>
<td>393,880</td>
<td>11,270</td>
<td>405,150</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR 522 (west of 61st Ave NE)</td>
<td>73,830</td>
<td>720</td>
<td>74,550</td>
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<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
<td>123,780</td>
<td>—</td>
<td>123,780</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
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<td>9,380</td>
<td>9,380</td>
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<tr>
<td>I-90 (West Bridge)—GP Lanes</td>
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<td>70</td>
<td>199,710</td>
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<td>I-90 (West Bridge)—HOV Lanes</td>
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<td>4,940</td>
<td>4,940</td>
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<td><strong>Total Cross-Lake</strong></td>
<td>397,250</td>
<td>15,110</td>
<td>412,360</td>
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<td></td>
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<td></td>
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<td>SR 522 (west of 61st Ave NE)</td>
<td>73,030</td>
<td>720</td>
<td>73,750</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
<td>121,810</td>
<td>—</td>
<td>121,810</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
<td>—</td>
<td>8,940</td>
<td>8,940</td>
</tr>
<tr>
<td>I-90 (West Bridge)—GP Lanes</td>
<td>174,370</td>
<td>200</td>
<td>174,570</td>
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<tr>
<td>I-90 (West Bridge)—HOV Lanes</td>
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<td>4,530</td>
<td>4,530</td>
</tr>
<tr>
<td>I-90 (West Bridge)—Rail</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Total Cross-Lake</strong></td>
<td>369,210</td>
<td>14,690</td>
<td>383,600</td>
</tr>
</tbody>
</table>

*a Includes non-HOV and commercial vehicles.

Notes: Model results are bi-directional and for comparison purposes.
The model was validated for the SR 520 corridor. Other regional facilities included in the model were validated as part of regional modeling process.

GP = general-purpose
### Exhibit 11-9. 2030 Cross-Lake Daily Person Trips

#### 2030 No Build Alternative

<table>
<thead>
<tr>
<th>Roadway Facility</th>
<th>Non-HOV</th>
<th>HOV (3+)</th>
<th>Commercial</th>
<th>Transit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 522 (west of 61st Ave NE)</td>
<td>79,190</td>
<td>3,230</td>
<td>9,710</td>
<td>4,290</td>
<td>96,420</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
<td>134,460</td>
<td>7,410</td>
<td>31,550</td>
<td>17,900</td>
<td>191,320</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>I-90 (West Bridge)—GP Lanes</td>
<td>212,940</td>
<td>390</td>
<td>31,900</td>
<td>140</td>
<td>245,370</td>
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<tr>
<td>I-90 (West Bridge)—HOV Lanes</td>
<td>—</td>
<td>24,520</td>
<td>—</td>
<td>16,170</td>
<td>40,690</td>
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<tr>
<td>Total Cross-Lake</td>
<td>426,590</td>
<td>35,550</td>
<td>73,160</td>
<td>38,500</td>
<td>573,800</td>
</tr>
</tbody>
</table>

#### 2030 6-Lane Alternative

<table>
<thead>
<tr>
<th>Roadway Facility</th>
<th>Non-HOV</th>
<th>HOV (3+)</th>
<th>Commercial</th>
<th>Transit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 522 (west of 61st Ave NE)</td>
<td>84,520</td>
<td>2,280</td>
<td>10,300</td>
<td>4,550</td>
<td>101,650</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
<td>121,780</td>
<td>—</td>
<td>32,230</td>
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<td>161,210</td>
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<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
<td>—</td>
<td>29,560</td>
<td>—</td>
<td>22,610</td>
<td>52,170</td>
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<tr>
<td>I-90 (West Bridge)—GP Lanes</td>
<td>219,720</td>
<td>230</td>
<td>34,450</td>
<td>120</td>
<td>254,520</td>
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<td>I-90 (West Bridge)—HOV Lanes</td>
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<td>15,580</td>
<td>—</td>
<td>17,170</td>
<td>32,750</td>
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<tr>
<td>Total Cross-Lake</td>
<td>426,020</td>
<td>47,650</td>
<td>76,980</td>
<td>44,450</td>
<td>595,100</td>
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#### 2030 Cumulative Effects

<table>
<thead>
<tr>
<th>Roadway Facility</th>
<th>Non-HOV</th>
<th>HOV (3+)</th>
<th>Commercial</th>
<th>Transit</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>SR 522 (west of 61st Ave NE)</td>
<td>83,440</td>
<td>2,280</td>
<td>10,300</td>
<td>3,150</td>
<td>99,170</td>
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<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
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<td>32,720</td>
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<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
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<td>14,290</td>
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<td>2,120</td>
<td>16,410</td>
</tr>
<tr>
<td>I-90 (West Bridge)—Rail</td>
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<td>36,450</td>
<td>36,450</td>
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<td>Total Cross-Lake</td>
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<td>45,400</td>
<td>79,810</td>
<td>51,420</td>
<td>561,560</td>
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</table>

Notes: Model results are bi-directional and for comparison purposes. The model was validated for the SR 520 corridor. Other regional facilities included in the model were validated as part of the regional modeling process.

