Appendix A
Transportation Technical Report

EAST LINK EXTENSION

I-90 Transportation Technical Report Draft

Prepared for:
Sound Transit

Prepared by:
CH2M

April 2017

Contents

Attachments

Tables

Exhibits

Acronyms and Abbreviations

ADT	average daily traffic
CAC	collision analysis corridor
CAL	collision analysis location
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FGTS	Freight Goods Transportation System
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GP	general purpose
HCM	*Highway Capacity Manual* (Transportation Research Board, 2010)
HCT	high-capacity transit
HSM	*Highway Safety Manual*
HOV	high-occupancy vehicle
I-90	Interstate 90
ICW	Island Crest Way
IJR	Interchange Justification Report
LOS	level of service
Metro	King County Metro
MVM	million vehicle miles
N/A	not applicable
NB	northbound
NEPA	National Environmental Policy Act
PSRC	Puget Sound Regional Council
ROD	Record of Decision
SB	southbound
SEPA	State Environmental Policy Act
SOV	single-occupant vehicle
ST	Sound Transit
ST2	Sound Transit 2 Plan (Sound Transit, 2008)
v/c	volume-to-capacity
VHT	vehicle hours of travel
VMT	vehicle miles of travel
WSDOT	Washington State Department of Transportation

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SECTION 1

Introduction

1.1 Purpose and Background

The East Link Extension will construct and operate an approximately 18-mile light rail system connecting Sound Transit's existing light rail line in downtown Seattle east across Lake Washington via Interstate 90 (I–90) to Mercer Island, Bellevue, and Redmond. Sound Transit, Washington State Department of Transportation (WSDOT), and the Federal Transit Administration (FTA) issued the *East Link Project Final Environmental Impact Statement* (EIS) pursuant to the National Environmental Policy Act (NEPA) and the State Environmental Policy Act (SEPA) in July 2011. The Sound Transit Board selected the East Link project to build in July 2011 and reconfirmed the decision to use I-90 when revising the selected project in April 2013. FTA and the Federal Highway Administration (FHWA) each issued a Record of Decision (ROD) for the East Link Extension light rail project (East Link) in November 2011.

Following issuance of the FTA and FHWA East Link RODs, FHWA approved the I-90 Interchange Justification Report (IJR) in December 2011, which approved use of the I-90 center roadway for light rail. In 2012, WSDOT granted Sound Transit an air space lease for light rail use of the center roadway. Sound Transit also completed SEPA Addenda to the East Link Final EIS in 2013 and 2016. The second Addendum addressed refinements to the project and construction staging in the I-90 corridor. Exhibit 1-1 shows the East Link Extension project schedule. Construction for East Link began in April 2016 in Bellevue and construction in the I-90 corridor will begin June 2017. The East Link Extension from Seattle to Overlake will open for service in 2023.

Exhibit 1-1. East Link Extension Project Schedule

The I-90 section of East Link was addressed in the Final EIS as the Preferred Alternative in Segments A and B (Alternative A1 and part of Alternative B2M). The corridor begins just south of the International District Station/Chinatown Station, where it connects to the existing light rail system. From there, the project enters the D2 Roadway, which is an exclusive right-of-way ramp, and continues in the center roadway lanes of I-90 across Lake Washington and Mercer Island to its exit at Bellevue Way SE. I-90 ramps accessing the center roadway located between Seattle and Mercer Island would be closed. There are two light rail stations in the I-90 corridor, the Judkins Park Station in Seattle and the Mercer Island Station located between 77th and 80th Avenue SE. Exhibit 1-2 shows the project selected to build by the Sound Transit Board.

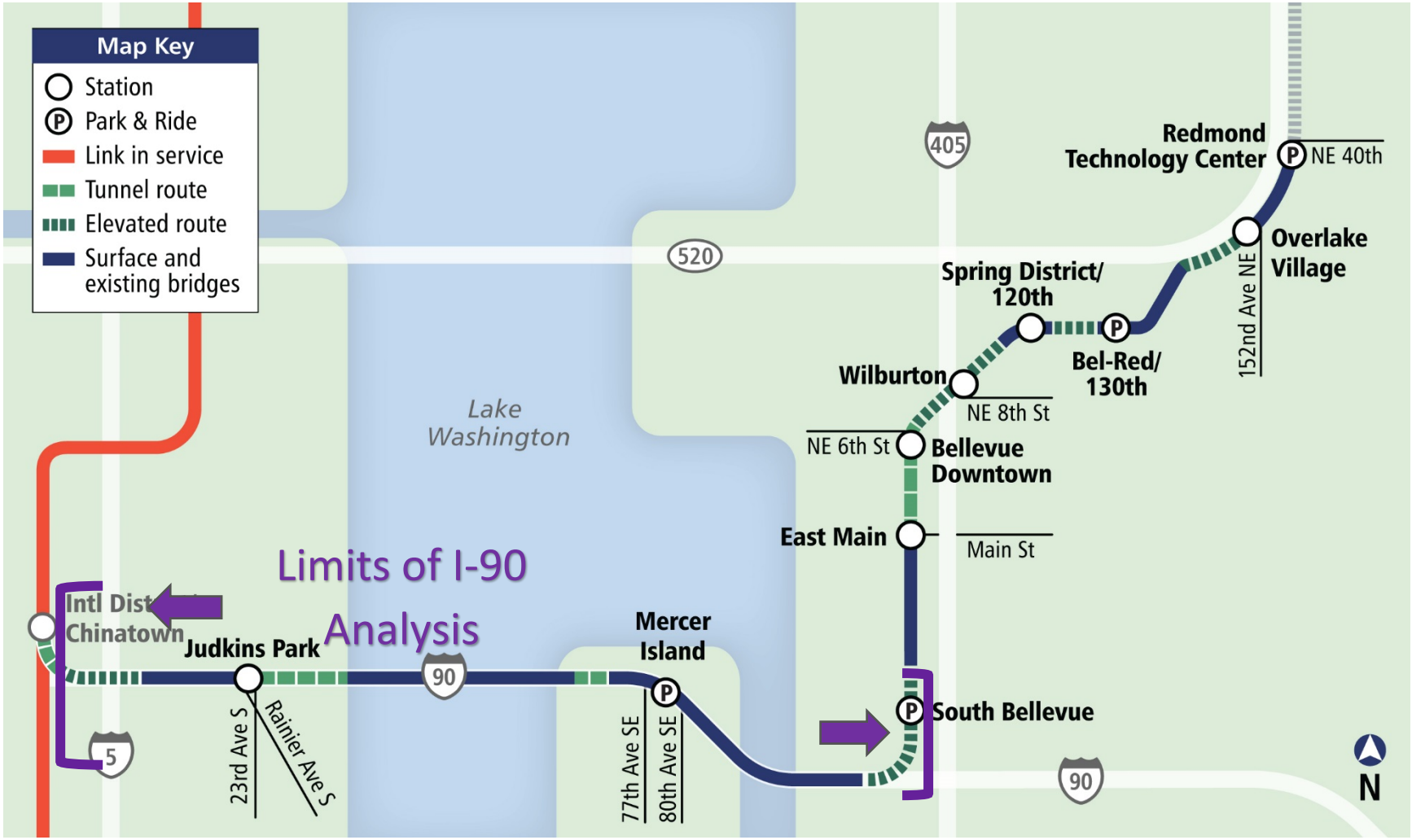
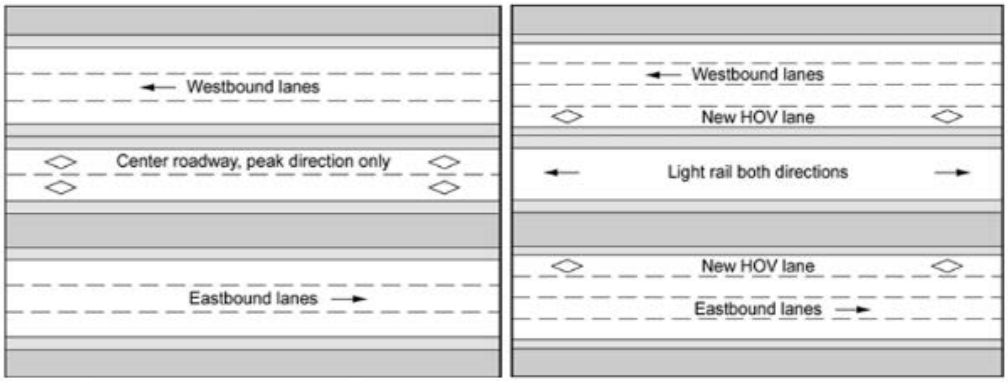


Exhibit 1-2. East Link Extension Project and I-90 Study Area

1.1.1 Changes in I-90 Operations

In anticipation of East Link, Sound Transit and WSDOT developed the I-90 Two-Way Transit and HOV Operations Project. Sound Transit, FHWA, and WSDOT issued the I-90 Two-Way Transit and HOV Operations Final EIS in April 2004, which identified Alternative R-8A as the Preferred Alternative. The Sound Transit Board selected R-8A as the project to build in August 2004. FHWA and FTA issued RODs for the project in September 2004 and April 2011, respectively. As shown in Exhibit 1-3, Alternative R-8A restripes the I-90 outer westbound and eastbound roadways to add high-occupancy vehicle (HOV) lanes between Seattle and Bellevue and provide I-90 HOV ramps to and from Mercer Island and Bellevue via new interchange ramps (https://www.wsdot.wa.gov/projects/i90/twowaytransit).



Existing I-90 lanes *East Link with R-8A HOV lanes*

Exhibit 1-3. Existing and R-8A Lane Configurations

Stage 1 of R-8A, completed in 2008, and Stage 2 of R-8A, completed in 2012, added HOV lanes in both directions in the outer roadways between 80th Avenue SE and Bellevue Way SE, along with HOV ramp modifications or additions at each end. Stage 3, currently under construction, will add HOV lanes in both directions of the outer roadways between Seattle and Mercer Island and build or modify ramps on Mercer Island to provide access. This stage will be completed just prior to closure of the center roadway for East Link construction. The outer roadways will have three general purpose (GP) lanes and one HOV lane traveling in both directions. With East Link occupying the center roadway and completion of R-8A, I-90 will have the same number of lanes as today, HOV lanes in both directions, plus the addition of light rail service in 2023.

The East Link Final EIS assumed that single-occupant vehicles (SOVs) between Seattle and Mercer Island would be able to use the R-8A HOV lanes in both directions of I-90 between Seattle and Island Crest Way, similar to how they currently use the center roadway. This assumption was based on conditions as they existed at the time the Final EIS was prepared regarding use of the HOV lanes.

In August 2016, FHWA sent a letter to WSDOT and the City of Mercer Island stating that the U.S. Department of Transportation does not have legal authority to grant temporary or permanent SOV access to the R-8A HOV lanes. This means that SOVs traveling to and from Mercer Island are prohibited from using the R-8A HOV lanes on the westbound and eastbound I-90 mainlines between Seattle and Mercer Island, and the Island Crest Way ramps that directly connect with those HOV lanes. At the time FHWA's letter was issued, the East Link Extension project had advanced into construction in some segments and the last stages of final design and contracting for the I-90 segment in anticipation of closing the I-90 center roadway for light rail construction in June 2017. Nonetheless, Sound Transit and

WSDOT have analyzed whether FHWA's decision creates any new significant impacts beyond the range of impacts and alternatives analyzed in the previous environmental documents. The FHWA letter is included in Attachment A.

1.1.2 Mercer Island Bus Transit Integration

Project refinements are a normal part of final design and engineering and the Transit Integration refinements are consistent with that process. Since publication of the Final EIS, Sound Transit has been coordinating with Mercer Island, King County Metro (Metro), and WSDOT to develop a transit integration plan along I-90 with implementation of East Link. The objective of a transit integration plan is to create efficiencies, enhance reliability, and enable future service expansion. In preparing the Final EIS, Metro and Sound Transit developed a transit integration plan that identified changes in both Metro and Sound Transit bus service that would occur with implementation of East Link. At each East Link station, including the South Bellevue and Mercer Island stations, plans were developed to route Seattle-bound buses to each station, where bus patrons would transfer to light rail.

On Mercer Island, the refined transit integration plan would create a central location allowing bus riders on some routes from the east to transfer to and from the East Link light rail transit system and eliminate duplicate transit service between Mercer Island and Seattle. Other bus routes from the east would allow transfers to light rail at the South Bellevue Station. Certain bus routes heading west on I-90 would end at Mercer Island, and routes heading east on I-90 would originate on Mercer Island. Although the East Link Final EIS assumed some bus routes would continue across I-90 into Seattle, all westbound I-90 bus routes would end at Mercer Island with the proposed Transit Integration refinements. These refinements would ensure transit reliability, avoid duplicative service, and provide an opportunity to increase transit service within the I-90 corridor once East Link service begins operation.

1.2 Description of Changes and Refinements

The changes in I-90 operations and the Mercer Island Bus Transit Integration refinements are described in more detail below.

1.2.1 Changes in I-90 Operations

As described in Section 1.1, FHWA has determined that SOVs will not be allowed in the new R-8A HOV lanes on the outer roadway between Mercer Island and Seattle. Because some I-90 on- and off-ramps on Mercer Island provide direct access to the HOV lanes, SOVs will no longer be able to use these ramps and will only be able to use ramps that provide access to and from the GP lanes. The analysis in this document assesses how the change in use of the R-8A HOV lanes and access to and from I-90 by SOVs would affect regional and local transportation and the environment.

The study area for the changes in I-90 Operations analysis is I-90 between 4th Avenue S in Seattle and I-405 in Bellevue (see Exhibit 1-2). Describing the different conditions for operating I-90 includes assumptions in three different timeframes:

- **Existing year:** The existing year, serving as a baseline, is 2016.
- **Construction year:** East Link construction will take place from 2017 through 2023, and 2020 is used as the construction year because that is approximately the mid-point in the construction schedule.
- **Operational year:** 2035 is used as the future operational horizon year for consistency with the regional forecasts used by both Puget Sound Regional Council (PSRC) and Sound Transit. Existing Conditions (2016)

The existing condition reflects the existing I-90 and local street system and operations, including the reversible center roadway from Bellevue to Seattle and completion of Stages 1 and 2 of the I-90 Two-

Way Transit and HOV Operations Project (R-8A) between Bellevue Way and 80th Avenue SE ramps on Mercer Island. The section of I-90 that crosses Lake Washington between Seattle and Bellevue currently has three GP lanes in each direction and a reversible center roadway that operates in the peak directions only. HOVs and buses can use the reversible center roadway between the Rainier Avenue S interchange in Seattle and the East Channel Bridge in Bellevue. On weekdays the center roadway operates westbound from 6:00 a.m. to 12:30 p.m. (6.5 hours) and eastbound from 2:00 p.m. to 5:00 a.m. (15 hours). On weekends the reversible roadway operates eastbound only, unless accommodations are made for special events. Therefore, for a typical week, the center roadway operates in the westbound direction for about 20 percent of the time and in the eastbound direction 80 percent of the time.

There are I-90 on- and off-ramps in Seattle, Mercer Island, and Bellevue. All ramps to the center roadway will close when construction of East Link on I-90 begins. On Mercer Island there are currently 16 on- and off-ramps. Fourteen of these serve GP traffic and two are HOV access only. With East Link, the ramps to and from the center roadway at 77th Avenue SE and Island Crest Way will be closed and the eastbound Island Crest Way ramp will be modified to connect to the new R-8A HOV lane. This will result in a total of 15 on- and off-ramps in the future.

1.2.1.1 No Build Condition

The No Build condition was analyzed for the construction and operations years in the transportation analysis only. This No Build condition assumes implementation of other reasonable and foreseeable regional transportation projects for each analysis year (2020 and 2035). It provides a baseline of what transportation conditions would be in the future years with these other projects but without completing the R-8A project and the East Link Extension. This allows the changes in conditions with the East Link Extension to be identified when comparing the two conditions (No Build and East Link). It is provided for comparison purposes only as the East Link Extension is already approved. The analysis years are:

- **Construction (2020) analysis year**: The No Build construction analysis assumes the existing conditions with the forecast 2020 population, employment, and future background projects. It assumes Stages 1 and 2 of the R-8A HOV lanes are constructed and the center roadway is available for peak-direction use by HOVs, transit, and Mercer Island SOVs. R-8A Stage 3 (outer roadway HOV lanes) is not included in the No Build condition. Buses on I-90 would continue in and out of Seattle and use the D2 Roadway.
- **Operations (2035) analysis year**: The No Build operation analysis assumes existing conditions with forecast 2035 population, employment, and future background projects. It assumes completion of Stages 1 and 2 of the R-8A HOV lanes, and the center reversible roadway is still available for peak-direction use by HOVs, transit, and Mercer Island SOVs. R-8A Stage 3 (outer roadway HOV lanes) is not included in the No Build condition. Buses on I-90 would continue in and out of Seattle and use the D2 Roadway.

1.2.1.2 Build Conditions

Three options were analyzed for the construction (2020) analysis year and two options were analyzed for the operations (2035) analysis year for I-90 operations as described below. The operations analysis also includes three Transit Integration scenarios on Mercer Island. These scenarios are the Final EIS (FEIS) Configuration, 77th Avenue SE Configuration, and 80th Avenue SE Configuration and are described in more detail in Section 1.2.2. Table 1-1 summarizes which conditions and options are evaluated in each analysis year.

Table 1-1. I-90 Conditions Evaluated and Analysis Years

Year	Existing Condition	No Build Condition	Build Condition		
			Option 1 Mercer Island SOVs Allowed in HOV Lanes	Option 2 Mercer Island SOVs Prohibited from HOV Lanes	Option 3 HOV Lanes Converted to GP lanes
2016	X				
2020 (Construction)		X	X	X	X
2035 (Operations)		X	X	X	

Option 1 - Mercer Island SOVs Allowed in the HOV Lanes (Construction and Operations)

Option 1 is what was assumed in the Final EIS for the build condition. It assumes completion of Stage 3 of the R-8A HOV lanes and that the center roadway would be closed for East Link construction and operation. HOVs, buses, and Mercer Island SOVs would be allowed in the HOV lanes between Seattle and Mercer Island (Exhibit 1-4). For Option 1, the 77th Avenue and Island Crest Way on- and off-ramps connecting with the center roadway on Mercer Island are closed to all vehicles because of East Link occupying the center roadway (Exhibit 1-5). The eastbound Island Crest Way off-ramp from the center roadway will be modified to connect to the R-8A HOV lane. Mercer Island SOVs would continue to access I-90 via Island Crest Way and would have access to the R-8A HOV lanes via the HOV westbound and eastbound direct-access ramps. This option is included in the Addendum to update the Final EIS analysis as a point of comparison.

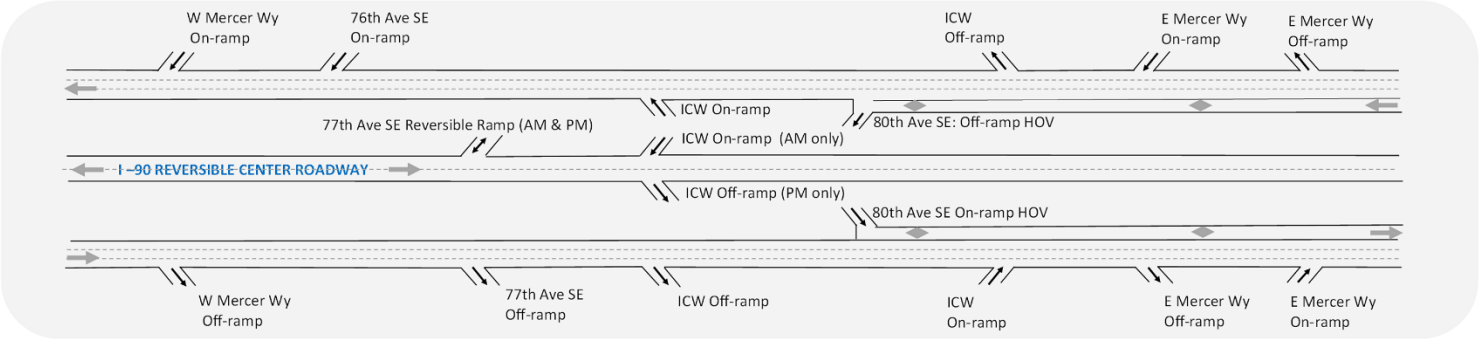
Option 2 - Mercer Island SOVs Prohibited from HOV Lanes (Construction and Operations)

Option 2 is based on the FHWA determination. It assumes completion of Stage 3 of the R-8A HOV lanes and that the center roadway would be closed for East Link construction and operation. HOVs and buses would be allowed in the HOV lanes between Seattle and Mercer Island (see Exhibit 1-4). SOVs to and from Mercer Island between Seattle and Mercer Island would not be allowed to use the HOV lanes or the Island Crest Way westbound and eastbound HOV ramps. There is a GP off-ramp to Island Crest Way eastbound but not a GP on-ramp westbound. Similar to Option 1, the 77th Avenue SE ramp (connecting with the center roadway) would be closed to all vehicles on Mercer Island.

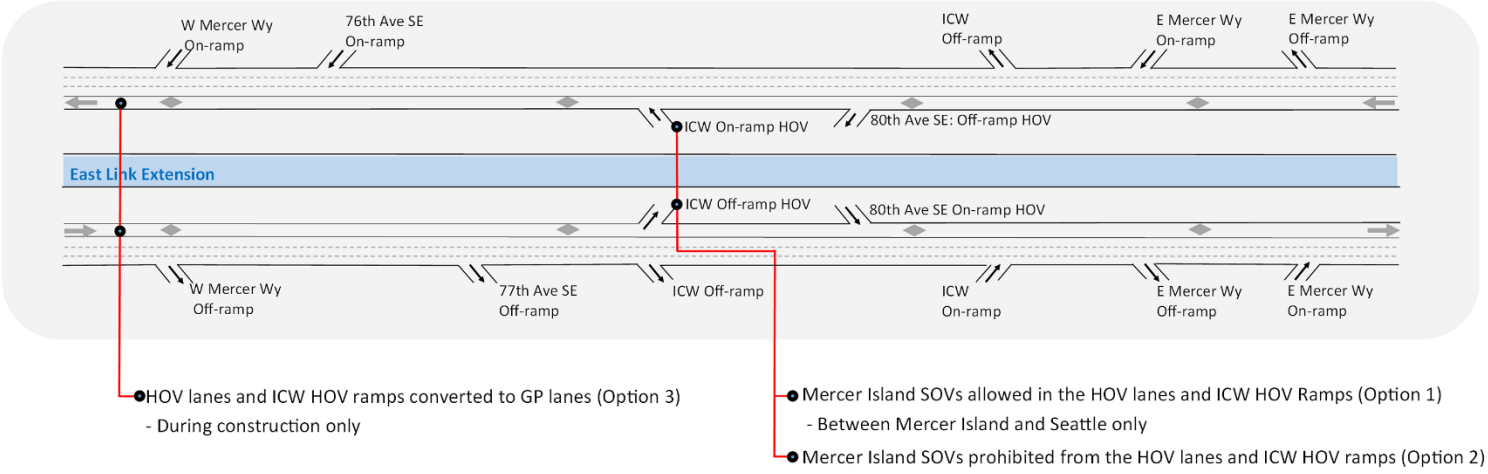
Option 3 - HOV Lanes Converted to General Purpose (Construction Only)

Option 3 assumes completion of Stage 3 of the R-8A HOV lanes but the outer roadway HOV lanes between Mercer Island and Seattle would be converted to GP lanes during East Link construction only. This option also would convert the westbound and eastbound Island Crest Way HOV ramps to GP ramps. This option was requested for study by the City of Mercer Island. Converting HOV lanes to GP lanes may not be consistent with regional goals and policies and may require repayment of both local and federal funds that have already been invested in the HOV lanes on this portion of I-90.

Existing I-90 Operations



I-90 Operations with East Link and R-8A Projects Completed



PLEASE NOTE: This exhibit is intended to illustrate existing and changes to the I-90 operations once East Link and R-8A projects are completed. It is not to scale.

Exhibit 1-4. I-90 Existing Operations and Changes on Mercer Island

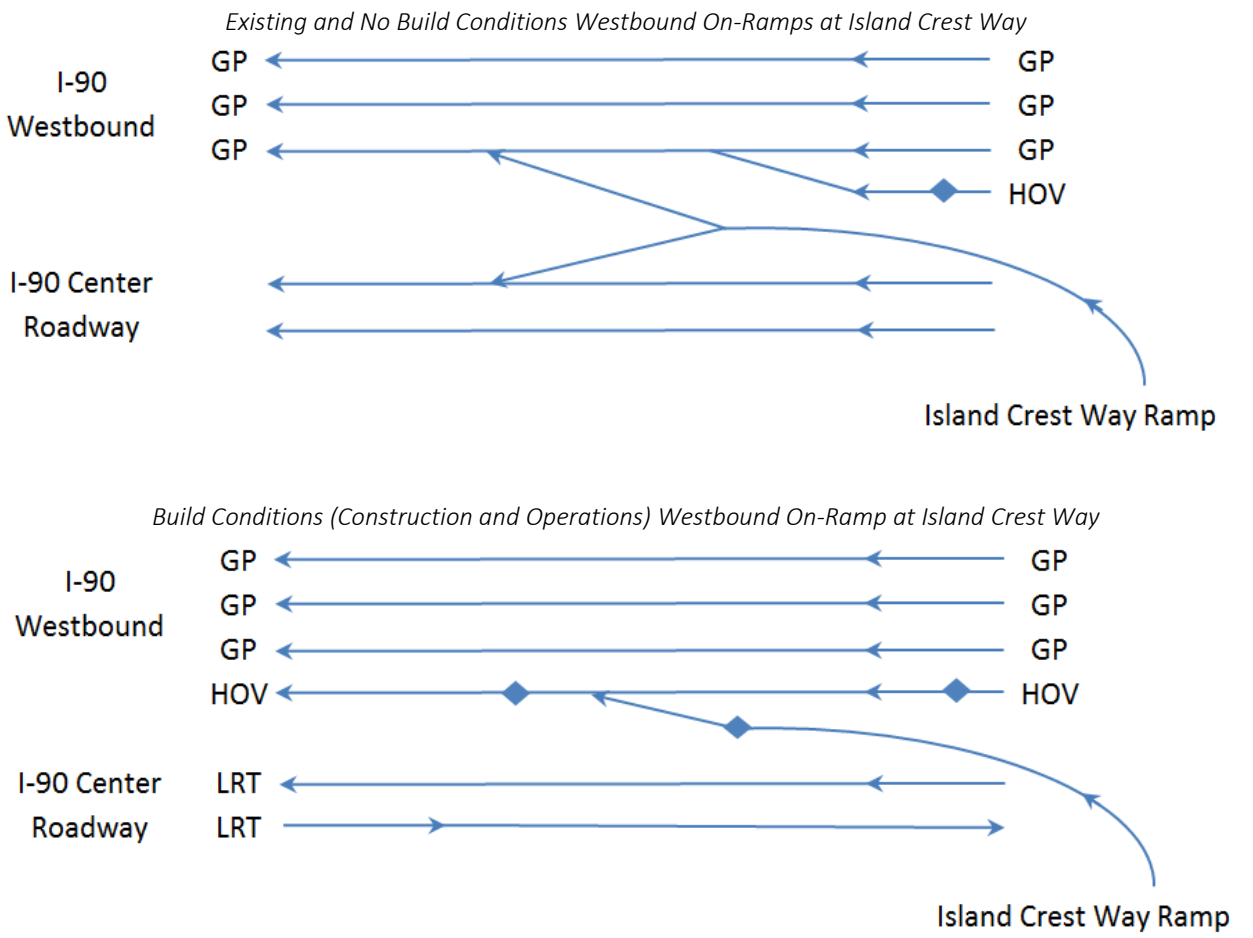


Exhibit 1-5. Changes to I-90 Island Crest Way Westbound On-Ramp

1.2.2 Mercer Island Bus Transit Integration

Sound Transit, in consultation with other agencies, has developed configurations for transit integration on Mercer Island that differ from the plan evaluated in the Final EIS. Sound Transit evaluated these configurations in the *Sound Transit East Link: Bus/Light Rail Transit System Integration Study* (CH2M HILL, 2014) and in this Addendum. Based on these studies, community outreach, and consultation with the City of Mercer Island, WSDOT, and Metro, two refined configurations for transit integration are evaluated for when East Link light rail begins service in 2023. These two configurations differ from that described in the Final EIS (the FEIS Configuration): the 77th Avenue SE Configuration and the 80th Avenue SE Configuration. Bus service would continue to be provided between Mercer Island and Seattle during East Link construction.

Both of these refined configurations would include bus drop-off and pick-up areas, bus layover areas, and roadway improvements, with buses stopping at Mercer Island Station and using the 80th Avenue HOV ramps for access to and from the east. Sound Transit and Metro routes that currently travel from east of Mercer Island to Seattle via I-90 would be rerouted to other Eastside communities, deleted, or modified to begin and end at Mercer Island where riders could transfer to the regional light rail system.

Table 1-2 summarizes the number of buses that would be traveling on Mercer Island with each configuration.

Table 1-2. Number of Buses Stopping at Mercer Island Park-and-Ride (both directions)

Existing Conditions	FEIS Configuration	77th Avenue SE Configuration	80th Avenue SE Configuration
AM peak hour: 33 buses PM peak hour: 31 buses **Daily:** **352 buses**	AM peak hour: 18 buses PM peak hour: 19 buses **Daily:** **197 buses**	AM peak hour: 40 buses PM peak hour: 40 buses **Daily:** **318 buses**	AM peak hour: 40 buses PM peak hour: 40 buses **Daily:** **318 buses**

For all configurations, East Link trains would operate 4-car trains with an 8-minute headway during the peak periods. Although the assumption used in the Final EIS was 7-minute headways, the operating plan has been updated since that time and the analysis in this technical report reflects the 8-minute headway operating plan.

1.2.2.1 Existing Conditions

Currently, buses use the center roadway in the peak direction and GP lanes in the outer roadways in the non-peak direction. Buses traveling to and from Mercer Island on I-90 use the 76th Avenue SE, 77th Avenue SE, and 80th Avenue SE ramps, depending on direction and time of day. Buses drop off and pick up riders on both sides of N Mercer Way near 80th Avenue SE adjacent to the Mercer Island Park-and-Ride, and there is layover space for up to four buses. Currently there are about 350 buses that stop daily in this area.

1.2.2.1 FEIS Configuration

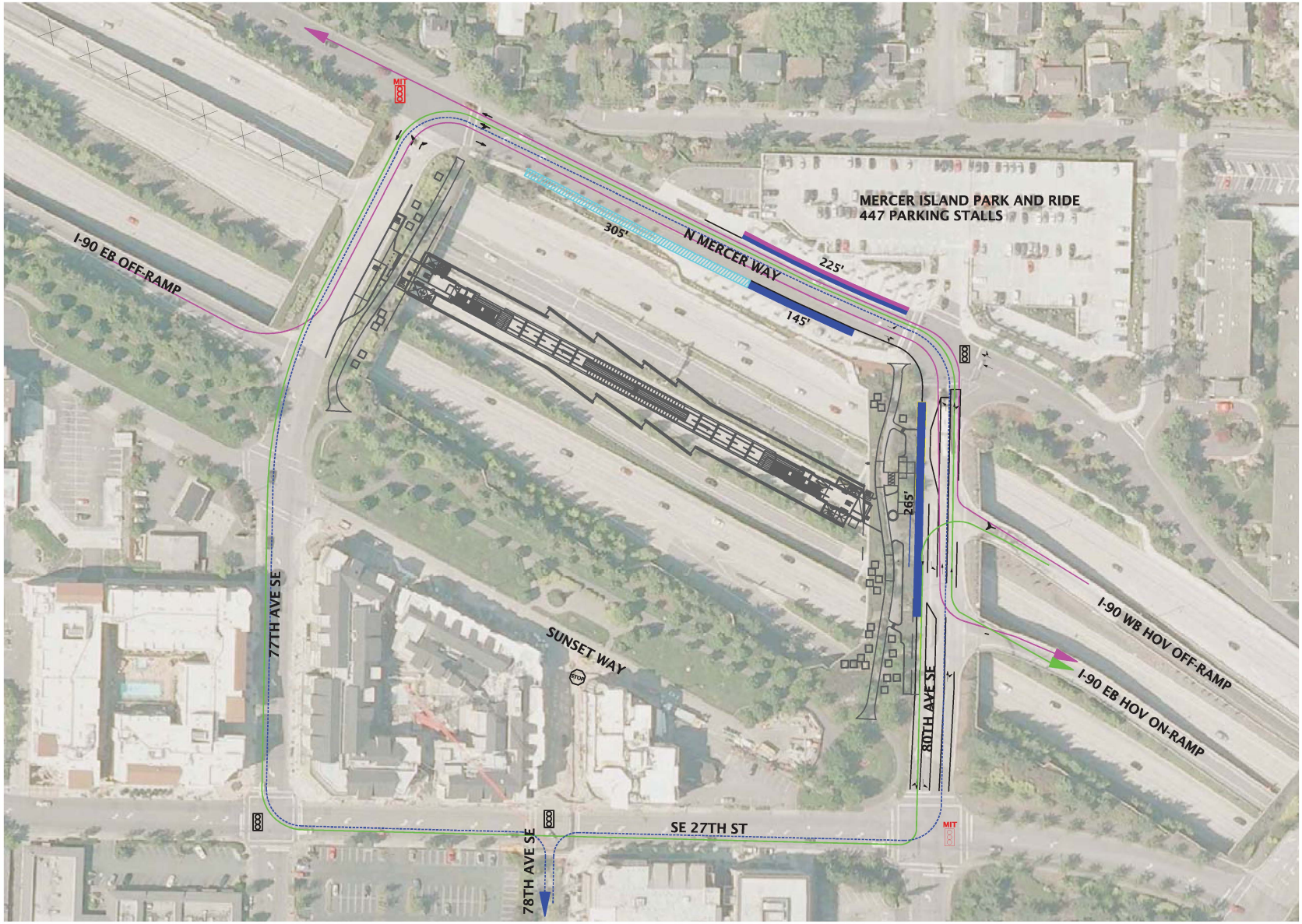
Under the FEIS Configuration (Exhibit 1-6), some bus routes that travel on I-90 would be discontinued, rerouted, or terminate on Mercer Island, while others would continue to stop on Mercer Island. There would be about 200 buses stopping daily on Mercer Island with this configuration.

The most critical operations of the transit integration with this configuration occur for bus routes in the westbound direction during the AM peak period and routes traveling in the eastbound direction during the PM peak period. In the AM peak period, bus riders need to be dropped off prior to an arriving light rail train, while in the PM peak period, a key consideration is to facilitate an easy transfer from light rail to bus routes ready for pick-up. Changes to specific bus routes are described in Section 3.2.

Bus Stop and Layover Locations on Mercer Island

With the FEIS Configuration (Exhibit 1-6), a combined drop-off/pick-up bus stop would be located on the north side of N Mercer Way just to the west of 80th Avenue SE, the same as existing conditions. This stop is expected to accommodate up to two articulated buses and would serve westbound routes from I-90 as well as the local Mercer Island bus routes.