GP = general-purpose
### Exhibit 11-10. 2030 Cross-Lake Afternoon Peak Period Vehicle Trips (General-Purpose and HOV)

#### 2030 No Build

<table>
<thead>
<tr>
<th>Roadway Facility</th>
<th>2030 No Build</th>
<th>Afternoon Peak Period Vehicle Volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total Non-HOV</td>
</tr>
<tr>
<td>SR 522 (west of 61st Ave NE)</td>
<td></td>
<td>16,990</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
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<td>29,400</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
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<td>—</td>
</tr>
<tr>
<td>I-90 (West Bridge)—GP Lanes</td>
<td></td>
<td>43,570</td>
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<td>I-90 (West Bridge)—HOV Lanes</td>
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<td>—</td>
</tr>
<tr>
<td>Total Cross-Lake</td>
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<td>89,960</td>
</tr>
</tbody>
</table>

#### 2030 6-Lane Alternative

<table>
<thead>
<tr>
<th>Roadway Facility</th>
<th>2030 6-Lane Alternative</th>
<th>Afternoon Peak Period Vehicle Volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total Non-HOV</td>
</tr>
<tr>
<td>SR 522 (west of 61st Ave NE)</td>
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<td>18,080</td>
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<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
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<td>28,320</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
<td></td>
<td>—</td>
</tr>
<tr>
<td>I-90 (West Bridge)—GP Lanes</td>
<td></td>
<td>44,710</td>
</tr>
<tr>
<td>I-90 (West Bridge)—HOV Lanes</td>
<td></td>
<td>—</td>
</tr>
<tr>
<td>Total Cross-Lake</td>
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<td>91,110</td>
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#### 2030 Cumulative Effects

<table>
<thead>
<tr>
<th>Roadway Facility</th>
<th>2030 Cumulative Effects</th>
<th>Afternoon Peak Period Vehicle Volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total Non-HOV</td>
</tr>
<tr>
<td>SR 522 (west of 61st Ave NE)</td>
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<td>17,910</td>
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<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
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<td>27,670</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
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<td>—</td>
</tr>
<tr>
<td>I-90 (West Bridge)—GP Lanes</td>
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<td>40,130</td>
</tr>
<tr>
<td>I-90 (West Bridge)—HOV Lanes</td>
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<td>—</td>
</tr>
<tr>
<td>Total Cross-Lake</td>
<td></td>
<td>85,710</td>
</tr>
</tbody>
</table>

*Includes non-HOV and commercial vehicles.

Notes: PM Peak Period represents 3 hours.

Model results are bi-directional and for comparison purposes.

GP = general-purpose
Exhibit 11-11. Cross-Lake Afternoon Peak Period Person Trips (General-Purpose and HOV)

### 2030 No Build

<table>
<thead>
<tr>
<th>Roadway Facility</th>
<th>Non-HOV</th>
<th>HOV (3+)</th>
<th>Commercial</th>
<th>Transit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 522 (west of 61st Ave NE)</td>
<td>18,760</td>
<td>790</td>
<td>2,890</td>
<td>1,660</td>
<td>24,100</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
<td>27,160</td>
<td>1,010</td>
<td>8,980</td>
<td>6,440</td>
<td>43,590</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>I-90 (West Bridge)—GP Lanes</td>
<td>46,110</td>
<td>40</td>
<td>8,910</td>
<td>70</td>
<td>55,130</td>
</tr>
<tr>
<td>I-90 (West Bridge)—HOV Lanes</td>
<td>—</td>
<td>7,880</td>
<td>—</td>
<td>6,120</td>
<td>14,000</td>
</tr>
<tr>
<td>Total Cross-Lake</td>
<td>92,030</td>
<td>9,720</td>
<td>20,780</td>
<td>14,290</td>
<td>136,820</td>
</tr>
</tbody>
</table>

### 2030 6-Lane Alternative

<table>
<thead>
<tr>
<th>Roadway Facility</th>
<th>Non-HOV</th>
<th>HOV (3+)</th>
<th>Commercial</th>
<th>Transit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 522 (west of 61st Ave NE)</td>
<td>19,970</td>
<td>410</td>
<td>3,070</td>
<td>1,770</td>
<td>25,220</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
<td>25,250</td>
<td>—</td>
<td>9,340</td>
<td>—</td>
<td>34,590</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
<td>—</td>
<td>8,570</td>
<td>—</td>
<td>8,050</td>
<td>16,620</td>
</tr>
<tr>
<td>I-90 (West Bridge)—GP Lanes</td>
<td>46,850</td>
<td>—</td>
<td>9,490</td>
<td>60</td>
<td>56,400</td>
</tr>
<tr>
<td>I-90 (West Bridge)—HOV Lanes</td>
<td>—</td>
<td>4,350</td>
<td>—</td>
<td>6,480</td>
<td>10,830</td>
</tr>
<tr>
<td>Total Cross-Lake</td>
<td>92,070</td>
<td>13,330</td>
<td>21,900</td>
<td>16,360</td>
<td>143,660</td>
</tr>
</tbody>
</table>