For eastbound buses, one combined drop-off/pick-up stop would be located on the south side of N Mercer Way to the west of 80th Avenue SE, and one combined drop-off/pick-up stop would be located on the west side of 80th Avenue SE to the south of N Mercer Way. Both of the eastbound stops are expected to accommodate up to two articulated buses each. Bus layover bays would be included along the south side of N Mercer Way, to the east of 77th Avenue SE. The layover areas are expected to accommodate up to six articulated buses during layover times.



LEGEND

- BUS DROP-OFF AREA
- BUS LAYOVER AREA
- BUS PICK UP
- MERCER ISLAND EAST LINK STATION
- MERCER ISLAND ROUTES
- TRANSIT CENTER ROUTES
- SOUND TRANSIT ROUTE 554
- MIT — EAST LINK FEIS PROPOSED MITIGATION
- EXISTING SIGNAL CONTROL
- STOP — EXISTING STOP CONTROL

SOUNDTRANSIT

50' 25' 0' 50' 100'
HORIZONTAL SCALE

MERCER ISLAND BUS TRANSIT INTEGRATION
Exhibit 1-6 - FEIS Configuration

Road Network and Intersections

The FEIS Configuration includes all road network and roadway assumptions within the Mercer Island study area that are documented in the Final EIS. The main network differences between existing conditions and the FEIS Configuration are the closures of the I-90 center roadway and the 77th Avenue ramp to vehicle traffic. The FEIS Configuration included traffic signal mitigation at the 77th Avenue SE and N Mercer Way intersection and the 80th Avenue SE and SE 27th Street intersection.

1.2.2.2 77th Avenue SE Configuration

The 77th Avenue SE Configuration would route buses in a counter-clockwise direction to allow them to get from the westbound 80th Avenue HOV off-ramp to the eastbound 80th Avenue HOV on-ramp. The configuration would include roadway/sidewalk improvements, bus drop-off and pick-up areas, and bus layover areas on the both sides of N Mercer Way and the west side of 80th Avenue SE (Exhibit 1-7). There would be about 320 buses stopping daily on Mercer Island with this configuration.

Bus Stop and Layover Locations on Mercer Island

Bus drop-off/pick-up areas would remain on both sides of N Mercer Way between 77th Avenue SE and 80th Avenue SE, as well as a pick-up area on the west side of 80th Avenue SE south of N Mercer Way. The north and south sides of N Mercer Way between 77th Avenue SE and 80th Avenue SE would also provide bus layover space for three buses.

Exhibit 1-8 illustrates the bus movements on the four roadway segments. Buses would only travel on SE 27th Street and 77th Avenue SE to access the additional bays on N Mercer Way when the four layover bays at the park-and-ride are full.

Road Network and Intersections

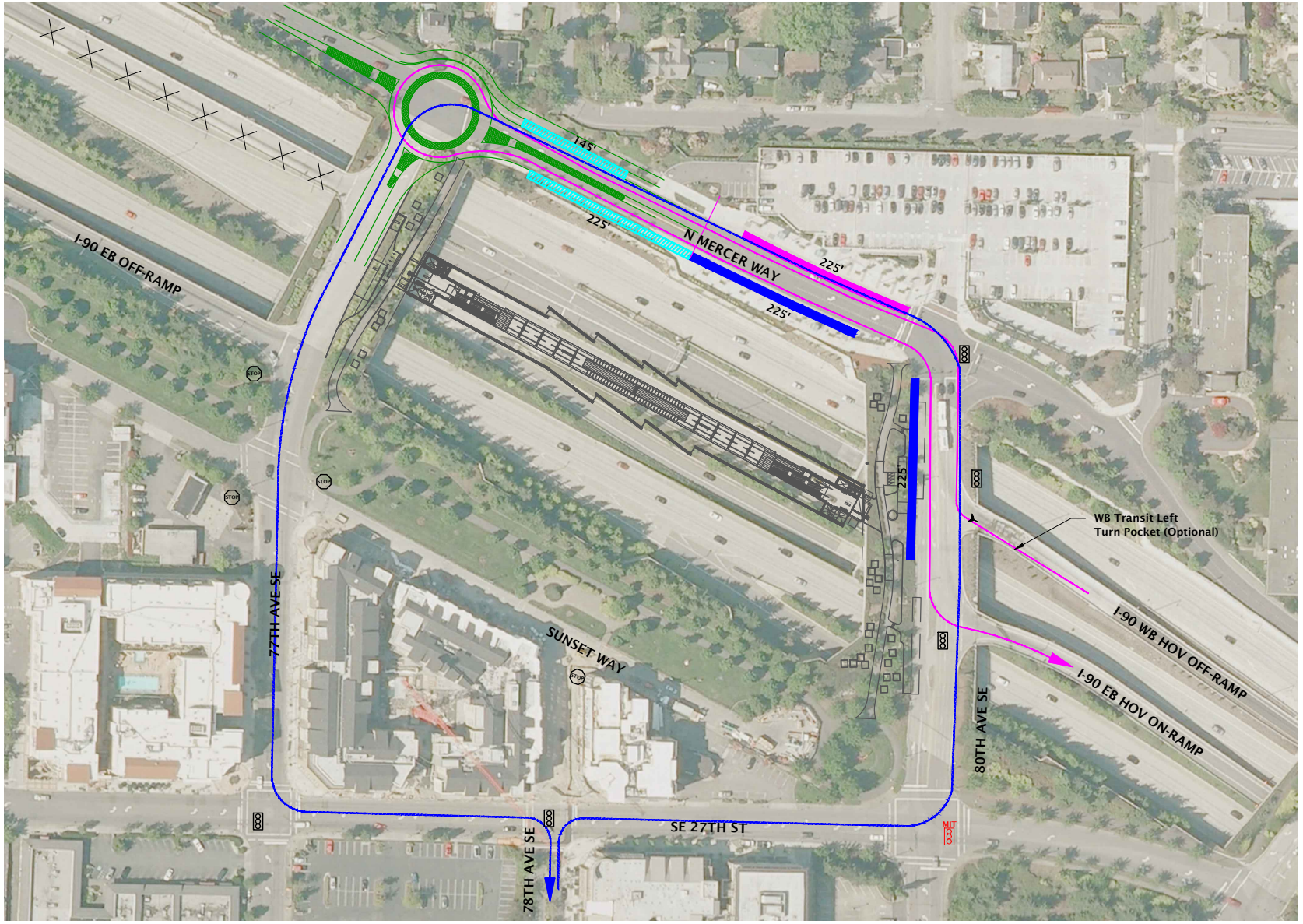
Network and roadway assumptions with the 77th Avenue SE Configuration are the same as documented for the FEIS Configuration, except for the signalized intersection at 77th Avenue SE and N Mercer Way. Instead of becoming signalized, a roundabout would be constructed to allow buses to turn around and prepare to travel eastbound on I-90.

1.2.2.3 80th Avenue SE Configuration

The 80th Avenue SE Configuration would route buses in a counter-clockwise direction through a bus transfer area on the west side of 80th Avenue SE to allow them to get from the westbound 80th Avenue HOV off-ramp to the eastbound 80th Avenue HOV on-ramp. The 80th Avenue SE Configuration would include bus drop-off and pick-up areas on the western side of 80th Avenue SE and bus layover areas along N Mercer Way (Exhibit 1-9). There would be about 320 buses stopping daily on Mercer Island with this configuration.

Bus Stop and Layover Locations on Mercer Island

Buses would enter the transfer area from the I-90 80th Avenue SE HOV westbound off-ramp and would return to I-90 using the 80th Avenue SE HOV eastbound on-ramp. If buses are not laying over on Mercer Island they would only travel on 80th Avenue SE (Exhibit 1-10). There would be no bus stops on N Mercer Way, but additional layover space could be located on the south side, for a total of up to eight layover bays. Buses laying over on N Mercer Way would exit the 80th Avenue SE transfer area, use SE 27th Street and 77th Avenue SE to travel in a clockwise direction to reach N Mercer Way.



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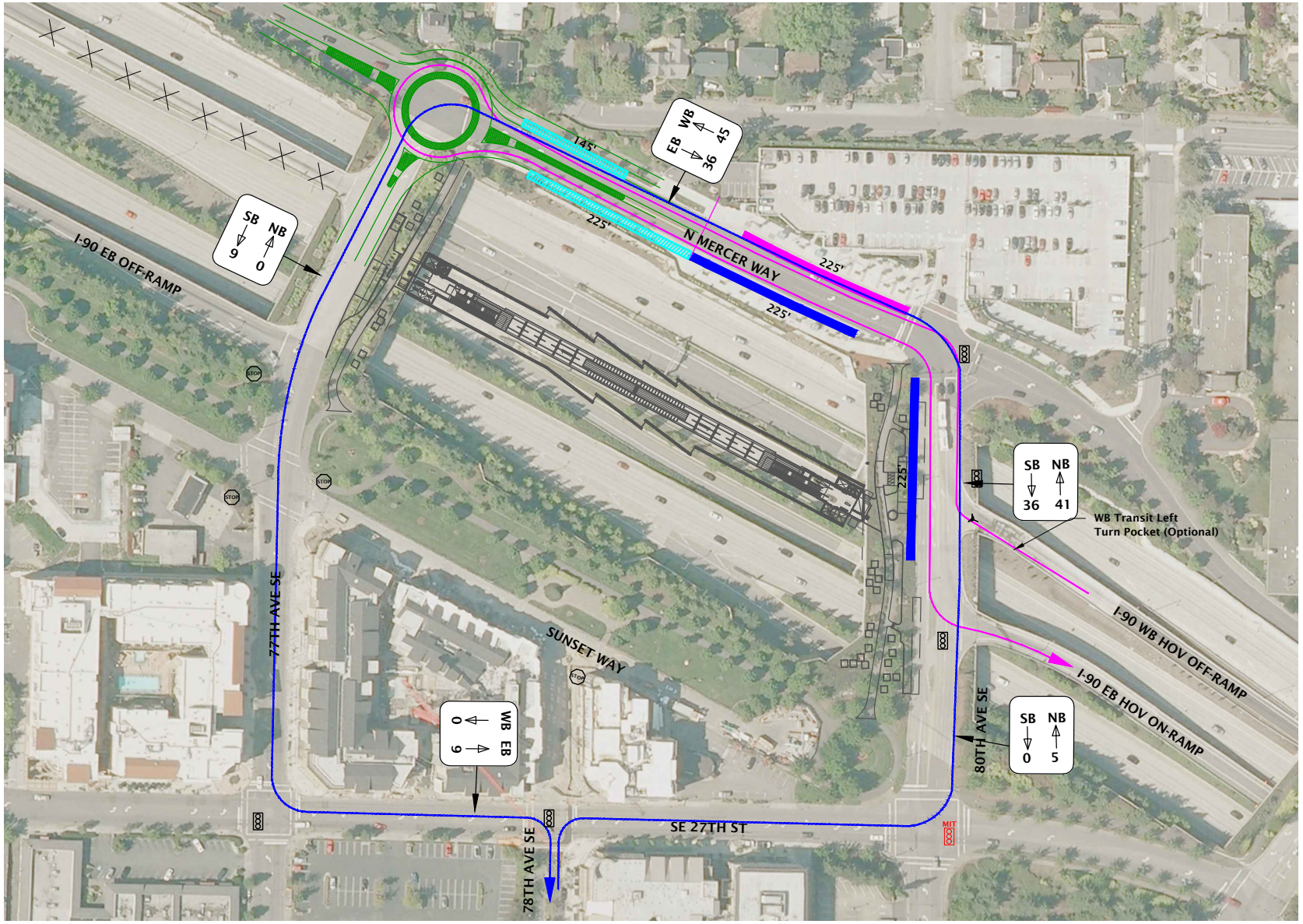
- STOP — EXISTING STOP CONTROL

SOUNDTRANSIT

50' 25' 0' 50' 100'
HORIZONTAL SCALE

MERCER ISLAND BUS TRANSIT INTEGRATION
Exhibit 1-7 - 77th Avenue SE Configuration



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- TRANSIT CENTER ROUTES
- EAST LINK FEIS PROPOSED MITIGATION
- EXISTING SIGNAL CONTROL
- EXISTING STOP CONTROL
- PM PEAK HOUR BUS TURNING MOVEMENT VOLUMES

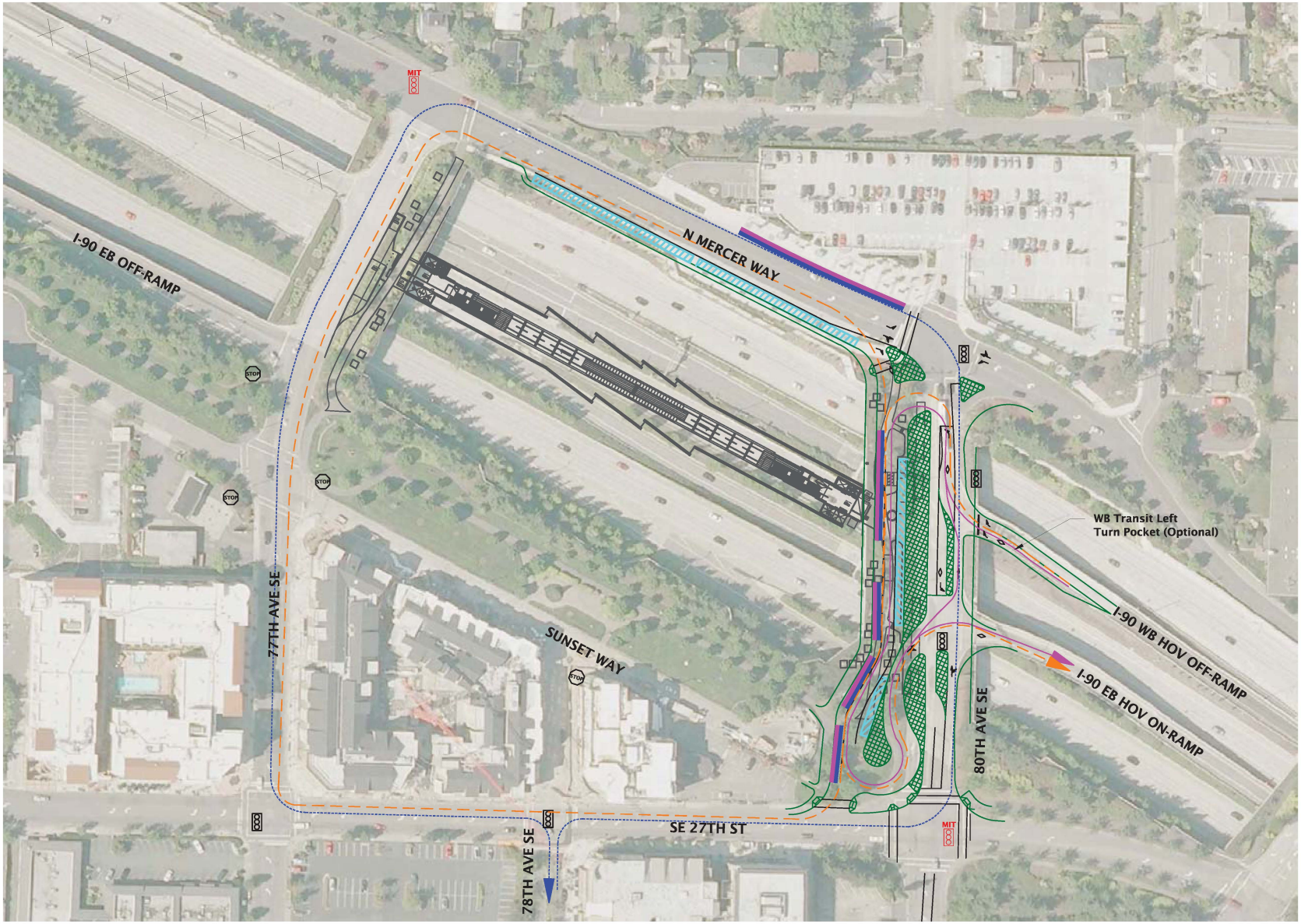
NOTES:

1. Bus Volumes are the same for AM and PM Peak Hours

SOUNDTRANSIT

50' 25' 0' 50' 100'
HORIZONTAL SCALE

MERCER ISLAND BUS TRANSIT INTEGRATION
Exhibit 1-8 - 77th Avenue SE Configuration Bus Routes



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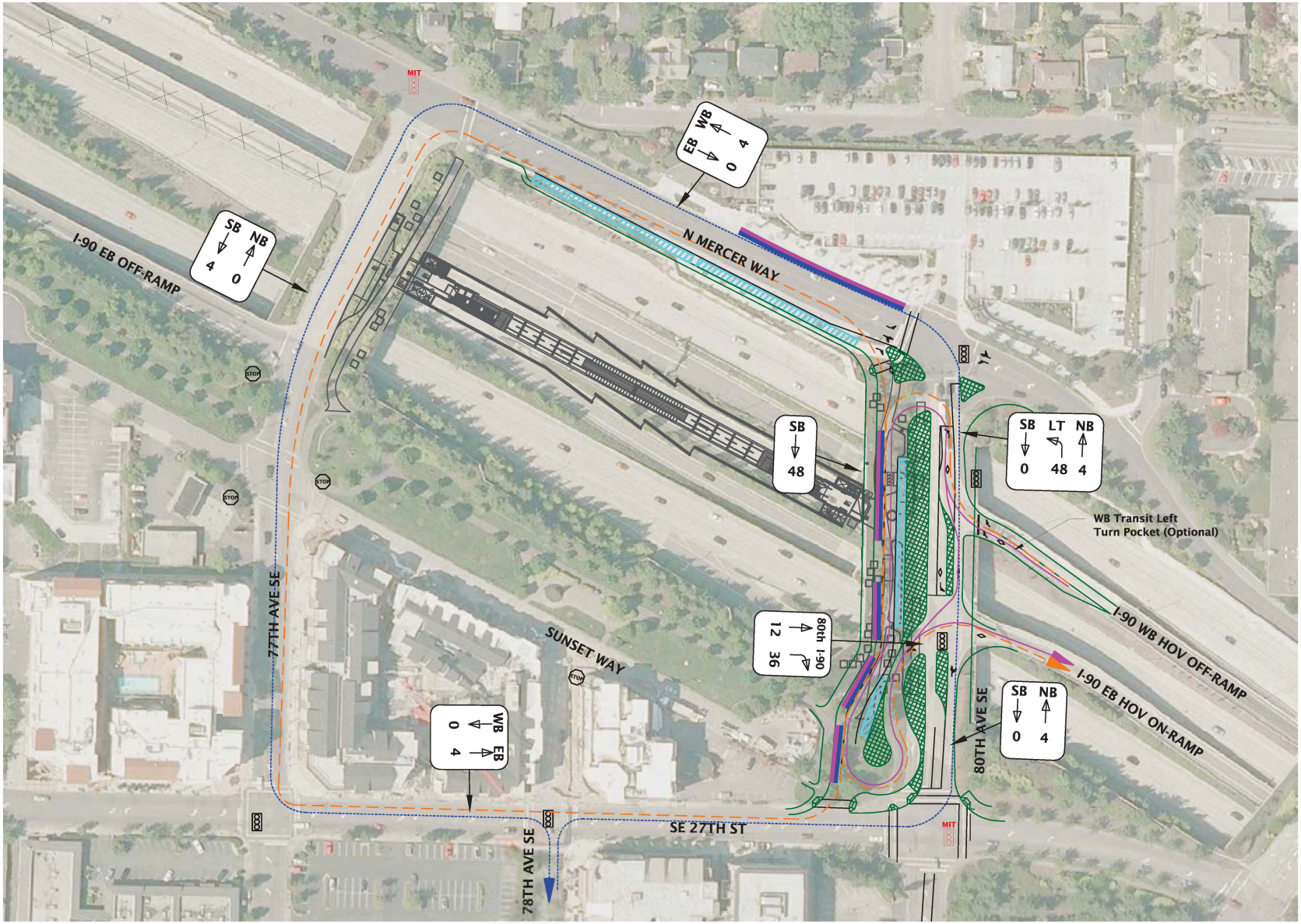
- TRANSIT CENTER ROUTE
- N MERCER WAY LAYOVER ROUTE*
- EXISTING SIGNAL CONTROL
- EXISTING STOP CONTROL
- MIT EAST LINK FEIS PROPOSED MITIGATION

NOTES:
*N MERCER WAY LAYOVER ROUTE USED WHEN ALL TRANSIT CENTER LAYOVER SPACES OCCUPIED

SOUNDTRANSIT

50' 25' 0' 50' 100'
HORIZONTAL SCALE

MERCER ISLAND BUS TRANSIT INTEGRATION
Exhibit 1-9 - 80th Avenue SE Configuration



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- EXISTING STOP CONTROL
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- MIT EAST LINK FEIS PROPOSED MITIGATION

NOTES:
*N MERCER WAY LAYOVER ROUTE USED WHEN ALL TRANSIT CENTER LAYOVER SPACES OCCUPIED

SOUNDTRANSIT

50' 25' 0' 50' 100'
HORIZONTAL SCALE

MERCER ISLAND BUS TRANSIT INTEGRATION

Exhibit 1-10 80th Avenue SE Configuration Bus Routes

Road Network and Intersections

Network and roadway assumptions with the 80th Avenue SE Configuration are the same as documented for the FEIS Configuration, including signals at 77th Avenue SE and N Mercer Way, 77th Avenue SE and the I-90 eastbound off-ramp, and 80th Avenue SE and SE 27th Street. The configuration would add a westbound transit lane pocket, signals at the westbound HOV off-ramp to 80th Avenue SE and at the eastbound HOV on-ramp at 80th Avenue SE, a northbound turn pocket on the off-ramp to 80th Avenue SE, and a four-way intersection at the eastbound HOV on-ramp with the addition of the outlet from the bus transfer area on the west side of 80th Avenue SE.

SECTION 2

Methodology and Assumptions

The methodology and assumptions used to analyze the transportation impacts of the proposed refinements have been compiled in a *Transportation Methodology and Assumptions Report*, which is provided in Attachment B and provides more detail on the methodologies summarized below.

2.1 Regional Travel

Regional travel conditions were evaluated based on travel demand information obtained using the PSRC transportation demand model and Sound Transit's transit ridership model, which includes King, Pierce, and Snohomish counties. Regional population and employment forecasts suggest that the regional highways within the project vicinity will continue to serve increasing travel demand. Future roadway capacity projects will complete the HOV system and allow for an increase in carpool trips, but they generally do not substantially improve high-capacity modes of travel. Based on these forecasts and driver travel patterns, the number of miles and hours traveled were estimated to forecast vehicle miles of travel (VMT) and vehicle hours of travel (VHT). Within the project vicinity on each roadway, the future vehicle demand and mode share were predicted, giving the volume-to-capacity (v/c) ratio (congestion) and mode share at each of the project's screenlines.

Two screenlines were established to assess the travel in each corridor of the study area. As shown in Exhibit 2-1, the screenlines include key arterials and highways at the following locations:

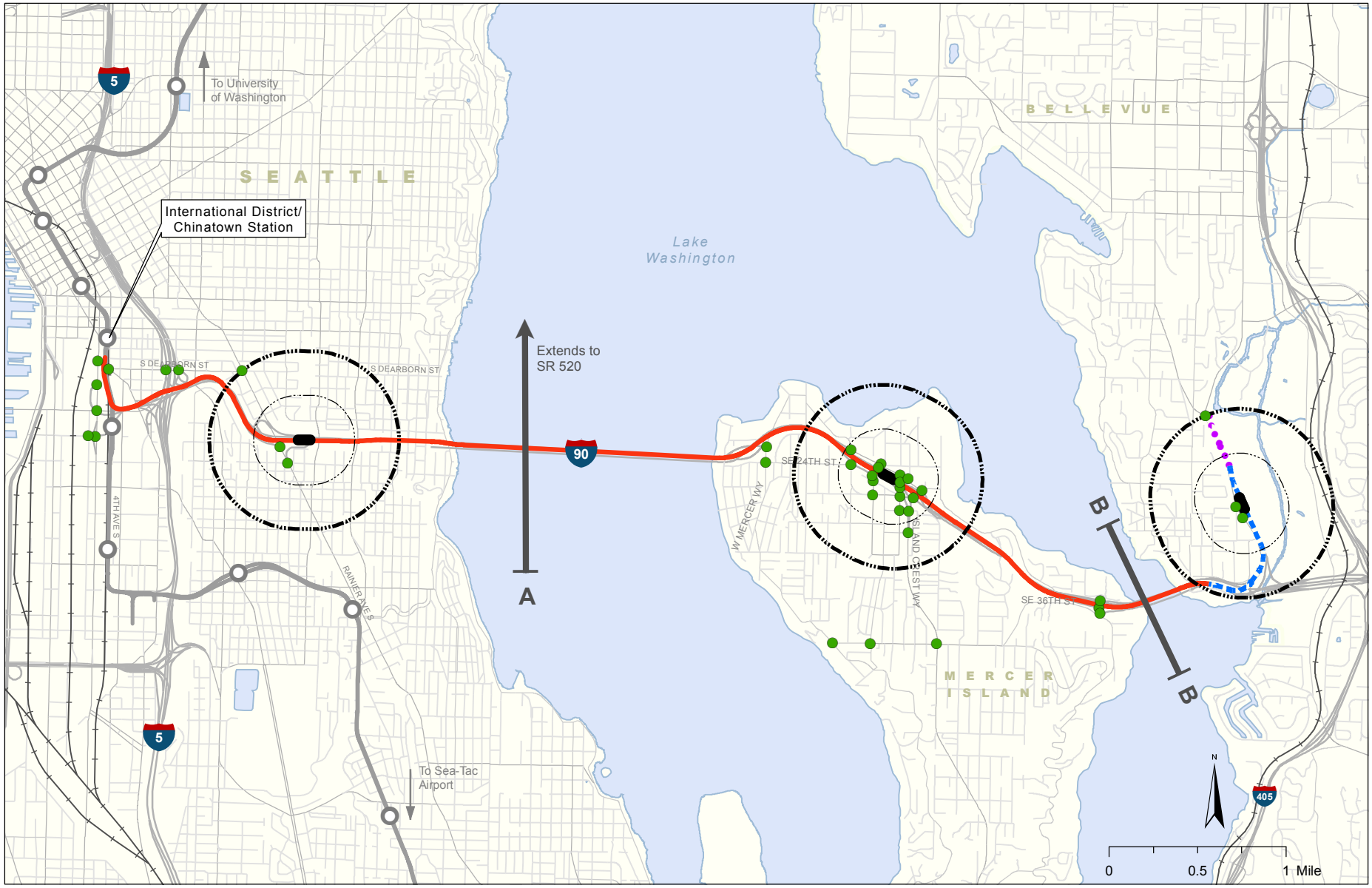
A) Lake Washington (including SR 520 and I-90): An east-west screenline between the I-90 Mount Baker Tunnel and Mercer Island

B) East Channel Bridge (I-90 only): An east-west screenline between Mercer Island and Bellevue Way

Note that Screenline A is the same as Screenline 2 in the Final EIS, but Screenline B is new and was not analyzed in the Final EIS. It was added to capture changes between Mercer Island and Bellevue Way SE. These screenlines provided a snapshot of traffic operations and mode share along each corridor based on the travel demand estimated from the PSRC and Sound Transit models.

2.2 Transit

In the study area, Metro provides fixed-route local and express buses, Americans with Disabilities Act (ADA) paratransit, dial-a-ride, vanpool, ride matching, and park-and-ride services. During peak periods, the average headway for Metro buses is about 30 minutes.



Study Intersection
Screenline
Sidewalk and On-Street Parking Study Area (1/4 mile)
Bicycle Study Area (1/2 mile)

Preferred Alternative
At-Grade Route
Elevated Route
Retained-Cut Route
Retained-Fill Route
Tunnel Route

Traction Power Substation
Proposed Station
Central Link Alignment and Station

Source: Data from King County (2006) and modified by CH2M. Updated by CH2M 2017.

Exhibit 2-1 **Transportation and Local Street Analysis Study Area**
East Link Project

Metro has implemented its *Strategic Plan for Public Transportation 2011-2021* (King County Metro, 2016a), last updated in the spring of 2016, to improve service between residential areas and transit hubs and activity centers. The following measures were used to analyze transit impacts:

- Ridership
- Travel time
- Service frequency LOS
- Hours of service LOS
- Passenger load LOS
- Reliability

Transit Levels of Service

For transit, LOS A indicates frequent peak-period service, more hours served during the day, high on-time performance, and minimal passenger crowding in a transit vehicle. Conversely, LOS F indicates infrequent or irregular service, minimal service hours, poor reliability, and passenger crowding in the vehicle.

The Sound Transit ridership forecasting model was used to develop the 2035 daily light rail system ridership estimates associated with the adopted project. The project follows a combination of the Interstate 90 Alternative (A1), 112th Avenue SE Modified Alternative (B2M), 110th NE Tunnel Alternative (C9T), NE 16th At-Grade Alternative (D2A), and Marymoor Alternative (E2). Further information on the methodology used to forecast light rail ridership is described in Attachment B.

Screenlines A and B, described in Section 3.2, Environmental Impacts, were used to analyze transit travel time, reliability and LOS measures for both construction and operations. Travel time was assessed for the trip between Seattle and the South Bellevue Park-and-Ride to capture changes in conditions for the entire length of proposed changes on I-90.

2.3 Highway Operations and Safety

Traffic volumes during the AM and PM peak periods were analyzed on freeway lanes and ramps using VISSIM software, which is compatible with the methodologies of the *Highway Capacity Manual* (HCM) (Transportation Research Board, 2010). Current freeway traffic volumes, geometry, vehicle occupancy, and base and ramp free-flow speed were obtained from existing traffic data and as-built drawings. These data were used to calibrate the simulation to represent current operating conditions on I-90. Attachment B provides greater detail on the assumptions and VISSIM results associated with the freeway analysis. Based on the forecasts described in Section 5, Highway Operations and Safety, freeway operations during the AM and PM peak periods were analyzed using the VISSIM simulation software package for years 2020 and 2035. Attachment B provides information on the assumptions for the future conditions analysis

Highway Operations Analysis Terms

Vehicle and person throughput: Vehicle and person throughput is an indicator of the number of vehicles and people in vehicles that cross a screenline. Compared with vehicle throughput, person throughput is a more appropriate assessment measure for analysis of a transit project because it illustrates the overall efficiency of the system through number of people moved instead of vehicles.

Travel time: Travel times provide information on how long it would take to travel through the corridor or certain paths within the corridor.

Level of service (LOS): LOS descriptions indicate when, how long, and how severely congestion occurs. LOS is useful to understand where poorly operating (i.e., LOS E and F) sections of the highway are located.

2.3.1 Highway Operations

The three key operating measures used to evaluate operating conditions on I-90 are vehicle and person throughput, travel time, and freeway level of service (LOS). Compared with vehicle throughput, person throughput is a more appropriate assessment measure for analysis of a transit project because it illustrates the overall efficiency of the system through number of people moved instead of number of vehicles. Throughput information is presented at Screenline A (Lake Washington) to explain changes in travel patterns across the lake, while the East Channel Bridge screenline (Screenline B) is used to understand the impact of light rail. Travel times provide information on how long it would take to travel through the corridor or certain paths within the corridor. LOS

descriptions indicate when, how long, and how severely congestion occurs. LOS is useful to understand where poorly operating (i.e., LOS E and F) sections of freeway are located. Although LOS is based on vehicle density and the congestion maps are based on speed, the two measurements are generally related to one another.

2.3.2 Safety

The Interactive Highway Safety Design Model (IHSDM) software based on the Highway Safety Manual (HSM) predictive method was used to assess the change in safety performance of the freeway facilities within the study area between the different analysis conditions. These facilities include the I-90 mainline and ramps. WSDOT has not developed safety calibration factors for freeway facilities; therefore, no calibration factors were available or used for the analysis.

The ramp terminal intersections were analyzed to assess any changes in safety performance based on changes in volume and traffic control, where applicable. The corresponding HSM safety performance functions were used to calculate the basic predicted crash average for each intersection and each analysis condition. Since no other geometric changes occur at these intersections between conditions, the difference of these values is the same relative difference as if all characteristics had been analyzed.

2.4 Arterials and Local Streets

2.4.1 Operations and Level of Service

Existing AM and PM peak-hour turning movement counts were collected in January, August, and September 2016 for the study intersections listed in Attachment B. Additional information used in the operational analysis includes the roadway's functional use, the lane geometry, and the traffic signal timing and phasing patterns.

The quality of traffic operations is described in terms of intersection LOS. Due to limitations of the HCM 2010 methodology and to be consistent with East Link Final EIS methodology, traffic volumes were analyzed using the HCM 2000 methodology to calculate peak-hour LOS at signalized and unsignalized intersections. Future auto demand volumes for local streets and arterials were estimated using a combination of future volume growth projections from the forecast model and post-processing adjustments based on existing counts, as explained in Attachment B. Changes in roadway geometry due to different Transit Integration configurations were taken into account in the volume forecasts. Intersection results at signalized locations are reported as the average delay of all vehicles as they approach the intersection. Results at unsignalized intersections are reported as the average delay for all vehicles at all-way stop-controlled intersections, and reported for the approach that would experience the greatest delay, or worst LOS, for two-way stop-controlled intersections. LOS grades range from LOS A to LOS F; LOS A represents the best operation, where most vehicles do not stop at all, and LOS F the poorest operation, where most of the drivers stop and wait more than a minute until proceeding through the intersection. A more detailed discussion of intersection LOS is provided in Attachment C.

2.4.2 Safety

Crash data were collected from WSDOT for years 2011 to 2015 for the study intersections. A summary of the historical crash data for all study intersections within Seattle, Mercer Island, and Bellevue was developed to illustrate the existing conditions of the study intersections. For the future year conditions at these intersections, the HSM predictive models for urban arterial intersections were used to assess the change in safety performance based on any changes in volume and traffic control, if applicable.

For Mercer Island, in addition to reviewing crashes at intersections, roadway segments (not including ramp terminals) were analyzed using the HSM predictive models for urban arterials for all of the

options. This analysis incorporated all geometric and volume data inputs to provide a more detailed analysis of the impacts to Mercer Island local streets.

2.4.3 Parking

Parking surveys were conducted during winter 2017 to inventory the availability of on-street parking within 0.25 mile of the Mercer Island Station. The survey included a space occupancy count of both unrestricted parking and Mercer Island Town Center permit parking zones within 0.25 mile of station entrances during the AM peak hour to calculate the percent parking utilization. Areas north of I-90 were not surveyed because all areas within a 0.25 mile of station entrances either do not allow parking, are within a residential permit parking zone, or are more than a 0.25-mile walk due to limited neighborhood access from N Mercer Way. Off-street parking was not inventoried because it is regulated by property owners and not considered available for light rail user parking.

2.5 Non-Motorized

In order to assess pedestrian exposure to vehicle conflicts as a result of a Transit Integration configuration, the number of pedestrians crossing a street due to a bus/light rail transfer was calculated for each configuration. A high number of pedestrian crossings could indicate a need for improvements at those locations.

For the purposes of this evaluation, estimating pedestrians that would already cross N Mercer Way to/from the park-and-ride or riders transferring from a local Mercer Island bus route (bus stops on the north side of N Mercer Way) are not included since those pedestrians are not affected by the project Transit Integration configurations. The FEIS Configuration assumed that park-and-ride users would cross N Mercer Way to access the Mercer Island Station. Only the pedestrians associated with a bus/light rail transfer from an I-90 route were included in this assessment.