### 2030 Cumulative Effects

<table>
<thead>
<tr>
<th>Roadway Facility</th>
<th>Non-HOV</th>
<th>HOV (3+)</th>
<th>Commercial</th>
<th>Transit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 522 (west of 61st Ave NE)</td>
<td>19,720</td>
<td>410</td>
<td>3,090</td>
<td>1,280</td>
<td>24,500</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—GP Lanes</td>
<td>24,220</td>
<td>—</td>
<td>9,460</td>
<td>—</td>
<td>34,130</td>
</tr>
<tr>
<td>SR 520 (Lk Wash Bridge)—HOV Lanes</td>
<td>—</td>
<td>7,850</td>
<td>—</td>
<td>3,720</td>
<td>11,570</td>
</tr>
<tr>
<td>I-90 (West Bridge)—GP Lanes</td>
<td>39,820</td>
<td>230</td>
<td>10,190</td>
<td>10</td>
<td>50,250</td>
</tr>
<tr>
<td>I-90 (West Bridge)—HOV Lanes</td>
<td>—</td>
<td>4,070</td>
<td>—</td>
<td>830</td>
<td>4,900</td>
</tr>
<tr>
<td>I-90 (West Bridge)—Rail</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>12,680</td>
<td>12,680</td>
</tr>
<tr>
<td>Total Cross-Lake</td>
<td>83,760</td>
<td>12,560</td>
<td>22,740</td>
<td>18,520</td>
<td>137,580</td>
</tr>
</tbody>
</table>

Notes: PM Peak Period represents 3 hours.
Model results are bi-directional and for comparison purposes.
GP = general-purpose
- Total cross-lake vehicle travel with the cumulative effects scenario would be lower when compared to the 6-Lane Alternative. The reduction in HOV trips is projected to be lower than the reduction in general-purpose trips.

- Vehicle trips decrease at a higher rate than person trips. This means that more people would be moved by fewer vehicles with the 6-Lane Alternative and the cumulative effects scenario than with the No Build Alternative.

- Total cross-lake transit travel would increase with the cumulative effects scenario compared to the No Build and 6-Lane Alternatives. This is due to the increased ridership associated with the implementation of the East Link rail service on I-90.

Internal traffic circulation on the Eastside would improve and more trips would likely remain on the Eastside due to capacity improvements along regional corridors such as I-405, SR 167, and SR 522. Therefore, the volume across the cross-lake screenline is expected to decrease, while volumes across screenlines on the Eastside are projected to increase with the cumulative effects scenario.
Chapter 12—Traffic and Parking Improvement Guidelines

What is in this chapter?

This chapter describes jurisdiction guidelines for traffic and parking improvements and summarizes the measures and design modifications for the I-5 to Medina: Bridge Replacement and HOV Project. WSDOT will coordinate with local jurisdictions to determine if traffic and parking improvements are required for the project and how they should be implemented. Agreements with jurisdictions may supersede jurisdiction-specific guidelines for project-related improvements.

How have agency policies guided development of the SDEIS 6-Lane Alternative options?

A Draft EIS and addendum were completed in August 2006 for the SR 520 Bridge Replacement and HOV Project. The Draft EIS addendum included design options for a Westside interchange between I-5 and the western shore of Lake Washington. The public response to the proposed design options was not favorable, forcing the state to reconsider the configuration of the Westside interchange near Montlake Boulevard and SR 520.

The Washington State Legislature passed Engrossed Substitute Senate Bill (ESSB) 6099 during the 2007 legislative session. ESSB 6099 directed the Office of Financial Management to hire a mediation group to facilitate an agreement on the interchange configuration on the west end of SR 520. The goal of mediation was to select a Westside interchange option for the 6-Lane Alternative configuration that would be analyzed further in the supplemental draft environmental impact statement (SDEIS).

During the mediation process, the transportation team compiled data in response to requests from the mediation group, provided feedback on early option development, and provided detailed traffic operational
analysis for development of a final set of options. The mediation group participants developed new Build Alternative options based on their goals to minimize roadway widths and reduce freeway traffic passing through neighborhoods. Although these options incorporated some of the design refinements identified by the project team, design improvements that conflicted with the goals of the mediation group were not included. This discussion includes those design refinements that were suggested but not incorporated. In addition, new findings from the SDEIS traffic analysis are presented.

How were project guidelines for traffic and parking improvements developed?

WSDOT design standards and Seattle concurrency thresholds for local traffic operations and parking policies were reviewed to establish project standards and thresholds for traffic and parking improvements. These standards and thresholds are described below.

WSDOT Standards

WSDOT design guidelines for traffic operations are discussed in this section. These guidelines are based on level of service (LOS) grades.

WSDOT has acknowledged that meeting design standards for 2030 in an urban environment may be difficult. However, the design standards should be used as first level guidance for alternative development with the acknowledgement that the final design decisions could be based on agreements between WSDOT and local jurisdictions.

Highway Mainline

SR 520 is a designated highway of statewide significance (HSS). WSDOT uses an LOS standard of D as the minimum operational standard for an HSS corridor. Under this standard, LOS D or better is the preferred operating condition for highways in urban areas.

Arterial Intersections at Ramp Terminals

WSDOT recommends that traffic operation improvements be considered if an existing ramp terminal intersection operates at LOS E or worse and is negatively affected by the project (compared to the No Build Alternative).
New intersections, such as the intersection at the terminus of Option K or L Westside interchange ramps, are typically designed to operate at LOS D for the horizon year. WSDOT would consider additional improvements if queue spillback from an on-ramp or off-ramp were to exceed the available storage and affect freeway operations.

**Level of Service Standards for Regionally Significant Highways**

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

Based on its classification as an RSSH, Montlake Boulevard has an LOS threshold of LOS E, which calls for improvements to reduce traffic congestion when the afternoon peak hour falls below LOS E.

**Coordination with Local Jurisdictions**

Local jurisdictions’ design standards and concurrency thresholds were also considered as the project effects were evaluated. WSDOT coordinates with local jurisdictions to determine what types of traffic improvement measures should be included in the project and how the measures will be implemented.

Some jurisdictions require that local development projects conform to the jurisdiction’s concurrency and maximum operational thresholds. Local development projects include housing, condominium, apartment, and business development that generate various amounts of traffic into the local street network.

The I-5 to Medina: Bridge Replacement and HOV Project is not considered a local development project because it would not include any new facilities that generate vehicle-trips within city limits. Therefore, the criteria used for identifying local street traffic improvement measures for project effects along the corridor do not directly correlate to specific jurisdictions’ concurrency thresholds.

**City of Seattle Concurrency Guidelines**

*Seattle’s Comprehensive Plan: Toward a Sustainable Seattle* (January 2005) divides the city into more than 20 subareas for which average screenline
traffic operations are measured. To determine whether a project meets or exceeds Seattle’s concurrency thresholds, a project’s volume to capacity (V/C) ratios across screenlines would be calculated.

Each of the screenlines identified for the I-5 to Medina: Bridge Replacement and HOV project has a V/C ratio threshold of 1.2. The V/C ratio of 1.2 indicates that the traffic demand crossing the screenline may be no more than 20 percent greater than the capacity; this ratio is calculated for both morning and afternoon peak hours.

Comprehensive Plan Policy T67 states, “When the calculated LOS for a screenline approaches the LOS standard for that screenline, first pursue strategies to reduce vehicular travel demand across the screenline before increasing the operating capacity across the screenline.”

**What are SR 520 program guidelines for traffic and parking improvements?**

The SR 520 program guidelines for traffic operations indicate that the project should result in operations similar to or better than the No Build Alternative within the study area. Therefore, the project will not require improvements to traffic operation conditions that are unrelated to direct project effects.

**Local**

Exhibit 12-1 presents the project’s guidelines for determining if traffic improvement measures are necessary at a local level. These guidelines were developed as a part of the transportation methodology report for the project.

Based on City of Seattle criteria, the V/C ratios across a screenline or within a subarea must be below a designated threshold. Because the analysis for the I-5 to Medina: Bridge Replacement and HOV Project focused on groups of individual intersections, the screenline level of information was not prepared.
The team adapted the City’s criteria for use on the project by determining the average of the maximum intersection V/C ratios for all of the study intersections in each interchange area. This resulted in an interchange area maximum V/C ratio.

The team then compared the interchange area maximum values to the City’s screenline V/C thresholds. This method results in a more conservative analysis than the City’s methodology because it emphasizes the worst approach of each intersection within the interchange area. Exhibit 12-2 shows the results of that comparison.

### Parking

Local jurisdiction parking policies focus on managing congestion by encouraging commuters to choose alternative modes of travel other than single-occupant vehicles. However, the importance of providing enough parking to sustain economic vitality in commercial areas is acknowledged. The guidelines for improving parking availability in conjunction with a project are not as clearly defined as those for improving traffic operations.

The parking policies provide local jurisdictions to provide input on the type of parking improvements that may be warranted when existing parking is affected by a project. Negative effects to undesignated use of public right-of-way for parking would not be considered a cause for new parking improvements.
Exhibit 12.2. Interchange Area Maximum V/C Ratios

<table>
<thead>
<tr>
<th>Interchange Area</th>
<th>Time Period</th>
<th>No Build Alternative</th>
<th>6-Lane Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montlake Boulevard/Lake Washington Boulevard</td>
<td>AM</td>
<td>0.66</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>0.86</td>
<td>0.80</td>
</tr>
<tr>
<td>E Roanoke Street/ Harvard Avenue E</td>
<td>AM</td>
<td>0.85</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>1.01</td>
<td>1.07</td>
</tr>
<tr>
<td>NE 45th Street</td>
<td>AM</td>
<td>0.60</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>0.80</td>
<td>0.85</td>
</tr>
<tr>
<td>Stewart Street</td>
<td>AM</td>
<td>0.87</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>0.92</td>
<td>0.92</td>
</tr>
<tr>
<td>Mercer Street</td>
<td>AM</td>
<td>0.83</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>0.92</td>
<td>0.91</td>
</tr>
</tbody>
</table>

The rest of this chapter identifies areas affected by the I-5 to Medina: Bridge Replacement and HOV Project and describes proposed improvements to traffic and parking conditions. WSDOT will discuss these proposed improvements with the City of Seattle prior to design and incorporation into the project.

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

As the project design was developed, the transportation discipline team identified locations where the project would affect traffic and proposed design modifications to be included in the Build Alternative definition. This includes the number of lanes needed for on- and off-ramps, and intersection configurations and stop control adjacent to the corridor.