Physical changes to non-motorized facilities, including sidewalks, crosswalks, and pathways, were also considered and evaluated for potential impacts. A qualitative analysis of potential impacts to non-motorized users from increases in traffic volumes was conducted by comparing the proposed increase in peak-hour trips on a particular road with the projected average peak-hour volume for the analysis year.

Non-motorized safety impacts on Mercer Island were assessed using the arterials and local streets safety analysis (see Section 2.4.2). The HSM predictive models provide an estimate of pedestrian and bicycle crashes, which was used to compare the impacts on non-motorized users for the different options.

2.6 Freight

Freeways, arterials, and local streets are vital to moving freight and goods between major transportation hubs and local business and consumer destinations. Within the East Link study area, there are key freight corridors such as I-5 and I-90 that serve not only the Puget Sound region but also national and international markets. Using the WSDOT Freight Goods Transportation System tonnage classifications and local truck route information, key freight facilities were identified within the study area.

Truck classification counts on I-90 were summarized and averaged for the data collection timeframe between January and May 2016. Data were obtained from WSDOT for a data collection point on I-90 between I-5 and Rainier Avenue S. The percentage of daily traffic was calculated for the AM peak, PM peak, and off-peak time periods to determine travel trends and characteristics on a typical weekday.

There are no roadways designated as truck routes on Mercer Island. Most truck trips consist of single-unit trucks (e.g., delivery trucks) rather than large commercial vehicles (e.g., tractor-trailer trucks)

because Mercer Island does not have large commercial and industrial activity areas like some other cities in the region. Existing truck volumes were included in the study intersection counts and are included in the existing and future traffic operational analysis.

SECTION 3

Regional Travel

This section analyzes potential impacts on regional travel based on the changes in I-90 operations and the Transit Integration configurations. The measures for changes in regional travel include vehicle miles of travel (VMT), vehicle hours of travel (VHT), vehicle volume-to-capacity (v/c) ratio, and mode share (see text box).

Impacts would be similar among the three Transit Integration configurations; therefore, they are not discussed in this section.

Regional Travel Analysis Terms

Vehicle miles traveled (VMT): Total number of vehicle miles traveled in a specific geographic area over a given period of time.

Vehicle hours traveled (VHT): Total vehicle hours expended traveling on the roadway network in a specified area during a specified time period.

Average daily traffic (ADT): Total volume of traffic during a given time period divided by the number of days in that time period, representative of average traffic in a one-day time period.

Vehicle volume-to-capacity (v/c) ratio: Ratio of vehicle demand compared to roadway capacity, used as the performance measure to assess travel conditions on the regional facilities in the study area. A v/c ratio of 0.9 and above indicates capacity deficiencies and the need for improved travel efficiency

Peak hour: Hour of the day in which the maximum demand for service is experienced, accommodating the largest number of automobile or transit patrons.

Mode share: Percentage of people using a particular type of transportation (automobile, HOV, or transit).

3.1 Affected Environment

3.1.1 Vehicle Miles Traveled/Vehicles Hours Traveled

Today, almost 76 million VMT occur daily within the Puget Sound region (King, Pierce, and Snohomish counties). This results in over 2 million VHT for all users of the transportation system. In the AM peak period (6 to 9 a.m.), about 14 million VMT occur each day, which equates to almost 425,000 VHT. In the PM peak period (3 to 6 p.m.), there are approximately 16.7 million total VMT and about 500,000 total VHT. Forty percent of the daily VMT occur in the AM and PM peak periods, and over 45 percent of all daily VHT occur in the AM and PM peak periods. This indicates that the most congested periods in the Puget Sound region are during the AM and PM work commuting periods, with the PM peak being slightly higher. Table 3-1 provides existing daily regional VMT and VHT information.

The regional highways serve a substantial number of vehicle trips in the central Puget Sound region and beyond in terms of vehicle travel and freight. SOVs were the dominant mode of regionwide travel in 2014, accounting for 53 percent of the trips made, and HOVs accounted for 36 percent. Major regional transit service providers within the study area include King County Metro, Sound Transit, and Community Transit. Major highway facilities, including I-90, I-5, I-405, and SR 520, serve most of the regional trips within the study area.

Table 3-1. Existing Regional Travel

Time of Day	VMT / % share	VHT / % share
AM Peak Period (6 to 9 a.m.)	14,086,000 / 19%	423,900 / 21%
Non-Peak Period	45,092,700 / 59%	1,142,100 / 55%
PM Peak Period (3 to 6 p.m.)	16,661,900 / 22%	495,100 / 25%
Daily Total	75,840,600 / 100%	2,061,100 / 100%

Source: PSRC (2014).

3.1.2 Regional Highways

I-90 is a major east-west interstate highway that extends from Boston to Seattle, where it intersects the western portion of the East Link Extension corridor. In Washington, I-90 connects various freight and state routes originating in Seattle, through Mercer Island and Bellevue, to the eastern side of the state and beyond. The section of I-90 that crosses Lake Washington, including the floating bridges (Lacey V. Murrow Memorial Bridge and Homer M. Hadley Memorial Bridge), has three GP lanes in each direction and a reversible center roadway that operates as a peak directional expressway. The reversible center roadway is located between approximately Rainier Avenue S in Seattle and E Mercer Way on Mercer Island. It is used by HOVs and buses for this entire length, and Mercer Island SOVs are allowed to use it between Rainier Avenue S and Island Crest Way. The reversible roadway is physically separated from the eastbound and westbound mainline lanes and operates in the westbound direction in the morning and eastbound in the afternoon and evenings. In 2015, average daily traffic (ADT) volumes on the I-90 floating bridges mid span were about 160,000 vehicles; this includes about 145,000 vehicles per day in the eastbound and westbound mainline lanes and about 15,000 daily vehicles in the reversible center roadway (WSDOT, 2015). The ADT on the I-90 East Channel Bridge between Mercer Island and Bellevue is about 174,000 vehicles.

3.1.3 Screenline Performance

Table 3-2 shows the performance of Screenlines A and B for existing AM and PM peak-hour conditions. Screenline A, which crosses I-90 and SR 520, has heavy congestion in both directions in the PM peak hour. This congestion is indicated by v/c ratios above 0.9, which is expected because these highways are some of the most heavily traveled highways in the region. Although Screenline B is located on I-90, its v/c ratio is considerably less than at Screenline A because of the additional lanes (collector-distributor system) provided between the Bellevue Way and I-405 interchanges that manage the flow of traffic to and from these closely spaced interchanges and increase roadway capacity in this area.

Mode share in the study area varies depending on congestion, land use in the surrounding the area (e.g., commercial, residential, and retail), and individual preference. Overall, SOVs have the highest mode share and generally range from about 45 to 70 percent. HOVs generally vary between about 20 and 35 percent, and transit is less, with 5 to 25 percent. Relatively high HOV and transit mode shares are those leaving Seattle in the PM peak period (Screenline A eastbound).

Table 3-2. Existing AM and PM Peak-Hour Screenline Performance

Screenline	Direction	V/c Ratio	Mode Share (percent) (SOV/HOV/transit)
AM Peak-Hour			
A (Lake Washington)	Westbound	0.84	43/31/27
	Eastbound	0.78	66/17/17
B (East Channel Bridge)	Westbound	0.76	49/34/17
	Eastbound	0.60	72/22/6
PM Peak-Hour			
A (Lake Washington)	Westbound	0.98	62/25/13
	Eastbound	0.91	46/29/25
B (East Channel Bridge)	Westbound	0.70	67/28/5
	Eastbound	0.84	51/33/16

Source: PSRC (2014).

3.2 Environmental Impacts

For construction and operation, there would not be noticeable differences between the options at the regional level; therefore, this analysis only compares the No Build condition to both options.

For the 2020 and 2035 analysis years, a substantial number of highway and arterial improvements are assumed and are listed in Table 3-3. These include projects in WSDOT's Connecting Washington transportation package. Attachment B provides the complete list of future transportation projects.

3.2.1 Construction Impacts

Regional travel is expected to be similar between the options because the differences between the options are focused within a segment of the I-90 corridor and therefore would have an impact only in that area, not at a regional level. The analysis provided in this section only compares the options during construction to the No Build condition.

3.2.1.1 Traffic Forecasts and Vehicle Miles Traveled/Vehicle Hours Traveled

Annual traffic volumes and growth rates were based on the 2020 PSRC travel demand models. Vehicle growth forecasted from the 2020 PSRC travel demand models was applied to existing (2016) volumes to estimate future volumes. No Build condition traffic volumes along I-90 across Lake Washington are predicted to grow at an average annual rate (up to year 2020) of about 0.8 percent in both AM and PM peak periods.

Table 3-4 presents the peak period traffic volumes and growth rates based on the PSRC travel demand model. No Build condition traffic volumes across Lake Washington on I-90 and on SR 520 combined would grow at an average annual rate of about 1.4 percent, which is slightly higher than growth on I-90 alone, due to completion of SR 520 improvements. No Build condition traffic volumes along I-90 at Screenline B are predicted to grow at an average annual rate of about 0.8 percent in both AM and PM peak periods.

Table 3-3. No Build Condition Transportation Programs and Projects

Program/Project	Horizon Year	
	2020	2035
Roadway		
I-405 Renton to Bellevue – Corridor Widening		X
I-405/SR 167 Interchange Direct HOV Connector	X	X
I-405/NE 132nd Street Interchange – New Interchange		X
SR 520/124th Street Interchange – Improvements		X
SR 520 - Floating Bridge and Landings Project	X	X
I-90/Eastgate to SR 900 – Peak Use Shoulder Lanes	X	X
SR 509 Extension to I-5		X
SR 167 - Tacoma to Edgewood New Freeway		X
SR 167 - 8th to 277th Southbound High-Occupancy Toll Lane	X	X
SR 99 - Alaskan Way Viaduct Replacement		X
Local Agencies		
Capital Improvement Programs/Transportation Facility Plans	X	X
Comprehensive and Transportation Plans	X	X

Table 3-3. No Build Condition Transportation Programs and Projects

Program/Project	Horizon Year	
	2020	2035
Sound Transit		
ST2 Plan[a]	X[b]	X
King County Metro		
Service Implementation Plans	X	X
Transit Service Integration Plan	X	X

[a] The Sound Transit 2 (ST2) Plan (Sound Transit, 2008) is a package of HCT investments in the regional transit system, which includes light rail in the Eastside corridor.
[b] Not all projects identified in this program are expected to be built by 2020; refer to Attachment B for the project list by horizon year.

Table 3-4. No Build Condition AM and PM Peak-Period Travel Demand Forecasts

Screenline	2016 Existing	2020 No Build Condition	
	Vehicles	Vehicles	Annual Growth Rate (percent)
AM Peak Period			
Screenline A (I-90 and SR 520)	48,500	51,200	1.4
Screenline B (I-90)	37,900	39,100	0.8
PM Peak Period			
Screenline A (I-90 and SR 520)	56,300	59,400	1.4
Screenline B (I-90)	42,900	44,200	0.8

Note: Vehicle totals include the number of entering and exiting vehicles on each segment.

During construction of East Link, there would be a slight reduction in the auto forecasts compared to the No Build condition as people switch to HOV and transit due to increases in congestion with reduced capacity in the peak directions (westbound in the AM peak and eastbound in the PM peak) and the closure of the I-90 center roadway. Table 3-5 provides the regional VMT and VHT for 2020. Regional growth, VMT, and VHT are expected to be similar among the options because operational changes and transit service for the options are localized and would not impact regional travel patterns.

Table 3-5. 2020 Regional Travel Impact Comparison Summary

Measure	No Build	Options	Percent Change
Peak Periods VMT	34,491,700	33,913,800	-1.7%
Peak Periods VHT	1,098,200	1,053,130	-4.1%

Source: PSRC (2014); Sound Transit (2014).

3.2.1.2 Screenline Performance

For the No Build condition and options, the eastbound PM v/c ratios crossing Screenline A would increase compared with existing conditions to over or near 0.9, indicating highly congested conditions. Option 3 would have a slightly lower v/c ratio at Screenline A than Options 1 and 2 due to all four lanes

being general purpose. The travel modes across Screenline A would shift among SOVs, HOVs, and transit in the future compared with existing conditions. The percentage of SOV users in both westbound and eastbound directions would slightly decrease in the future No Build condition as congestion worsens and people choose alternative modes, such as HOV and transit. Table 3-6 compares the v/c ratio for the No Build condition to the options and Table 3-7 compares mode shares for the No Build condition to the options.

Table 3-6. 2020 AM and PM Peak-Hour Volume-to-Capacity Ratios at Screenlines

Screenline	Direction	Existing 2016	2020 v/c Ratio			
			No Build	Options		
				Option 1	Option 2	Option 3
AM Peak Hour						
A (Lake Washington)	Westbound	0.84	0.82	0.86	0.86	0.84
	Eastbound	0.78	0.71	0.63	0.63	0.62
B (East Channel Bridge)	Westbound	0.76	0.79	0.83	0.84	0.85
	Eastbound	0.60	0.63	0.75	0.74	0.76
PM Peak Hour						
A (Lake Washington)	Westbound	0.98	0.90	0.80	0.79	0.78
	Eastbound	0.91	0.89	0.93	0.93	0.90
B (East Channel Bridge)	Westbound	0.70	0.73	0.89	0.88	0.90
	Eastbound	0.84	0.89	0.93	0.93	0.95

Source: PSRC (2014).

Table 3-7. 2020 AM and PM Peak-Hour Mode Share at Screenlines

Screenline	Direction	Existing 2016	2020 Mode Share (percent) (SOV/HOV/Transit)[a]			
			No Build	Option 1	Option 2	Option 3
AM Peak Hour						
A (Lake Washington)	Westbound	43/31/27	41/31/28	42/30/29	41/30/29	42/30/29
	Eastbound	66/17/17	63/18/20	63/17/20	63/17/20	63/17/20
B (East Channel Bridge)	Westbound	49/34/17	48/30/22	50/27/23	49/29/23	50/27/23
	Eastbound	72/22/6	73/20/7	72/21/7	72/22/7	73/20/7
PM Peak Hour						
A (Lake Washington)	Westbound	62/25/13	59/25/16	60/25/16	59/25/16	60/25/16
	Eastbound	46/29/25	44/29/27	45/28/28	44/28/28	45/28/28
B (East Channel Bridge)	Westbound	67/28/5	69/25/6	68/27/6	66/29/6	68/26/6
	Eastbound	51/33/16	50/29/20	52/27/21	50/29/21	52/27/21

Source: PSRC (2014).
[a] Sum of percentages may be greater than 100 percent due to rounding.

For the No Build condition and options across Screenline B, the PM v/c ratios in both directions would increase compared with existing conditions to over or near 0.9. Mode shift patterns indicate that in the future No Build condition and the options during construction, SOV usage would decrease and HOV and transit usage would increase compared with the existing conditions. Option 3 would have slightly higher v/c ratios at Screenline B than Options 1 and 2 in both directions. When combined with the lower v/c ratios seen at Screenline A relative to Options 1 and 2, Option 3 would have similar capacity as the other options.

By 2020, the percentage of SOV users in the AM peak westbound and PM peak eastbound directions would decrease slightly in the future No Build condition compared to existing as congestion worsens and people choose alternative modes, such as HOV and transit. Option 1 would see a 1 to 2 percent mode share shift in the peak directions to SOV compared to the No Build condition, while Options 2 and 3 would have similar mode share as the No Build in the eastbound direction.

3.2.2 Operational Impacts

There would not be noticeable differences between the options at the regional level; therefore, this analysis only compares the No Build condition to the options.

3.2.2.1 Traffic Forecasts and Vehicle Miles Traveled/Vehicle Hours Traveled

Table 3-8 lists peak period traffic volumes and growth rates based on the 2035 PSRC travel demand model. Vehicle growth forecasted from the 2035 PSRC travel demand models was applied to existing (2016) volumes to estimate future volumes. No Build condition traffic volumes along I-90 at Screenline B are predicted to grow at an annual average rate of up to 0.5 percent in both AM and PM peak periods, while growth on I-90 and on SR 520 combined at Screenline A are expected to grow at approximately 0.7 percent per year.

Table 3-8. No Build Condition AM and PM Peak-Period Travel Demand Forecasts

Screenline	2016 Existing	2035 No Build	
	Vehicles	Vehicles	Annual Growth Rate (percent)
AM Peak Period			
Screenline A (I-90 and SR 520)	48,500	55,100	0.7
Screenline B (I-90)	37,900	41,200	0.5
PM Peak Period			
Screenline A (I-90 and SR 520)	56,300	63,400	0.7
Screenline B (I-90)	42,900	46,300	0.4

Note: Vehicle totals include the number of entering and exiting vehicles on each segment.

For the options, the Sound Transit ridership forecasting model was also used, in conjunction with the PSRC model, to develop the 2035 East Link light rail system ridership forecasts. The light rail alignment analyzed generally follows the path of the FEIS Configuration based on the 2011 FHWA *Record of Decision* (FHWA, 2011): Interstate 90 Alternative (A1), 112th Avenue SE Modified Alternative (B2M), 110th NE Tunnel Alternative (C9T), NE 16th At-Grade Alternative (D2A), and Preferred Marymoor Alternative (E2). The transit ridership associated with the light rail alternatives and the transit service modifications was incorporated into the modeling process to understand the changes in auto demands and their patterns with the project.

For both Options 1 and 2, there would be a slight reduction in the auto forecasts as people are forecasted to shift their mode of transportation and choose to use light rail. Table 3-8 provides the regional VMT and VHT in 2035. Regional travel is expected to be similar between Option 1 and Option 2 because operational changes between the options are concentrated in a segment of the I-90 corridor and transit service coverage would be similar between the options having similar mode shift patterns. Under the FEIS Configuration, the transit ridership is similar but light rail boardings are slightly lower on Mercer Island and at Rainier Station, compared to the Transit Integration configurations, because fewer buses would service Mercer Island Station, reducing transit transfer boardings, and continued bus service across the bridge reduces light rail boardings.

Any change in new transit riders with the Transit Integration configurations does not have adverse impacts on VMT and VHT, which are similar between the transit integration configurations. As shown in Table 3-9, the Transit Integration configurations would have a slight reduction to similar VMT and VHT as with the FEIS Configuration.

Table 3-9. 2035 Regional Travel Impact Comparison Summary

Measure	No Build	Options with FEIS Configuration	Percent Change from No Build	Options with Transit Integration	Percent Change from No Build
Peak Periods VMT	39,378,400	39,301,900	-0.19	39,296,900	-0.21
Peak Periods VHT	1,504,700	1,496,000	-0.58	1,495,300	-0.62

Source: PSRC (2014); Sound Transit (2014).

3.2.2.2 Screenline Performance

The following subsections summarize screenline vehicle performance results during the AM and PM peak hour in the No Build condition and for the options during operations. Generally, with the East Link Extension, the roadway v/c ratios would increase in the peak direction across both screenlines compared with the No Build condition. The mode share would generally become less dominated by SOVs as the transit share increases. This mode shift provides increased person-mobility in the corridor as it has limited opportunities for road expansion.

By converting the I-90 reversible center roadway to light rail, other regional highways would not be affected because v/c ratios across Screenlines A and B with the project remain similar to or less than the No Build condition. Table 3-10 shows 2035 PM v/c ratios at each screenline, and Section 5, Highway Operations and Safety, further discusses I-90 operations (including vehicle and person throughput and capacity, travel time, LOS and congestion, and safety). The v/c ratios during operations are similar among the options and Transit Integration configurations.

Table 3-10. 2035 AM and PM Peak-Hour Volume-to-Capacity Ratios at Screenlines

Screenline	Direction	Existing 2016	2035 V/C Ratio	
			No Build	Options
AM Peak Hour				
A (Lake Washington)	Westbound	0.84	0.81	0.84
	Eastbound	0.78	0.86	0.75
B (East Channel Bridge)	Westbound	0.76	0.80	0.84
	Eastbound	0.60	0.70	0.85

Table 3-10. 2035 AM and PM Peak-Hour Volume-to-Capacity Ratios at Screenlines

Screenline	Direction	Existing 2016	2035 V/C Ratio	
			No Build	Options
PM Peak Hour				
A (Lake Washington)	Westbound	0.98	1.02	0.89
	Eastbound	0.91	0.90	0.93
B (East Channel Bridge)	Westbound	0.70	0.78	0.94
	Eastbound	0.84	0.91	0.94

Source: PSRC (2014).

Screenline A: Lake Washington (Includes I-90 and SR 520)

In the 2035 AM No Build condition, the westbound v/c ratio would decrease while the eastbound v/c ratio would increase crossing Screenline A compared with existing conditions. With the options, the v/c ratio in the westbound direction is expected to increase slightly, while it would decrease in the eastbound direction. The increased transit use with the project would provide additional capacity for growth (as described further in Section 5, Highway Operations and Safety).

In the 2035 PM No Build condition, the westbound and eastbound v/c ratios crossing Screenline A would increase compared with existing conditions to over 1.0 in the PM westbound direction, indicating highly congested conditions. With the options, the v/c ratio in the peak eastbound direction in the PM peak period is expected to increase slightly because vehicle access to the reversible center roadway would be prohibited. Even so, the increased transit use with the project would increase the person throughput across this screenline and provide additional capacity for growth (as described further in Section 5.2, Environmental Impacts). In the westbound direction, the v/c ratio is expected to improve with the options because providing light rail and a new HOV lane would shift the modes across the lake to a higher transit and HOV emphasis and thus reduce congestion.

Screenline B: Interstate 90 at East Channel Bridge

In the 2035 AM No Build condition across this screenline, v/c ratios would increase in both directions compared with existing conditions. With the options, v/c ratios would increase in both directions compared with the No Build condition because the demand at Screenline B would increase but capacity would stay the same.

In the 2035 PM No Build condition across this screenline, v/c ratios would increase in the eastbound and westbound directions compared with existing conditions. With the options, v/c ratios would increase in both directions compared with the No Build condition. There would be a higher increase in demand in the reverse-peak direction (AM eastbound and PM westbound) with the new R-8A HOV lanes; therefore, the v/c ratio in the reverse-peak direction would increase more than it would in the peak direction.

Table 3-11 shows how the travel modes across screenlines would shift among SOVs, HOVs, and transit in the future. The percentage of SOV and HOV auto users in both westbound and eastbound directions would generally decrease in the future No Build condition as congestion worsens and people choose alternative modes, such as transit. In the 2035 build conditions, SOV and HOV usage would decrease compared to the No Build condition as people choose to use transit. Providing light rail on I-90 across Lake Washington would increase the transit mode share at Screenline A compared to the No Build condition by up to 5 percent in the peak hour. HOVs are expected to shift slightly between I-90 and SR 520 due to the HOV capacity on each facility.

Table 3-11. 2035 AM and PM Peak-Hour Mode Share at Screenlines

Screenline	Direction	Existing 2016	2035 Mode Share (percent) (SOV/HOV/Transit)[a]		
			No Build	Option 1	Option 2
AM Peak Hour					
A (Lake Washington)	Westbound	43/31/27	39/30/32	38/28/34	38/29/34
	Eastbound	66/17/17	62/16/22	58/15/27	57/16/27
B (East Channel Bridge)	Westbound	49/34/17	45/29/26	41/24/35	40/25/35
	Eastbound	72/22/6	73/18/9	58/16/26	57/17/26
PM Peak Hour					
A (Lake Washington)	Westbound	62/25/13	59/23/19	55/22/22	55/23/22
	Eastbound	46/29/25	42/28/30	42/26/32	41/27/32
B (East Channel Bridge)	Westbound	67/28/5	69/23/8	56/21/23	54/24/22
	Eastbound	51/33/16	47/29/24	44/23/33	43/25/32

Source: PSRC (2014).

[a] Sum of percentages may be greater than 100 percent due to rounding.

3.3 Mitigation

No mitigation for regional travel impacts would be required because, overall, the volumes at regional screenlines would not exceed capacity (i.e., v/c ratios would be less than 1.0) and would generally be similar to the No Build condition or improve with the East Link Extension for all options.

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SECTION 4

Transit

This section discusses both existing and proposed bus and light rail transit services and facilities. The analysis assesses the changes in I-90 operations and the Transit Integration configurations for the following transit performance measures at Screenlines A and B: ridership, service frequency level-of-service (LOS), hours of service LOS, passenger load LOS, and reliability. The PM peak hour is used for these measures because it is generally the most congested period. Transit travel time along I-90 between Seattle and Bellevue is also provided to compare bus and light rail transit performance during the AM and PM peak periods.

4.1 Affected Environment

4.1.1 Transit Facilities and Services

The Mercer Island Park-and-Ride and South Bellevue Park-and-Ride are both located within the study area and are served by King County Metro and Sound Transit (Table 4-1). Sound Transit's Regional Express buses provide regional transit service to commuters in the study area as well as in other parts of King County and Pierce and Snohomish counties. Metro provides express and local service throughout King County and provides most of the local service within the study area. Sound Transit and Metro provide bus services across Lake Washington that connect Downtown Seattle to the Eastside.

Table 4-1. Existing and Proposed Bus Transit Facilities and Services in Study Area

Transit Facility	Rider Amenities (Existing/Future)	Number of Routes	Parking Stalls (Existing/Future)
Mercer Island Park-and-Ride	Storage for 40 bikes/storage for 80-100 bikes[a]	Existing: 4 Metro, 2 ST FEIS Configuration: 4 Metro, 1 ST Proposed: 6 Metro, 0 ST	447/447
South Bellevue Park-and-Ride	Storage for 40 bikes/storage for 120 bikes	Existing: 3 Metro, 4 ST FEIS Configuration: 3 Metro, 3 ST Proposed: 5 Metro, 4 ST	519/1,500

Note: Existing transit routes and parking stalls listed as of summer 2016.
[a] New bike storage would be located at 77th Avenue SE entrance of the Mercer Island Station.
Source: Metro (2016b).
ST Sound Transit

During peak periods, the average headway for Metro buses is about 30 minutes. Metro has implemented its *Strategic Plan for Public Transportation 2011-2021* (Metro, 2016b) as an effort to continue to improve service between residential areas and transit hubs and activity centers. The plan was last updated in the spring of 2016. Within the study area, Sound Transit's Regional Express buses have approximate headways of 5 to 30 minutes. In general, during the peak periods, the number of buses and routes in the peak direction is greater than the number of buses running in the opposite "reverse-peak" direction. Midday, off-peak, and weekend transit service is limited, and many of the routes in the study area do not operate as often during these times. Available routes during these times also operate with less frequent headways, generally about 1 hour. Existing bus routes within the study area are listed in Table 4-2.

Table 4-2. Existing Bus Routes Evaluated in Study Area

Route	Stop Locations in Study Area	Service Area	Schedule (with headways)
Metro 111	I-90	Downtown Seattle, I-90 and Rainier, Newport Hills Park-and-Ride, Kennydale, Renton Highlands Park-and-Ride, Renton Highlands, Maplewood Heights, Lake Kathleen	Weekdays (5:15 a.m. to 7:30 a.m., 3:30 p.m. to 6:00 p.m.) every 20 minutes
Metro 114	I-90	Downtown Seattle, I-90 and Rainier, Newport Hills Park-and-Ride, Kennydale, Renton Highlands Park-and-Ride, Renton Highlands, Maplewood Heights, Lake Kathleen	Weekdays (5:30 a.m. to 7:45 p.m., 4:00 p.m. to 5:30 p.m.) every 30 minutes
Metro 201	North Mercer Island	Downtown Seattle, North Mercer Island, South Mercer Island	Weekdays (7:00 a.m. to 7:40 a.m., 6:00 p.m.) every 40 minutes
Metro 204	North Mercer Island	Downtown Seattle, North Mercer Island, South Mercer Island	Weekdays (5:45 a.m. to 6:30 p.m.) every 30 to 60 minutes
Metro 212	I-90	Downtown Seattle, I-90 and Rainier, Factoria, Eastgate I-90 Freeway Station, Eastgate Park-and-Ride	Weekdays (6:00 a.m. to 9:30 a.m., 3:30 p.m. to 7:00 p.m.) every 10 to 30 minutes
Metro 214	I-90	Downtown Seattle, I-90 and Rainier, Issaquah Transfer Point, Issaquah, Preston, Fall City, Snoqualmie Falls, Snoqualmie, North Bend, Factory Stores of North Bend	Weekdays (5:45 a.m. to 8:15 a.m., 3:15 p.m. to 6:30 p.m.) every 10 to 30 minutes
Metro 216	I-90, North Mercer Island	Downtown Seattle, I-90 and Rainier, North Mercer Island, Pine Lake, South Sammamish Park-and-Ride, Redmond, Bear Creek Park-and-Ride	Weekdays (5:30 a.m. to 8:15 a.m., 3:30 p.m. to 6:00 p.m.) every 20 to 40 minutes
Metro 217	I-90	Downtown Seattle, I-90 and Rainier, Factoria, Eastgate Park-and-Ride, Eastgate, North Issaquah	Weekdays (6:45 a.m. to 8:00 a.m., 4:45 p.m. to 5:45 p.m.) every 30 minutes
Metro 218	I-90	Issaquah Highlands Park-and-Ride, Eastgate I-90 Freeway Station, I-90 and Rainier, Downtown Seattle	Weekdays (3:15 p.m. to 4:00 p.m.) every 10 to 20 minutes
Metro 219	I-90	Redmond, Issaquah Highlands Park-and-Ride, Eastgate I-90 Freeway Station, I-90 and Rainier, Downtown Seattle	Weekdays (4:45 p.m. to 6:45 p.m.) every 10 to 30 minutes
Metro 630	Mercer Island	Mercer Island, Downtown Seattle	Weekdays (4:45 a.m. to 11:45 p.m.) every 10 to 30 minutes
ST 550	North Mercer Island, I-90	Bellevue Square, Bellevue Transit Center, South Bellevue Park-and-Ride, North Mercer Island, I-90 and Rainier, Downtown Seattle	Weekdays (4:45 a.m. to 11:45 p.m.) every 10 to 30 minutes Weekends (6:30 a.m. to 11:45 p.m.) every 15 to 30 minutes
ST 554	North Mercer Island, I-90	South Sammamish Park-and-Ride, Issaquah Highlands Park-and-Ride, Downtown Issaquah, Issaquah Transfer Point, Bellevue Community College, Eastgate Park-and-Ride, Eastgate I-90 Freeway Station, North Mercer Island, I-90 and Rainier, Downtown Seattle	Weekdays (4:30 a.m. to 11:30 p.m.) every 15 to 60 minutes Weekends (6:00 a.m. to 11:30 p.m.) every 20 to 60 minutes

Note: Transit routes are from summer 2016 schedules obtained from Metro and Sound Transit web sites: http://metro.kingcounty.gov and http://www.soundtransit.org.
Source: Metro (2016a); Sound Transit (2016).

4.1.2 Transit Level of Service and Operations

4.1.2.1 Service Frequency

For this analysis, service frequency LOS represents the frequency (headways) that a transit service is available throughout the PM peak hour. Only buses that travel on I-90 were included in this analysis. In the existing condition, the bus routes between Downtown Seattle, Mercer Island, Bellevue, and Issaquah operate at an average headway of less than 10 minutes (transit service frequency LOS A and B). The Mercer Island to Downtown Redmond and the Downtown Seattle to Downtown Redmond connections have a service frequency of LOS C or better. Exhibit 4-1 shows the PM peak-hour service frequency LOS for existing conditions.

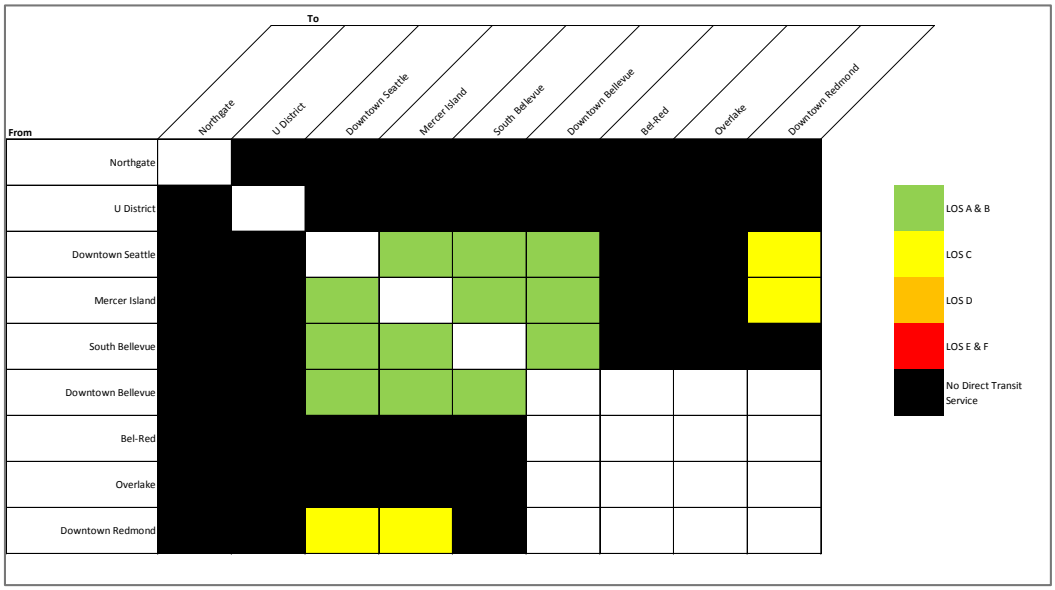


Exhibit 4-1. Existing PM Peak-Hour Service Frequency Level of Service

4.1.2.2 Hours of Service

Hours of service LOS represents the number of hours that a transit service is available throughout the day. Under existing conditions, transit service is provided 17 to 20 hours during the day where present (hours of service LOS B or better). This includes service between Downtown Seattle, Mercer Island, and Bellevue. There is no direct service connection to Northgate, the University District, the Bel-Red area, or the Overlake area. Exhibit 4-2 shows the hours of service LOS for existing conditions between areas connected by the bus routes evaluated in this analysis.

4.1.2.3 Passenger Load Level of Service

In the AM peak-hour westbound direction and in the PM peak-hour eastbound direction, the passenger load would be LOS C or D for both screenlines, which indicates that passenger overcrowding is a potential issue and could impact stop dwell times and reliability. Screenline A has the highest passenger load with 1.03 passengers per seat, indicating that buses are overcrowded during the PM peak-hour in the eastbound direction and the AM peak-hour in the westbound direction.