As described previously, although many design recommendations were shared with the City of Seattle and communities adjacent to the corridor, some were excluded from the project during the mediation process. Excluded design improvements, however, are included in our discussion here to provide a more complete perspective of actions that may be required to avoid or minimize negative effects.
What project design refinements could further minimize negative effects?

The transportation discipline team reviewed the operational results for the various signalized intersection networks presented in Chapters 5 and 6 to determine if additional traffic improvement measures are warranted. The results of our review are reported below for local arterials, the SR 520 corridor, and parking.

Local Arterials

All of the interchange area V/C ratios are under the threshold of 1.2. The SR 520/I-5/East Roanoke Street interchange for Option A shows a V/C ratio of 1.07 (compared to 1.01 for the No Build Alternative). Option A includes the closure of ramps to and from Lake Washington Boulevard. With this change in capacity, there is an increase in trips that divert to the Harvard off-ramp from SR 520, resulting in the increased V/C ratio.

In addition to reviewing project effects for the overall interchange area, the transportation team reviewed individual intersection operations to identify where additional design changes could be considered based on WSDOT’s LOS guidelines. The complete results of the intersection LOS analysis are summarized in Chapter 6.

The intersections shown in Exhibit 12-3 operate at LOS E or F, worse than the No Build Alternative. Design changes have been identified to meet WSDOT LOS guidelines. Exhibit 12-3 summarizes the location, issue, and possible design modification (based on traffic operations results) and identifies if this improvement was reviewed in the mediation process.

SR 520 Corridor

Congestion occurs on the SR 520 corridor westbound across Portage Bay with the No Build Alternative and 6-Lane Alternative options. In the Draft EIS, the 6-Lane Alternative included auxiliary lanes across Portage Bay to improve operations between the Montlake Boulevard on-ramp and the I-5 interchange ramps, which are located less than one-half mile from each other.
### Exhibit 12-3. **Local Issues and Possible Design Modifications per WSDOT Guidelines**

<table>
<thead>
<tr>
<th>Location</th>
<th>Issue</th>
<th>Possible Design Modification Based on Traffic Operations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common to All 6-Lane Alternative Options</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lakeview Boulevard E/I-5 NB off-ramp</td>
<td>During morning peak hour, intersection degrades to LOS F (LOS C under the No Build Alternative), with an increase of 240 vph (or 25%)</td>
<td>Signalize intersection.</td>
<td>Monitor queue onto I-5 northbound off-ramp.</td>
</tr>
<tr>
<td>Harvard Avenue E/I-5 NB on-ramp</td>
<td>Intersection degrades to LOS F (LOS E in the No Build Alternative) during afternoon peak hour</td>
<td>Signalize intersection.</td>
<td>Monitor queue from center left turn lane.</td>
</tr>
<tr>
<td>Boylston Avenue E/E Lynn Street</td>
<td>Operates at LOS F in the morning peak hour, with 11% (+200 vph) increase in total entering volume (compared to the No Build Alternative at LOS E)</td>
<td>Signalize intersection.</td>
<td>Queues occur on side street approach. Monitor queues.</td>
</tr>
<tr>
<td><strong>Option A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvard/Roanoke intersection</td>
<td>Operates at LOS F (V/C of 1.58) in the afternoon peak hour, with 320 additional peak hour trips entering the intersection (compared to the No Build Alternative LOS F and V/C of 1.39)</td>
<td>Increase off-ramp capacity to the Montlake/Lake Washington Boulevard interchange areas to reduce the number of trips diverting to the Harvard off-ramp (as included in Suboption A).</td>
<td>Identified design change in mediation process. Consensus by Option A proponent group was to not include this capacity as part of Option A; therefore, this has been evaluated as Suboption A to compare this capacity improvement.</td>
</tr>
<tr>
<td>NE 45th St/7th Avenue NE/I-5 northbound off-ramp</td>
<td>Operates at LOS E in the afternoon peak hour, with 130 additional northbound trips exiting (compared to the No Build Alternative at LOS D)</td>
<td>Increase off-ramp capacity to the SR 520/Montlake/Lake Washington Boulevard interchange areas to reduce the number of trips diverting to the NE 45th Street off-ramp (as included in Suboption A).</td>
<td>Monitor queue onto I-5 northbound off-ramp.</td>
</tr>
<tr>
<td><strong>Option K</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montlake Boulevard NE/NE Pacific Street intersection</td>
<td>Operates at LOS F in the afternoon peak hour. V/C ratio in No Build is 1.26, increase to 1.38 with Option K.</td>
<td>Add third northbound through lane from south of intersection to north of Pacific Place (as included in Suboption K). Reduces the V/C ratio to less than No Build, but still operates at LOS F.</td>
<td>Identified design change in mediation process. Consensus by Option K proponent group was to not include this capacity as part of Option K; therefore, this has been evaluated as Suboption K.</td>
</tr>
</tbody>
</table>
Exhibit 12-3. **Local Issues and Possible Design Modifications per WSDOT Guidelines**

<table>
<thead>
<tr>
<th>Location</th>
<th>Issue</th>
<th>Possible Design Modification Based on Traffic Operations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Turn-Around</td>
<td>Operates at LOS F in the afternoon peak hour. Carries about 2,000 vph (equivalent to a freeway lane), with half of the vehicles trying to make a lane change in less than 500 feet. Northbound and southbound sections would operate with congestion.</td>
<td>Additional analysis is required to determine design modifications.</td>
<td>Identified operational issues in mediation.</td>
</tr>
<tr>
<td>Suboption K</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic Turn-Around</td>
<td>Similar as Option K.</td>
<td>Additional analysis is required to determine design modifications.</td>
<td>Identified operational issues in mediation.</td>
</tr>
<tr>
<td>Option L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montlake Boulevard NE/NE Pacific Street intersection</td>
<td>Operates at LOS F in the afternoon peak hour. V/C ratio with the No Build Alternative is 1.26, increasing to 1.32 with Option L.</td>
<td>Add third northbound through lane from south of intersection to north of Pacific Place (as included in Suboption L). Reduces the V/C ratio to less than No Build, but still operates at LOS F.</td>
<td>Suboption L was analyzed to compare this capacity improvement.</td>
</tr>
<tr>
<td>Suboption L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Interchange SPUI/SR 520 ramps</td>
<td>Suboption increases traffic on the northbound to eastbound movement through SPUI (reduces southbound to eastbound). Operates at LOS E in the morning peak hour,</td>
<td>Add second right turn lane for northbound to eastbound movement to improve to LOS D.</td>
<td>Finding result of SDEIS traffic analysis.</td>
</tr>
<tr>
<td>Lake Washington Boulevard/SR 520 ramp terminus</td>
<td>Suboption increases traffic through this intersection (reduces traffic through Montlake Blvd NE/NEPacific Street). Operates at LOS F in the afternoon peak hour.</td>
<td>Provide right turn pocket for southbound trips exiting from SR 520 destined northbound on Lake Washington Boulevard.</td>
<td>Finding result of SDEIS traffic analysis.</td>
</tr>
</tbody>
</table>
During the mediation process, the westbound auxiliary lane was incorporated into Option A, but was excluded from Options K and L. Options K and L are located farther to the east, so the spacing between the I-5 ramps is improved compared to today. However, the operations analysis indicated this section of the freeway would still operate with substantial congestion for Options K and L. The congestion would spill back onto the local street system. The operational issues and design recommendations are summarized in Exhibit 12-4.

Exhibit 12-4. SR 520 Issues and Possible Design Modifications

<table>
<thead>
<tr>
<th>Location</th>
<th>Issue</th>
<th>Recommended Design Modification Based on Traffic Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option A</td>
<td>Additional volume across Portage Bay and at the I-5 ramps increases congestion compared to the No Build Alternative. Queues onto the local system at the SR 520/Montlake Boulevard and I-5/East Roanoke Street interchange areas. The SR 520/Montlake Boulevard interchange on-ramp merge is over capacity.</td>
<td>Increase off-ramp capacity to the SR 520/Montlake Boulevard/Lake Washington Boulevard interchange areas (Suboption A) to reduce traffic volumes across Portage Bay.</td>
</tr>
<tr>
<td>Option K, Suboption K, Option L, Suboption L</td>
<td>The westbound on-ramp merge is over capacity, causing congestion to spill back onto the Westside interchange. Congestion spills back from I-5, contributing to congestion.</td>
<td>Add a westbound auxiliary lane across Portage Bay Bridge</td>
</tr>
</tbody>
</table>

**Parking**

Parking would not be replaced in-kind in some areas where it would be adversely affected by the project; this is due to a shortage of space available for replacement. Coordination and discussion between WSDOT, the City of Seattle, and affected land owners are required to determine the actual parking measures that may be implemented as part of the project. Exhibit 12-5 identifies the parking that exists today and capacity lost with the project.
### Exhibit 12-5. Existing Parking and Capacity Changes with the Project

<table>
<thead>
<tr>
<th>Location</th>
<th>Existing Capacity</th>
<th>Comments</th>
<th>Capacity Changes With the Project</th>
<th>Option A</th>
<th>Option K</th>
<th>Option L</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bagley Viewpoint (Delmar Drive East and East Roanoke Street)</strong></td>
<td>10</td>
<td>Low utilization</td>
<td>Some provided on Roanoke lid</td>
<td>Some provided on Roanoke lid</td>
<td>Some provided on Roanoke lid</td>
<td></td>
</tr>
<tr>
<td><strong>NOAA Northwest Fisheries Science Center (2725 Montlake Boulevard East)</strong></td>
<td>148</td>
<td>136 typically utilized</td>
<td>-12</td>
<td>No change</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td><strong>East Roanoke Street On-Street Parking (East Roanoke Street and West Montlake Place East)</strong></td>
<td>6</td>
<td>Fully utilized</td>
<td>No change</td>
<td>-6</td>
<td>-6</td>
<td></td>
</tr>
<tr>
<td><strong>76 Gas Station (2645 East Montlake Place)</strong></td>
<td>5</td>
<td>Parking associated with gas station</td>
<td>-5, also removes gas station (demand)</td>
<td>No change</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td><strong>Hop-In Market (2605 22nd Avenue East)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Side of the Market</td>
<td>Demand 15</td>
<td>-9</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>East Side of the Market</td>
<td>10</td>
<td>Fully utilized</td>
<td>-10</td>
<td>No change</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>24th Avenue East On-Street Parking (East Hamlin Street and 24th Avenue East)</td>
<td>5</td>
<td>Low utilization</td>
<td>No change</td>
<td>-1</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td><strong>Museum of History and Industry (2700 24th Avenue East)</strong></td>
<td>150</td>
<td>Parking associated with MOHAI and park</td>
<td>-150, parking would be provided for park users</td>
<td>-150, parking would be provided for park users</td>
<td>-150, parking would be provided for park users</td>
<td></td>
</tr>
<tr>
<td><strong>Husky Stadium (3800 Montlake Boulevard)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>E11 (includes effects of Sound Transit University Link project)</td>
<td>429</td>
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<td>No change</td>
<td>-20</td>
<td>-114</td>
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<tr>
<td>E12 (includes effects of Sound Transit University Link project)</td>
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<td>Fully utilized</td>
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<td>No change</td>
<td>-57</td>
<td></td>
</tr>
<tr>
<td>WSDOT Public Lot (Lake Washington Boulevard East)</td>
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<td>Fully utilized</td>
<td>No change</td>
<td>-24</td>
<td>No change</td>
<td></td>
</tr>
</tbody>
</table>
How can the project minimize negative effects during construction?