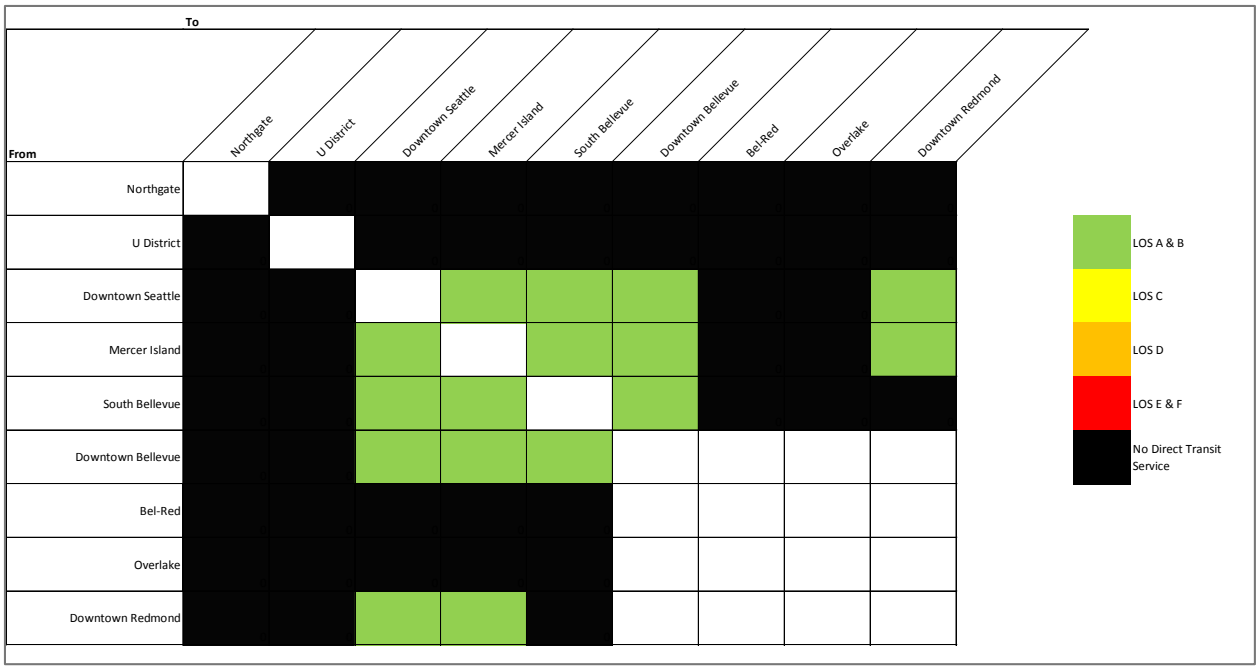


Exhibit 4-2. Existing Hours of Service Level of Service

In the PM peak-hour westbound direction, a passenger load LOS of A was calculated because of more frequent service and more routes operating in that direction. This indicates that passengers are able to find empty seats. Table 4-3 summarizes the existing PM peak-hour passenger load LOS associated with the study area screenlines.

Table 4-3. Existing PM Peak-Hour Bus Passenger Loads

Screenline	Existing Routes	Direction	LOS
A (Lake Washington)	9 local, 3 express	Eastbound	D
		Westbound	A
B (East Channel Bridge)	9 local, 3 express	Eastbound	C
		Westbound	A

Source: Sound Transit (2014).

4.1.2.4 Reliability

Metro had a systemwide on-time performance of 74.9 percent in 2015, which is below their target of 80 percent (Metro, 2016c). More buses in the PM peak and on highways were late, likely due to increases in both traffic congestion and ridership activity. This may reflect lower than expected reliability in the study area. Sound Transit routes that serve the study area were on time 82 percent of the time in 2016.

4.2 Environmental Impacts

This section discusses both the No Build condition and proposed bus and light rail transit services and facilities during construction and operations. The analysis addresses the changes in I-90 operations and the Transit Integration refinements for the following transit performance measures at Screenlines A and B during the PM peak hour: ridership, service frequency LOS, hours of service LOS, passenger load LOS, and reliability. Transit travel time was compared for bus and light rail transit along I-90 between Seattle and Bellevue in both the AM and PM peak periods. Transit travel time to and from Mercer Island is discussed in Section 5.

4.2.1 Construction Impacts

Along I-90, construction would affect the bus routes stopping at Rainier Avenue S and at Mercer Island. Bus service would continue at these locations, but buses would use the outer roadway HOV lanes to access the Rainier Avenue S and Mercer Island stops. The R-8A HOV lanes between Seattle and Mercer Island would be completed before East Link construction begins on I-90. When light rail construction begins on the D2 Roadway in mid-2018, buses would not be able to use that facility and would be rerouted to the I-90 mainline and 4th Avenue S.

4.2.1.1 Service Frequency

In the 2020 No Build condition, the bus routes between Downtown Seattle, Mercer Island, Issaquah, and Bellevue would continue to operate at an average headway of less than 10 minutes (transit service frequency LOS A and B). The Mercer Island to Downtown Redmond and the Downtown Seattle to Downtown Redmond connections would have an improved service frequency to LOS A in the No Build and build compared to the existing LOS of C. Bus schedules are consistent between the No Build condition and the options, and therefore the options during construction have similar service frequency LOS compared to No Build. Exhibit 4-3 shows the PM peak-hour service frequency LOS for the No Build condition and the options during construction.

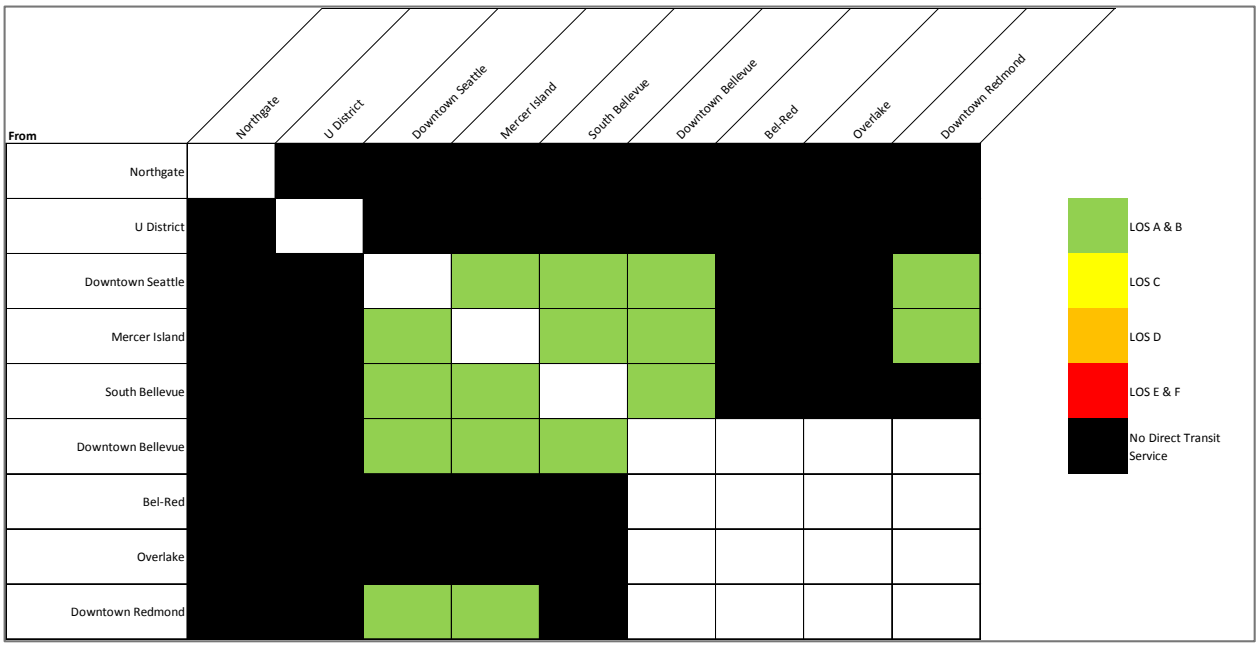


Exhibit 4-3. PM Peak-Hour Service Frequency LOS for No Build Condition and Options during Construction

4.2.1.2 Hours of Service

Existing routes that continue in the future, without major changes, were assumed to have the same hours of service as they do currently. In the No Build condition and options during construction , service changes would consist of mostly frequency changes and removal of duplicative routing. Therefore, the hours of service LOS is similar to the existing condition. Exhibit 4-4 shows the hours of service LOS for the 2020 No Build condition and the options during construction.

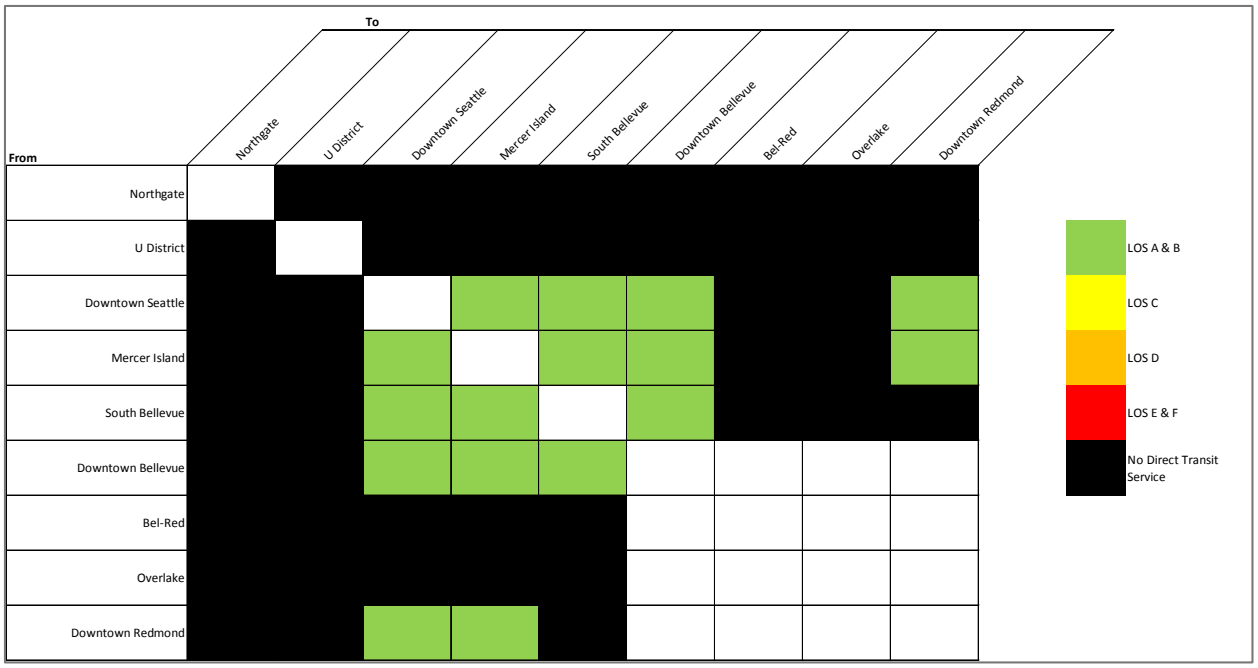


Exhibit 4-4. PM Hours of Service LOS for the 2020 No Build Condition and Options during Construction

4.2.1.3 Passenger Loads

No Build passenger load LOS is similar to the construction options because transit service schedules and service area are similar between the conditions. In the PM peak-hour eastbound direction, the passenger load would be LOS D for both screenlines, which indicates that passenger overcrowding is a potential issue and could impact stop dwell times and reliability. Screenline A has the highest passenger load with 1.26 passengers per seat, indicating that buses are overcrowded. In the westbound direction, the passenger load LOS would be A and B for Screenline A and B, respectively, indicating that crowding is not an issue and passengers are able to stow carry-ons in empty seats. Table 4-4 summarizes the PM peak-hour passenger load LOS associated with the study area screenlines.

Table 4-4. 2020 Construction PM Peak-Hour Bus Passenger Load Level of Service

Screenline	Existing Routes	Direction	No Build	Options
			LOS	LOS
A (Lake Washington)	9 local, 3 express	Eastbound	D	D
		Westbound	A	A
B (East Channel Bridge)	9 local, 3 express	Eastbound	D	D
		Westbound	B	B

Source: Sound Transit (2014).

4.2.1.4 Reliability

In the future No Build condition, reliability is expected to be similar to or worse than existing in the peak and off-peak directions. Congestion would be similar to or increased from the existing condition, which worsens travel times and degrades transit reliability. Options 1 and 2 could have similar or improved reliability in the off-peak direction with the addition of HOV lanes on the outer roadway, which provides a less congested route compared to the No Build condition (which requires buses to use the GP lanes). In the peak directions, Option 2 would have slightly better reliability than Option 1 because the outer

roadway HOV lanes have fewer vehicles traveling in them in Option 2. In Option 3, reliability would generally be worse compared to the other two options and the No Build condition because HOV lanes are not provided on the outer roadway in this option and therefore buses use the GP lanes.

4.2.1.5 Transit Travel Time

Table 4-5 shows transit travel times between Bellevue and Downtown Seattle for the 2020 No Build condition and the options during construction. In the peak directions, buses would have slightly longer travel times with any option because they would not be able to use the center roadway. In the opposite, reverse-peak direction, bus travel times in the PM peak period would be improved compared to the No Build condition because buses can use the R-8A HOV lanes. Among the three options, the shortest bus travel time would be with Option 2 because buses would be in a lane where only HOVs are allowed.

Table 4-5. AM and PM 2020 Construction I-90 Transit Travel Times Between Seattle and Bellevue (minutes)

Time Period/Condition	I-90 Westbound	I-90 Eastbound
AM Peak Period		
No Build	18.5 (18.6)	16.3 (16.7)
Option 1	22.0 (22.1)	17.0 (17.6)
Option 2	18.4 (18.7)	16.8-18.5 (17.4-19.0)
Option 3	22.3 (22.3)	17.9 (18.5)
PM Peak Period		
No Build	18.8 (20.4)	13.7 (14.6)
Option 1	15.9 (17.0)	18.6 (19.2)
Option 2	15.9 (16.5)	18.1-19.1 (18.7-19.6)
Option 3	16.9 (17.9)	19.9 (20.6)

Notes:
Bellevue travel time reference point is I-90 mainline at the I-405 overcrossing. Values shown in parentheses represent bus trip travel times to/from the South Bellevue Park-and-Ride.
The Option 2 range of results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

4.2.2 Operational Impacts

4.2.2.1 Coverage and Circulation

Table 4-6 shows the proposed changes in bus service between existing conditions, the No Build condition, and the Transit Integration configurations. Table 4-7 summarizes the number of buses that would be traveling on Mercer Island with each configuration.

Table 4-6. I-90 Bus Service Summary - Existing and Proposed Configurations

Route	Existing (2016)/No Build Condition (2020 and 2035)	FEIS Configuration[a]	77th Avenue SE/ 80th Avenue SE Configurations
111	I-90 Only	I-90 Only	Rerouted to Downtown Bellevue
114	I-90 Only	I-90 Only	Rerouted to Downtown Bellevue
201	Mercer Island Only	Mercer Island Only	Deleted
204	Mercer Island Only	Mercer Island Only	Mercer Island Only
212	I-90 Only	I-90 Only	I-90 ending at Eastgate
214	I-90 Only	I-90 Only	I-90 ending at Mercer Island
215	Does not occur	Does not occur	I-90 ending at Mercer Island
216	I-90 w/stops on Mercer Island	I-90 w/stops on Mercer Island	Replaced with 219
217	I-90 Only	Deleted	Deleted
218	I-90 Only	I-90 Only	I-90 ending at Mercer Island
219	I-90 Only	I-90 Only	I-90 ending at Mercer Island
550	I-90 w/stops on Mercer Island	Replaced by light rail transit	Replaced by light rail transit
554	I-90 w/stops on Mercer Island	I-90 ending at Mercer Island	Rerouted to Downtown Bellevue
630[b]	Mercer Island to Seattle	Mercer Island Only	Mercer Island Only

[a] Routes modified based on the East Link Final EIS Conceptual Bus Integration Plan.
[b] Metro route 630 is included in this table because it is a current route on I-90, but in the future it is planned to only circulate on the island during peak periods with limited headways and would not affect the technical analysis.

Table 4-7. Number of Buses Stopping at Mercer Island Park-and-Ride (both directions)

Existing Conditions	FEIS Configuration	77th Avenue SE Configuration	80th Avenue SE Configuration
AM peak hour: 33 buses PM peak hour: 31 buses **Daily:** **352 buses**	AM peak hour: 18 buses PM peak hour: 19 buses **Daily:** **197 buses**	AM peak hour: 40 buses PM peak hour: 40 buses **Daily:** **318 buses**	AM peak hour: 40 buses PM peak hour: 40 buses **Daily:** **318 buses**

In all I-90 Operations options and Transit Integration configurations, Sound Transit Regional Express Route 550 (ST 550) would be eliminated because it would provide parallel service to light rail. The center roadway would be closed to transit service, so transit routes that continue to use I-90 would be routed to the outer roadway and have the ability to use the R-8A HOV lanes, using the 76th Avenue on-ramp to westbound I-90 and the 77th Avenue off-ramp from eastbound I-90 to access the station. Under the 77th Avenue SE and 80th Avenue SE Transit Integration configurations, bus riders traveling to and from Seattle would need to transfer to light rail at Mercer Island or the South Bellevue Park and Ride.

4.2.2.2 Transit Level of Service and Operations

Service Frequency

Several routes will be truncated or have changes in their service plans under both the No Build condition and the options. In the No Build condition, existing routes would have more frequent headways, improving the service frequency LOS to A compared to the existing service frequency LOS C between Downtown Redmond, Mercer Island, and Seattle. This service frequency improvement would be due to more frequent headways of ST 554, which travels between Seattle, Mercer Island, and Issaquah in the PM peak hour. Even though many of the bus routes are planned to have more frequent headways, buses would likely be unable to meet their schedules in the future due to additional congestion on roadways.

For all options, East Link would connect all areas in the corridor with more frequent service. The Eastside areas would be directly connected by light rail service, with frequent direct connections with the Bel-Red, Overlake, and Downtown Redmond areas. Compared to bus service in the No Build condition, light rail would provide a substantial improvement in the frequency of service by providing more direct connections. Service frequency results for all of the Transit Integration configurations would be similar because the light rail service would provide the most frequent service throughout the corridor with and without the Transit Integration refinement. With the 77th Avenue SE and 80th Avenue SE Transit Intersection configurations light rail would be the only connection from Mercer Island to Bellevue and there would be no bus service between Seattle and Mercer Island. Exhibits 4-5 and 4-6 show the PM peak-hour service frequency for the No Build condition and the options.

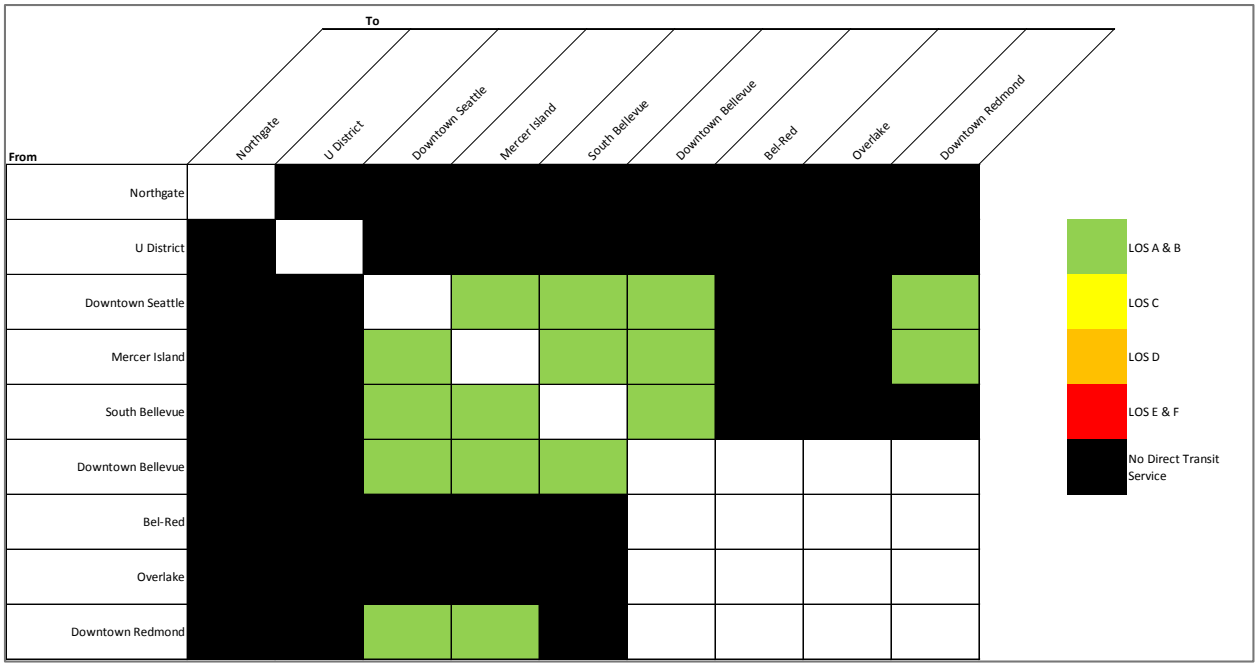


Exhibit 4-5. No Build Condition PM Peak-Hour Service Frequency Level of Service

Hours of Service

Existing routes that continue in the future, without major changes, were assumed to have the same hours of service as they do currently. Exhibit 4-7 shows the hours of service LOS for the 2035 No Build condition. In the No Build condition, service changes would consist of mostly frequency changes and removal of duplicative routing. Therefore, the hours of service LOS is similar to the existing condition.

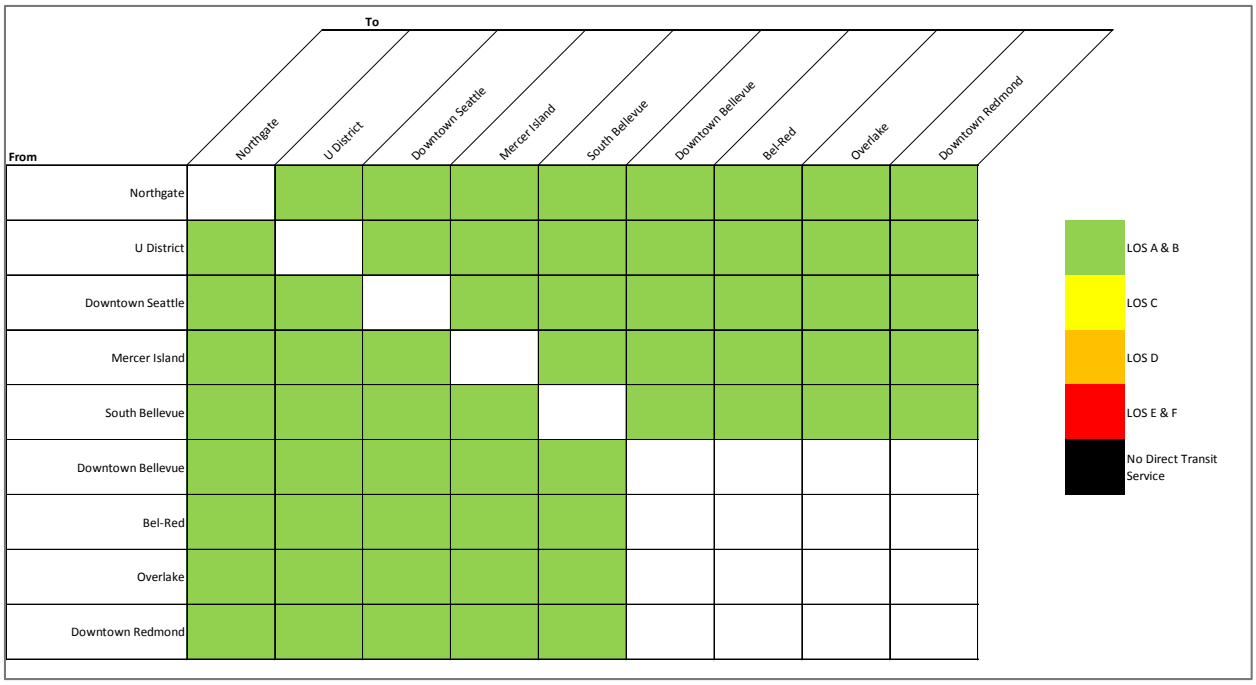


Exhibit 4-6. Options PM Peak-Hour Service Frequency Level of Service (All Transit Integration Configurations)

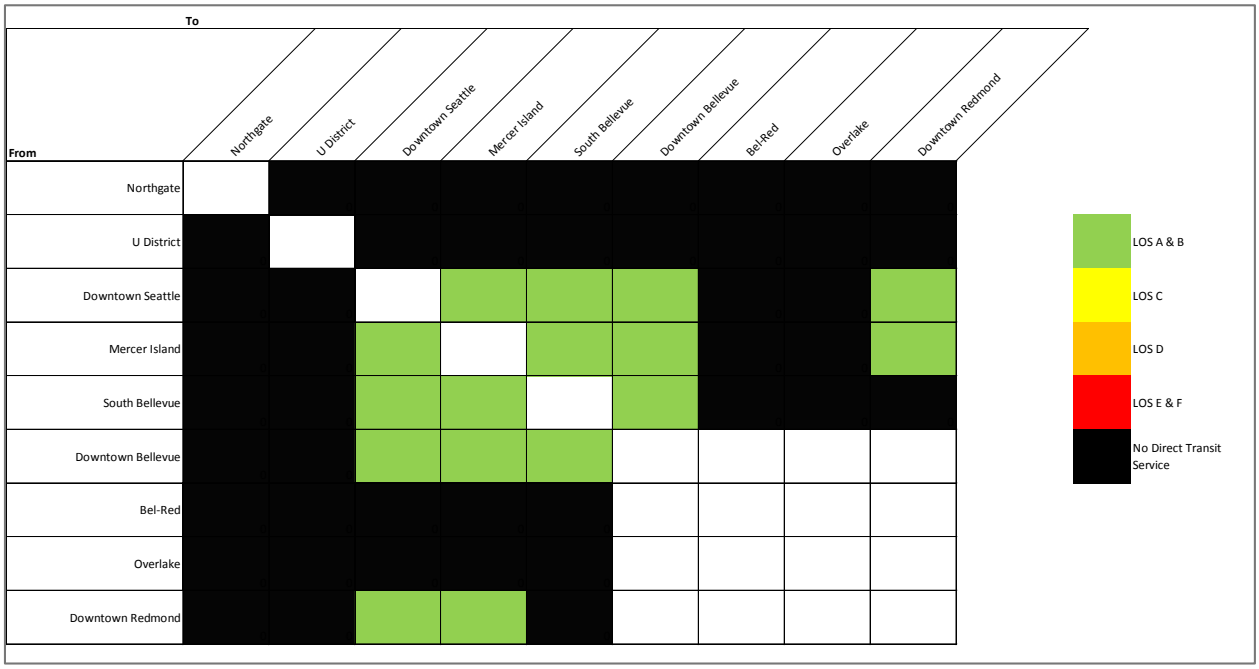


Exhibit 4-7. 2035 No Build Condition PM Hours of Service Level of Service

With light rail, the hours of service would be LOS A between all areas directly connected by light rail as East Link would either introduce new direct connections among them or provide substantial improvements to existing service areas. East Link would operate for 20 hours each day, a longer operating duration than most future bus routes. Future build hours of service LOS is shown in Exhibit 4-8. Hours of service LOS is expected to be similar between I-90 Operations options or all Transit Integration configurations.

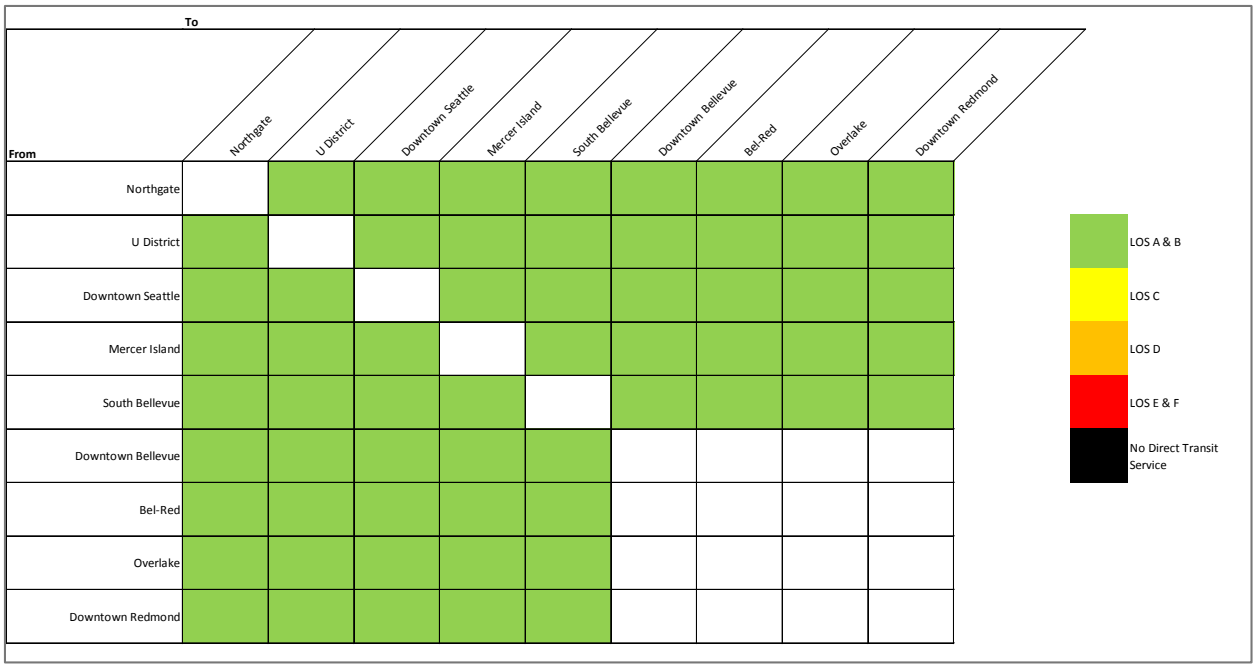


Exhibit 4-8. 2030 Build Hours of Service Level of Service

Passenger Load Level of Service

By 2035, the passenger load LOS reflects an increase in transit usage in both the No Build condition and build conditions (Table 4-8). For the build condition, passenger load LOS would operate at LOS C or better in comparison to the No Build condition bus service that would operate at LOS E or better. The number of transit (bus and light rail combined) riders would increase across Lake Washington (Screenline A and B) compared with the No Build condition. In the build condition with either of the Transit Integration refinements, Screenline A (Lake Washington) would have no bus trips and light rail would be the only transit service for that screenline on I-90. Under the FEIS Configuration, light rail operations would have a passenger load LOS of A due to more passengers traveling across I-90 via bus service. Operations in the eastbound direction would degrade compared to the No Build condition to LOS F across screenline A as passenger congestion increases on routes that continue to the east and passengers have less opportunities to transfer to less congested light rail with reduced bus service on Mercer Island.

Table 4-8. 2035 No Build Condition and Build PM Peak-Hour Passenger Load Level of Service

		2035 No Build Condition	2035 With 77th Ave SE and 80th Ave SE Transit Integration Configurations		2035 FEIS Configuration	
Screenline	**Direction**	**Bus**	**Bus**	**Light Rail**	**Bus**	**Light Rail**
A (Lake Washington)	Eastbound	E	N/A	C	F	A
	Westbound	B	N/A	B	A	A
B (East Channel Bridge)	Eastbound	D	D	C	C	A
	Westbound	C	A	B	B	A

N/A Not applicable because buses would not cross this screenline.

Reliability

In the future No Build condition, reliability is expected to be similar to existing in the peak direction and worse in the off-peak direction. With the center roadway still open to transit, the peak direction congestion and travel times would be similar along the center roadway. On the outer roadway in the off-peak direction, congestion is expected to increase. Travel times are also expected to increase due to the congestion (Section 4.2.2, Operational Impacts). Both of these factors reduce transit reliability and therefore reliability would become worse in the No Build condition.

For the 77th Avenue SE and the 80th Avenue SE Transit Integration configurations, buses would only travel to and from Mercer Island to the east. Vehicle congestion is expected to improve in the HOV lane between Bellevue and Mercer Island, which would improve travel times and reliability. Light rail would be the transit service connection between Seattle and Mercer Island, providing substantial improvements in reliability. For the 77th Avenue SE and the 80th Avenue SE Transit Integration configurations, buses traveling to and from east of Mercer Island would have similar reliability between the options because congestion would be similar.

With the FEIS Configuration, both options would have longer bus travel times in the AM peak westbound direction compared to the No Build condition. Option 2 would have less congestion in the HOV lane in the AM westbound peak period between Mercer Island and Seattle, which would improve transit travel times and reliability compared to Option 1. For the AM peak eastbound direction, congestion would be similar between the options with the FEIS Configuration and the No Build condition, and therefore reliability is expected to be similar. In the PM peak eastbound direction, bus travel times for both options with the FEIS Configuration would be 5 to 8 minutes longer and buses would have lower reliability compared to the No Build condition. In the westbound direction in the PM peak, bus travel times for both options with the FEIS Configuration would be about 6 minutes shorter compared to No Build condition because the new R-8A HOV lanes would provide higher reliability. For the FEIS Configuration, light rail would provide greater transit reliability between Seattle and Mercer Island than buses under both options.

In both build conditions and Transit Integration configurations, the light rail operates exclusively in the center roadway and would have very high reliability.

4.2.2.3 Transit Travel Time

Table 4-9 shows transit travel times between the International District Station in Seattle and either I-90 mainline at the I-405 overcrossing or South Bellevue Park-and-Ride in Bellevue for the 2035 No Build condition and build conditions. With the 77th Avenue SE and 80th Avenue SE Transit Integration configuration, buses would not travel between South Bellevue and Seattle and therefore bus travel times are not included in the table. In the FEIS Configuration, buses traveling in the reverse-peak direction (eastbound in the AM and westbound in the PM) do not stop on Mercer Island and therefore it is not a direct comparison to the light rail travel patterns, so those travel times are also not provided in the table below.

In the AM westbound direction, bus travel times under the FEIS Configuration would be over 4 minutes longer with Option 1 and 2 minutes longer with Option 2 compared to the No Build condition. The increase is due to congestion in the HOV lane in the westbound direction because there is reduced HOV lane capacity in the peak travel direction. In the eastbound direction during the PM peak period, bus travel time under the FEIS Configuration would be over 5 minutes longer with Option 1 and over 8 minutes longer with Option 2 compared to the No Build condition. Buses in Option 2 would experience more congestion on I-90 GP lanes between I-5 and the start of the HOV lane near the Mount Baker Tunnel than Option 1. The 77th Avenue SE and 80th Avenue SE configurations would have transit travel times between Bellevue and Seattle similar to or better than the FEIS Configuration, even with a transfer

from bus to light rail on Mercer Island, because light rail would have a faster travel time between Seattle and Mercer Island.

Table 4-9. AM and PM 2035 I-90 Transit Travel Times between Seattle and Bellevue (minutes)

Time Period/Condition	Transit Integration Option	Westbound		Eastbound	
		Bus[a]	Light Rail[b]	Bus[a]	Light Rail[b]
AM Peak Period					
No Build	N/A	17.6 (17.6)	N/A	15.6 (16.0)	N/A
Option 1	77th Avenue and 80th Avenue Configurations	N/A	14.0	N/A	14.0
	FEIS Configuration	22.3	14.0	N/A	14.0
Option 2	77th Avenue and 80th Avenue Configurations	N/A	14.0	N/A	14.0
	FEIS Configuration	19.6-20.7[c]	14.0	N/A	14.0
PM Peak Period					
No Build	N/A	18.9 (20.5)	N/A	13.7 (14.5)	N/A
Option 1	77th Avenue and 80th Avenue Configurations	N/A	14.0	N/A	14.0
	FEIS Configuration	N/A	14.0	19.1	14.0
Option 2	77th Avenue and 80th Avenue Configurations	N/A	14.0	N/A	14.0
	FEIS Configuration	N/A	14.0	22.3-22.3[c]	14.0

Note: Travel times do not include additional delay due to transfers between bus and light rail.
[a] Bus travel times outside the parentheses are measured between the International District Station and I-405 overcrossing, while bus travel times inside the parentheses are measured between the South Bellevue Park-and-Ride and International District Station.
[b] Travel times for light rail are measured between the International District Station and the South Bellevue Park-and-Ride.
[c] The Option 2 range of results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

4.2.2.4 Light Rail Ridership

The 2035 daily transit boardings at the Mercer Island Station are expected to increase by approximately 6,000 with the 77th Avenue SE and 80th Avenue SE Transit Integration configurations compared to the FEIS Configuration. Although this boarding information suggests a potential increase in the number of riders at the Mercer Island Station, the park-and-ride lot would only accommodate 447 vehicles. Therefore, potential riders exceeding this parking capacity would either use another station or use a different mode of transportation to access the Mercer Island Station.

Table 4-10 lists 2035 daily station boardings and East Link projectwide ridership. Transit ridership is not expected to be different for either I-90 Operations options, which reflect the 77th or 80th Avenue SE Transit Integration configurations; therefore, they are not discussed. With the Transit Integration configurations, projectwide ridership would be about 62,000 daily riders in 2035. In the FEIS Configuration, the station ridership at the Mercer Island Station is expected to be approximately half of that under the 77th Avenue SE and 80th Avenue SE Transit Integration configurations, due to reduced

bus transfer activity on the island under this condition. Projectwide ridership is also lower under the FEIS Configuration at about 57,000 boardings because some riders travel across I-90 on buses instead of on light rail. The D2 Roadway that connects I-90 and the Downtown Seattle Transit Tunnel is expected to operate with exclusive light rail service for all the options and Transit Integration configurations. Therefore, transit (bus and rail) ridership along I-90 in the peak periods would not noticeably change because the anticipated slight increase in rail ridership would be offset by the slight decrease in bus ridership as riders transfer from bus service to light rail service due to operational improvements such as travel times and passenger load as described above.

Table 4-10. Year 2035 Ridership Forecasts in Study Area

	77th Ave SE and 80th Ave SE Configurations	**FEIS Configuration**
Rainier Station	4,000	4,000
Mercer Island Station	6,000	3,000
Projectwide Ridership	61,750	57,250

4.3 Mitigation

During construction, no mitigation would be required for transit beyond what was identified in the Final EIS, which included roadway modifications in Seattle for buses headed to downtown once the D2 Roadway closes to buses in 2018. Additionally, the R-8A HOV lanes would be completed prior to East Link construction.

During East Link operations, bus routes on I-90 would not require mitigation because the R-8A HOV lanes would be completed prior to East Link construction and would be used with the FEIS Configuration. For the Transit Integration configurations, bus routes would not operate on I-90 west of the Mercer Island Station and would continue to use the existing HOV lanes to the east.

SECTION 5

Highway Operations and Safety

Where the East Link Extension crosses Lake Washington, I-90 consists of two "outer" roadways that are the westbound and eastbound mainline lanes, as well as a reversible center roadway that has peak-directional reversible lanes for use by transit, HOVs, and other drivers traveling between Seattle and Mercer Island. During the weekday morning peak period, the reversible roadway operates in the westbound direction for a period of 6 hours, or 25 percent of the day; during the afternoon peak and evening periods, the roadway operates in the eastbound direction for a period of 15 hours, or about 63 percent of the day. On weekends, the center roadway operates eastbound from 2 p.m. Friday to 5 a.m. Monday morning, unless adjusted to accommodate traffic for a special event. Therefore, for a typical week, the center roadway operates in the westbound direction for about 20 percent of the time and in the eastbound direction 80 percent of the time. A 1.4-mile corridor for buses and HOVs, called the D2 Roadway, connects the reversible center roadway to the Downtown Seattle Transit Tunnel and to the intersection of 5th Avenue South and Airport Way South. East Link would traverse Lake Washington within the I-90 reversible center roadway and would access the transit tunnel via the D2 Roadway.

5.1 Affected Environment

This section describes the current I-90 operations and safety (crash data). Section 2.3 describes the methods and measures used to analyze impacts to highway operations and safety in this section.

5.1.1 Vehicle and Person Throughput

I-90 has an average daily traffic (ADT) volume of 160,000 on the floating bridge (Screenline A) and 174,000 on the East Channel Bridge (Screenline B). In the existing conditions, 55 to 60 percent of the total number of vehicles on I-90 travel in the peak direction (westbound in the AM peak period and eastbound in the PM peak period). The AM peak period is 6:30 to 10:00 AM and the PM peak period is between 3:30 and 7:00 PM. In the AM peak period, a little over 17,000 vehicles use I-90 to or from Mercer Island. This increases to slightly under 21,000 vehicles in the PM peak period. For an average day, about 68,000 vehicles use I-90 to or from Mercer Island. Exhibit 5-1 shows the AM and PM peak-period travel patterns to and from Mercer Island. In both the AM and PM peak periods, about 55 percent of trips on I-90 to and from Mercer Island ramps are to and from the Eastside, while 45 percent are to and from Seattle.

In the AM peak period at Screenline A, approximately 40,600 vehicles travel on I-90 in both directions, while in the PM peak period, about 41,300 vehicles travel on I-90. In both AM and PM peak periods, the center roadway accommodates less than 15 percent of the total vehicles on I-90. Slip ramps provide access to the center roadway to and from the outer mainline roadways at the Rainier Avenue S interchange or the East Channel Bridge, and to the D2 Roadway from the five-leg signalized intersection of 5th Avenue S and S Dearborn Street. These access points do not provide enough capacity to use the reversible center roadway effectively (WSDOT, 2004). Vehicle throughput at Screenline B is 43,000 and 45,000 in the AM and PM peak periods, respectively. Consistent with the trend of more trips between Mercer Island and the Eastside than trips between Mercer Island and Seattle, Screenline B shows more vehicles and person throughput compared to Screenline A. Table 5-1 provides the existing I-90 vehicle and person throughput data for Screenlines A and B in the AM and PM peak periods.

Exhibit 5-1. Existing AM and PM Peak Period Travel Patterns To/From Mercer Island

Table 5-1. Existing (2016) I-90 AM and PM Peak-Period Vehicles and Persons

Direction	AM Peak Period				PM Peak Period			
	Vehicles	Persons	Vehicle Percentage of Total	Person Percentage of Total	Vehicles	Persons	Vehicle Percentage of Total	Person Percentage of Total
Screenline A (Lake Washington: I-90 Floating Bridge)								
Westbound Outer Roadway	16,500	19,000	41	31	18,700	26,400	45	43
Reversible Center Roadway	6,000	17,200	15	29	5,500	16,300	13	26
Eastbound Outer Roadway	18,100	24,000	44	40	17,100	19,400	42	31
Screenline A Total (for I-90)	40,600	60,200	100	100	41,300	62,100	100	100
Screenline B (I-90 at East Channel Bridge)								
Westbound Outer Roadway	23,200	36,100	54	58	20,600	28,200	46	43
Eastbound Outer Roadway	19,800	25,900	46	42	24,400	37,400	54	57
Screenline B Total	43,000	62,000	100	100	45,000	65,600	100	100

Person throughput was also evaluated across both Screenlines A and B. Approximately 60 percent of person throughput on I-90 travels in the peak direction for both the AM and PM peak periods. For Screenline B, in the AM peak period up to 62,000 people travel along I-90, with 17,200 of those people using the center roadway. For Screenline B, in the PM peak period 65,600 people travel along I-90. Of those people, 16,300 people use the center roadway. Exhibit 5-2 provides the existing AM and PM peak-period person throughput by direction and travel mode at Screenlines A and B.

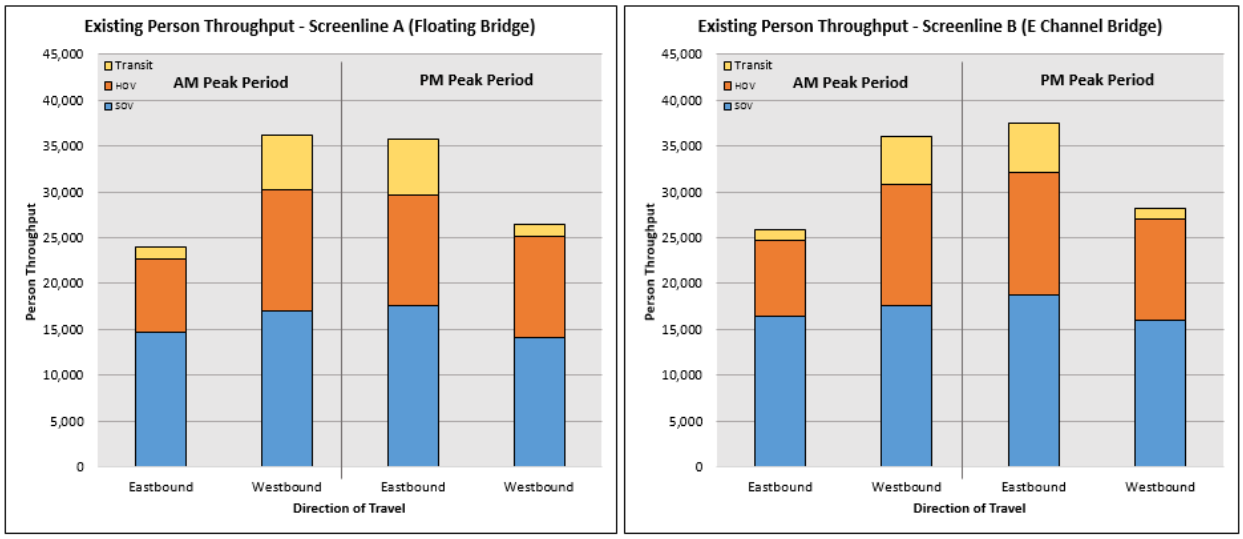


Exhibit 5-2. I-90 Existing AM and PM Peak-Period Person Throughput at Screenline A and B

5.1.2 Travel Times

Travel times on I-90 were computed for these locations in the study area:

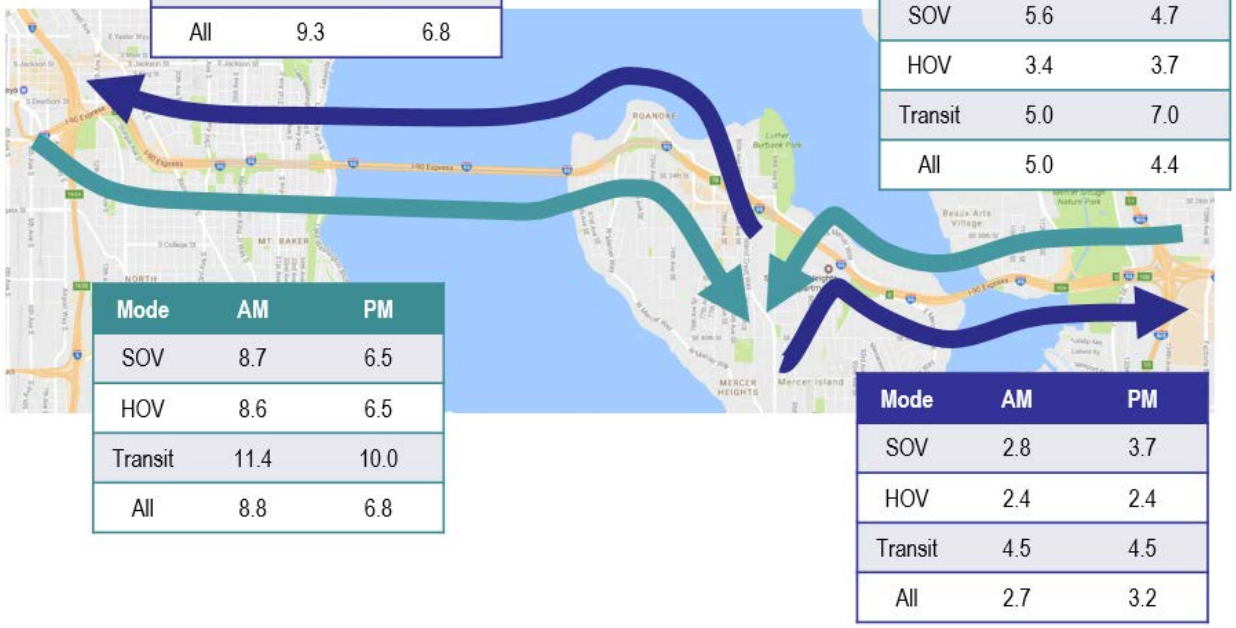
- Mercer Island (an average of all on- and off-ramps) to and from Seattle (at I-90 and 4th Avenue S), and Mercer Island to and from the I-405 interchange
- Seattle (at I-90 and 4th Avenue S) to and from the I-405 interchange
  - For transit only: Seattle (at I-90 and 4th Avenue S) to and from the South Bellevue Park-and-Ride

5.1.2.1 Travel Times To and From Mercer Island

Existing travel times by mode of travel (SOV, HOV, and transit) as well as a person-weighted average travel time of all modes for all trips to and from Mercer Island between Seattle and Bellevue are shown in Exhibit 5-3. The travel time is how long it would take someone to travel from one location to another. It is developed by summarizing the travel times to and from each of the I-90 ramps on Mercer Island. Attachment E provides detailed travel time results by mode for person trips to and from Mercer Island.

Travel times between Bellevue and Downtown Seattle on I-90 include the reversible center roadway and/or D2 Roadway for those vehicles eligible to use them for the entire trip (e.g., HOVs and transit vehicles).

In the AM peak period, existing travel times between Mercer Island and Seattle for SOVs and HOVs in both directions of travel are about 9 minutes. The range of existing AM peak travel times for westbound SOV trips from Mercer Island to Seattle is as short as 6.7 minutes from the 77th Avenue SE center roadway on-ramp to as long as about 16 minutes from the E Mercer Way on-ramp. When including all travel modes, including people in HOV and transit, the average person-travel time between Mercer Island and Seattle in the AM peak is 9.3 minutes in the westbound direction and 8.8 minutes in the eastbound direction. Between Mercer Island and Bellevue, the average travel time in the AM peak for SOVs is over 5 minutes in the westbound direction and under 3 minutes in the eastbound direction. HOV travel time is about 2 minutes faster compared to SOVs because of the HOV lane between Mercer Island and Bellevue.



Mode	AM	PM
SOV	9.1	7.1
HOV	9.0	6.1
Transit	12.1	13.5
All	9.3	6.8

Mode	AM	PM
SOV	5.6	4.7
HOV	3.4	3.7
Transit	5.0	7.0
All	5.0	4.4

Mode	AM	PM
SOV	8.7	6.5
HOV	8.6	6.5
Transit	11.4	10.0
All	8.8	6.8

Mode	AM	PM
SOV	2.8	3.7
HOV	2.4	2.4
Transit	4.5	4.5
All	2.7	3.2

Exhibit 5-3. Existing AM and PM Peak Period Travel Times To/From Mercer Island

Existing PM peak period travel times between Mercer Island and Seattle for SOVs and HOVs in both directions of travel are slightly less than 7 minutes. The range of travel times in the existing PM peak for eastbound SOV trips between Seattle and Mercer Island is between 6 minutes to W Mercer Way and 10 minutes to E Mercer Way. Between Mercer Island and Bellevue, travel times for SOVs are about 4 to 5 minutes in either direction and period, while travel times for HOVs are about 1 minute shorter.

5.1.2.2 Travel Times Between Seattle and Bellevue

Travel times by mode of travel between Seattle and the I-405 overcrossing of I-90 are shown in Exhibit 5-4. Existing travel times between Bellevue and Seattle for SOVs in the westbound direction are about 20 minutes in the AM peak period, but about 11 minutes in the eastbound direction. HOV travel time by comparison is only 10 minutes in the westbound direction using the center roadway, unless HOV trips use the outer roadway in the AM peak (which would be over 15 minutes). Transit takes about 17 minutes to travel westbound in the AM peak using the center roadway, compared to 16 minutes in the eastbound direction on the outer roadway.

In the PM peak, travel time between Seattle and Bellevue in the eastbound direction takes just over 12 minutes for SOVs in the outer roadway, compared to just under 9 minutes for HOVs in the center roadway. Transit takes between 14 and 15 minutes in the eastbound direction. In the westbound direction in the PM peak, SOV travel time is over 18 minutes while HOV travel time is over 12 minutes. Transit takes between 19 and 20 minutes in the PM peak to travel from Bellevue to Seattle.

Exhibit 5-4. Existing AM and PM Peak Period Travel Times Between Seattle and Bellevue

Note: **Bold** text represents travel times for vehicles in the I-90 center roadway. Values in parenthesis represent travel times to/from the South Bellevue Park-and-Ride.

5.1.3 Level of Service

The freeway LOS on I-90 varies throughout the study area. Substantial congestion and/or bottlenecks occur when vehicles travel at stop-and-go conditions (LOS F). Vehicle queues are observed throughout most of the peak periods, in the westbound direction in the AM peak period and both directions in the PM peak period.

The congestion maps in Exhibit 5-5 illustrate the I-90 mainline LOS. These congestion maps indicate vehicle travel speeds over time (vertical axis) and distance (horizontal axis). The time indicated on these maps is a 3.5-hour duration in both the AM (6:30 to 10:00 a.m.) and PM (3:30 to 7:00 p.m.) peak periods. The distance covers I-90 from the I-5 interchange to the I-405 interchange. Although LOS is based on vehicle density and the congestion maps are based on speed, the two measurements are generally related to one another. On the maps, LOS E or F conditions (speeds at or below 50 mph) are indicated where areas of yellow, red, or black occur. Black indicates the greatest congestion where speeds are below 20 mph. LOS D (vehicle speeds over 50 mph) or better is portrayed where areas of green occur.

5.1.3.1 AM Peak Period

For travel in the westbound direction from east of I-405 to the Bellevue Way interchange in the AM peak period, I-90 operates at LOS D or better. From the Bellevue Way interchange to I-5, I-90 operates at LOS F. Westbound congestion in the AM peak period is caused by two separate bottlenecks that join together: one that forms between the E Mercer Way and Island Crest Way interchanges and another approaching the I-5 interchange due to congestion on I-5 northbound extending back onto I-90 westbound.

For travel on I-90 eastbound between the I-5 interchange and the Mount Baker Tunnel (just east of the Rainier Avenue S interchange), I-90 operates at LOS E or worse. The heaviest of this congestion is experienced at the Mount Baker Tunnel, as I-90 mainline is split into two separate roadways to travel through the tunnel portals. East of the Mount Baker Tunnel to the I-405 interchange, I-90 operates at LOS D or better.

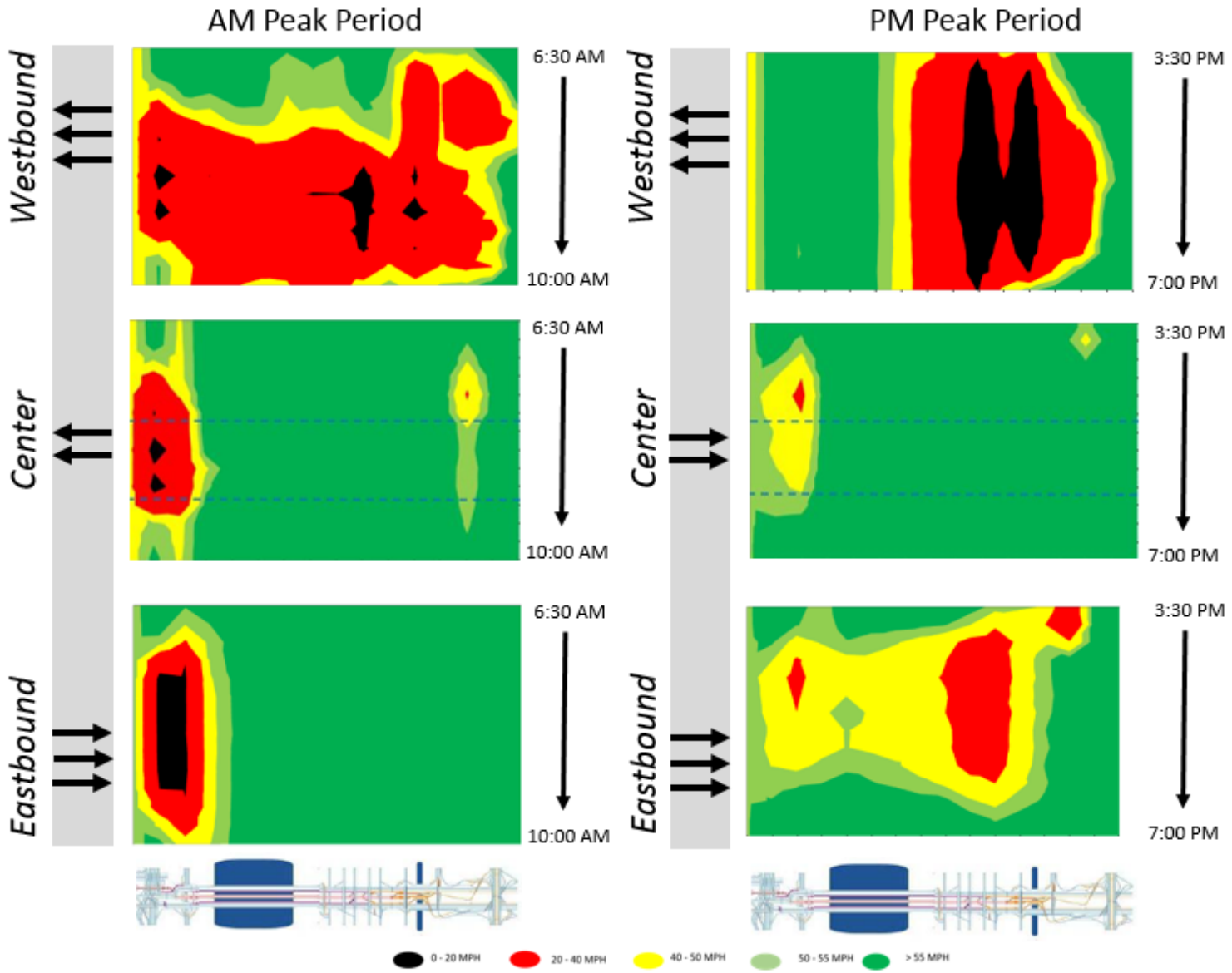


Exhibit 5-5. Congestion on I-90 Mainline

The reversible center roadway operates in the westbound direction and all sections operate at LOS C or better, with the worst operating conditions at the western terminus of the reversible roadway near the Rainier Avenue S interchange where vehicles in the center roadway merge onto the congested I-90 outer roadway.

5.1.3.2 PM Peak Period

For travel in the westbound direction in the PM peak period, I-90 operates at LOS D or better between I-405 and the Bellevue Way interchange. I-90 west of the Bellevue Way interchange to the W Mercer Way interchange on Mercer Island is very congested and operates at LOS E or worse. Across the I-90 floating bridge and into Seattle, I-90 operates at LOS D or better.

I-90 in the eastbound direction operates at LOS D or better west of the Rainier Avenue S interchange. Eastbound congestion is formed by two separate bottlenecks: one that forms from the I-405 southbound on-ramp extending onto I-90 as drivers from I-90 desire to get to I-405 southbound, and another between the Island Crest Way and E Mercer Way interchanges. I-90 operates at LOS E or worse between the Rainier Avenue S and E Mercer Way interchanges. East of the center roadway on-ramp to the I-90/I-405 interchange, I-90 mainline conditions improve to operate at LOS D or better.

In the PM peak period, the reversible center roadway operates in the eastbound direction and operates at LOS B.

5.1.4 Safety

Crash data were collected from WSDOT for the I-90 mainline, ramps, and ramp terminal intersections for the most recent 5 years of data (2011-2015) (WSDOT, 2016a). Table 5-2 summarizes the crash data by severity for the I-90 mainline and each interchange, which includes ramps and ramp terminal intersections. More than 2,200 crashes were recorded on the mainline of I-90 an interchanges in the study area during this time, with the majority of them (approximately 70 percent) being incidents involving property damage only.

Of the over 2,200 total crashes on I-90, 70 were located at Mercer Island interchanges. The interchanges with the highest number of reported crashes in the overall study area are the Rainier Avenue S interchange (with 81 total crashes) and the Island Crest Way interchange (with 42 total crashes for all Island Crest Way ramps combined). All other interchanges within the study area recorded fewer than 25 crashes.

At the Island Crest Way interchange, the westbound on-ramp to the outer roadway was designed for low peak period and daily volumes with a minimal taper rate and short ramp acceleration length. The average daily traffic (2015 ADT) volume on this ramp is approximately 2,000 vehicles. This compares with an ADT of about 4,000 vehicles on the 76th Avenue SE and West Mercer Way on-ramps. On the I-90 westbound mainline within the vicinity (1,000 feet before and after) of the Island Crest Way westbound left-side on-ramp and along the ramp, there were almost 60 crashes from 2011 to 2015. Twenty crashes occurred on the left-side Island Crest Way on-ramp. The 76th Avenue SE and West Mercer Way on-ramps experienced 6 and 8 crashes, respectively, during the same time period.

Over the course of the 5 years of crash data collected, more crashes occurred every year up through 2015. This is generally consistent with increases in volume in the corridor over this period. As vehicle trips grow, so does the number of crashes.

Table 5-2. Summary of Historical Crash Data 2011-2015

Location	Crash Data 2011-2015[a]		
	FI	PDO	Total
I-90 Mainline	652	1,413	2,065
Rainier Ave. S Interchange	22	59	81
W Mercer Way Interchange	0	8	8
76th Ave. SE Interchange	3	3	6
77th Ave. SE Interchange	0	0	0
Island Crest Way Interchange	12	30	42
80th Ave. SE Interchange	1	0	1
E Mercer Way Interchange	8	5	13
Bellevue Way Interchange	4	18	22
TOTAL	**702**	**1,536**	**2,238**

[a] FI = fatality or injury; PDO = property damage only
Source: WSDOT (2016a).

5.2 Environmental Impacts

This section describes the differences in I-90 operations and safety between the No Build condition and the options for years 2020 (for construction impacts) and 2035 (for operational impacts). Future travel patterns to and from Mercer Island during both construction and operations years would be similar to existing travel patterns (see Exhibit 5-1). Congestion and LOS on I-90 are generally better with the I-90 options than with the No Build condition because the R-8A HOV Lanes project (in both construction and operations) and light rail service (when in operations) shift travel modes and provide additional capacity along I-90.

Traffic modeling indicates that in the future there would be congestion in the eastbound direction of I-90 near the Mount Baker Tunnel in Seattle. Based on forecasted traffic volumes and assumptions, this could be more evident in the No Build condition and Option 2. The traffic congestion in this area will be monitored by WSDOT to determine if conditions warrant further analysis of potential modifications to the HOV lane transition to improve operations between I-5 and the Mount Baker Tunnel. This operational adjustment could not be made until after 2018 when the D2 Roadway closes to buses.

5.2.1 Construction Impacts

The reversible center roadway will be closed for East Link construction on I-90 in June 2017. Buses would continue to travel on the D2 Roadway until mid-2018 when the roadway will be closed and buses will be rerouted to adjacent I-90 accesses, either the SR 519/S Atlantic Street or Rainier Avenue S interchange. While most construction activities would be on the reversible center roadway, activities might occur for short periods along the I-90 shoulder and outer roadway HOV lanes near the East Channel Bridge and at the Rainier Avenue S interchange in Seattle. At the Bellevue Way interchange, the westbound mainline, HOV direct-access ramps, and ramps to and from I-90 to the east would experience short-term partial (likely nighttime) closures to construct the elevated structures. If applicable, vehicles would be detoured to the corresponding GP or HOV ramps, but vehicles could also be detoured to another interchange. This information was included in the Final EIS.

5.2.1.1 Access and Circulation Modifications

The No Build condition assumes the current configuration of I-90 would remain, which includes completion of the R-8A project through Stage 2. All three of the options assume Stage 3 of the R-8A HOV

lanes project would be completed. Stage 3 of this project will modify access and circulation along the I-90 corridor. The following modifications would occur with Stage 3 of the R-8A HOV lanes project and the East Link Extension:

- R-8A HOV lanes project (Stage 3):
  - Add a westbound and eastbound HOV lane to the outer roadways between 80th Avenue SE and Rainier Avenue S.
  - Construct an eastbound HOV direct-access off-ramp at Island Crest Way.
- East Link Extension:
  - Prohibit HOVs from using the I-90 D2 Roadway between Seattle and the Rainier Avenue S interchange.
  - Close vehicle access to and from the reversible center roadway from the outer roadways near Rainier Avenue S and E Mercer Way.
  - Close the Island Crest Way access to and from the reversible center roadway.
  - Close the 77th Avenue SE westbound on-ramp and eastbound off-ramp access to the reversible center roadway.

Section 1.2.1 describes changes to R-8A HOV lane operations for Options 1, 2, and 3.

5.2.1.2 Traffic Forecasts

Vehicle and transit demand forecasts were prepared using the PSRC and Sound Transit travel demand models, as described in Section 3.2, Environmental Impacts. Traffic volume would be expected to grow along I-90 by about 0.8 percent annually between existing and the 2020 No Build condition. Growth rates from existing to the No Build condition along I-90 would be greater in the AM peak period than the PM peak period by approximately 0.3 percent. Table 5-3 provides peak-period vehicle demand forecasts for existing and 2020 forecast years along Screenlines A and B on I-90. These forecast data are compared to the vehicle throughput data to determine the vehicle demand served, which is discussed in the next section.

Traffic volumes would decrease in the peak direction for all options during construction compared to the No Build condition with the closure of the center roadway. In the off-peak direction, traffic volumes would be expected to increase due to the increased capacity from the new HOV lane constructed as a part of the R-8A HOV lanes project. Section 2, Methodology and Assumptions, discusses the demand forecasting process. Each of the options during construction would have very similar vehicle demands, with Option 2 having the lowest demand forecast and Option 3 having the highest forecast as the R-8A HOV lanes would be converted to GP lanes. Mode share, as described in Section 3.2.1.2, would see a decrease in SOV users in the AM peak westbound and PM peak eastbound directions in the No Build condition compared to existing as congestion worsens and people choose alternative modes, such as HOV and transit. Mode share would be similar among all of the options during the construction year as light rail would not yet be constructed, although the HOV mode share in Option 2 would be slightly higher than the other options due to the higher operating speeds of the HOV lane.

5.2.1.3 Vehicle and Person Throughput

Year 2020 person and vehicle throughput information for the No Build condition and the options at Screenline A and Screenline B is presented in Table 5-4. Vehicle throughput with any of the options compared to the No Build condition would be up to 6 percent higher overall in the AM peak and from 5 to 13 percent higher in the PM peak. This is because completing the R-8A project would provide HOV lanes in both directions of I-90 rather than just the one-way reversible center roadway. Vehicle throughput would be as low as 8 percent less in the peak directions, depending on the option, and between 8 and 29 percent higher in the reverse-peak directions because outer roadway HOV lanes

would be complete. Total vehicle throughput across Lake Washington (Screenline A) with Option 2 is up to 6 percent less than the other options during the AM and PM peak periods.

Table 5-3. Existing and 2020 Peak-Period Vehicle Demand Forecasts for I-90

Screenline	Direction	Existing	No Build	Option 1	Option 2	Option 3
A) Lake Washington	***AM Peak Period***					
	Westbound	22,700	23,400	22,300	22,100	22,700
	Eastbound	18,200	19,000	21,300	20,900	21,700
	TOTAL	40,900	42,400	43,600	43,000	44,400
	PM Peak Period					
	Westbound	19,100	19,600	23,300	23,100	23,700
	Eastbound	23,100	23,700	22,600	22,600	23,100
	TOTAL	42,200	43,300	45,900	45,700	46,800
B) East Channel Bridge	***AM Peak Period***					
	Westbound	23,100	23,900	22,600	22,600	23,100
	Eastbound	20,200	20,900	23,300	22,800	23,700
	TOTAL	43,300	44,800	45,900	45,400	46,800
	PM Peak Period					
	Westbound	21,000	21,600	25,200	25,000	25,500
	Eastbound	24,300	24,800	23,800	23,400	23,800
	TOTAL	45,300	46,400	49,000	48,400	49,300

Notes:
Units are in vehicles, including SOVs, HOVs and trucks. Does not include transit vehicles.
Option 1 – Mercer Island SOV traffic eligible to use HOV lanes between Seattle and Mercer Island
Option 2 – Mercer Island SOV traffic not allowed to use HOV lanes between Seattle and Mercer Island
Option 3 – HOV lane between Seattle and Mercer Island converted to GP lane during construction only.

Total person throughput would be similar or increased compared to the No Build condition by up to 4 percent in the AM peak and from 4 to 9 percent in the PM peak. Person throughput would be from 1 to 8 percent less in the peak directions than the No Build condition and from 6 to 24 percent higher in the reverse-peak directions. Person throughput would be 1 to 2 percent less in Option 2 compared to the other options during the AM peak period. Option 2 serves 1 to 2 percent more people during the PM peak period at Screenline A compared to the other options.

Screenline A (Lake Washington for I-90 only)

At Screenline A, the person throughput with both directions combined is between 0 and 4 percent higher with the options than with the No Build condition. In the peak direction with each of the options, person throughput in the peak direction would be lower than the No Build condition because the center roadway would be closed for East Link construction, which reduces capacity in the peak direction. The new R-8A HOV lane would add one lane to the outer roadway in the peak direction, but would have less capacity than the center roadway, reducing overall capacity during this time. In the reverse-peak direction, person throughput would be higher because the new R-8A HOV lane in this direction would provide additional capacity. In the AM peak period, person throughput would be similar (within 1 percent) among the options, with each serving approximately 37,000 people in the westbound direction. In the eastbound direction, person throughput would be higher with each of the options compared to the No Build condition as the outer roadway R-8A HOV lane would be completed. Among the options, Option 3 would have the highest person throughput. In the PM peak period, Option 2 would serve up to 4 percent more people in the eastbound direction across Lake Washington than Option 1 or Option 3.

More HOVs would be served with Option 2 because Mercer Island SOVs would not be allowed in the HOV lane, which would lower demand in the HOV lane. In the PM westbound direction, person throughput would be similar among the options and higher than the No Build condition. Exhibit 5-6 provides the AM and PM peak-period person throughput for each option by direction and travel mode at Screenline A.

Table 5-4. 2020 Vehicle and Person Peak-Period Throughput

Direction	Screenline A					Screenline B				
	Vehicles			Persons Total	% Change from No Build	Vehicles			Persons Total	% Change from No Build
	SOV	HOV[a]	Total			SOV	HOV[a]	Total		
AM Westbound										
No Build	17,200	5,500	22,700	38,400	--	17,800	5,500	23,300	38,200	--
Option 1	17,000	5,000	22,000	37,100	-3%	17,500	5,000	22,500	36,700	-4%
Option 2	16,100	5,200	21,300	36,800	-5%	17,000	5,100	22,100	36,600	-4%
Option 3	16,800	5,200	22,000	37,300	-3%	17,200	5,100	22,300	36,800	-4%
AM Eastbound										
No Build	14,800	3,700	18,500	25,200	--	16,300	3,800	20,100	27,000	--
Option 1	17,300	4,000	21,300	28,600	13%	18,700	4,000	22,700	29,800	10%
Option 2[b]	16,200-16,800	3,800-4,000	20,000-20,800	26,900-28,000	7% - 11%	18,100-18,600	3,800-4,000	21,900-22,600	28,600-29,500	6% - 9%
Option 3	17,700	4,000	21,700	28,900	14%	19,000	3,800	22,800	29,700	10%
AM Total (Both Directions)										
No Build	32,000	9,200	41,200	63,600	--	34,100	9,300	43,400	65,200	--
Option 1	34,300	9,000	43,300	65,700	3%	36,200	9,000	45,200	66,500	2%
Option 2[b]	32,300-32,900	9,000-9,200	41,300-42,100	63,500-64,800	0% - 2%	35,100-35,600	8,900-9,100	44,000-44,700	65,200-66,100	0% - 1%
Option 3	34,500	9,200	43,700	66,100	4%	36,200	8,900	45,100	66,500	2%
PM Westbound										
No Build	14,500	4,200	18,700	26,200	--	16,200	4,600	20,800	28,600	--
Option 1	18,800	5,000	23,800	32,300	23%	20,400	5,200	25,600	34,400	20%
Option 2	17,700	5,400	23,100	32,200	23%	19,800	5,500	25,300	34,500	21%
Option 3	19,100	5,000	24,100	32,600	24%	20,800	5,200	26,000	34,800	22%
PM Eastbound										
No Build	17,700	5,200	22,900	38,300	--	19,200	5,200	24,400	39,000	--
Option 1	17,700	4,400	22,100	36,200	-5%	19,600	3,900	23,500	36,400	-7%
Option 2[b]	16,500-17,900	4,600-5,000	21,100-22,900	35,700-38,000	-7% - -1%	17,800-18,800	4,500-4,700	22,300-23,500	35,800-37,400	-8% - -4%
Option 3	18,300	4,500	22,800	37,100	-3%	19,800	4,200	24,000	37,200	-5%
PM Total (Both Directions)										
No Build	32,200	9,400	41,600	64,500	--	35,400	9,800	45,200	67,600	--
Option 1	36,500	9,400	45,900	68,500	6%	40,000	9,100	49,100	70,800	5%
Option 2[b]	34,200-35,600	10,000-10,400	44,200-46,000	67,900-70,200	5% - 9%	37,600-38,600	10,000-10,200	47,600-48,800	70,300-71,900	4% - 6%
Option 3	37,400	9,500	46,900	69,700	8%	40,600	9,400	50,000	72,000	7%

Notes:
Option 1 – Mercer Island SOV traffic eligible to use HOV lanes between Seattle and Mercer Island
Option 2 – Mercer Island SOV traffic not allowed to use HOV lanes between Seattle and Mercer Island
Option 3 – HOV lane between Seattle and Mercer Island to converted GP
[a] HOV vehicle values are the total number of HOVs crossing the screenline, not the number of vehicles only in the HOV lanes, and does not include transit vehicles. Person values account for persons using all modes, including SOVs, HOVs, and transit.
[b] Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

Screenline B (East Channel Bridge)

At Screenline B, the total person throughput and comparisons between the No Build condition and the options would be similar to Screenline A. Each of the options would be expected to serve 1 to 2 percent more persons in the AM peak period and 4 to 6 percent more persons in the PM peak period compared to the No Build condition. The options would serve about 4 percent fewer persons in the AM peak westbound direction and between 4 and 8 percent fewer persons in the PM peak eastbound direction compared to the No Build condition. In the reverse-peak directions, the options would serve between 6 and 10 percent more persons in the AM peak (eastbound) and between 20 and 21 percent more in the PM peak (westbound). In the PM peak in the eastbound direction, Option 2 would serve 4 percent fewer people than Option 1 or Option 3. Exhibit 5-7 provides the AM and PM peak-period person throughput for each option by direction and travel mode at Screenline B.

Vehicle and Person Demand Served

The percentage of the forecasted travel demand that would be accommodated was evaluated as a part of the analysis. This measure compares the vehicle throughput to the expected demand across each screenline. A percent served value less than 100 indicates congested conditions that limit the number of vehicles (or people) crossing the screenline. The ability to serve more of the demand indicates that congestion patterns might not be as substantial and that congestion might not occur for as long of a period. Table 5-5 provides the vehicle demand served across Screenlines A and B for the No Build condition and the options.

At Screenlines A and B, the AM and PM peak-hour total (combined eastbound and westbound directions) vehicle-demand-served percentage would be similar to or increase with the options during construction compared to the No Build condition. Percent demand served would be similar among all options (within 3 percent) during both the AM and PM peak periods. During the PM peak hour, 100 percent of demand could be served with each of the options across both screenlines, compared to between 96 and 97 percent of the vehicle demand served in the No Build condition.

5.2.1.1 Travel Times

The following subsections provide travel-time comparisons for each of the three modes (SOV, HOV, and transit) between the No Build condition and each of the options. The travel time information is presented by mode and as a person-weighted average for all modes. Shorter trips to and from Mercer Island as well as longer regional trips between Seattle and Bellevue are compared. Attachment E, I-90 Person-Weighted Travel Times to and from Mercer Island, provides detailed travel times from specific I-90 ramps on Mercer Island by mode, peak period and analysis year.

Travel Time To and From Mercer Island

Table 5-6 provides the composite overall travel time during East Link construction for travel on I-90 to and from Mercer Island and Bellevue and Seattle. This travel time considers all directions of travel on I-90 and Mercer Island and is weighted by person for all modes (SOV, HOV, and transit). I-90 travel time for all modes to and from the island would be similar or improved between No-Build and the options during construction, except for Option 3 in the AM peak period. With Option 3, HOV and transit trips westbound in the AM peak would see an increase in travel time without the HOV lane between Mercer Island and Seattle. Most people from Mercer Island that travel on I-90 will not experience a change, and in certain routes there will be improvements to and from Mercer Island.

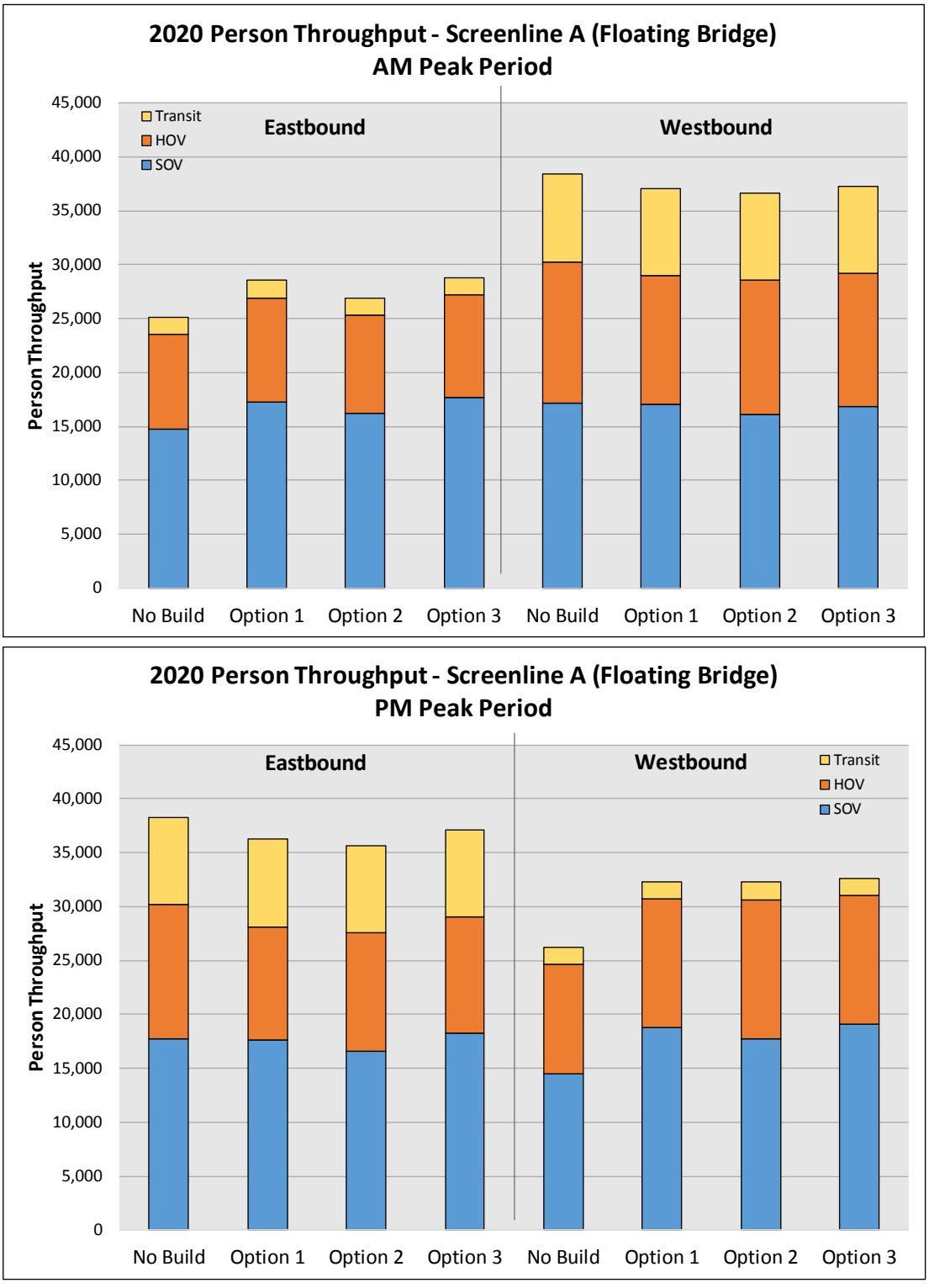
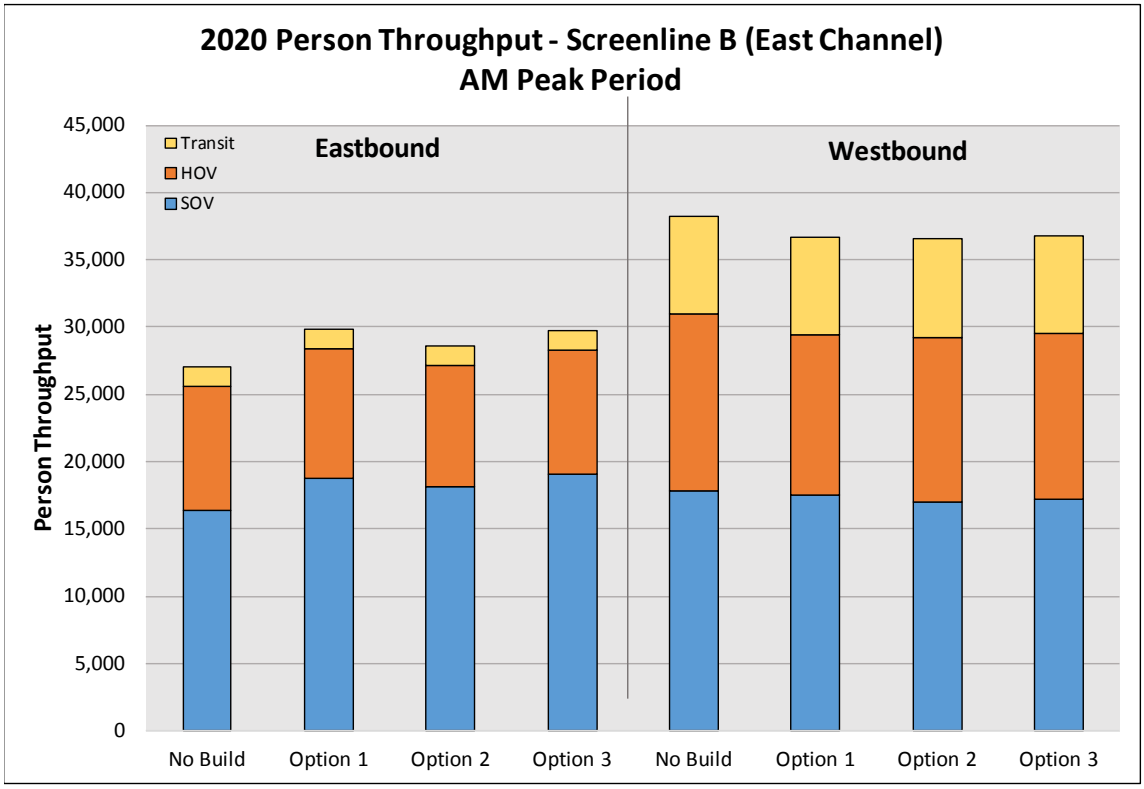


Exhibit 5-6. 2020 I-90 Peak-Hour Person Throughput by Mode at Lake Washington (Screenline A)



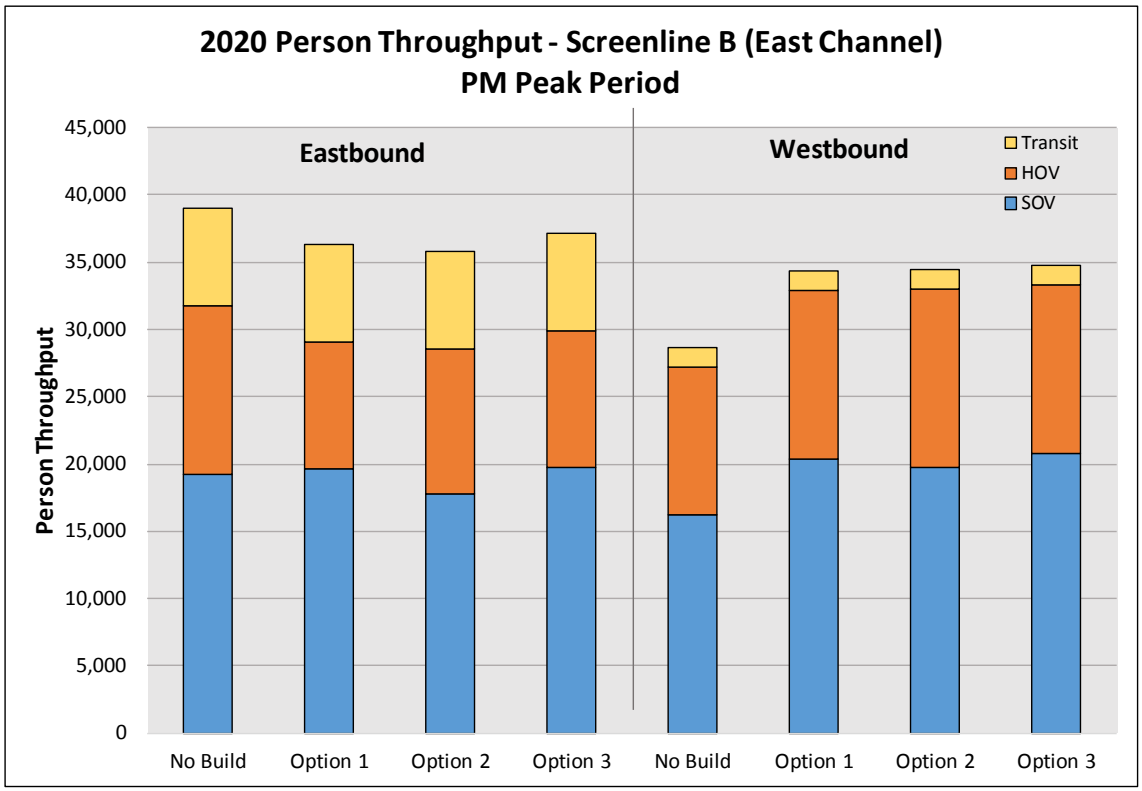


Exhibit 5-7. 2020 I-90 Peak-Hour Person Throughput by Mode at East Channel Bridge (Screenline B)

Table 5-5. 2020 Vehicle Peak-Period Percent Demand Served

Direction	Screenline A			Screenline B		
	Vehicle Demand	Vehicle Throughput	Percent Served	Vehicle Demand	Vehicle Throughput	Percent Served
AM Westbound						
No Build	23,400	22,700	97%	23,900	23,300	97%
Option 1	22,300	22,000	99%	22,600	22,500	100%
Option 2	22,100	21,300	96%	22,600	22,100	98%
Option 3	22,700	21,900	96%	23,100	22,300	97%
AM Eastbound						
No Build	19,000	18,500	97%	20,900	20,100	96%
Option 1	21,300	21,200	100%	23,300	22,800	98%
Option 2[a]	20,900	20,000-20,800	96%-100%	22,800	21,900-22,600	96%-99%
Option 3	21,700	21,700	100%	23,700	22,800	96%
AM Total (Both Directions)						
No Build	42,400	41,200	97%	44,800	43,400	97%
Option 1	43,600	43,200	99%	45,900	45,300	99%
Option 2[a]	43,000	41,300-42,100	96%-98%	45,400	44,000-44,700	97%-98%
Option 3	44,400	43,600	98%	46,800	45,100	96%
PM Westbound						
No Build	19,600	18,700	95%	21,600	20,800	96%
Option 1	23,300	23,300	100%	25,200	25,200	100%
Option 2	23,100	23,100	100%	25,000	25,000	100%
Option 3	23,700	23,700	100%	25,500	25,500	100%
PM Eastbound						
No Build	23,700	22,900	97%	24,800	24,400	98%
Option 1	22,600	22,100	98%	23,800	23,700	100%
Option 2[a]	22,600	21,100-22,600	93%-100%	23,400	22,300-23,400	95%-100%
Option 3	23,100	22,800	99%	23,800	23,800	100%
PM Total (Both Directions)						
No Build	43,300	41,600	96%	46,400	45,200	97%
Option 1	45,900	45,900	100%	49,000	49,000	100%
Option 2[a]	45,700	44,200-45,700	97%-100%	48,400	47,600-48,400	98%-100%
Option 3	46,800	46,800	100%	49,300	49,300	100%

Notes:
Units are in vehicles, including SOVs, HOVs, and Trucks. Does not include transit vehicles.
Option 1 – Mercer Island SOV traffic eligible to use HOV lanes between Seattle and Mercer Island
Option 2 – Mercer Island SOV traffic not allowed to use HOV lanes between Seattle and Mercer Island
Option 3 – HOV lane between Seattle and Mercer Island converted to GP lane during construction only
[a] Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

Table 5-6. 2020 I-90 Travel Time Summary To and From Mercer Island between Seattle and Eastside (minutes)

Year 2020 Condition	AM Peak Period	PM Peak Period
No Build	7.1	6.4
Option 1	6.8	5.4
Option 2[a]	7.0-7.0	6.0-6.2
Option 3	7.5	5.9

Note: Travel times are person-weighted based on all modes (SOV, HOV, and transit) and consider all ramps on Mercer Island. Travel time to and from Seattle is measured on I-90 just east of 4th Avenue S. Travel time to and from Bellevue is measured on I-90 at the I-405 interchange except for transit, which also considers bus and LRT trips at the South Bellevue Park-and-Ride.

[a] Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

Exhibits 5-8 and 5-9 show the travel times by mode for the AM and PM peaks to and from Mercer Island and Bellevue and Seattle in 2020.

AM Peak Period

SOV travel times in the AM peak from Mercer Island to Seattle (westbound) would be similar between the No Build condition and Option 1, but would be approximately 1.5 to 2 minutes longer in Options 2 and 3 as more SOV vehicles use the GP lanes. With Option 1, the range of travel times for a westbound SOV trip from Mercer Island to Seattle is between 7.6 minutes from W Mercer Way to minutes from E Mercer Way with an SOV trip from Island Crest Way taking slightly less than 10 minutes. In Options 2 and 3, the range of travel times from Mercer Island is similar with the shortest trip taking about 9 minutes from W Mercer Way and the longest trip taking about 17 minutes from E Mercer Way. A trip from 76th Avenue SE in Option 2 would take a little under 12 minutes to go to Seattle.

Eastbound SOV trips from Seattle to Mercer Island would be lower than the No Build condition for all three options. Option 2 SOV travel time could range from the same as Option 1 or be 3 to 4 minutes longer than Option 1, which is similar to the No Build condition. Travel time for Option 3 would be in between Option 1 and the No Build condition. Westbound SOV travel times between Bellevue and Mercer Island would generally be similar between the No Build condition and Options 1 and 2 but be up to 0.5 minute longer in Option 3 than in the No Build condition. Eastbound SOV travel times between Mercer Island and Bellevue would be up to 0.5 minute longer in Options 1 and 3 compared to the No Build condition or Option 2.

HOV travel times in the AM westbound direction between Mercer Island and Seattle would, on average, be about 2 minutes faster in Option 2 than the other options and the No Build condition with fewer vehicles using the HOV lanes. Westbound HOV travel times between Bellevue and Mercer Island would also be the shortest in Option 2 by about 0.5 minute compared to the other options. Eastbound HOV trips from Seattle to Mercer Island would take up to 1.5 minutes longer with Option 3 than the other options, but all options would be lower than the No Build condition. Eastbound HOV travel between Mercer Island and Bellevue would be similar among the No Build condition and all options.

Transit travel times in the AM westbound direction, to and from Mercer Island, would be shorter with Option 2 than with the No Build condition or the other options. Options 1 and 3 would have longer transit travel times than the No Build condition because buses would not be able to use the center roadway and the outer roadway westbound HOV lane would include either Mercer Island traffic or be a GP lane. Transit travel times eastbound from Seattle to Mercer Island in the AM peak would be 1.5 to 2.5 minutes longer with all options because buses would not be able to use the D2 Roadway once closed for East Link construction.

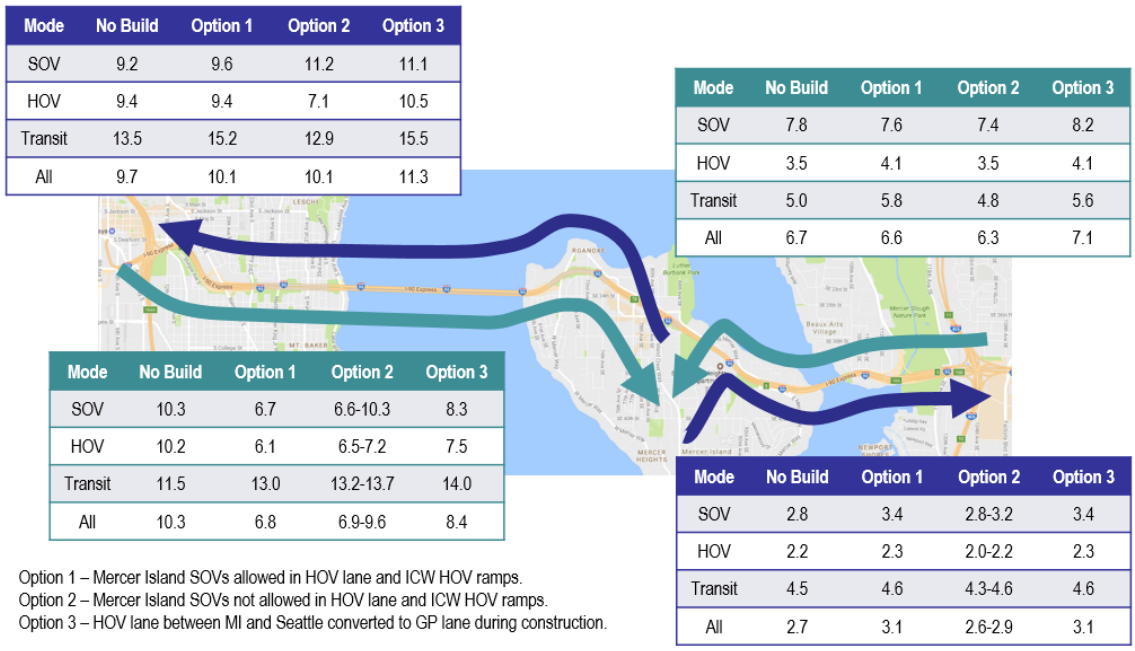


Exhibit 5-8. 2020 AM Peak Period Travel Times To/From Mercer Island

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

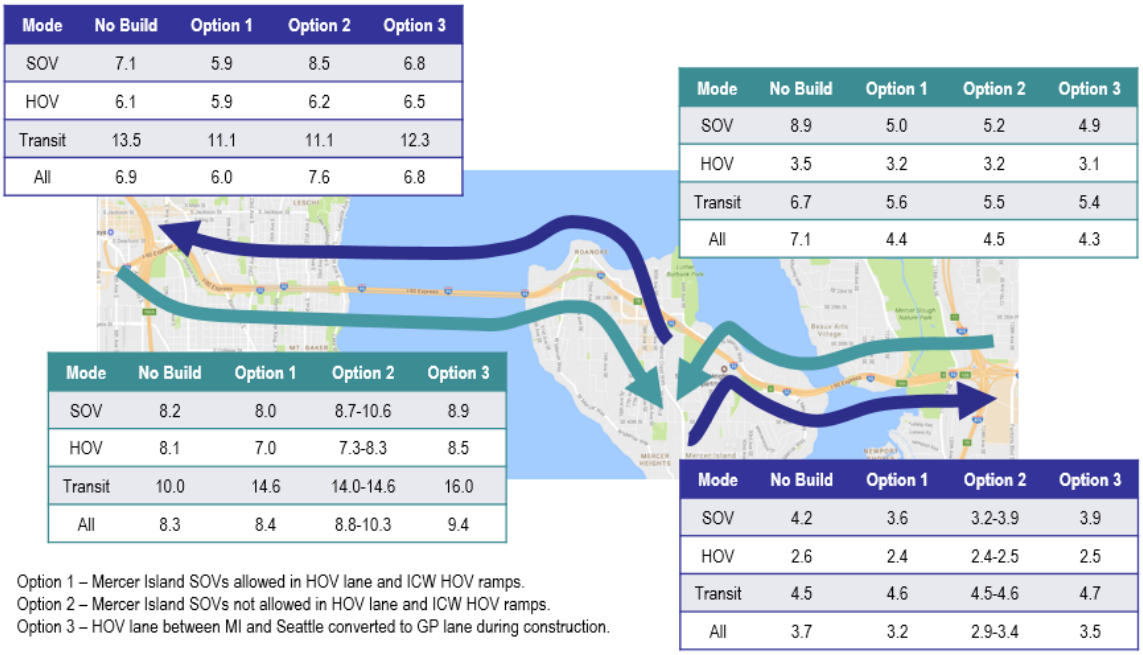


Exhibit 5-9. 2020 PM Peak Period Travel Times To/From Mercer Island

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

PM Peak Period

Eastbound SOV travel times in the PM peak from Seattle to Mercer Island would vary between the No Build condition and the options. Option 1 would have slightly faster travel times among the options and be similar to the No Build condition, while Options 2 and 3 could range from less than a minute longer compared to the No Build condition to up to 2.5 minutes longer with Option 2. Westbound SOV travel

times in Option 2 between Mercer Island and Seattle would be 2 to 2.5 minutes longer than in Options 1 and 3. With Options 1 and 3, the range of travel times for a westbound SOV trip from Mercer Island to Seattle is between 5 minutes from W Mercer Way to 9 minutes from E Mercer Way, with an SOV from Island Crest Way taking about 6.5 minutes. In Option 2, the range of SOV travel times from Mercer Island are about 7 minutes from W Mercer Way to about 13.5 minutes from E Mercer Way. A trip from 76th Avenue SE in Option 2 would take 9 minutes. SOV travel time westbound between Bellevue and Mercer Island would be up to 4 minutes faster with all options compared to the No Build condition. Eastbound SOV travel time between Mercer Island and Bellevue would be similar to improved by up to one minute in all options compared to the No Build condition.

In the PM peak, HOV travel times in both directions between Mercer Island and Seattle would be similar to improved between Options 1 and 2 compared to the No Build condition. In Option 3, HOV travel times would be slightly longer than the other options as the HOV lane is converted to a GP lane. HOV travel times between Mercer Island and Bellevue would be similar in both directions for all options and the No Build condition.

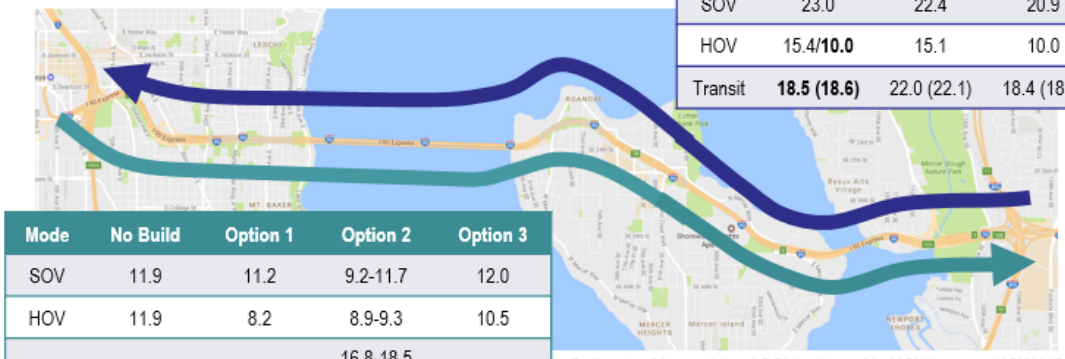
Transit travel times in the PM eastbound direction would be longer for all options compared to the No Build condition, but up to 2 minutes shorter with Options 1 and 2 than Option 3. In the westbound direction to and from Mercer Island, transit travel time would be faster for all options compared to the No Build condition. Transit westbound between Mercer Island and Seattle would be up to 2 minutes faster in Options 1 and 2 compared to the No Build condition. Transit travel times in Option 3 would be a minute longer than in Options 1 and 2.

Travel Time Between Seattle and Bellevue

Exhibits 5-10 and 5-11 present travel times by mode (SOV, HOV, and Transit) between Downtown Seattle (I-90 just east of 4th Avenue S) and Bellevue (I-90 mainline at the I-405 overcrossing) for the AM and PM peak periods. SOV peak-period travel times would generally be similar to or improved from the No Build condition in both the peak and non-peak directions, with the westbound PM direction showing substantial improvement of about 5 to 10 minutes.

In the AM peak westbound direction, HOV travel times in Option 2 travel times are similar to the No Build condition as the HOV lane is only available for HOV and transit vehicles, while in Options 1 and 3, the HOV travel times would be up to 5 minutes longer when compared to an HOV using the center roadway in the No Build condition. In the eastbound direction, HOV travel times in the AM peak would be faster for all options compared to the No Build condition, although the longest travel time would be with Option 3. HOV travel times in the PM peak eastbound direction would be similar for Options 1 and 2 compared to the No Build condition, but take up to 2.5 minutes longer in Option 3. All options would experience lower HOV travel time in the westbound direction in the PM peak.

Westbound transit travel times in the AM peak would be similar between Option 2 and the No Build condition and up to 4 minutes longer for Options 1 and 3. This is because Options 1 and 3 would have lower speeds in the HOV lane as more vehicles are allowed to use the lane. Transit travel time could be similar to improved for all options in the eastbound direction in the AM peak, but about 2 minutes longer in Option 3 because the HOV lane is converted to a GP lane in this option. Transit travel times would be 4 to 6 minutes longer for all options in the eastbound direction in the PM peak, but would be 2 to 4 minutes shorter in the westbound direction with the new HOV lane.



Mode	No Build	Option 1	Option 2	Option 3
SOV	23.0	22.4	20.9	22.6
HOV	15.4/**10.0**	15.1	10.0	14.5
Transit	**18.5 (18.6)**	22.0 (22.1)	18.4 (18.7)	22.2 (22.3)

Mode	No Build	Option 1	Option 2	Option 3
SOV	11.9	11.2	9.2-11.7	12.0
HOV	11.9	8.2	8.9-9.3	10.5
Transit	16.3 (16.7)	17.0 (17.6)	16.8-18.5 (17.4-19.0)	17.9 (18.5)

Option 1 – Mercer Island SOVs allowed in HOV lane and ICW HOV ramps.
Option 2 – Mercer Island SOVs not allowed in HOV lane and ICW HOV ramps.
Option 3 – HOV lane between MI and Seattle converted to GP lane during construction.

Exhibit 5-10. 2020 AM Peak Period Travel Times Between Seattle and I-405

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

Mode	No Build	Option 1	Option 2	Option 3
SOV	22.9	14.2	17.5	13.4
HOV	12.6	8.9	8.7	9.3
Transit	18.8 (20.4)	15.9 (17.0)	15.9 (16.5)	16.9 (17.9)

Mode	No Build	Option 1	Option 2	Option 3
SOV	16.7	13.9	12.7-13.0	14.4
HOV	14.5/**9.6**	9.9	9.9-10.6	12.4
Transit	**13.7 (14.6)**	18.6 (19.2)	18.1-19.1 (18.7-19.6)	19.9 (20.6)

Option 1 – Mercer Island SOVs allowed in HOV lane and ICW HOV ramps.
Option 2 – Mercer Island SOVs not allowed in HOV lane and ICW HOV ramps.
Option 3 – HOV lane between MI and Seattle converted to GP lane during construction.

Exhibit 5-11. 2020 PM Peak Period Travel Times Between Seattle and I-405

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

5.2.1.2 Level of Service

Congestion on I-90 would worsen in the 2020 No Build condition compared to existing conditions. The I-90 freeway LOS would continue to degrade and generally operate at LOS E or F conditions throughout the AM and PM peak periods under the 2020 No Build condition. Congestion and resulting vehicle travel hours would likely extend to longer periods

The congestion maps in Exhibits 5-12 and 5-13 indicate vehicle speeds over time (vertical axis) and distance (horizontal axis) for the year 2020. The time indicated on these maps is for a 3.5-hour duration in both the AM (6:30 to 10:00 a.m.) and PM (3:30 to 7:00 p.m.) peak periods. The distance covers I-90 from the I-5 interchange to the I-405 interchange. On the maps, LOS E or F conditions (speeds at or below 50 mph) are indicated where areas of yellow, red, or black occur. Black indicates the greatest congestion. LOS D (vehicle speeds over 50 mph) or better is portrayed where areas of green occur.

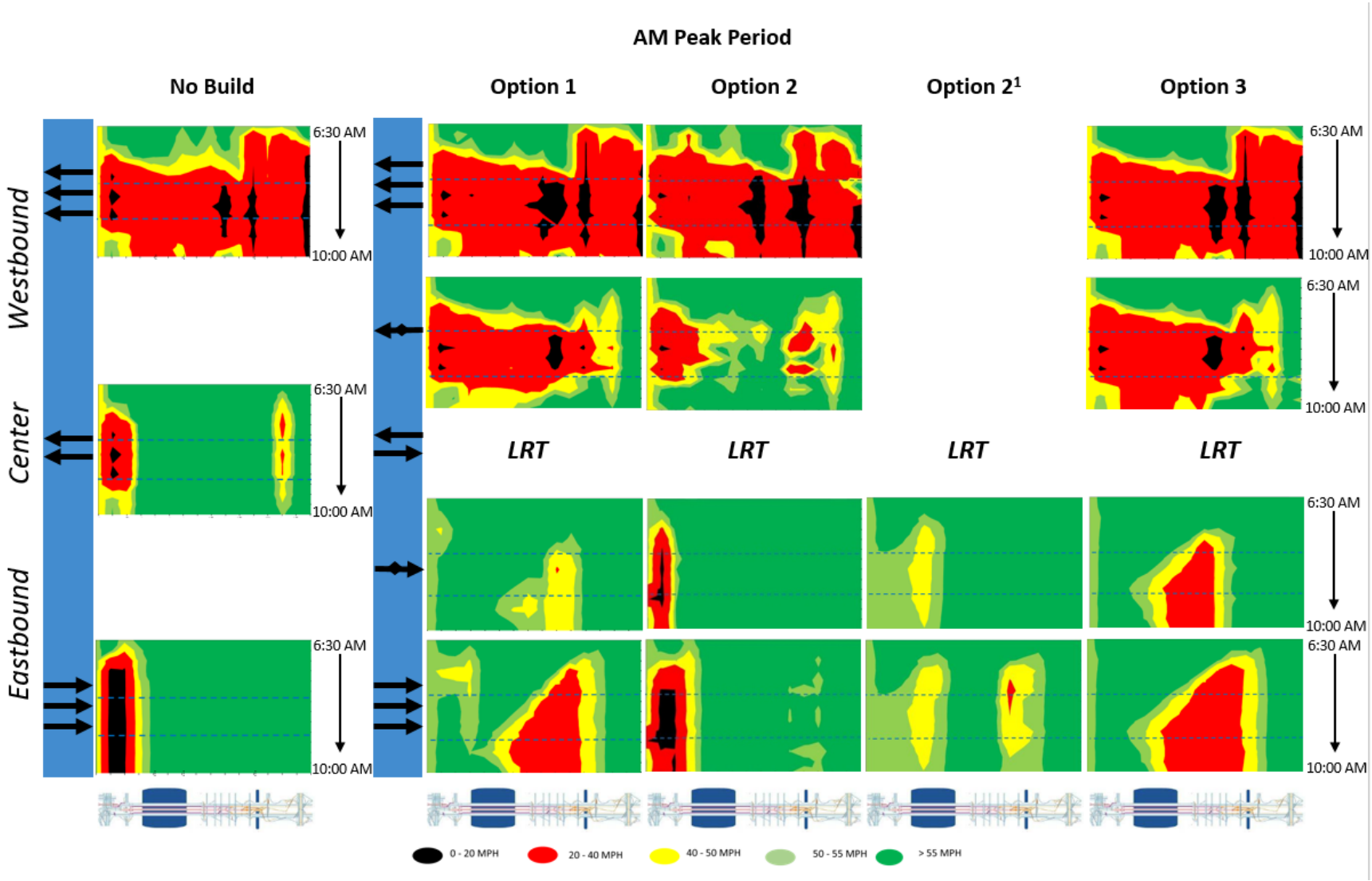


Exhibit 5-12. I-90 Year 2020 AM Peak-Period Vehicle Speeds

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

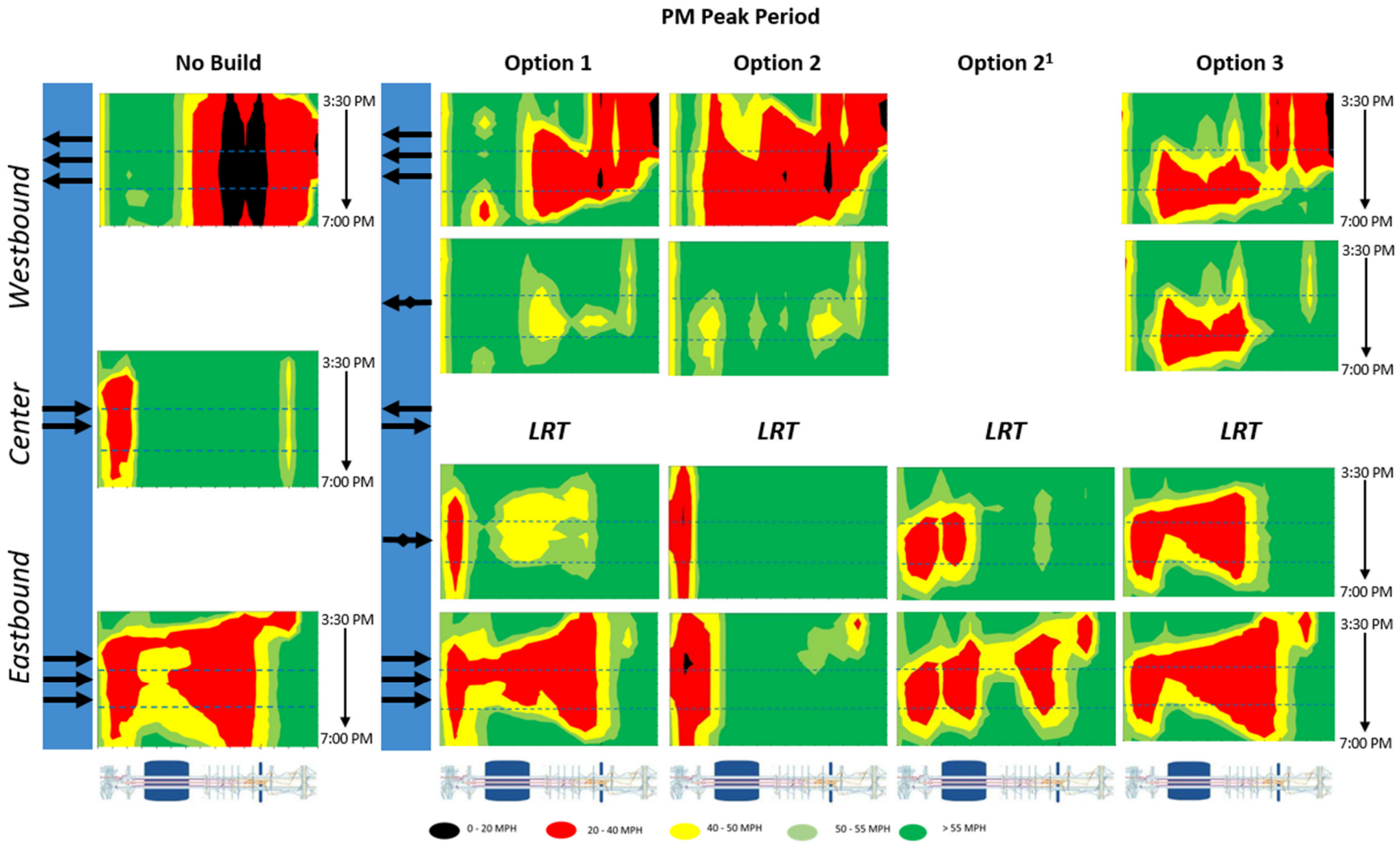


Exhibit 5-13. I-90 Year 2020 PM Peak-Period Vehicle Speeds

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

AM Peak Period

In each of the options, congestion in the westbound direction would be similar to the No Build condition, with minor increases in congestion between the W Mercer Way and Island Crest Way interchanges. This would be caused by the closure of the center roadway, shifting vehicles from the center roadway to the outer roadway.

In the eastbound (reverse-peak) direction, Options 1 and 3 would have less congestion between I-5 and the Mount Baker Tunnel compared to the No Build condition due to the increased capacity created by the new HOV (or GP in Option 3) lane. This would allow more vehicles to travel through this area and, as a result, additional congestion would occur on I-90 around Mercer Island. Near the Mount Baker Tunnel, congestion under Option 2 is similar to the No Build condition, although congestion begins later and farther west of the tunnel toward Seattle.

WSDOT has an operational policy for managing its HOV facilities and desires the vehicle operating speeds to be 45 mph or higher 90 percent of the peak period. With Option 1, the westbound HOV lane would operate at 45 mph or above for less than 60 percent of the time during the AM peak period and would not meet the WSDOT policy. The eastbound lane would meet the policy 100 percent of the time. With Option 2, the HOV lanes in both directions would meet the policy. In Option 3 the HOV lane would only extend between I-405 and Mercer Island, similar to the No Build condition, and would meet the WSDOT policy.

WSDOT would consider actions to improve the HOV lane performance and the Island Crest Way westbound on-ramp operations. This would include metering the westbound Island Crest way on-ramp at a rate that matches the HOV traffic volume, and consideration of other traffic control and enforcement strategies on mainline I-90 and/or this ramp. These strategies would be required for Options 1 and 3, and they may also be implemented for Option 2, depending on the growth in HOV demand in the I-90 corridor. Adding these operational actions would increase vehicle queues on the Island Crest Way westbound on-ramp for Options 1 and 3 and drivers may shift to use other I-90 ramps, which would affect local travel times for those drivers similar to in Option 2. See Section 3.4.2 for local street operations in the future with the options.

PM Peak Period

Congestion in the westbound direction would decrease in both severity and duration with the options during construction compared to the No Build condition. This is because of the increased capacity in the reverse peak direction with the R-8A HOV lane to Seattle. As a result, more vehicles would be able to travel across Mercer Island and therefore congestion would increase along the floating bridge in all options. Under Option 2 the increased congestion would stretch farther to the west than in the other options as more vehicles would be in the GP lanes.

In the eastbound peak direction, Options 1 and 3 would have similar congestion between the Mount Baker Tunnel and Mercer Island compared to the No Build condition. Option 2 would have more congestion between I-5 and the Mount Baker Tunnel compared to the other options because Mercer Island SOVs would not be able to use the HOV lane through the Mount Baker Tunnel. Traffic modeling estimates that congestion west of the tunnel could be higher with the No Build condition and Option 2 conditions compared to Options 1 and 3. The No Build condition only has three GP lanes through the tunnel, while Option 2 requires drivers to change lanes to either access the HOV lane or move out of it when the GP lane transitions to an HOV lane. Congestion in Option 2 at the Mount Baker Tunnel could shift farther east at the East Channel Bridge similar to Options 1 and 3.

The I-90 HOV lanes in both directions during the PM peak period would meet the operational policy Options 1 and 2 during construction. Option 3 would not have HOV lanes.

5.2.1.3 Safety

The Final EIS determined that with East Link occupying the center roadway there would be no impact on the total number of crashes in the I-90 corridor as traffic in the center roadway, and associated crashes, shifts to the outer roadway. Table 5-7 summarizes the difference in safety performance of the I-90 mainline and each interchange among Options 1, 2, and 3 for the 2020 options. Each interchange includes the ramps and ramp terminal intersections.

Table 5-7. Safety Performance Changes for 2020 Options 1 and 3 Compared to Option 2

Segment	Option 2 compared to Option 1 (crashes/year)	Option 2 compared to Option 3 (crashes/year)
I-90 Mainline	-2	-13
Rainier Ave. S Interchange	0	0
W Mercer Way Interchange	2	2
76th Ave. SE Interchange	1	1
77th Ave. SE Interchange	0	0
Island Crest Way Interchange	-3	-3
80th Ave. SE Interchange	0	0
E Mercer Way Interchange	0	-1
Bellevue Way Interchange	0	0
TOTAL	**-2**	**-14**

Note: A positive number indicates an increase in predicted crashes per year for Option 2; a negative number indicates a decrease in predicted crashes per year for Option 2.

With Option 2, the I-90 mainline would have slightly fewer crashes (2 crashes per year) compared to Option 1. The crash reduction is attributed to the changes in travel patterns to and from Mercer Island as drivers use different ramps between the options and slightly fewer vehicles travel on I-90 with Option 2 compared to Options 1 and 3. For example, in Option 2, fewer vehicles would travel westbound on I-90 between Island Crest Way and W Mercer Way with the westbound Island Crest Way on-ramp becoming HOV-only, and therefore the predicted number of crashes on I-90 mainline in this area would decrease. Option 3 would have 12 more predicted crashes per year than Option 1 and 14 more than Option 2 because of higher volumes primarily on the I-90 mainline.

The total number of crashes at the I-90 interchanges (ramps and ramp terminal intersections), would be similar for all options, even with the shift in Mercer Island local travel patterns associated with Option 2. Crashes at the Island Crest Way I-90 interchange, which has the highest crash frequency on Mercer Island, would have 3 fewer crashes per year with Option 2 than with Options 1 and 3 because of the decreased volumes on the Island Crest Way HOV-only westbound on-ramp. It is predicted there would be 2 more crashes at the W Mercer Way and 1 more at the 76th Avenue SE interchanges with Option 2 than with Option 1 and Option 3, due to an increase in volumes, particularly on the westbound on-ramps. The geometry of the Island Crest Way westbound on-ramp with the R8-A project complete, in conjunction with higher volumes on this on-ramp with Options 1 and 3 would increase the potential for crashes at this location. Ramp metering and other operational actions described to address the westbound HOV lane performance for Option 1 would also improve safety performance at the Island Crest Way westbound on-ramp.

Overall, all of the I-90 facilities (mainline and interchanges) collectively are predicted to experience a reduction of 2 crashes per year with Option 2 over Option 1 and a reduction of 14 crashes per year over Option 3. When compared to the other options, Option 2 would have an overall reduction in crashes on the I-90 mainline of about 1 to 3 percent of the approximately 500 crashes per year on I-90 predicted in

2020. For all of the options, the majority of crashes (about 70 percent) are expected to be property damage only.

Safety analysis for construction of the new R-8A HOV lanes, including narrower lane and shoulder widths, was addressed in the Final EIS for the I-90 Two-Way Transit and HOV project (2004). That analysis addressed emergency recovery maneuvers, refuge for disabled vehicles, motorist assistance activities, emergency incident response, highway maintenance activities, and traffic law enforcement. The R-8A Final EIS also acknowledged that the precedent exists for reduced lane and shoulder widths to implement HOV lanes on interstate highway facilities, noting that I-90 operated for several years in an interim condition that provides a westbound configuration with shoulder widths from 2 to 6 feet.

5.2.2 Operational Impacts

This section presents vehicle and person throughput results at Screenlines A and B. Travel times are provided along the full length of the corridor (between Seattle and I-405) and for trips to and from Mercer Island. Congestion maps are presented to show the I-90 freeway LOS.

The No Build condition does not include the R-8A HOV lanes Stage 3. Stage 3 provides HOV lanes to the outer roadway eastbound and westbound along the floating bridge between Mercer Island and Seattle. It would be completed prior to East Link construction and therefore is included in the build condition.

With the options, light rail would operate exclusively along the center roadway and D2 Roadway. HOV, transit, and Mercer Island SOV traffic using the center roadway would use the outer roadways to travel on I-90. The two options compared different vehicle eligibility with the HOV facilities. Option 1 assumes that Mercer Island SOVs would be allowed to use the outer roadway HOV lane between Seattle and Mercer Island and the Island Crest Way HOV on- and off-ramps. Option 2 assumes that Mercer Island SOVs would not be allowed to use the outer roadway HOV lanes or the Island Crest Way HOV on- and off-ramps.

5.2.2.1 Access and Circulation Modifications

Access and circulation modifications would be the same as described for construction under Section 5.2.1.1. Section 1.2.1 describes changes specific to vehicle occupancy for Options 1 and 2.

5.2.2.2 Traffic Forecasts

Vehicle and transit demand forecasts were prepared using the PSRC and Sound Transit travel demand models, as described in Section 3.2, Environmental Impacts. Traffic volume would be expected to grow on I-90 by about 0.5 percent annually between existing and 2035 No Build condition. Similar traffic growth rates would be expected on I-90 in both the AM and PM peak periods. Table 5-8 provides the existing and 2035 3-hour vehicle demand forecasts for Screenlines A and B on I-90.

Table 5-8. Existing and 2035 Peak-Period Vehicle Demand Forecasts for I-90

Screenline	Direction	Existing	No Build	Option 1	Option 2
A) Lake Washington	***AM Peak Period***				
	Westbound	22,700	23,800	22,300	22,300
	Eastbound	18,200	20,900	21,700	21,100
	TOTAL	40,900	44,700	44,000	43,400
	PM Peak Period				
	Westbound	19,100	21,000	24,000	23,600
	Eastbound	23,100	25,200	22,400	22,300
	TOTAL	42,200	46,200	46,400	45,900

Table 5-8. Existing and 2035 Peak-Period Vehicle Demand Forecasts for I-90

Screenline	Direction	Existing	No Build	Option 1	Option 2
B) East Channel Bridge	***AM Peak Period***				
	Westbound	23,100	24,300	22,800	23,000
	Eastbound	20,200	23,200	24,100	23,600
	TOTAL	43,300	47,500	46,900	46,600
	PM Peak Period				
	Westbound	21,000	23,600	26,500	26,300
	Eastbound	24,300	26,700	23,800	23,300
	TOTAL	45,300	50,300	50,300	49,600

Notes:
Units are in vehicles, including SOVs, HOVs, and Trucks. Does not include transit vehicles.
Option 1 – Mercer Island SOV traffic allowed to use HOV lanes between Seattle and Mercer Island
Option 2 – Mercer Island SOV traffic not allowed to use HOV lanes between Seattle and Mercer Island

With the East Link Extension, overall traffic growth would be similar between the No Build condition and the options, although some trends occur by direction. In the peak direction, traffic from both options would be slightly less compared to the No Build condition because people would shift from driving to riding light rail and the center roadway would be closed. In the off-peak direction, demand would be expected to increase due to the increased capacity from the new HOV lane constructed as a part of the R-8A HOV lanes project. East Link would provide a more reliable mode of travel between the region's urban centers with substantial travel-time savings compared to a vehicle traveling in the congested roadway system. Section 2, Methodology and Assumptions, discusses the East Link Extension overall demand forecasting process. The two options would have similar vehicle demands (within 600 forecasted vehicles or less).

The demand mode shares for people in SOV, HOV, and transit were calculated for the No Build condition and the options. Although this information is also presented in Section 3.2, Environmental Impacts, more detailed information for I-90 is provided in this section. The pie charts in Exhibit 5-14 provide the I-90 person mode share comparison between the No Build condition and the options in year 2035 across Lake Washington (Screenline A).

With more congestion expected in the future, the forecasts suggest a slight decrease of SOV and HOV auto users and a shift toward higher use of transit in the No Build condition. In the build condition with both options, the forecasts suggest an even more substantial shift to transit as both options provide light rail service to the Eastside and similar bus service on I-90. Mode share percentages along I-90 would be similar for Option 1 and Option 2, although there would be a slight shift from SOV to HOV with Option 2 compared to Option 1 of approximately 2 percent. This is because the HOV lane would be less congested in Option 2, improving travel times for the HOV lane. The transit mode share would increase in the options in the peak directions (westbound in the AM peak and eastbound in the PM peak) by about 2 percent and in the off-peak directions by 3 to 5 percent compared to the No Build condition. For the Transit Integration scenarios, these shifts would also be similar because total ridership between the scenarios is similar.

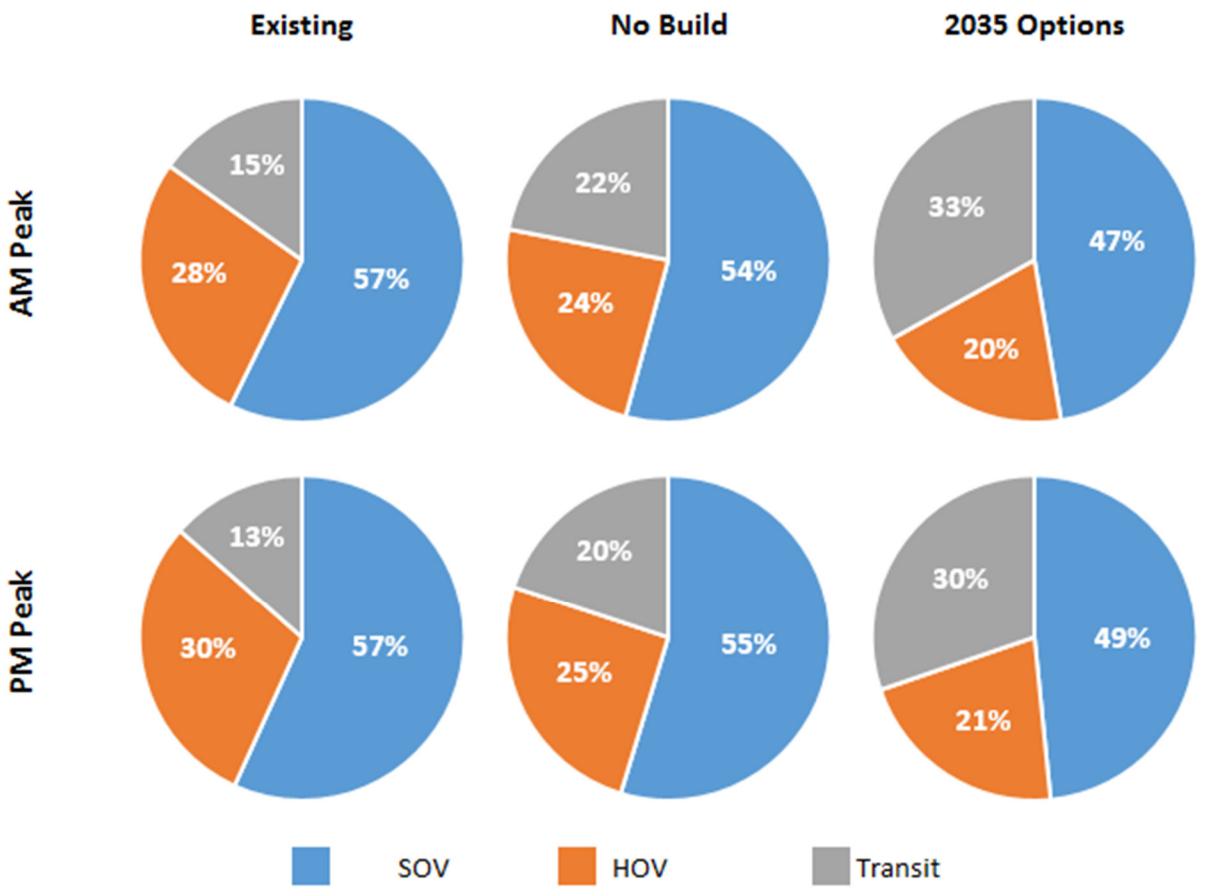


Exhibit 5-14. Screenline A (I-90 only) 2035 Mode Share
Source: PSRC (2014); Sound Transit (2014)

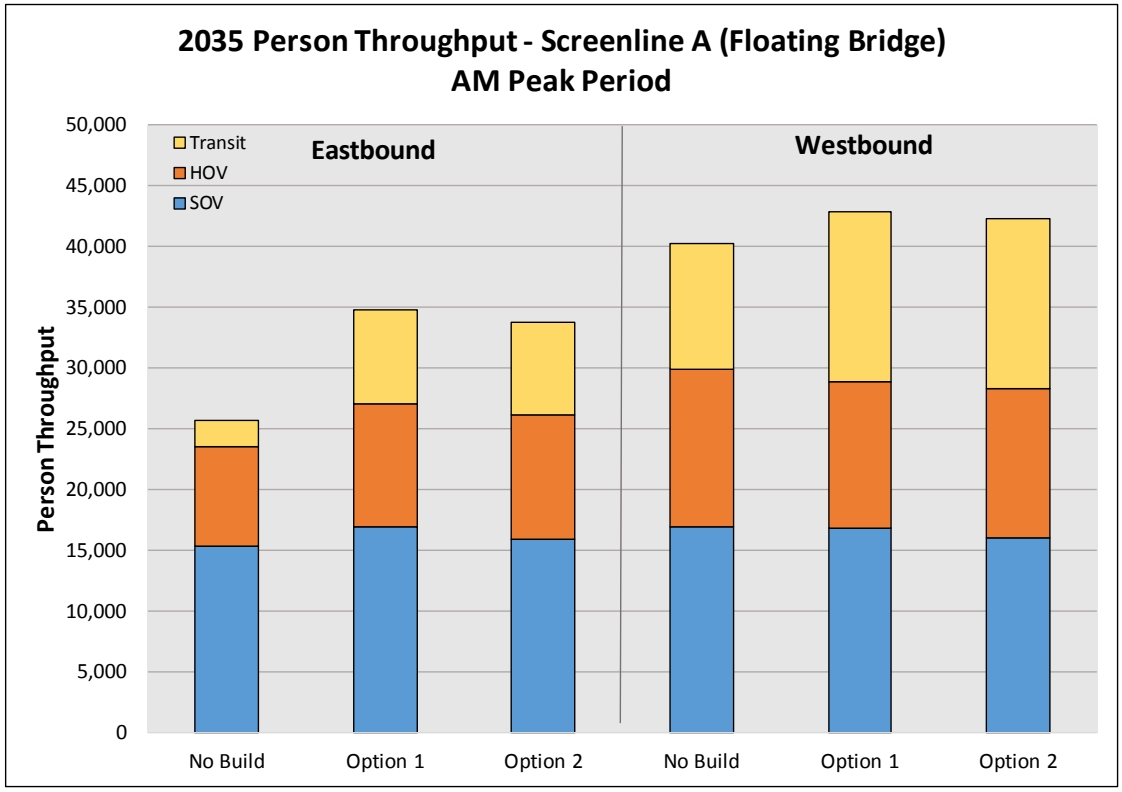
5.2.2.3 Vehicle and Person Throughput

Vehicle and person throughput on I-90 were calculated for Screenlines A and B, and summarized for SOV, HOV, and transit modes. Vehicle throughput for both directions combined would increase with both options by 1 to 5 percent in the AM peak period and by 5 to 11 percent in the PM peak period. With Option 1, the overall person throughput on I-90 across Lake Washington (Screenline A) in 2035 would increase by 11,800 people (about 18 percent) in the AM peak period and 14,600 people (about 22 percent) in the PM peak period compared to the No Build condition. Option 2 would also increase person throughput compared to the No Build condition, with an increase of 17 and 20 percent in the AM and PM peak periods, respectively. Vehicle and person throughput with Option 2 would be slightly lower than Option 1. This change would be due to the restriction of Mercer Island SOVs in the HOV lane.

The total person capacity of I-90 across Lake Washington would also improve with East Link compared to the No Build condition. The project would use dedicated right-of-way, allowing East Link to operate reliably, independent of congested roadway conditions. The following subsections present the vehicle and person throughput results at Screenlines A and B.

Screenline A (Lake Washington for I-90 only)

At Screenline A, the person throughput in both of the options would be higher in both directions and peak periods in 2035 when compared to the No Build condition (Exhibit 5-15).



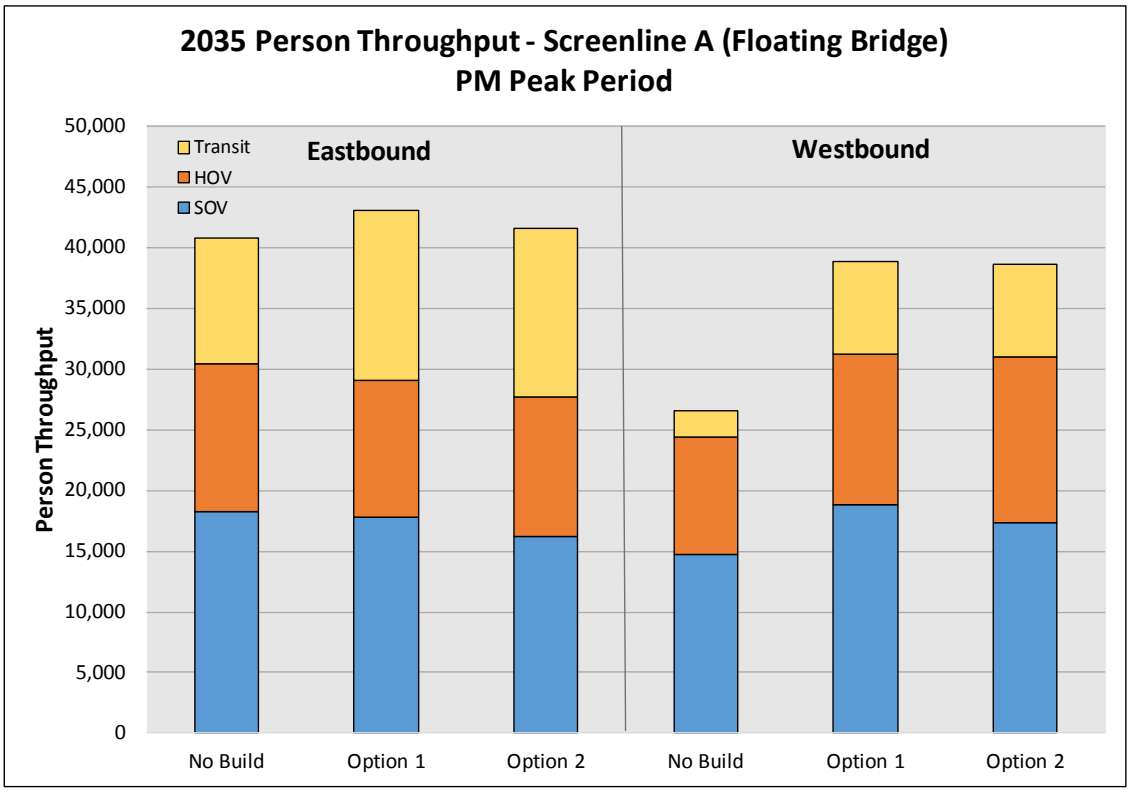


Exhibit 5-15. 2035 I-90 Peak-Hour Person Throughput by Mode at Lake Washington (Screenline A)

With Option 1, there would be an 18 percent and a 22 percent increase in total person throughput in the AM and PM peak periods, respectively, compared to the No Build condition. With Option 2, the increase in person throughput would be similar but slightly lower than Option 1, with a 15 to 17 percent increase in the AM peak period and a 19 to 20 percent increase in the PM peak period compared to the No Build condition. The throughput in Option 2 could increase up to 20 percent in the AM and PM peak periods compared to the No Build condition.

The greatest increase in person throughput would occur in the reverse-peak directions on I-90 (eastbound in the AM peak and westbound in the PM peak) because new HOV lanes and light rail would provide additional person-capacity in the direction opposite of vehicle travel in the reversible center roadway (when compared to the No Build condition). In 2035, East Link would increase person throughput between 35 and 47 percent with Option 1 in the reverse-peak directions compared to the No Build condition, and Option 2 would increase person throughput between 32 and 46 percent.

The options would increase overall vehicle throughput compared to the No Build condition, with a higher increase in the reverse-peak directions (i.e., eastbound AM peak and westbound PM peak) because the roadway capacity would increase due to new HOV lanes in combination with people adjusting their mode choice and riding light rail. As people shift their mode of travel to ride light rail, there would be a slight reduction in congestion and increased vehicle throughput.

Compared to the No Build condition, vehicle throughput in the reverse-peak direction would increase 13 to 28 percent for Option 1 and 8 to 23 percent for Option 2.

Although the options would increase the person throughput in the peak direction, the vehicle throughput would be slightly lower compared to the No Build condition. Under Option 1, the vehicle throughput in the westbound direction in the AM peak period would be 2 percent less than the No Build condition, while Option 2 would decrease by 5 percent. In the eastbound direction during the PM period, vehicle throughput with Option 1 would decrease by 4 percent compared to the No Build condition, while Option 2 would decrease by 10 percent. The decrease is due to the closure of the center roadway. Table 5-9 presents Screenline A and Screenline B vehicle and person throughput.

Table 5-9. 2035 Vehicle and Person Peak-Period Throughput

Direction	Screenline A					Screenline B				
	Vehicles			Persons Total	% Change from No Build	Vehicles			Persons Total	% Change from No Build
	SOV	HOV[a]	Total			SOV	HOV[a]	Total		
AM Westbound										
No Build	17,000	5,400	22,400	40,200	--	17,500	5,400	22,900	39,800	--
Option 1	16,900	5,000	21,900	42,900	7%	17,600	5,000	22,600	42,900	8%
Option 2	16,000	5,100	21,100	42,300	5%	16,900	5,000	21,900	42,300	6%
AM Eastbound										
No Build	15,300	3,400	18,700	25,700	--	17,500	3,600	21,100	28,100	--
Option 1	17,000	4,200	21,200	34,800	35%	19,000	4,300	23,300	36,800	31%
Option 2[b]	15,900-16,500	4,300-4,400	20,200-20,900	33,800-34,600	32% - 35%	18,400-18,700	4,200-4,300	22,600-23,000	36,100-36,600	28% - 30%
AM Total (Both Directions)										
No Build	32,300	8,800	41,100	65,900	--	35,000	9,000	44,000	67,900	--
Option 1	33,900	9,200	43,100	77,700	18%	36,600	9,300	45,900	79,700	17%
Option 2[b]	31,900-32,500	9,400-9,500	41,300-42,000	76,100-76,900	15% - 17%	35,300-35,600	9,200-9,300	44,500-44,900	78,400-78,900	15% - 16%

Table 5-9. 2035 Vehicle and Person Peak-Period Throughput

Direction	Screenline A					Screenline B				
	Vehicles			Persons Total	% Change from No Build	Vehicles			Persons Total	% Change from No Build
	SOV	HOV[a]	Total			SOV	HOV[a]	Total		
PM Westbound										
No Build	14,700	4,000	18,700	26,500	--	16,300	4,400	20,700	28,800	--
Option 1	18,800	5,200	24,000	38,900	47%	21,200	5,500	26,700	41,900	45%
Option 2	17,300	5,700	23,000	38,600	46%	20,400	5,800	26,200	41,900	45%
PM Eastbound										
No Build	18,200	5,100	23,300	40,800	--	20,100	5,100	25,200	41,700	--
Option 1	17,800	4,700	22,500	43,000	5%	19,900	4,600	24,500	44,300	6%
Option 2[b]	16,300-16,700	4,700-4,900	21,000-21,600	41,600-42,400	2% - 4%	17,700-18,000	4,700-4,700	22,400-22,700	42,400-42,900	2% - 3%
PM Total (Both Directions)										
No Build	32,900	9,100	42,000	67,300	--	36,400	9,500	45,900	70,500	--
Option 1	36,600	9,900	46,500	81,900	22%	41,100	10,100	51,200	86,200	22%
Option 2[b]	33,600-34,000	10,400-10,600	44,000-44,600	80,200-81,000	19% - 20%	38,100-38,400	10,500-10,500	48,600-48,900	84,300-84,800	20%

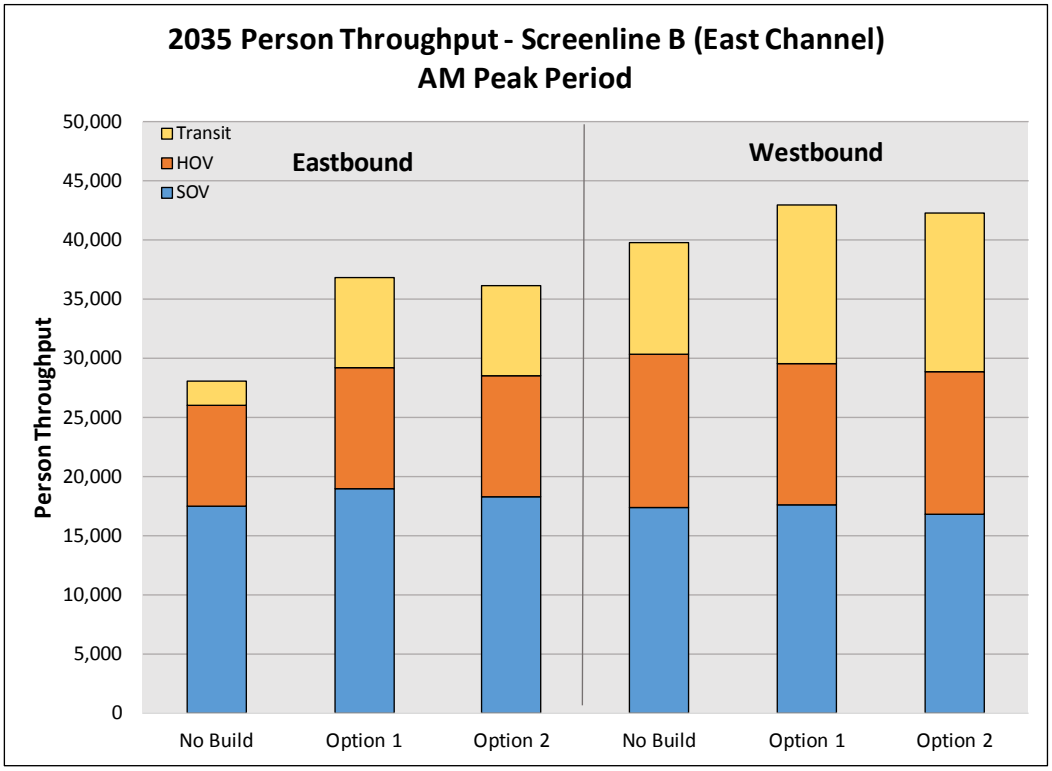
Notes:
Option 1 – Mercer Island SOV traffic eligible to use HOV lanes between Seattle and Mercer Island
Option 2 – Mercer Island SOV traffic not allowed to use HOV lanes between Seattle and Mercer Island
[a] HOV vehicle values are the total number of HOVs crossing the screenline, not the number of vehicles only in the HOV lanes, and do not include transit vehicles. Person throughput results include all modes (SOVs, HOVs, and transit vehicles).
[b] Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

Screenline B (East Channel Bridge)

At Screenline B, the total person throughput would be similar to Screenline A for the No Build condition and the options (Exhibit 5-16). In year 2035, the total person throughput with Option 1 would increase between 18 and 22 percent, depending on peak period, compared to the No Build condition, while Option 2 would increase by 16 to 20 percent.

In the AM peak period, the eastbound person throughput in either build condition would increase by approximately 30 percent; in the westbound direction, it would increase by 6 to 8 percent. In the PM peak period, the options would increase person throughput in the westbound reverse-peak direction 46 percent and between 2 and 6 percent in the eastbound peak direction, compared to the No Build condition. Person throughput has a larger increase in the reverse peak direction compared to the No Build condition due to additional HOV lanes and light rail service. Option 1 has about 2 percent higher throughput than Option 2 overall.

Overall vehicle throughput at Screenline B would increase with the options compared to the No Build condition. In the reverse-peak directions, the vehicle throughput with the options would increase between 7 and 10 percent in the AM period and between 27 and 29 percent in the PM period compared to the No Build condition. Reasons for this increase are discussed earlier in this section. In the peak directions, vehicle throughput would be lower in the build condition by 1 to 4 percent in the AM period and from 3 to 11 percent lower in the PM period compared to the No Build condition. Overall vehicle throughput for Option 1 is about 2 percent higher than Option 2 in the AM peak and about 5 percent higher in the PM peak. Table 5-8 summarizes Screenline B vehicle and person throughputs.



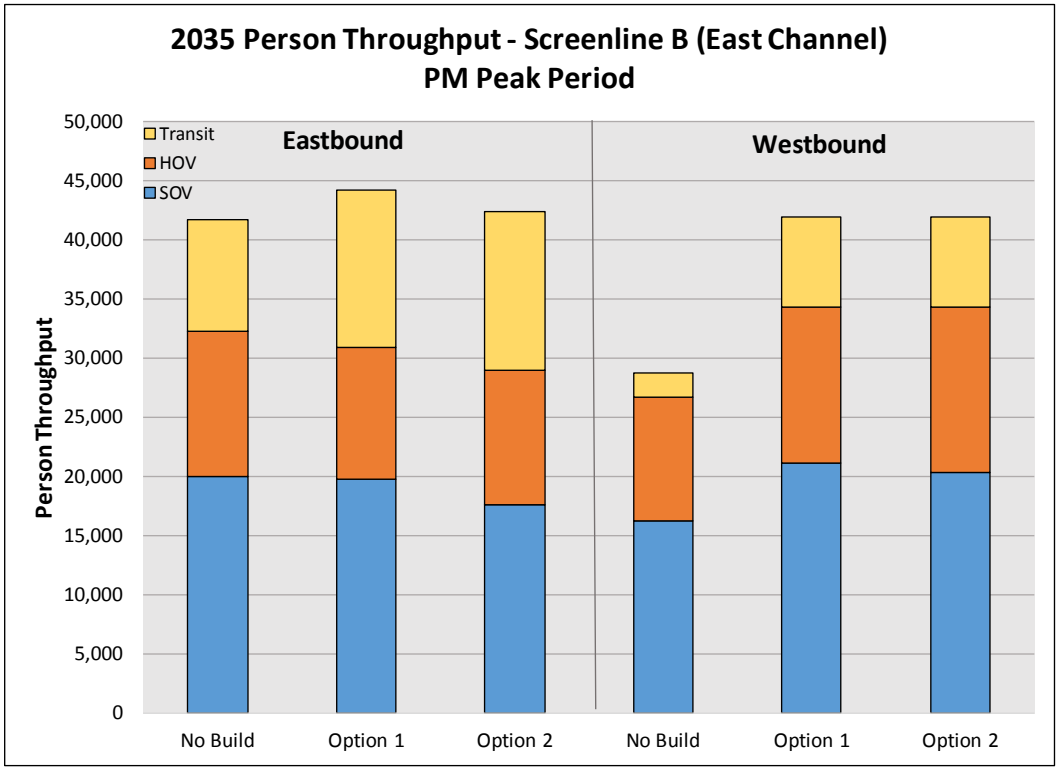


Exhibit 5-16. 2035 I-90 Peak-Hour Person Throughput by Mode at East Channel Bridge (Screenline B)

Vehicle and Person Demand Served

In conjunction with person and vehicle throughput, the percentage of the forecasted travel demand that can be accommodated during the peak period was estimated. This measure compares the person and vehicle throughput to the expected demand across each screenline. A percent served value less than 100 indicates congested conditions that limit the number of vehicles (or people) crossing the screenline. The ability to serve more of the demand indicates that congestion patterns might not be as substantial and that congestion might not occur for as long of a period. Table 5-10 provides the vehicle demand served across screenlines A and B for year 2035 conditions. This information is only for vehicles and does not include transit ridership.

Table 5-10. 2035 Vehicle Peak-Period Percent Demand Served

Direction	Screenline A			Screenline B		
	Vehicle Demand	Vehicle Throughput	Percent Served	Vehicle Demand	Vehicle Throughput	Percent Served
AM Westbound						
No Build	23,800	22,400	94%	24,300	22,900	94%
Option 1	22,300	21,900	98%	22,800	22,600	99%
Option 2	22,300	21,100	95%	23,000	21,900	95%
AM Eastbound						
No Build	20,900	18,700	89%	23,200	21,100	91%
Option 1	21,700	21,200	98%	24,100	23,300	97%
Option 2[a]	21,100	20,200-20,900	96%-99%	23,600	22,600-23,000	96%-97%
AM Total (Both Directions)						
No Build	44,700	41,100	92%	47,500	44,000	93%
Option 1	44,000	43,100	98%	46,900	45,900	98%
Option 2[a]	43,400	41,300-42,000	95%-97%	46,600	44,500-44,900	95%-96%
PM Westbound						
No Build	21,000	18,700	89%	23,600	20,700	88%
Option 1	24,000	24,000	100%	26,500	26,500	100%
Option 2	23,600	23,000	97%	26,300	26,200	100%
PM Eastbound						
No Build	25,200	23,300	92%	26,700	25,200	94%
Option 1	22,400	22,400	100%	23,800	23,800	100%
Option 2[a]	22,300	21,000-21,600	94%-97%	23,300	22,400-22,700	96%-97%
PM Total (Both Directions)						
No Build	46,200	42,000	91%	50,300	45,900	91%
Option 1	46,400	46,400	100%	50,300	50,300	100%
Option 2[a]	45,900	44,000-44,600	96%-97%	49,600	48,600-48,900	98%-99%

Notes:
Units are in vehicles, including SOVs, HOVs, and trucks. Transit vehicles not included.
Option 1 – Mercer Island SOV traffic eligible to use HOV lanes between Seattle and Mercer Island
Option 2 – Mercer Island SOV traffic not allowed to use HOV lanes between Seattle and Mercer Island
[a] Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

At Screenline A, the AM and PM peak period total (combined eastbound and westbound directions) vehicle-demand-served percentage would increase in both options compared to the No Build condition. Total vehicle percent demand served would increase between 6 and 9 percent in the Option 1 condition and between 3 and 6 percent in the Option 2 condition compared to the No Build condition. During the PM peak hour, 100 percent of demand is served with Option 1.

At Screenline B, the Option 1 total (eastbound and westbound directions) vehicle and person demand served would increase between 6 and 9 percent compared to the No Build condition, and up to 8 percent with Option 2. During the PM peak hour, 100 percent of demand is served with Option 1.

5.2.2.4 Travel Times

The following subsections provide travel-time comparisons for each of the three modes (SOV, HOV, and transit) between the No Build condition and each of the options. Shorter trips to and from Mercer Island as well as longer regional trips between Seattle and Bellevue are compared. Travel time for trips to and from Mercer island is also presented as a person-weighted average for all modes.

Travel Time To and From Mercer Island

Table 5-11 provides the composite overall travel time for travel on I-90 to and from Mercer Island and Bellevue and Seattle during East Link operations. This travel time considers all directions of travel on I-90 to and from Mercer Island and is weighted by person for all modes. I-90 travel time for all modes to and from the island would be similar or improved with the options compared to the No Build condition. Most people from Mercer Island who travel on I-90 will not experience a change, and in certain routes there will be improvements to and from Mercer Island.

Table 5-11. 2035 I-90 Travel Time Summary To and From Mercer Island between Seattle and Eastside (minutes)

Year 2035 Condition	AM Peak Period	PM Peak Period
No Build	7.5	6.7
Option 1	6.6	5.3
Option 2[a]	7.1-7.8	6.4-6.6

Note: Travel times are person-weighted based on all modes (SOV, HOV, and transit) and consider all ramps on Mercer Island. Travel time to and from Seattle is measured on I-90 just east of 4th Avenue S. Travel time to and from Bellevue is measured on I-90 at the I-405 interchange except for transit, which also considers bus and light rail trips at the S Bellevue Park and Ride.

[a] Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

Exhibits 5-17 and 5-18 show the travel times for the AM and PM peak periods between Mercer Island and Bellevue and between Mercer Island and Seattle in 2035. AM and PM peak-period person-weighted travel times for all modes to and from Mercer Island are expected to be similar to or better than the No Build condition with both options for most directions, with some exceptions. The following discussion further compares the options and No Build condition.

AM Peak Period

In the AM peak, westbound SOV travel times from Mercer Island to Seattle would be similar between the No Build condition and Option 1, but would be about 2 minutes longer in Option 2 as more SOVs use the GP lanes. With Option 1, the range of travel times for a westbound SOV trip from Mercer Island to Seattle is between 7.7 minutes from W Mercer Way to 14.6 minutes from E Mercer Way, with an SOV trip from Island Crest Way taking about 9.5 minutes. In Option 2, the range of travel times from Mercer Island to Seattle is between 9.7 minutes from W Mercer Way and 18 minutes from E Mercer Way. A trip from 76th Avenue SE in Option 2 would take about 12 minutes. Eastbound SOV trips from Seattle to Mercer Island would be up to 4 minutes shorter with the options than the No Build condition.

Mode	No Build	Option 1	Option 2
SOV	9.6	9.5	11.8
HOV	9.9	9.3	7.5
Transit	12.5	10.0	10.0
All	10.0	9.5	10.4

Mode	No Build	Option 1	Option 2
SOV	8.6	7.6	8.8
HOV	3.7	4.2	3.8
Transit	5.0	4.6	4.4
All	7.3	6.7	7.4

Mode	No Build	Option 1	Option 2
SOV	11.5	7.4	7.7-13.5
HOV	11.4	6.7	7.2-9.2
Transit	11.5	10.0	10.0
All	11.5	7.4	7.7-12.1

Mode	No Build	Option 1	Option 2
SOV	2.7	3.4	2.8-3.1
HOV	2.2	2.4	2.2-2.3
Transit	4.5	4.0	4.0
All	2.6	3.1	2.7-2.9

Exhibit 5-17. 2035 AM Peak Period Travel Times to/from Mercer Island

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

Mode	No Build	Option 1	Option 2
SOV	7.0	6.0	8.9
HOV	6.7	6.0	6.3
Transit	13.6	10.0	10.0
All	7.1	6.2	7.9

Mode	No Build	Option 1	Option 2
SOV	9.8	5.6	6.1
HOV	3.8	3.6	3.9
Transit	6.8	4.1	4.1
All	7.8	4.9	5.4

Mode	No Build	Option 1	Option 2
SOV	8.9	7.4	10.0-12.0
HOV	9.0	7.0	9.8-10.1
Transit	10.0	10.0	10.0
All	9.0	7.6	10.0-11.2

Mode	No Build	Option 1	Option 2
SOV	3.5	3.5	2.8-2.9
HOV	2.4	2.5	2.3-2.4
Transit	4.4	3.7	3.7
All	3.2	3.2	2.7

Option 1 – Mercer Island SOVs allowed in HOV lane and ICW HOV ramps.
Option 2 – Mercer Island SOVs not allowed in HOV lane and ICW HOV ramps.

Exhibit 5-18. 2035 PM Peak Period Travel Times to/from Mercer Island

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

Travel times between Bellevue and Mercer Island would be similar (within a minute) between the options and the No Build condition. HOV travel time in the AM peak westbound direction from Mercer Island to Seattle improves in both options compared to the No Build condition but is about 2 minutes faster in Option 2 as fewer vehicles use the HOV lane. Westbound HOV travel time between Bellevue and Mercer Island would the same between Option 2 and the No Build condition and about 0.5 minute shorter than Option 1. Eastbound HOV travel from Seattle to Mercer Island in the AM peak would be shorter with both options compared to the No Build condition.

Transit travel times in the AM peak period in all directions would be shorter with both options compared with the No Build condition as light rail would provide a shorter and more reliable travel time. Between Seattle and Mercer Island, transit travel times with either option would be about 2 minutes shorter than the No Build condition in both directions.

PM Peak Period

In the PM peak eastbound direction between Seattle and Mercer Island, Option 1 would have the shortest SOV travel time compared to the No Build condition and Option 2. Option 2 would have longer travel times than the No Build condition with an average travel time of between 10 to 12 minutes. Westbound SOV travel time in Option 2 from Mercer Island to Seattle would be 2 minutes longer than the No Build condition, and Option 1 would be 1 minute faster than the No Build condition. With Option 1, the range of travel times for a westbound SOV trip from Mercer Island to Seattle is between 5 minutes from W Mercer Way to 9 minutes from E Mercer Way, with an SOV trip from Island Crest Way taking about 6.5 minutes. In Option 2, the range of travel times from Mercer Island to Seattle is between 7.5 minutes from W Mercer Way to about 14 minutes from E Mercer Way. A trip from 76th Avenue SE in Option 2 would take over 9 minutes. SOV travel time in the westbound direction from Bellevue to Mercer Island would be up to 4 minutes faster with both options compared to the No Build condition.

In the PM peak, HOV travel time would be improved in the westbound direction under both options compared to the No Build condition. In the eastbound direction between Seattle and Mercer Island, HOV travel times in Option 2 would be about 1 minute longer than the No Build condition. In the eastbound direction between Seattle and Mercer Island, HOV travel times in Option 2 would be about 1 minute longer than the No Build condition. HOV travel between Mercer Island and Bellevue would be similar between both options and the No Build condition in both directions.

Transit travel times in the PM peak with both options would be similar to or faster than the No Build condition as light rail would provide a shorter and more reliable travel time. Eastbound transit travel times for both options would be the same as the No Build condition, but would be about 3.5 minutes faster in the westbound direction compared to the No Build condition. Depending on direction, transit travel times between Mercer Island and Bellevue would be 1 to 3 minutes faster in both options compared to the No Build condition.

Travel Time Between Seattle and Bellevue

Exhibits 5-19 and 5-20 show the travel times for the AM and PM peaks between Bellevue and Seattle in 2035. Travel times for all modes between I-405 and Seattle would generally be similar or improve in both directions compared to the No Build condition during the both the AM and PM peak periods because of a shift from people driving to riding light rail and the additional capacity provided with the outer roadway HOV lanes.

Exhibit 5-19. 2035 AM Peak Period Travel Times Between Seattle and I-405

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

Exhibit 5-20. 2035 PM Peak Period Travel Times Between Seattle and I-405

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

SOV travel times in the AM peak would be improved with both options compared to the No Build condition in the westbound direction. In the eastbound direction, SOV travel time with both options would increase by about 1 minute compared to the No Build condition. Option 2 could see shorter travel time for SOVs eastbound by about 1.5 minutes compared to the No Build condition. In the PM peak, SOV travel time in both directions would see substantial improvement of between 3 and 9 minutes with both options compared to the No Build condition. Option 1 would have westbound SOV travel times of 3.5 minutes shorter than Option 2.

HOV travel time in the AM peak westbound direction in Option 2 would be similar to the No Build condition as the HOV lane is only available for HOV and transit. In Option 1, the HOV travel times would be 4 minutes longer when compared to an HOV using the center roadway in the No Build condition or the HOV lane in Option 2. HOV travel times in the AM peak would be faster for both options compared to the No Build condition in the eastbound direction, with Option 2 having longer travel time than Option 1. HOV travel time in the PM peak eastbound direction would be shorter for Option 1 compared to the No Build condition, with Option 2 taking up to 2 minutes longer than the No Build condition. Both

options would improve HOV travel time in the westbound direction in the PM peak by over 3 minutes compared to the No Build condition due to the new HOV lane.

Transit travel times between Seattle and Bellevue would generally improve in both the AM and PM peak periods because light rail would take 14 minutes to travel between the International District Station and South Bellevue Station. Westbound in the AM peak, transit travel times would be up to 3.5 minutes shorter with the options and almost 2 minutes shorter in the eastbound direction compared to the No Build condition. In the PM peak, the transit travel time in the peak eastbound direction would be the same as the No Build condition, while the westbound direction would see a savings of up to 6 minutes. There is no difference in transit travel times between the options.

5.2.2.5 Level of Service

The I-90 LOS would continue to degrade and generally operate at LOS E or F conditions throughout the peak periods with the 2035 No Build condition compared to existing conditions. Congestion and resulting vehicle travel hours would likely extend to longer periods.

The congestion maps in Exhibits 5-21 and 5-22 indicate vehicle speeds over time (vertical axis) and distance (horizontal axis) for the year 2035. The time indicated on these maps is for a 3.5-hour duration in both the AM (6:30 to 10:00 a.m.) and PM (3:30 to 7:00 p.m.) peak periods. The distance covers I-90 from the I-5 Interchange to the I-405 interchange. On the maps, LOS E or F conditions (speeds at or below 50 mph) are indicated where areas of yellow, red, or black occur. Black indicates the worst congestion. LOS D (vehicle speeds over 50 mph) or better is portrayed where areas of green occur.

AM Peak Period

In both options, congestion in the westbound direction would show traits similar to those of the No Build condition. Westbound congestion would be caused by two separate bottlenecks that eventually join together: one would be formed between the E Mercer Way and Island Crest Way interchanges, and the other formed by congestion from the I-5 northbound off-ramp queueing back to the I-90 westbound mainline. Although the westbound congestion patterns are similar between Options 1 and 2, there would be slightly more congestion in Option 2 in the GP lanes because the HOV lane would have less vehicle demand as Mercer Island SOVs would not be allowed to use it. This is why SOV travel times would be slightly longer but HOV travel times would be shorter in Option 2 compared to Option 1.

In the eastbound direction, Option 1 would have less congestion between I-5 and the Mount Baker Tunnel than the No Build condition for two reasons: Mercer Island SOVs would be allowed to use the HOV lane in the Mount Baker Tunnel north portal and more people would shift to ride light rail and decrease vehicle demand. As a result, more vehicles are able to get through the Mount Baker Tunnel and create additional congestion downstream between the interchanges at E Mercer Way, Bellevue Way, and I-405. In Option 2, congestion similar to the No Build condition would form between I-5 and the Mount Baker Tunnel because Mercer Island SOVs would not be allowed to use the HOV lane in the Mount Baker Tunnel north portal, increasing demand in the GP lanes. As described for construction, congestion west of the tunnel could be higher with the No Build condition and Option 2, although Option 2 would be less than the No Build condition. The traffic congestion in this area will be monitored by WSDOT to determine if conditions warrant further analysis of potential modifications to the HOV lane transition to improve operations between I-5 and the Mount Baker Tunnel, which may result in shifting congestion farther east to the East Channel Bridge similar to Option 1. Congestion in Option 2 at the Mount Baker Tunnel could shift farther east at the East Channel Bridge similar to Option 1.PM peak-period congestion in the I-90 GP lanes would be less for both options in the westbound direction than in the No Build condition, although Option 2 would have more congestion than Option 1. The westbound HOV lane would similar congestion in both options. In the eastbound direction, both options would be better than the No Build condition. Option 1 would have congestion for a shorter duration than the No Build condition, while Option 2 would have more congestion at the Mount Baker Tunnel and less to the

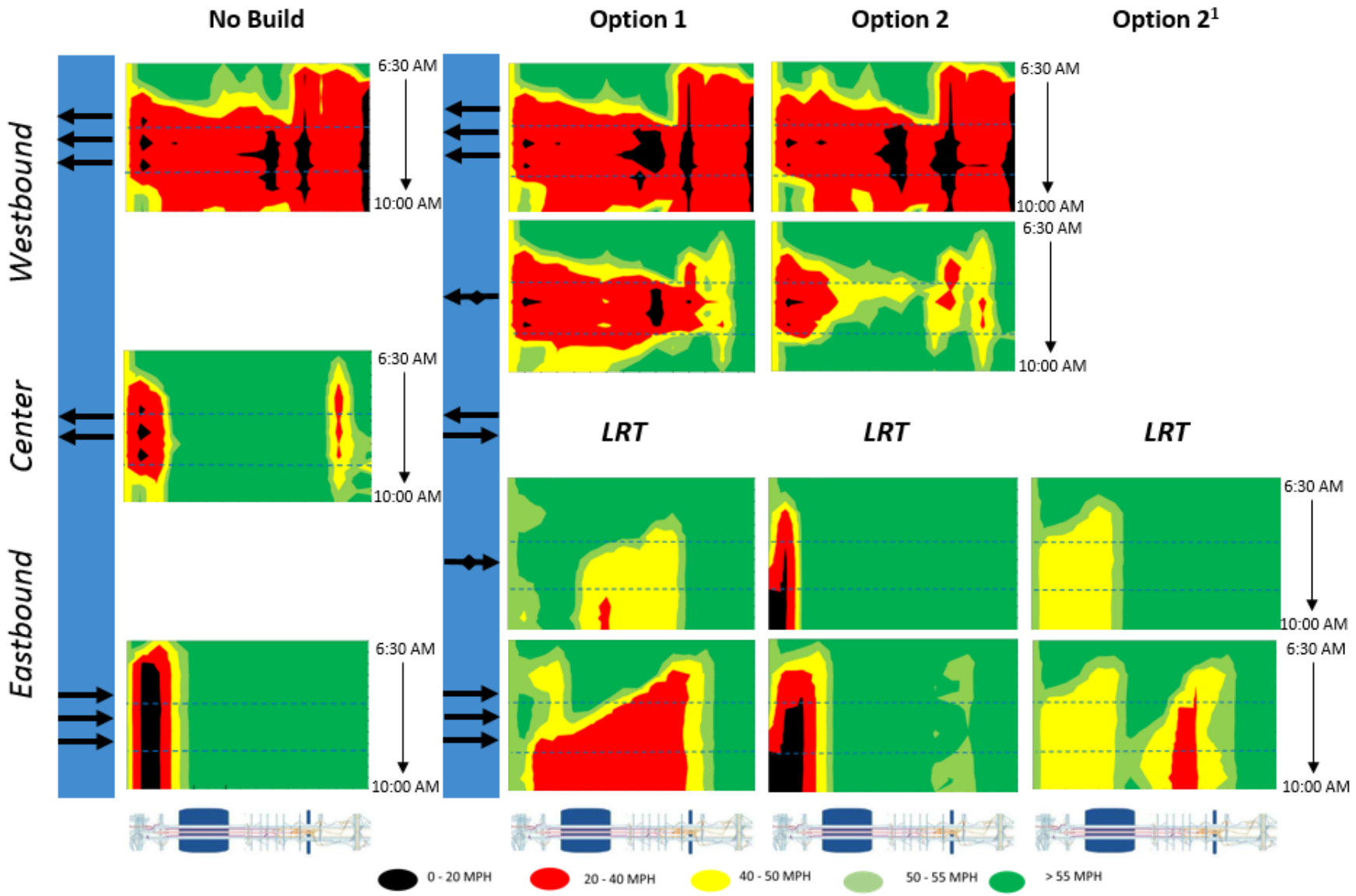


Exhibit 5-21. I-90 Year 2035 AM Peak-Period Vehicle Speeds

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

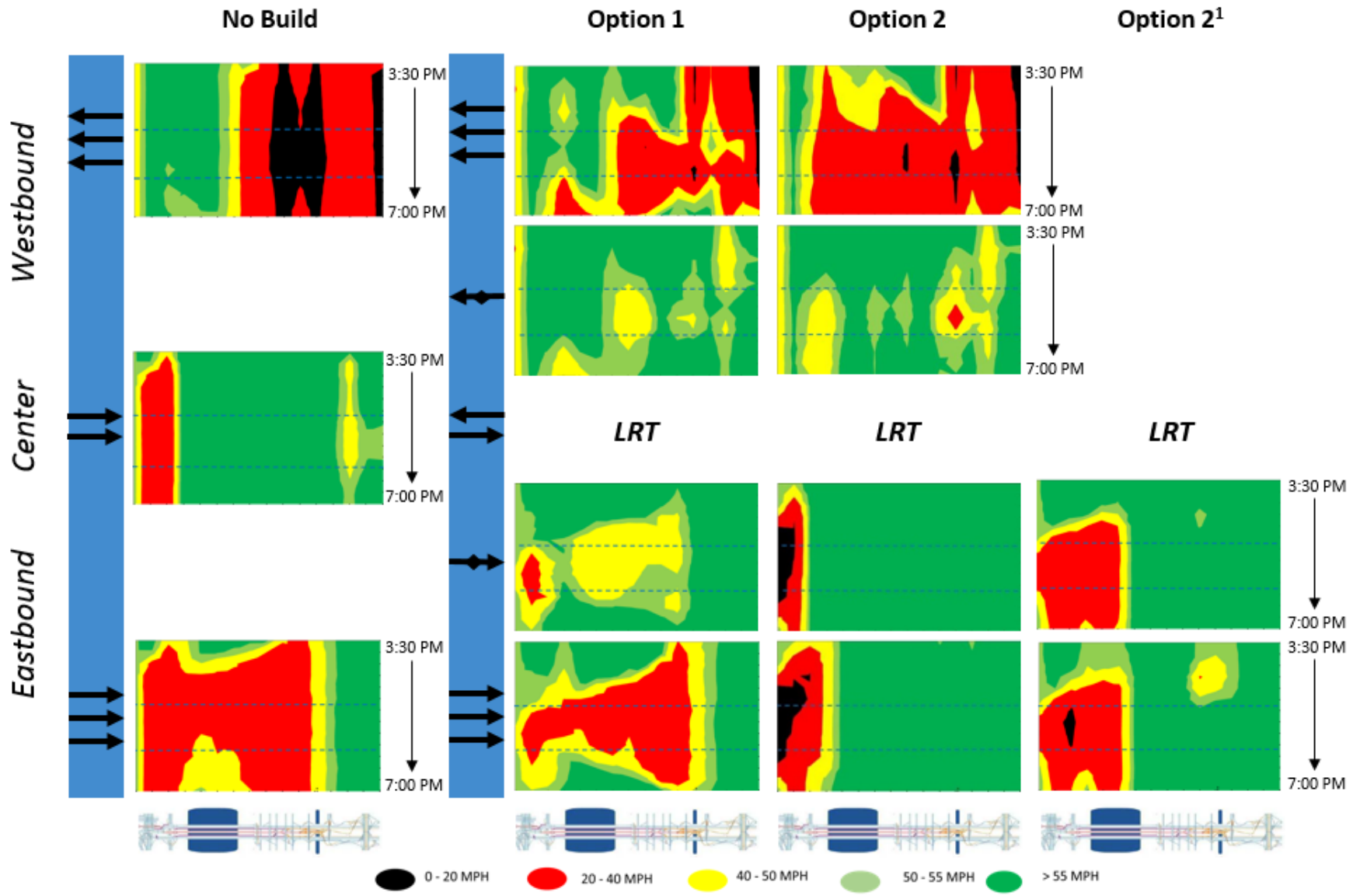


Exhibit 5-22. I-90 Year 2035 PM Peak-Period Vehicle Speeds

Note: Range of Option 2 results depends on whether WSDOT determines it is appropriate in the future to modify the eastbound HOV lane transition at the Mount Baker Tunnel in Seattle.

east of the tunnel. Although this would occur, HOV and transit travel times would be lower and person throughput would be higher in the build condition compared to the No Build condition.

WSDOT has an operational policy for managing its HOV facilities and desires vehicle operating speeds to be 45 mph or higher 90 percent of the peak period. With Option 1, the westbound HOV lane would operate at 45 mph or above for less than 60 percent of the time during the AM peak period and would not meet the WSDOT policy. The eastbound lane would meet the policy 100 percent of the time including both peak periods. With Option 2, the HOV lanes in both directions would meet the policy during both peak periods.

WSDOT would meter the Island Crest Way westbound on-ramp and consider other actions to improve the HOV lane and the Island on-ramp operations. Adding these operational actions would increase vehicle queues on the Island Crest Way westbound on-ramp and drivers may shift to use other I-90 ramps, which would affect local travel times for those drivers similar to Option 2. See Section 3.4.2 for local street operations in the future with the options.

PM Peak Period

Under the 2035 No Build condition in the PM peak period, freeway LOS would generally operate at LOS E or F conditions in both eastbound and westbound directions. Congestion in the GP lanes would noticeably decrease in the westbound reverse-peak direction with both options compared to the No Build condition as the new HOV lanes would increase capacity in the outer roadway.

In the eastbound direction, congestion would be less in duration and severity under Option 1 compared to the No Build condition because congestion would dissipate by the end of the PM peak period. In Option 2, congestion would be similar to the AM peak period and would form between I-5 and the

Mount Baker Tunnel because Mercer Island SOVs would not be allowed to use the HOV lane in the Mount Baker Tunnel north portal, increasing the demand in the GP lanes. Option 2 could have congestion diminished between I-5 and the Mount Baker Tunnel, but more congestion would form downstream east of the Mount Baker Tunnel where the new HOV lane transition point occurs. Although this would occur, congestion would be less than the No Build condition.

The I-90 HOV lanes in both directions during the PM peak period would meet the operational policy for both options during operations.

5.2.2.6 Safety

The Final EIS determined that with East Link occupying the center roadway, the total number of crashes in the I-90 corridor would be similar as traffic in the center roadway, and associated crashes, shift to the outer roadway. This crash analysis was conducted to compare vehicle crashes on I-90 between Options 1 and 2 and does not include the safety benefit of travel by light rail. The Final EIS included a safety performance measure by person, which included light rail ridership, and both Options 1 and 2 would have substantially fewer crashes by person compared to the No Build condition because riders on light rail would be traveling in a safer mode than people who currently use the center roadway. By 2035, it is likely that crashes would increase in the No Build condition over the existing crashes on I-90 facilities, as volumes increase in the future.

Table 5-12 summarizes the difference in safety performance of the I-90 mainline and each interchange between Option 1 and 2 for the 2035 build condition. Each interchange includes the ramps and ramp terminal intersections. Overall, Option 2 shows a reduction in predicted crashes per year in 2035 compared to Option 1. This is largely due to a reduction in traffic volumes with Option 2. Option 2 would have slight increases in crashes at W Mercer Way and 76th Avenue SE as more vehicles shift to use these ramps. At Island Crest Way, Option 2 would have fewer crashes than Option 1 because less vehicles would be using this ramp with Option 2. The majority of crashes (about 70 percent) for both options are expected to be property damage only. The geometry of the Island Crest Way westbound on-ramp with

the R8-A project in conjunction with higher volumes on this on-ramp with Option 1 would increase the potential for crashes at this location. Ramp metering and other operational actions previously described to address the westbound HOV lane and Island Crest Way westbound on-ramp operations would also improve safety at the Island Crest Way westbound on-ramp.

The safety analysis for construction of the new R-8A HOV lanes, including narrower lane and shoulder widths, was addressed in the Final EIS for the I-90 Two Way Transit and HOV project (2004). That analysis addressed emergency recovery maneuvers, refuge for disabled vehicles, motorist assistance activities, emergency incident response, highway maintenance activities, and traffic law enforcement. The R-8A Final EIS also acknowledged that the precedent exists for reduced lane and shoulder widths to implement HOV lanes on interstate highway facilities, noting that I-90 operated for several years in an interim condition that provided a westbound configuration with shoulder widths from 2 to 6 feet.

Table 5-12. Safety Performance Changes for 2035 Option 1 compared to Option 2

Location	2035 Option 2 Compared to Option 1 (crashes/year)
I-90 Mainline	-7
Rainier Ave. S Interchange	0
W Mercer Way Interchange	2
76th Ave. SE Interchange	1
77th Ave. SE Interchange	0
Island Crest Way Interchange	-3
80th Ave. SE Interchange	0
E Mercer Way Interchange	0
Bellevue Way Interchange	0
TOTAL	**-7**

Note: A positive number indicates an increase in predicted crashes per year for Option 2; a negative number indicates a decrease in predicted crashes per year for Option 2.

5.3 Mitigation

During East Link construction, as described in the Final EIS, Sound Transit would coordinate with WSDOT on incident management, construction staging, and traffic control where light rail construction might affect freeway traffic. Sound Transit would also coordinate with WSDOT to disseminate construction closure information to the public as needed.

Vehicle and person throughput would increase across Lake Washington in both the AM and PM peak periods compared with the No Build condition in both construction and operation conditions, and no mitigation is needed.

No mitigation related to travel time would be necessary along the I-90 mainline during East Link construction and operation because overall I-90 composite travel time for all modes to and from Mercer Island and regionally between Seattle and Bellevue would be similar or improved between the No Build condition and the options. Congestion on the I-90 mainline in either direction during the AM and PM peak periods would be similar or improved with Option 2 and the other optionscompared to the No Build condition and therefore no mitigation is needed. For Option 1, ramp metering at the Island Crest Way westbound on-ramp and other WSDOT operational actions on this ramp and/or the westbound HOV lane would improve HOV lane performance.Regarding safety, all of the options have a similar predicted number of crashes relative to total annual crashes on I-90, with Option 2 the fewest. All options would have a similar vehicle crash rate in the I-90 corridor with the addition of light rail and would have substantially fewer crashes per person as light rail riders travel in a safer mode than vehicles; no safety mitigation is required. Operational actions to address the westbound HOV lane and Island Crest Way westbound on-ramp operations would also improve safety performance at the on-ramp.