Similar to any large construction project, traffic congestion is expected in the project area as a result of construction activities. The project construction plans will include staging techniques and temporary improvements, described in Chapter 10, to reduce the potential construction effects to traffic. These plans include specific restrictions on construction methods, prescribed work times for construction to avoid peak travel periods, and temporary roadway improvements.

These methods serve to manage the timing of construction activities and alleviate capacity constraints through the construction area. In addition to these physical methods, the strategies described in this section may be used to manage the flow of traffic and minimize the traffic demand during construction.

Safety

The Federal Highway Administration (FHWA) published the Work Zone Safety and Mobility Rule on September 9, 2004, in the Federal Register (69 FR 54562). In accordance with this rule, the project would develop a temporary traffic control plan. This plan would address traffic safety and control throughout the work zone.

Traffic Management Plan

The contractor selected to construct the project will be required to prepare a Traffic Management Plan (TMP) to be approved by WSDOT, in coordination with the City of Seattle, to ensure that construction effects on local streets, property owners, and businesses are minimized. The TMP will include, as a minimum, the following measures:

- Details on required street and lane closures (duration and timing)
- Proposed detours and signing plans (for vehicles, pedestrians, freight, and bicycles)
- Measures to minimize impacts on transit operations and access to/from transit facilities (in coordination with transit service providers)
- Traffic enforcement measures, including deployment of police officers
• Coordination with emergency service providers
• Measures to minimize traffic and parking impacts from construction employees
• Measures to minimize effects of truck traffic for equipment and material delivery
• Measures to minimize disruption of access to businesses and properties
• Measures to minimize conflicts between construction activities and traffic during events (this may or may not include stopping construction activities during certain hours)
• Public outreach communication plan

**Work Zone Management Techniques**

Other options for construction traffic management include developing and implementing various work zone management strategies. These strategies may include using Intelligent Transportation Systems (ITS), traveler information, real-time work zone monitoring, traffic incident management, and enforcement techniques.

**Traveler Information Systems**

Traveler information systems are designed to inform the general public of construction activities and transportation system operating conditions. They allow drivers to avoid traffic problems, save time, and reduce frustration. Examples include, but are not limited to, dynamic and variable message signs, highway advisory radio, e-mail alerts, and project web sites that provide real-time information on traffic conditions around construction and outlying areas. The traveler information system already in place will be used for this project, which includes all the above-mentioned examples except for a project-specific web site with real-time information.

**Incident Management Systems**

WSDOT’s current incident response program will continue to be used for this project. Incident management systems are planned and coordinated strategies to detect, respond to, and remove traffic incidents to restore traffic capacity as safely and quickly as possible.
The process of restoring traffic capacity involves a number of public and private sector partners, including law enforcement, fire and rescue, emergency medical services, transportation, public safety communications, emergency management, towing and recover services, hazardous materials contractors, and traffic information media. Incident management systems can help reduce impact during construction in the following areas:

- Incident clearance time: 38 to 66 percent
- Emergency vehicle response time: 20 to 30 percent
- Primary crashes: 35 to 40 percent
- Secondary crashes: 30 to 50 percent

**Active Traffic Management**

Active traffic management technology dynamically controls traffic based on the prevailing conditions. Using integrated systems and a coordinated response, both recurrent and non-recurrent congestion can be managed to improve roadway safety and traffic flows. Potential tools used as part of an active traffic management system include:

- **Overhead gantries** - to display variable speed limit and real-time traffic information over each lane
- **Variable speed limit** - to dynamically and automatically reduce speed limits approaching areas of congestion, collisions, or special events
- **Queue warning** - to warn motorists of downstream queues (or backups) and direct through traffic to alternate lanes
- **Junction control** - to use variable traffic signs, dynamic pavement markings, and lane use control to direct traffic to specific lanes (mainline or ramp) based on varying traffic demand
- **Hard shoulder running** - to use the shoulder as a travel lane during congested periods or to allow traffic to move around an incident
- **Dynamic rerouting** - to change destination signs to account for current traffic conditions
- **Travel time signs** - to display estimated travel time and other condition reports as well as communicate travel and traffic conditions. WSDOT currently uses variable message signs to post travel time information
Construction Worker Shuttle Service

Construction worker shuttle service moves workers from outlying temporary or permanent parking facilities into the work zones, thereby reducing the number of vehicles arriving and leaving the work zone areas.

Special Events

Several strategies can be used to help mitigate construction activities during special events, such as those at the University of Washington:

- Tailor special event traffic management plans to consider project construction congestion, including transit priority and special event shuttle services.
- Increase shuttle services so access is provided both to and from events.
- Provide discounts for transit shuttle (e.g., discount ticket by cost of transit shuttle).
- Implement additional event date/time-specific parking restrictions.
- Add police officer traffic control as needed.
- Provide a web site and other outreach regarding construction and travel options to special events that are accessible and understandable.
- Request that the City of Seattle revise routes for parades and other annual events.

Transportation Demand Management

Transportation Demand Management (TDM) includes a variety of strategies that provide alternatives to driving in single-occupant vehicles, particularly during peak traffic periods. TDM programs include outreach to increase public awareness about travel options and services, including incentives, that help people choose a new travel option. They even provide new travel options such as vanpools to encourage a shift away from travel in single-occupant vehicles. Transportation Demand Management is implemented in a regional context through a variety of ongoing state and local jurisdiction TDM programs.
Purpose of TDM During Construction
The I-5 to Medina: Bridge Replacement and HOV Project will be built over a period of approximately 5 years, and as with any major project, construction activities will affect the normal travel patterns of road users within the project vicinity. TDM may be used, in addition to other techniques, to minimize these effects by reducing traffic demand through the project area.

TDM and Transit
The goal of TDM is to increase the efficiency of travel on roadways by moving more people in fewer vehicles. Transit is typically a primary consideration for any comprehensive TDM program because it is a reliable mode of moving many people in fewer vehicles. This is particularly true in urban areas with well-established transit systems in place.

The people-moving capacity of transit is necessary for many TDM strategies to be successful. In cases when additional transit capacity is needed, enhanced services may be included as a TDM program element. However, the role of TDM is usually to provide services that make it easier for people to use existing transit services.

Implementing TDM During Construction
The project team will coordinate with the WSDOT Public Transportation Division to develop a strategy focused on maintaining traffic during construction. This strategy is expected to include a set of temporary TDM and transit enhancements that will provide additional travel options to the public during construction.

TDM is not a physical part of the roadway or a requirement of the construction methods like many of the other measures that are used to minimize construction effects. Instead, it seeks to improve the efficiency with which people use the roadway. In order for demand management to be effective on a specific project, it must be implemented in a way that reaches out to the primary users of the affected roadway facility.

Since SR 520 is classified as a Highway of Regional Significance, many of the users originate in communities well beyond the project limits and travel to destinations both within and beyond the project vicinity.

Many jurisdictions where SR 520 users live and work have existing TDM programs. Bellevue, Kirkland, Redmond, and Seattle have established programs that provide travel options to commuters.
King County also provides these services through its own efforts in addition to operating a popular vanpool program. WSDOT supports local jurisdictions through its investment in a variety of strategies and through the Commute Trip Reduction (CTR) program.

One of the principal elements of the project TDM strategy will be to support existing programs rather than implement an entirely new program during the construction period. Therefore, a significant aspect of the project TDM strategy will involve communication and cooperation with local experts who are already implementing successful programs. The project involves working closely with WSDOT demand management specialists to establish a plan for coordination with jurisdictions affected by SR 520. The plan will define a protocol for communication between the project, WSDOT staff, and implementers at the jurisdiction level.

The coordination plan is designed to enhance the effectiveness of the project’s TDM efforts by offering services to travelers through programs they already use. This approach will encourage continuity in the services provided to users and minimize the level of planning and development required to implement a project strategy. When construction is complete, it will allow a streamlined transition of project-related TDM services back to the ongoing programs managed by the local jurisdictions.

The project will include a communications plan to ensure that both the implementers and users of TDM programs receive the information they need about construction activities on the project. Prior to construction, the project team will work with WSDOT staff to find out who needs to be engaged in the process.

Conditions often change during construction of complex projects, and it will be necessary to communicate changes quickly and accurately to those who are affected. The communications plan will include a feedback process to constantly monitor the project TDM strategy. The feedback will be used to identify improvement opportunities and under-performing elements so that adjustments can be made to ensure that the project meets its goals.

The demand management goals for the project will be developed during the final planning phase of the project. The project team will work with WSDOT staff to develop goals based on the estimated construction effects to traffic for the proposed action. The demand
management goals will be designed to complement the other construction traffic management techniques such as temporary roadway improvements and prescribed construction methods. The project team will focus TDM measures on identified areas where other techniques may not be feasible or effective, and will develop specific strategies to maximize traveler options in those areas.
Chapter 13–References


King County Metro 2002. Highway 520 Bicycle Commuter Counts (winter, spring, summer, fall).


GIS References


CH2M HILL (2008) GIS Data (Park and Trails) include the following datasets:


