Council Meeting: 07/15/2014
Agenda: New Business
Item #: 11. b.

CITY OF KIRKLAND
Department of Public Works
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MEMORANDUM

To: Kurt Triplett, City Manager

From: David Godfrey, P.E.,Transportation Engineering Manager
Marilynne Beard, Interim Public Works Director

Date: July 3, 2014

Subject: SOUND TRANSIT LONG RANGE PLAN DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT COMMENT LETTER

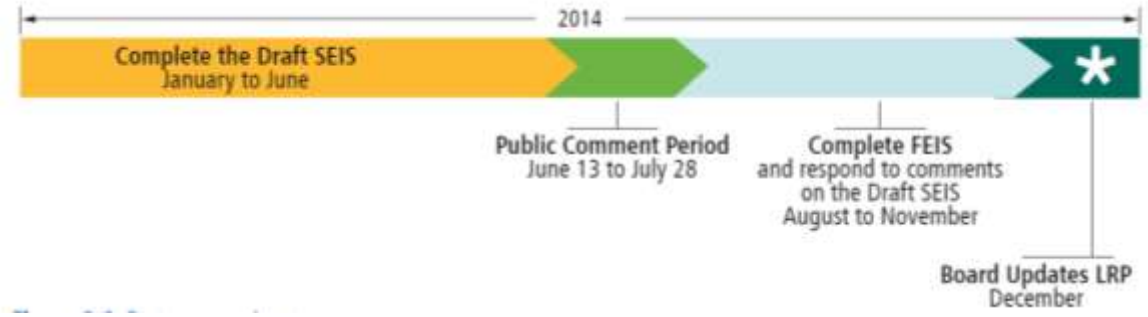
RECOMMENDATION:

It is recommended that the City Council approves the attached letter expressing the City of Kirkland's comments on the Draft Supplemental Environmental Impact Statement (EIS) for Sound Transit's Long Range Plan (LRP).

BACKGROUND DISCUSSION:

Introduction
Sound Transit staff has previously briefed Council on the process leading to the next phase of Sound Transit improvements. In summary, Sound Transit staff has been directed by the Sound Transit Board to update the agency's *Long Range Plan Document* and *Long Range Plan Map*. Once a revised Long Range Plan is adopted, the Board may choose a set of projects from that Long Range Plan to be placed in a *System Plan*. If the Board so chooses, the System Plan could go before voters and, if approved, would constitute the next phase of Sound Transit Improvements. November 2016 has been targeted by the Board as the earliest date a proposal would be put before voters. Also, authorization from the State Legislature to ask voters for additional funding is necessary.

Because elements of the System Plan can only come from the set of projects in the Long Range Plan (LRP), it is critical that the Plan contains items that Council may desire to have in the next phase of Sound Transit's system construction. Sound Transit staff has indicated that commenting on the Draft Supplemental Environmental Impact Statement is the means by which Agencies can affect the content of the LRP. Timing for the process is shown below:



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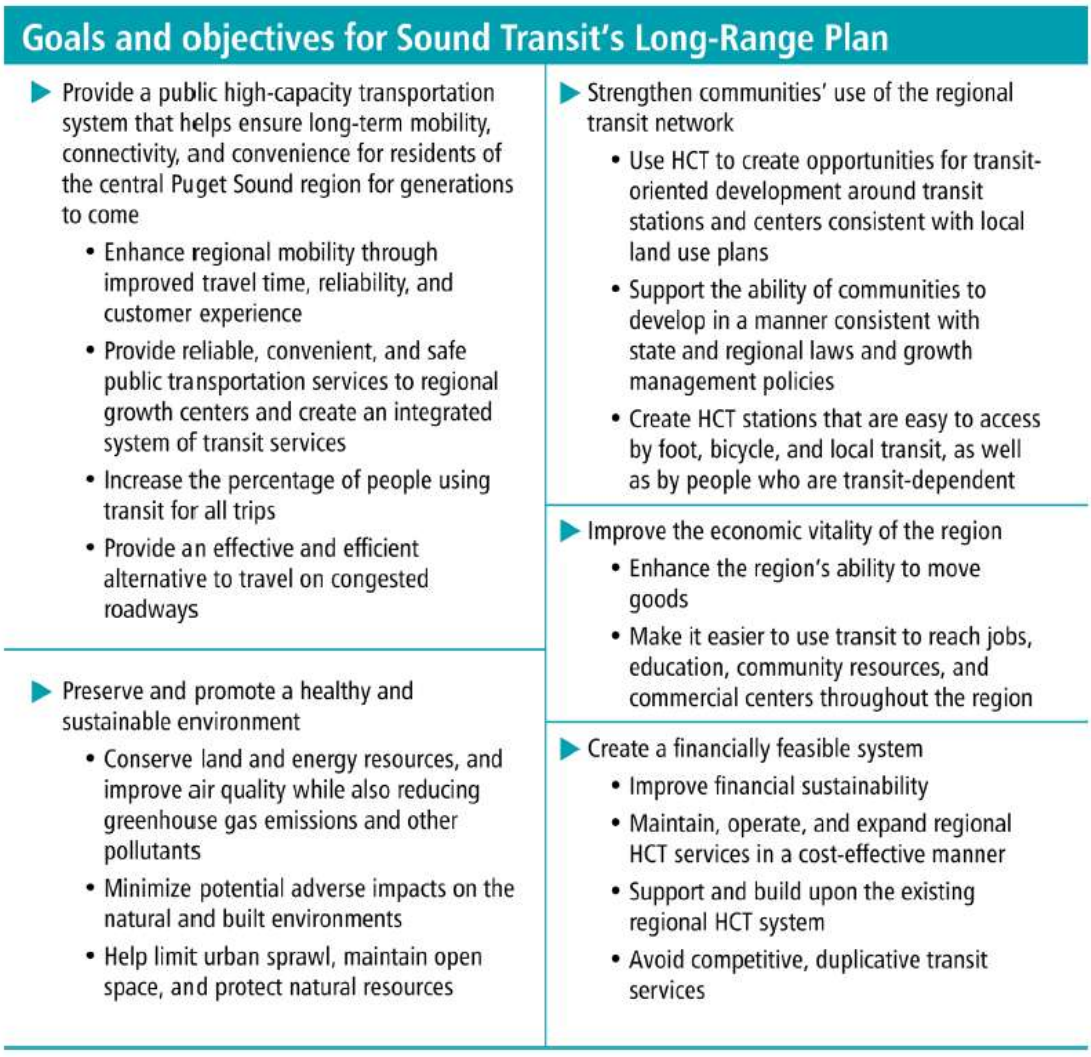
comment period on the DEIS extends through July 28. The Sound Transit Board has scheduled workshops on the LRP for July 31 and October 30. A final EIS is to be issued in November and Board adoption of the Long Range Plan is set for December 4, 2014.

Part of the process of updating the LRP is completion of an environmental review of alternatives. On June 13, a Draft Supplemental[1] Environmental Impact Statement (DSEIS) on the LRP update was released and it examines two alternatives; 1) the Existing Long Range Plan and 2) a Modified Long Range Plan. The Modified Plan includes all the elements in the Existing Plan plus other elements. The entire document is available on line and the Executive Summary is included here as Attachment 1.

Structure of the DSEIS

Chapter 1: *Purpose and Need* includes introductory material including Goals and Objectives for the LRP:



Goals and objectives for Sound Transit's Long-Range Plan

- Provide a public high-capacity transportation system that helps ensure long-term mobility, connectivity, and convenience for residents of the central Puget Sound region for generations to come
  - Enhance regional mobility through improved travel time, reliability, and customer experience
  - Provide reliable, convenient, and safe public transportation services to regional growth centers and create an integrated system of transit services
  - Increase the percentage of people using transit for all trips
  - Provide an effective and efficient alternative to travel on congested roadways
- Preserve and promote a healthy and sustainable environment
  - Conserve land and energy resources, and improve air quality while also reducing greenhouse gas emissions and other pollutants
  - Minimize potential adverse impacts on the natural and built environments
  - Help limit urban sprawl, maintain open space, and protect natural resources
- Strengthen communities' use of the regional transit network
  - Use HCT to create opportunities for transit-oriented development around transit stations and centers consistent with local land use plans
  - Support the ability of communities to develop in a manner consistent with state and regional laws and growth management policies
  - Create HCT stations that are easy to access by foot, bicycle, and local transit, as well as by people who are transit-dependent
- Improve the economic vitality of the region
  - Enhance the region's ability to move goods
  - Make it easier to use transit to reach jobs, education, community resources, and commercial centers throughout the region
- Create a financially feasible system
  - Improve financial sustainability
  - Maintain, operate, and expand regional HCT services in a cost-effective manner
  - Support and build upon the existing regional HCT system
  - Avoid competitive, duplicative transit services

Chapter 2: *Alternatives being considered*. This section describes the alternatives being considered and is explained in more detail below.

[1] It is a Supplemental review because it supplements the review done on the current Long Range Plan.

Chapter 3: *Transportation Impacts and Mitigation*. Features ridership forecasts and other transportation data for the various alternatives. Material from this chapter is also explained in more detail below.

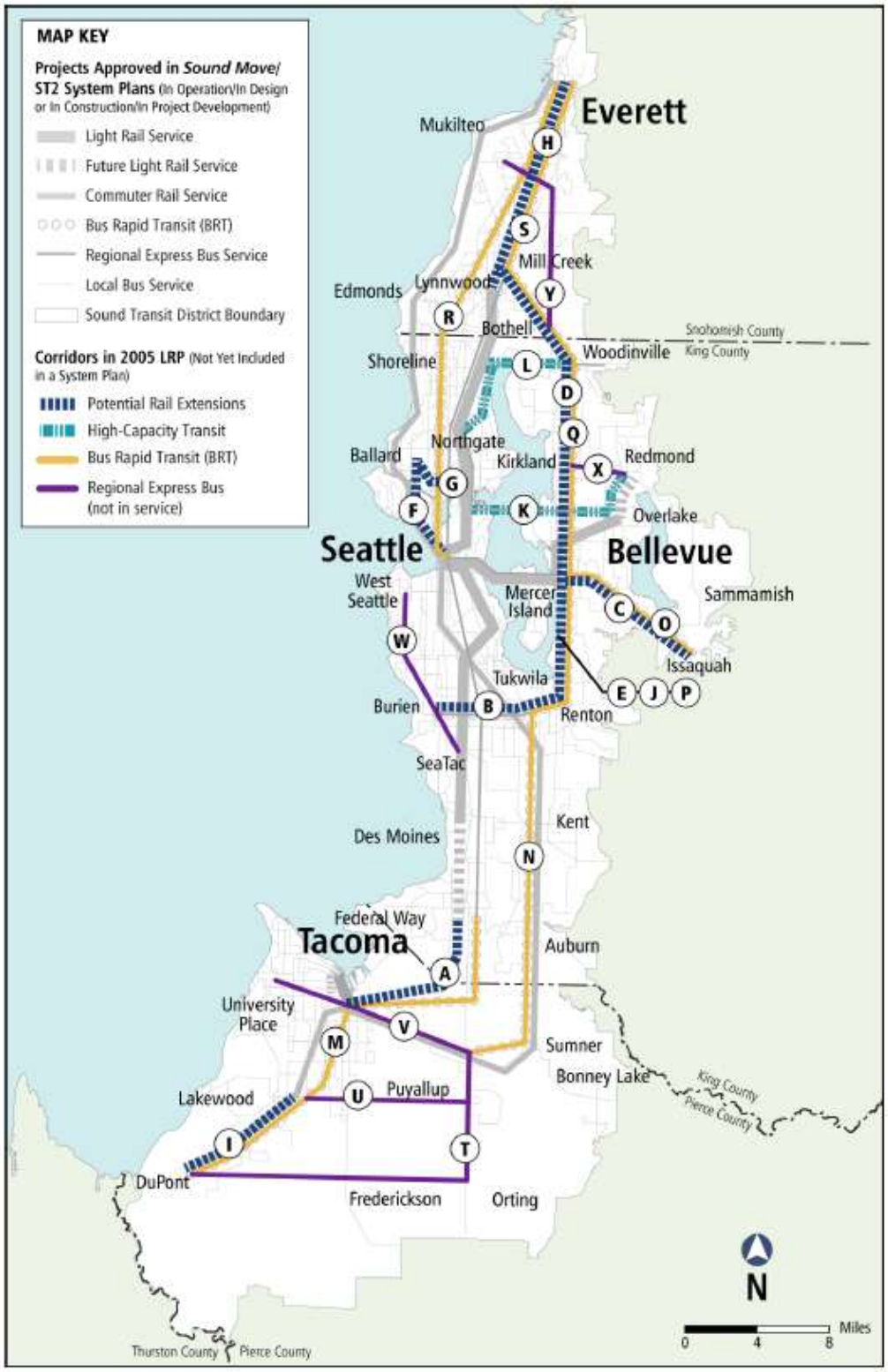
Chapter 4: *Environmental Impacts and Mitigation*. Covers the non-transportation impacts and mitigations in areas such as Air Quality, Environmental Health, Land Use, etc. A summary of this Chapter is contained in pages 17 through 27 of the Executive Summary (Attachment 1).

Alternatives being considered
Chapter 2 (Attachment 2 of this memo) of the DSEIS describes the alternatives being considered. Section 2.1 provides a discussion of the technologies considered in the LRP: Light Rail, Commuter Rail, Regional Bus/Bus Rapid Transit (BRT) and Street Car. Note that the LRP is unconstrained by funding or by time. Therefore it contains a large number of projects; projects in or near Kirkland are described in Table 1 and three maps below:

Table 1 Summary of projects in or near Kirkland

Selected projects in DSEIS		
Mode	Current Plan	Modified Plan = Current Plan plus:
Light Rail	Renton to Woodinville on ERC Map 1 (E,J,P)	North Kirkland or UW Bothell to Northgate via SR 522 Map 2 (10)
Commuter Rail		None
Bus Rapid Transit		None
Regional Bus	Redmond to Kirkland Map 1 (X)	UW Bothell to Sammamish via Redmond Map 3 (26)
		North Kirkland to Downtown Seattle Map 3 (30)
		Woodinville to Bellevue Map 3 (31)
Street Car	None	None
High Capacity Transit	UW to Redmond via SR 520 Map 1 (K)	
Other projects/details	See Appendix A (Attachment 3)	

Appendix A from the DSEIS (Attachment 3) contains a detailed list of potential project elements



Map 1 Current Plan Alternative corridors analyzed in DSEIS

Map 2. Plan Modification Alternatives (Light Rail, Commuter Rail, HCT)

Map 3. Plan Modification Alternatives (Regional Express Bus, BRT)

The Long Range Plan is limited to four modes; Light Rail (Link), Commuter Rail (Sounder) Regional Bus –either as Bus Rapid Transit or Express Bus. Section 2.6 of the DSEIS (pages 2-

31, Attachment 2) discusses technologies that are not included in the analysis of the LRP. The Table below summarizes this information.

Table 2-9. Summary of transit technologies not carried forward

High-capacity transit technology	Application	High-capacity transit capability	Reason not carried forward
Monorail	Regional	Moderate	Requires grade separation; capacity and operational limitations
SkyTrain	Regional	High	Requires grade separation
Heavy rail	Regional	High	Requires grade separation
High-speed rail/Maglev	Interregional	High	Not regional HCT service, requires grade separation
People movers/airport circulators	Local/Circulation	Low	Not regional HCT service
Gondola/aerial tram	Local/Circulation	Low to Moderate	Not regional HCT service
Personal rapid transit	Local/Circulation	Low	Not regional HCT service

Attachment 4, High-Capacity Transit Technologies Issue Paper, gives more background on why these particular technologies were not considered in the current LRP. There are several system characteristics studied in the Issue Paper that are key to judging whether or not a particular technology is included in the Long Range Plan:

Provides regional service. High Speed Rail and Maglev technologies were excluded because they are interregional in nature. On the other hand, People movers, Gondolas/aerial trams and Personal Rapid Transit were not considered because they were judged to be for local or circulation purposes.

Capacity: People movers, Gondolas/aerial trams and Personal Rapid Transit were judged to have only low to moderate capacity.

Grade Separation: Four modes were described as needing full grade separation throughout their length and therefore excluded; Monorail, SkyTrain, Heavy Rail and High-speed rail/Maglev.

Operation and Maintenance Requirements, Transfers: The Issue Paper describes concerns about higher Operation and Maintenance costs and extra facilities that could be required with different modes. Transfers between modes are also cited as reasons for not introducing new modes into the system.

Since the LRP is unconstrained in both time and cost, it seems short-sighted to exclude any mode. Given the speed of technological advancement, advanced high capacity transit modes such as maglev, aerial tram, and personal rapid transit should not be discounted and are in fact in service at various international locations. Last month, a manufacturer of Personal Rapid Transit contracted with Israel Aerospace Industries for the development of a demonstration project, to be followed by deployment of a system in Tel Aviv, Israel. This and other advanced transit concepts are particularly applicable to the Cross Kirkland Corridor, where alternative modes may be a good solution in the future.

Transportation Impacts

Chapter 3, *Transportation Impacts*, (Attachment 5) begins with a description of existing service, ridership and travel times. Changes in travel times and ridership between selected combinations of the Current and modified LRP and build out of ST2[2] are examined. All evaluations are for 2040.

Table 2 below shows travel time changes between Kirkland and selected Central Business Districts (CBDs), the data is selected from Table 3-6 on page 3-25 of Attachment 5.

Table 2 Changes in AM Peak Travel Time between Kirkland and various CBDs

Comparison	Location				
	Seattle	Bellevue	Kent	Everett[3]	Tacoma
Current LRP vs Sound Transit 2	0%	0%	-30%	-20%	-10%
LRP Alternative vs Current LRP	0%	0%	-7%	+16%	0%

The table below shows changes in ridership taken as a whole between various alternatives.

Table 3-7. Transit ridership estimates in 2040—Snohomish, King, and Pierce Counties

	2040 ST2	2040 Current Plan Alternative	2040 Potential Plan Modifications Alternative
Annual total transit boardings (in millions)	330-370	330–460	340–520
Annual light rail boardings (in millions)	100-110	120–190	180–280
Annual bus[1] boardings (in millions)	200-230	170–250	120–180
Annual commuter rail boardings (in millions)	10-20	10–20	10–20
Annual streetcar boardings (in millions)	<10	<10	30-40
Annual service hours (in millions)	5.7	6.1	6.9

[1] Bus mode includes local buses, regional express buses, and bus rapid transit operated by all transit systems.

Screenlines

Ridership changes are also measured across screenlines. A screenline volume is an indication of the sum of a transit ridership on routes that pass across the particular screenline. Screenlines are a standard way of evaluating transportation volume or demand. Map 4 is an example of a screenline analysis of ridership differences between the Adopted Long Range Plan and the Plan Alternative.

[2] ST2 is the set of projects that Sound Transit is currently implementing and contains, for example, East Link light rail from Seattle to Overlake.

[3] The increases in transit travel times affecting the Everett CBD would occur if an alternative light rail alignment between Lynnwood and Everett that serves the Southwest Everett Industrial Area is substituted of the Lynnwood to Everett light rail alignment in the Current Plan Alternative.

Figure 3-8. Daily transit ridership changes at selected screenlines—Potential Plan Modifications Alternative vs. Current Plan Alternative

Map 4. Screenline Map

Table 3 summarizes differences in ridership for screenlines close to Kirkland. The locations of the screenlines can be seen on Map 4 above.

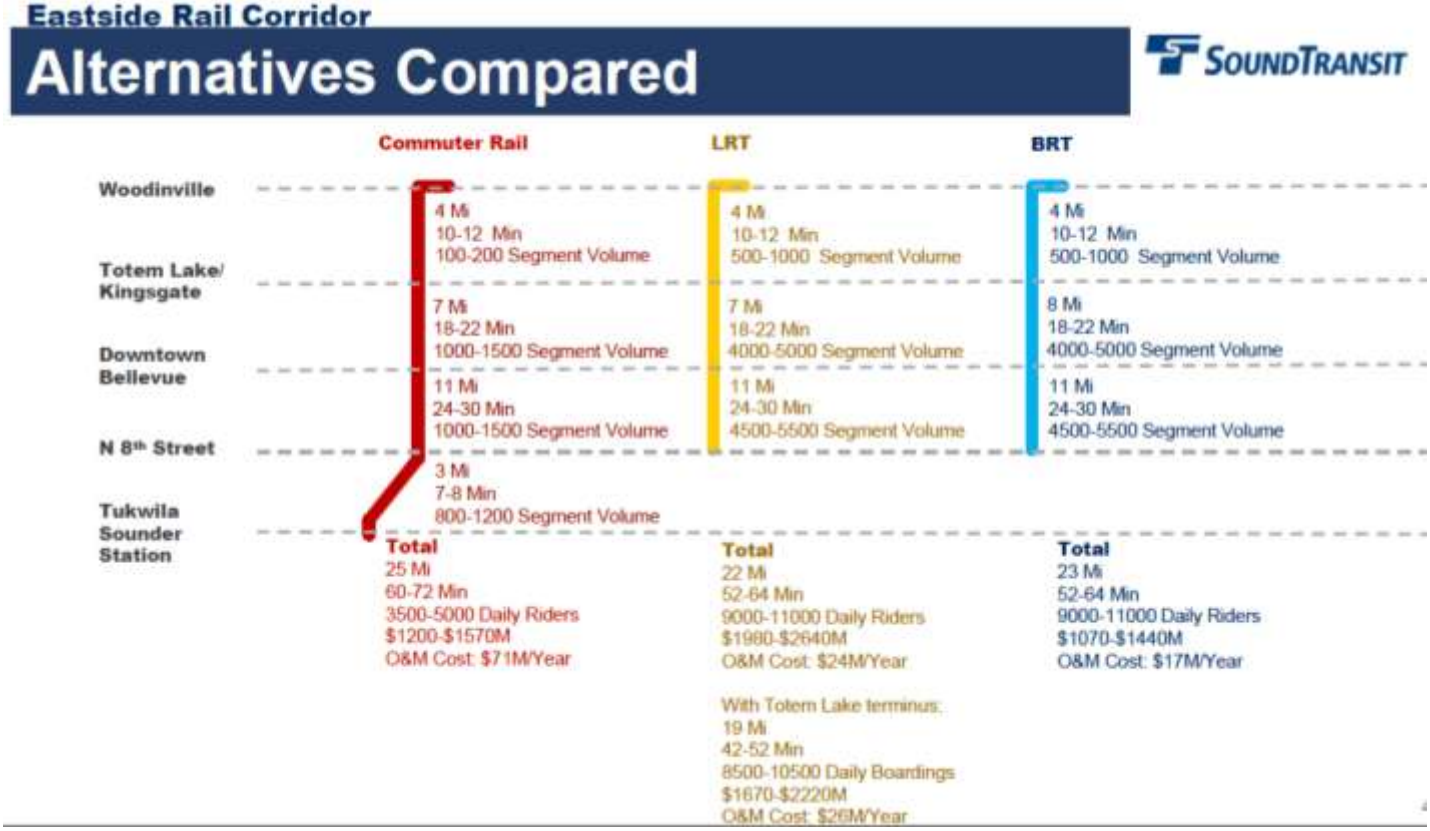
Table 3 Differences in Daily transit ridership across selected screenlines for various scenarios

Scenario	Screenline			
	8: Cross Lake	9: West of 148th Avenue NE	10: North of Totem Lake	21: North of Bellevue
Current LRP and ST2	3,000 or less	3,000 or less	5,000	3,000 or less
Alternative LRP and Current LRP	No difference	No difference	5,000	3,000 or less

The changes in volumes are attributable to the increased facilities across the screenline in the Alternative Long Range Plan. Note that changes in volume of 3000 riders or less is beyond the resolution of the model. Where there are no new routes, no difference is noted.

Corridor Studies

Sound Transit analyzed several different future transit lines to provide additional information for the Long Range Plan and to potentially help inform decisions about a future System Plan. Of particular interest are the studies done for the Eastside Rail Corridor and I-405 Bus Rapid Transit. Attachment 6 shows a presentation on the studies and the figure below shows a comparison of Rail corridor alternatives. Note that there is relatively small ridership north of Totem Lake and that BRT and LRT have similar ridership levels but the cost of BRT is much lower. Commuter Rail is the alternative with the lowest ridership.



Bus Rapid Transit alternatives on I-405 are summarized below. Note that Ridership is slightly higher for the I-405 alternatives compared to the ERC alternatives. The full build-out of the Master Plan includes all the projects that would benefit BRT operations. The phased build-out includes only the projects that are currently funded. The intent is to book-end the options. Sound Transit could consider funding some projects to implement them sooner. More information on the trunk and branch operation is shown on page 9 of Attachment 6.

Comment Letter

Attachment 7 is a draft letter to Sound Transit indicating the City's comments on the DSEIS. The first portion of the letter indicates our interest in connecting Totem Lake and Downtown with High Capacity Transit and requests a wide range of options. Comments are included that request BRT in I-405 to include the ability to serve the Totem Lake Urban Center fully rather than just at, for example, NE 128th Street, as well as provide a connection to Downtown. These comments may be a bit premature for the Long Range Plan, but they could be helpful to future discussions.

The next part of the letter indicates disappointment with the exclusion of certain modes from the LRP, this concern is general, but of special interest on the Cross Kirkland Corridor/Eastside Rail Corridor. The letter explains why these modes are entirely consistent with the Goals and Objectives of the LRP, and asks that they be reinstated and evaluated as part of the DSEIS.

Finally there is a request for assurance that the LRP will include provisions for a range of Bus and Street car technology.

Other points Council may wish to add include the notion that since it looks as though Sound Transit will not be developing transit on the ERC soon, we request a great deal of flexibility to develop the CKC. Another point for consideration is requesting terms that would govern Kirkland's support of future funding authorization.

Attachment 1: Executive Summary
Attachment 2: Chapter 2
Attachment 3: Appendix A
Attachment 4: HCT Technologies Issue Paper
Attachment 5: Chapter 3
Attachment 6: Corridor Study
Attachment 7: Draft Comments Letter

EXECUTIVE SUMMARY

INTRODUCTION

Sound Transit is updating its Regional Transit Long-Range Plan, which outlines the agency's vision for a high-capacity transit (HCT) system serving the urban areas of Snohomish, King, and Pierce Counties. The plan includes corridors for light rail, commuter rail, and regional express bus/bus rapid transit. The plan focuses on the functional elements of the system—how HCT and supporting services will continue to help meet the transportation needs created by future population and employment growth in the region. Sound Transit is in the process of completing the second phase of its investments, known as Sound Transit 2 (ST2), consistent with the current 2005 Long-Range Plan. An updated Long-Range Plan will look further ahead by addressing regional transit needs that remain after the ST2 system plan is fully implemented.

As required by the Washington State Environmental Policy Act, this Draft Supplemental Environmental Impact Statement (SEIS) supports Sound Transit's current planning and decision-making efforts for an updated Long-Range Plan and future transit system plan. This Draft SEIS presents a plan-level environmental review of two Long-Range Plan Update alternatives, the Current Plan Alternative (the No Action Alternative) and the Potential Plan Modifications Alternative (the Action Alternative). Each alternative considers broad actions throughout the region—transit modes, corridors, types of supporting facilities, programs, and policies. Upon completion of the environmental review process, the Sound Transit Board will decide whether to revise the Long-Range Plan.

History and Background of the Regional Transit Long-Range Plan

In 1996, Sound Transit developed and adopted its first *Regional Transit Long-Range Vision*, which later evolved into the agency's Long-Range Plan. At the same time, Sound Transit adopted *The Ten-Year Regional Transit System Plan*, which became known as *Sound Move*. *Sound Move* was the first phase of investments for implementing the Long-Range Vision. The current Long-Range Plan was adopted in 2005 as an update to the original Long-Range Vision. The second phase of investments, the ST2 System Plan, was subsequently adopted in 2008 and is in the process of being implemented.

Sound Transit's Long-Range Plan is a fiscally unconstrained plan that includes services and facilities to connect the region's growth centers with high-capacity transit. The regional transit system currently includes light rail, commuter rail, bus rapid transit (BRT), and regional express bus services and facilities. It also includes programs and policies that support these services. Sound Transit's services are integrated with local transit service, providing a "coordinated system of services" to make it easy to move around the region. The envisioned network of transit services described in the Long-Range Plan is at a corridor-wide level; specific routes or alignments are not defined. The Long-Range Plan has been implemented in phases through voter-approved funding programs, first through *Sound Move* and then ST2, which were both fiscally constrained. That is, they were limited by the funds projected to be available.

The purpose of the Long-Range Plan Update is to define a regional HCT system that could effectively and sustainably serve the mobility needs of the central Puget Sound region through 2040 and beyond.

Environmental Review Process

This Draft SEIS is part of a phased environmental review process. It supplements and builds on the *Regional Transit System Plan Final EIS* of 1993 (JRPC 1993) and the *Final Supplemental Environmental Impact Statement on the Regional Transit Long-Range Plan* of 2005 (Sound Transit 2005), which were prepared to support Sound Transit's previous long-range planning efforts. This SEIS process precedes any future project-level environmental review for individual projects. They may be implemented under future funding programs once ST2 is completed.

This Draft SEIS evaluates the potential transportation and environmental effects of implementing the Current Plan Alternative and the Potential Plan Modifications Alternative using a 2040 planning horizon. Corridors in the Potential Plan Modifications Alternative could be selected in whole, or in part, by the Board when updating the plan.

Along with other information developed through the update process (e.g., the high-capacity transit corridor studies—see page 12), this SEIS will support the decisions of the Sound Transit Board to:

- Ensure that the Long-Range Plan continues to meet Sound Transit's goals
- Make revisions to update the Long-Range Plan

Purpose and Need

Purpose

The purpose of the Long-Range Plan Update is to define a regional HCT system that could effectively and sustainably serve the mobility needs of the central Puget Sound region through 2040 and beyond, providing an alternative to travel by automobile and the congested freeway network. The Long-Range Plan Update will consider the projected regional population, employment, and transportation growth. This will be done in coordination with, and with the support of, the growth management strategies established in regional land use, transportation, and economic development plans.

Need

An update to Sound Transit's Long-Range Plan is needed to achieve the following:

- **Make it consistent with updated local and regional plans**
  Sound Transit's Long-Range Plan is a part of the larger regional transportation picture and feeds into *Transportation 2040*, the Puget Sound Region's Transportation Plan. Since the 2005 Long-Range Plan was adopted, *Transportation 2040*, *Vision 2040,* and other local plans have been updated by the Puget Sound Regional Council, the region's federally

recognized metropolitan planning organization. County and city comprehensive plans throughout the region reinforce the need for HCT investments to support new and continued population and employment growth, as well as to provide for vibrant urban communities that offer alternatives to travel via the automobile. Sound Transit's Long-Range Plan Update will help support these plans.

- **Incorporate current population and employment forecasts**
  From a base of more than 2.8 million today, the region's population is expected to grow by over 30 percent to more than 3.7 million in 2040. During the same period, employment is expected to grow even faster, from approximately 1.5 million jobs to over 2.5 million, an increase of 62 percent. The projected increases in population and jobs in the Plan area will result in more congestion. The Long-Range Plan update will address appropriate HCT service to support the anticipated growth.

- **Identify potential modifications to the plan that could serve as a basis for the next phase of HCT improvements to continue to address long-term mobility needs**
  It has been almost 10 years since the Long-Range Plan was last updated. During that time, several Sound Transit projects have been in varying stages of planning, design, and construction. Sound Transit's system ridership has grown almost 155 percent and is expected to continue to increase. An update to the Long-Range Plan may identify potential new or modified HCT corridors and services. It may also clarify modal choices and services for HCT corridors in the current plan.

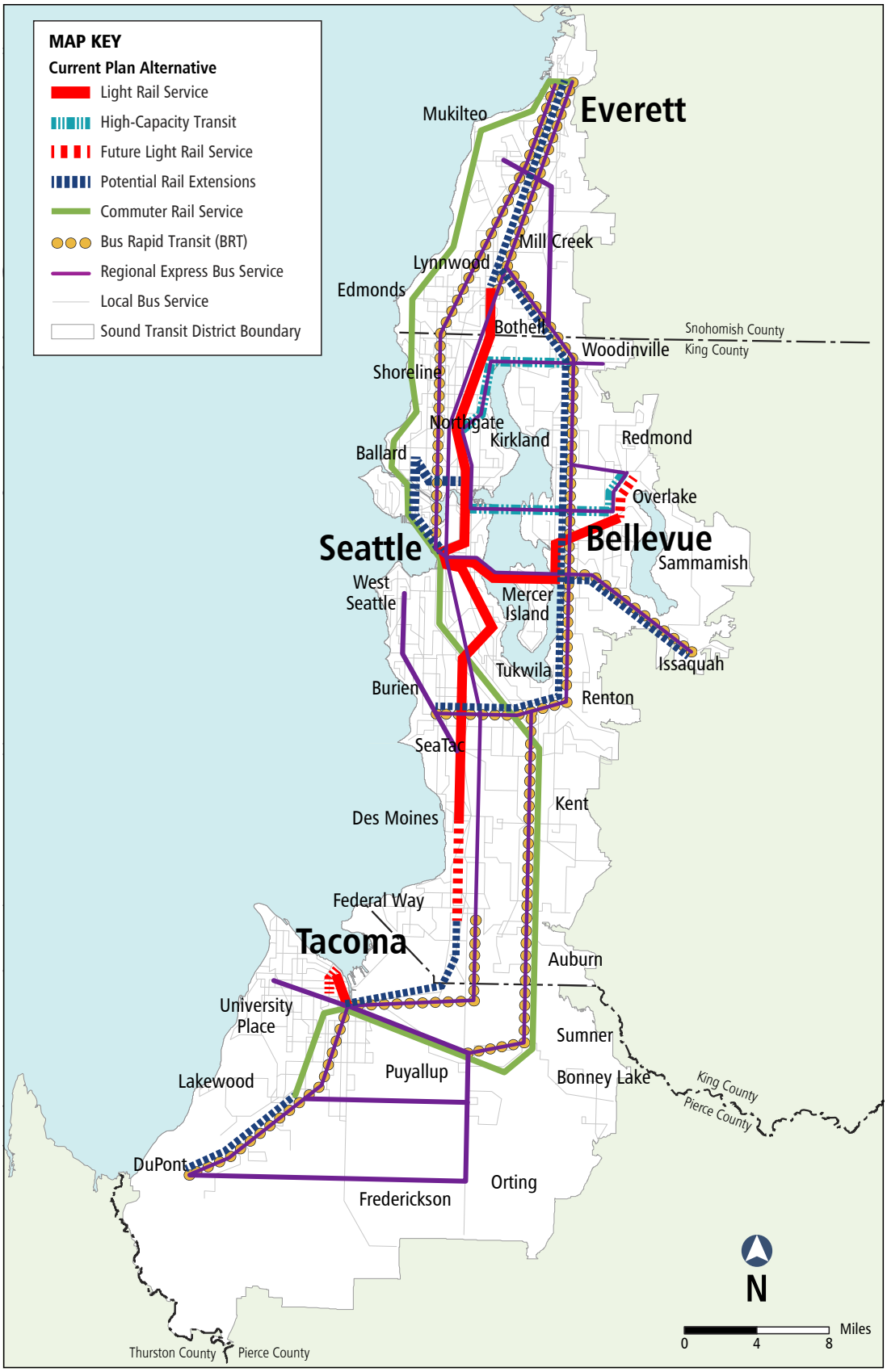
Goals

The goals of the current Long-Range Plan were refined for the Long-Range Plan Update and include the following:

- Provide a public high-capacity transportation system that helps ensure long-term mobility, connectivity, and convenience for residents of the central Puget Sound region for generations to come
- Strengthen communities' use of the regional transit network
- Create a financially feasible system
- Improve the economic vitality of the region
- Preserve and promote a healthy and sustainable environment

Alternatives Considered in the SEIS

Two alternatives have been developed for evaluation in this Draft SEIS: the Current Plan Alternative (the No Action Alternative) and the Potential Plan Modifications Alternative (the Action Alternative). These alternatives include a wide range of high-capacity corridors and modes for purposes of updating the fiscally unconstrained Long-Range Plan.



Source: Sound Transit 2014

Figure S-1 Current Plan Alternative

Development of alternatives

Three primary HCT transit technologies and supporting services were studied in this Draft SEIS—light rail, commuter rail, and regional express bus/BRT. In addition, the Draft SEIS also looked at streetcar services. Each of these modes is further defined in Chapter 2 of the Draft SEIS.

Sound Transit conducted a scoping process for the Long-Range Plan Update SEIS in fall 2013. The more than 5,000 comments received helped Sound Transit determine which alternatives and environmental issues would be studied in the Draft SEIS. The *Scoping Summary Report* for the 2014 Long-Range Plan Update presents more detailed information about the comments received.

Many suggestions made during scoping were related to corridors and specific services or facilities within HCT corridors already in the Current Plan Alternative. These corridors and "representative projects" (see page S-8) were presumed to be developable under the Current Plan Alternative. Suggestions for new transit corridors were put through a screening process in order to develop the Potential Plan Modifications Alternative. The screening criteria used during this process were based on the purpose and need for the Long-Range Plan Update and the goals and objectives described in Chapter 1 of the Draft SEIS.

Current Plan Alternative (No Action Alternative)

The No Action Alternative, referred to in the Draft SEIS as the *Current Plan Alternative*, consists of the current 2005 Long-Range Plan plus the Sound Transit Board actions taken as part of the development and implementation of the ST2 program. Key Board decisions that affected corridors in the Long-Range Plan are listed in Chapter 2 of the Draft SEIS.

Figure S-1 shows the general corridors that would be served as part of the Current Plan Alternative. For purposes of analyzing potential impacts on the transportation system and on transit ridership, all of the corridors shown in Figure S-1 were included as part of the Current Plan Alternative. When analyzing potential environmental impacts for this alternative, the Draft SEIS focuses primarily (but not exclusively) on those corridor sections that do not yet have service in operation, are not yet under construction, or have otherwise not begun project-level environmental reviews. Those corridors are shown in Figure 2.

On Figure S-2, the light rail, commuter rail, and bus corridors in operation, under construction, or in project-level environmental review are screened back because they have already been, or are currently, subject to project-level environmental review.

Light rail

Some corridors previously designated in the 1996 and 2005 Long-Range Plans as potential rail extensions were subsequently funded through *Sound Move* and ST2. Light rail elements of the Current Plan Alternative that were funded through *Sound Move* and ST2 and are in operation, under construction, or in project-level environmental review include the following:

- Central Link from Sea-Tac Airport to Downtown Seattle
- S. 200th Link Extension from Sea-Tac Airport south to S. 200th Street
- University Link Extension from Downtown Seattle to the University of Washington
- Northgate Link Extension from Husky Stadium to Northgate
- Lynnwood Link Extension from Northgate to Lynnwood
- East Link light rail from Seattle to Downtown Redmond
- Federal Way Link Extension from South 200th Street to the Federal Way Transit Center
- Tacoma Link light rail from Tacoma Station to Downtown Tacoma and an extension to the west
- Operations and maintenance facilities in Seattle and Tacoma and a satellite facility in either Lynnwood or Bellevue

Some of the remaining corridors in the Current Plan Alternative were identified as "Potential Rail Extensions" in the 2005 Long-Range Plan but have not yet been included in a system plan for project development or construction. Therefore, decisions on mode in those corridors have not yet been made but could be light rail. For purposes of analyzing potential impacts associated with the Current Plan Alternative, corridors A through H reflect potential rail extensions that were analyzed as light rail corridors (see the Current Plan Alternative list on page S-6 and Figure S-2). Some of these corridors were also evaluated for commuter rail and/or BRT (see the "Commuter Rail" and "Regional Express Bus/BRT" sections below).

Light rail corridors would have similar service characteristics as the Link light rail system implemented as

part of *Sound Move* and ST2 and would operate primarily on exclusive rights-of-way or on surface streets with protected rights-of-way.

Commuter rail

Sound Transit currently operates Sounder commuter rail service from Everett to Lakewood.

Some of the corridors in the Current Plan Alternative identified as "Potential Rail Extensions" in the 2005 Long-Range Plan have not yet been included in a system plan for construction (or the project development phase). These corridors, I and J, are shown in Figure S-2 and the Current Plan Alternative list on this page. Since they could be implemented as commuter rail, they were evaluated as such for purposes of analyzing potential impacts associated with the Current Plan Alternative.

Regional express bus/bus rapid transit

Numerous corridors are identified for regional express bus, BRT, or—in most cases—both under the Current Plan Alternative. Sound Transit currently operates 26 regional express bus (ST Express) routes, many of which operate in high-occupancy vehicle (HOV) lanes.

For purposes of analyzing potential environmental impacts for the Current Plan Alternative, this Draft SEIS focuses on the regional express bus and BRT corridors not yet implemented and includes corridors M through Y.

For BRT corridors M through S, ST Express bus service currently operates in all of these corridors except corridor P, which is the Eastside Rail Corridor east of Seattle. Each of these corridors is also shown as a BRT corridor in the 2005 Long-Range Plan and therefore could also be considered for higher performing BRT operating within exclusive rights-of-way where feasible.

Corridors T through Y of the Current Plan Alternative are identified exclusively for regional express bus service (no BRT) in the 2005 Long-Range Plan but are not yet in service.

High-capacity transit

The Current Plan Alternative includes two corridors identified in the 2005 Long-Range Plan as "HCT" without specifying a particular mode. These corridors could be implemented as light rail or as BRT. For purposes of analyzing potential impacts associated with the Current Plan Alternative, this Draft SEIS evaluates

Current Plan Alternative

LIGHT RAIL

Potential light rail corridors in the Current Plan Alternative. Potential rail extensions, assumed light rail.

- A Tacoma to Federal Way
- B Burien to Renton
- C Bellevue to Issaquah along I-90[1]
- D Renton to Lynnwood along I-405
- E Renton to Woodinville along Eastside Rail Corridor
- F Downtown Seattle to Ballard[1]
- G Ballard to University of Washington[1]
- H Lynnwood to Everett

COMMUTER RAIL

Potential commuter rail corridor in the Current Plan Alternative. Potential rail extension, assumed commuter rail.

- I DuPont to Lakewood
- J Renton to Woodinville along Eastside Rail Corridor

REGIONAL EXPRESS BUS/BUS RAPID TRANSIT

Bus rapid transit (BRT)

- M Federal Way to DuPont along I-5
- N Renton to Puyallup along SR 167
- O Bellevue to Issaquah along I-90
- P Renton to Woodinville along Eastside Rail Corridor
- Q Renton to Lynnwood along I-405
- R Seattle to Everett along SR 99
- S Lynnwood to Everett along I-5

Regional express bus

- T Puyallup to DuPont via Cross Base Highway
- U Puyallup to Lakewood
- V Puyallup to Tacoma
- W SeaTac to West Seattle
- X Redmond to Kirkland
- Y North Bothell to Mill Creek to Mukilteo

HCT (mode not specified)

- K University of Washington to Redmond via SR 520[1]
- L Northgate to Bothell on SR 522

[1] Portions of these corridors could be constructed in tunnels.

Source: Sound Transit 2014

Figure S-2 Current Plan Alternative—corridors analyzed in this Draft SEIS

these two HCT corridors shown on the Current Plan Alternative list on page S-6 and Figure S-2, as both light rail and BRT.

Similar to the current Sound Transit system operating today, regional express bus/BRT service could be implemented as an interim HCT mode for all or portions of potential light rail corridors until funding becomes available.

Representative projects, programs, and policies

Stations, park and rides, operations and maintenance facilities, access improvements, and other supporting transit facilities may be implemented along any of the Current Plan Alternative corridors, whether or not they have been implemented as part of *Sound Move* or ST2. This includes new track infill stations or other infrastructure that may be needed along routes already in service. The 2005 SEIS referred to these as "representative projects" since they represent the types of projects that could be built along any existing or future corridor. Building from the list in the 2005 Long-Range Plan SEIS, an updated list of representative projects for the Current Plan Alternative can be found in Appendix A of the Draft SEIS. These types of projects and their potential environmental impacts are broadly discussed in the Draft SEIS.

The types of representative projects are as follows, listed below by mode:

- **Light rail**—Service expansion, transit stations and park-and-and ride facilities, pedestrian and bicycle access and safety, and operations and maintenance facilities
- **Commuter rail**—Service expansion, new track, transit stations and park-and-ride facilities, pedestrian and bicycle access and safety, and operations and maintenance facilities
- **Regional express bus/bus rapid transit**—Service expansion or revised bus routes, transit stations and park-and-and ride facilities, HOV direct access, transit priority improvements, rider amenities, grade or barrier separation, and operations and maintenance facilities

The following programs and policies have been adopted by the Sound Transit Board and would continue to remain in effect as part of the Current Plan Alternative:

- Transit-Oriented Development Policy (December 2012)
- Sustainability Initiative (June 2007)
- System Access Policy (March 2013)
- Updated Bicycle Policy (April 2009)
- Environmental Policy (April 2004)

Potential Plan Modifications Alternative (Action Alternative)

The Potential Plan Modifications Alternative assumes implementation of all the elements of the Current Plan and adds HCT corridors and services that are potential modifications to the Current Plan. These corridors, shown in Figures S-3 and S-4, represent a menu of options that the Sound Transit Board could choose from when updating the Long-Range Plan.

Light rail

New light rail corridors considered under the Potential Plan Modifications Alternative would have the same characteristics as light rail corridors under the Current Plan Alternative.

Commuter rail

The additional commuter rail segments would have similar physical and operating characteristics to the existing Sounder line. There are existing rail lines along Corridors 16 and 18, while there are none along Corridor 17.

Regional express bus/bus rapid transit

The Potential Plan Modifications Alternative includes many new regional express and/or BRT corridors.

High-capacity transit corridors

Some suggestions for new HCT corridors or service did not specify a mode and are numbered as corridors 19, 20, and 21 on Figure S-3.

Similar to HCT corridors in the Current Plan Alternative, these new HCT corridors were evaluated as both BRT and light rail corridors.

Potential Plan Modifications Alternative

LIGHT RAIL

1 Downtown Seattle to Magnolia/Ballard to Shoreline Community College
2 Downtown Seattle to West Seattle/Burien
3 Ballard to Everett Station via Aurora Village, Lynnwood
4 Everett to North Everett
5 Lakewood to Spanaway to Frederickson to South Hill to Puyallup
6 DuPont to Downtown Tacoma via Lakewood, Steilacoom, and Ruston
7 Puyallup/Sumner to Renton via SR 167
8 Downtown Seattle along Madison Street or to Madrona
9 Tukwila to SODO via Duwamish industrial area
10 North Kirkland or University of Washington Bothell to Northgate via SR 522
11 Ballard to Bothell via Northgate
12 Mill Creek, connecting to Eastside Rail Corridor
13 Tacoma to Ruston Ferry Terminal
14 Tacoma to Parkland via SR 7
15 Lynnwood to Everett, serving Southwest Everett Industrial Center (Paine Field and Boeing)

COMMUTER RAIL

16 Puyallup/Sumner to Orting
17 Lakewood to Parkland
18 Tacoma to Frederickson

REGIONAL EXPRESS BUS/BUS RAPID TRANSIT

Bus rapid transit (BRT)

22 Puyallup vicinity, notably along Meridian Avenue
23 Madison Street in Seattle

Regional express bus

24 Issaquah to Overlake via Sammamish and Redmond
25 Renton to Downtown Seattle
26 UW Bothell to Sammamish via Redmond
27 Titlow Beach to Downtown Tacoma
28 Renton (Fairwood) to Eastgate via Factoria
29 145th Street from I-5 to SR 522
30 North Kirkland to Downtown Seattle
31 Woodinville to Bellevue
32 Woodinville to Everett
33 Connection to Joint Base Lewis-McChord

Regional express bus/BRT (mode not specified)

34 Tacoma to Bellevue
35 Kent to Sea-Tac Airport
36 Puyallup to Rainier Valley

HCT (mode not specified)

19 Tukwila Sounder Station to Downtown Seattle via Sea-Tac Airport, Burien, and West Seattle
20 Downtown Seattle to Edmonds via Ballard, Shoreline Community College
21 West Seattle to Ballard via Central District, Queen Anne

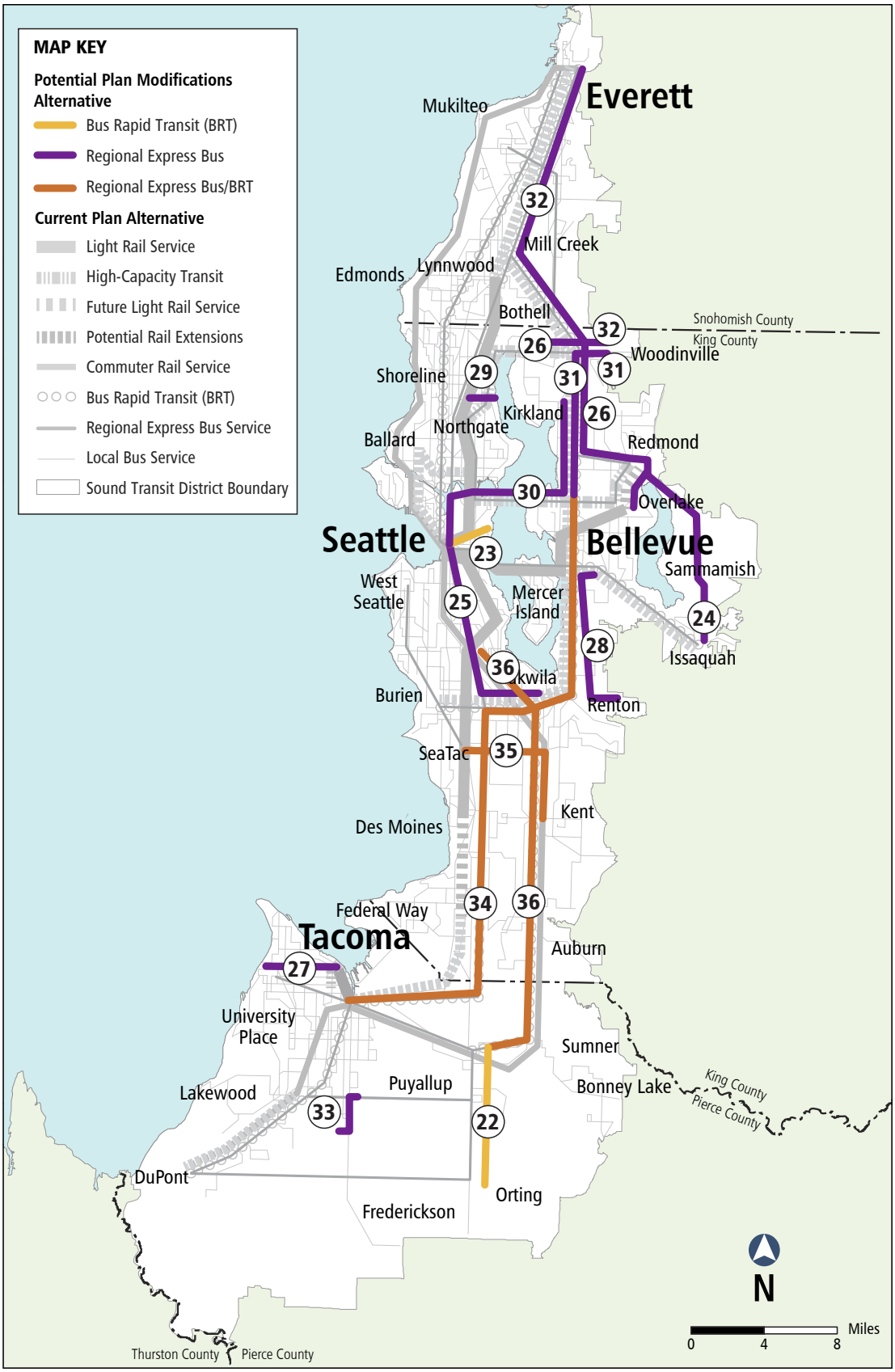
STREETCAR

Streetcar corridors were identified in the Potential Plan Modifications Alternative, typically as options to connect areas to regional transit hubs.

[1] A potential new tunnel under Downtown Seattle could also or alternatively support a Ballard-to-Seattle light rail line, which is included in the Current Plan Alternative.

Source: Sound Transit 2014

Figure S-3 Potential Plan Modifications Alternative—light rail, commuter rail, and high-capacity transit



Source: Sound Transit 2014

Figure S-4 Potential Plan Modifications Alternative—regional express bus and bus rapid transit

Streetcar

Streetcar services were identified in the Potential Plan Modifications Alternative, typically as options to connect areas to regional transit hubs.

Representative projects, programs, and policies

The types of representative projects or support facilities described by mode for the Current Plan Alternative could similarly be implemented along any of the Potential Plan Modifications Alternative corridors. A list of representative projects for the Potential Plan Modifications Alternative can be found in Appendix A of the Draft SEIS.

The Potential Plan Modifications Alternative could include new programs and policies or it could build upon existing programs and policies. For example, it could include new initiatives related to:

- System access
- Demand management
- Research and technology

Key Transportation Impacts

Impacts of plan alternatives on total transit ridership

This section describes the impacts on total transit ridership of two scenarios: 1) the Current Plan Alternative as compared to the Sound Transit system implemented through completion of ST2, and 2) the Potential Plan

High-capacity transit corridor studies

ST2 directed Sound Transit to conduct the following high-capacity transit corridor studies:

- Ballard to Downtown Seattle HCT Corridor Study
- Central to East HCT Corridor Study
  - Ballard to University District
  - Redmond to Kirkland to University District
  - Kirkland-to Bellevue to Issaquah
  - I-405 BRT
  - Eastside Rail Corridor
- Federal Way to Tacoma HCT Corridor Study
- Lynnwood to Everett HCT Corridor Study
- South King County HCT Corridor Study
  - Downtown Seattle to West Seattle to Burien
  - Renton to Tukwila, SeaTac, and on to Burien

All of the corridors listed above are also evaluated in the Draft SEIS as part of the Current Plan Alternative (except Downtown Seattle to West Seattle, which is evaluated as part of the Potential Plan Modifications Alternative). However, the HCT corridor studies and the Long-Range Plan Update SEIS are evaluating potential transit improvements in these corridors at a different scale. The HCT corridor studies are evaluating options within a more localized area and in greater detail, while the Draft SEIS generally identifies plan-level alternatives and evaluates their impacts at a broader regional level. To the extent possible, the Draft SEIS incorporates information available from these HCT corridor studies.

Modifications Alternative compared to the Current Plan Alternative. The description of impacts focuses on how corridors included in the alternatives affect transit ridership at selected screenlines shown on Figure S-5.

Current Plan Alternative

When compared to completion of ST2, the corridors included in the Current Plan Alternative would expand HCT service to communities throughout the Plan area (Sound Transit's service area).

The changes in ridership resulting from the Current Plan Alternative when compared to completion of ST2 reflect the relative effectiveness of Plan corridors in attracting riders.

One major change under the Current Plan Alternative is reduced transit travel times as compared to ST2. These changes in transit travel times result from exclusive right-of-way for transit as compared to mixed operations in ST2. The reduced travel times could also result from more direct transit connections under the Current Plan Alternative as compared to connections in ST2. Examples of reduced transit travel times include:

- Tukwila to Bellevue central business district (CBD)
- SeaTac to Tacoma CBD
- Ballard to Everett CBD
- Kirkland to Kent CBD
- Paine Field to Seattle CBD

The reduced transit travel times would result in transit ridership increases. The extent of ridership changes in the year 2040 from new corridors would vary substantially, ranging from approximately 15,000 additional transit riders per day to less than 3,000 additional transit riders per day at selected screenlines.

The effectiveness of a corridor in terms of increasing ridership could be particularly high if it has one or more of the following characteristics:

- It is resulting in a major increase in daily transit ridership (5,000 or greater) at one or more screenlines
- It is resulting in transit ridership increases at more than one screenline
- It is the only corridor affecting ridership changes at a screenline; at most screenlines, multiple corridors are affecting transit ridership changes

The following information summarizes the relative effectiveness of the corridors in the Current Plan Alternative in influencing transit ridership changes. The corridors, shown on Figure S-2, are in order of daily transit ridership increases.

Corridor A—Light rail between Tacoma and Federal Way: Corridor A would contribute to a major increase in daily transit ridership (15,000) at King County/Pierce County Line West (screenline 6). Corridor A also would increase ridership (5,000) at North of Spokane Street (screenline 2), as riders continue from Tacoma to Seattle.

Corridor B—Light rail between Burien and Renton: On its own, this corridor would result in a major increase in daily transit ridership (10,000) at West of SR 167/Rainier Avenue (screenline 14).

Screenlines represent a method to measure and show changes in ridership for multiple routes within a corridor. The screenlines discussed in this Executive Summary are intended to capture the potential effects on transit volumes of HCT elements included in the Current Plan Alternative and the Potential Plan Modifications Alternative.

Corridor F—Light rail between Downtown Seattle and Ballard: Corridor F would contribute to the major increase in daily transit ridership of 10,000 at Ship Canal (screenline 1).

Corridor G—Light rail between Ballard and University of Washington: Corridor G would result in a major increase (15,000) in daily transit ridership at Wallingford (screenline 20).

Corridor H—Light rail transit extension from Lynnwood Transit Center to Everett: Corridor H would contribute to a major increase in transit ridership (10,000) at the Ship Canal (screenline 1). Corridor H would also contribute to a major transit ridership increase (10,000) at the King County/Snohomish County Line West (screenline 6), as well as a ridership increase (5,000) at North of SR 526 South of Everett (screenline 5).

Figure S-5 Selected Screenlines

Corridor D—Light rail from Renton to Lynnwood along I-405: Corridor D would contribute to transit ridership increases (5,000) at King County/Snohomish County Line East (screenline 4). In addition, corridor D would contribute to transit ridership increases (5,000) at North of Totem Lake (screenline 10) and North of Renton (screenline 12).

The remaining transit corridors in the Current Plan Alternative would result in relatively low transit ridership increases at the selected screenlines.

Potential Plan Modifications Alternative

When compared to the Current Plan Alternative, the elements included in the Potential Plan Modifications Alternative would result in further expansion of HCT service throughout the Plan area. It should be noted that the Potential Plan Modifications Alternative does not represent an integrated HCT system but is instead a menu of potential additions to the Current Plan Alternative. Accordingly, there are corridors that may duplicate other corridors in serving the same travel market.

One major change under the Potential Plan Modifications Alternative is reduced transit travel times to many locations as compared to the Current Plan Alternative. In some cases, operating characteristics for the corridors would involve exclusive right-of-way for transit as compared to mixed operations in the Current Plan Alternative. In other cases, the reduced transit travel time would result from more direct connections under the Potential Plan Modifications Alternative as compared to transit service connections in the Current Plan Alternative.

Examples of reduced transit travel times include:

- West Seattle to Seattle CBD
- Bellevue CBD to Kent CBD
- Paine Field to Everett CBD
- U-District to Kent CBD
- Seattle CBD to Tacoma CBD

These reduced transit travel times would result in transit ridership increases. The extent of ridership changes in the year 2040 from new corridors would vary substantially, ranging from approximately 20,000 additional transit riders per day to less than 3,000 additional transit riders per day at selected screenlines.

The following information summarizes the relative effectiveness of corridors in the Potential Plan Modifications Alternative in increasing transit ridership. These corridors are shown on Figures S-3 and S-4. As is the case with corridors in the Current Plan Alternative, the effectiveness of any corridor in the Potential Plan Modifications Alternative would be particularly high if it has one or more of the following characteristics:

- It is resulting in a major increase in daily transit ridership (5,000 or greater) at one or more screenlines
- It is resulting in transit ridership increases at more than one screenline
- It is the only corridor affecting ridership changes at a screenline; at most screenlines, multiple corridors are affecting transit ridership changes

Corridor 2—Light rail between Downtown Seattle, West Seattle, and Burien: This corridor is affecting transit ridership at four locations, North of Spokane Street (screenline 2), West Seattle Bridge (screenline 3), North of SR 518 (screenline 13), and West of SR 167/Rainier Avenue (screenline 14). The extent of ridership changes is major—between 10,000 and 20,000 per location. At three locations, other corridors contribute to the ridership increases. However, at West of SR 167/Rainier Avenue (screenline 14), corridor 2 would be the only one contributing to the ridership increases.

Corridor 19—HCT line from Tukwila Sounder Station to Sea-Tac Airport to Burien to Downtown Seattle via West Seattle: This corridor is resulting in major transit ridership increases (20,000) at North of Spokane Street (screenline 2) and West Seattle Bridge (screenline 3). Corridor 19 is also contributing to ridership increases (10,000) North of SR 518 (screenline 13).

Corridor 7—Light rail from Puyallup/Sumner to Renton via SR 167: This corridor contributes to ridership increases at North of SR 518 (screenline 13). Corridor 7 is also resulting in transit ridership increases at two other locations: South of Renton (screenline 15) and King County/Pierce County Line East (screenline 17). At all locations, the added daily transit ridership is 10,000 at each screenline.

Corridor 10—Light rail from North Kirkland to UW Bothell to Northgate via SR 522: This corridor is increasing transit ridership at SR 522 (screenline 7) and at North of Totem Lake (screenline 10). Daily transit

ridership increases at each screenline would be approximately 5,000.

Corridor 11—Light rail from Ballard to Bothell via Northgate: This corridor is contributing to transit ridership increases at two locations, Ship Canal (screenline 1) and SR 522 (screenline 7). Daily transit ridership increases at each screenline would be approximately 5,000.

Corridor 20—HCT line from Downtown Seattle to Edmonds via Ballard and Shoreline Community College. This corridor is contributing to transit ridership increases (5,000) at the Ship Canal (screenline 1).

Several corridors would be affecting one location. These are corridors:

- 1—Light rail north/south–Downtown Seattle to Magnolia/Ballard to Shoreline Community College
- 5—Light rail from Lakewood to Spanaway to Frederickson to South Hill to Puyallup
- 6—Light rail from DuPont to Downtown Tacoma via Lakewood, Steilacoom, and Ruston
- 9—Light rail from Tukwila to SODO via Duwamish industrial area
- 12—Light rail to Mill Creek, connecting to Eastside Rail Corridor

The remaining transit corridors in the Potential Plan Modifications Alternative would result in relatively low transit ridership increases at the selected screenlines.

Impacts of plan alternatives on the regional transportation system

Implementation of the Current Plan Alternative and the Potential Plan Modifications Alternative would impact physical components of the multimodal transportation system, including public transit, operations of freeways and local streets, parking, non-motorized modes (pedestrian and bicycle facilities), safety, and freight. The items included in this section address impacts related to both operations and construction.

This assessment of potential impacts is a high-level overview of what could occur. No specific alignments have been selected for any transit mode, and there is no determination as to corridor profile (whether any particular element would be underground, at grade, or elevated).

Local bus service

New rail service and regional express bus/BRT could replace some transit services provided by local agencies, potentially freeing service hours for the local transit provider to use elsewhere. Demand could increase for local bus service connecting to new light rail and commuter rail stations and regional express/BRT services. Buses that use streets or freeways undergoing construction of new transit facilities could temporarily travel more slowly or be detoured to adjacent streets, which could increase walking or bicycling travel times to access the bus.

Highways and roads

Consistent with *Transportation 2040*, the assumption is that all limited access roadways will be tolled or managed by 2040. However, if lanes are not managed to allow 45 mile per hour speeds 90 percent of the time on limited-access roadways, then speeds for buses on these roadways could be much lower in some cases.

Both alternatives include new rail and bus corridors that, depending on the alignment and design, could impact local streets and freeways. These impacts could include use of lane capacity for HCT guideways and stations, at-grade crossings for rail or BRT, and increased congestion around stations and park and rides. Construction of HCT could occur on or adjacent to the freeway system, arterials, or local streets. This construction could close road and freeway lanes for short or long durations, which could reduce lane capacity, lower speeds and increase congestion, and require detours diverting traffic from the freeway system, arterials, and local streets to alternative routes.

Parking

With expanded rail or BRT service, demand for parking at stations could increase, which could spill over into surrounding neighborhoods. Decreased on-street parking in some corridors could occur to accommodate new guideways and stations. Loss of parking on-street and at park-and-ride facilities could be expected during guideway and station construction and where new or expanded park-and-ride facilities occur.

Safety

Rail and BRT facilities could create safety impacts for at-grade crossings or where operating in mixed traffic. Projects include safety features and often upgrades for unprotected pedestrian crossings on commuter rail lines. With new rail and bus service, there would be increased vehicular, walk, and bike activity in station areas potentially impacting the safety of roadway and non-motorized systems.

Non-motorized systems—pedestrian and bicycle facilities

Both the Current Plan Alternative and the Potential Plan Modifications Alternative could include potential pedestrian and bicycle facilities that improve access to transit facilities. With expanded transit operations under each alternative, there could be potential impacts on pedestrian and bicycle facilities.

Construction could temporarily close or restrict pedestrian and bicycle facilities such as sidewalks, bike lanes, and trails. Construction also would temporarily result in other localized impacts, such as increased congestion, restricted access to facilities, and a lower quality pedestrian and bicycle environment.

Freight movement

A reduction in vehicle miles traveled from both alternatives would benefit freight movements on highways. In some cases, new guideways and stations could reduce access to driveways used to access businesses. In addition, rail development could displace on-street loading capacity for trucks delivering goods.

Construction of transit facilities could temporarily restrict freight movement and access to businesses. New commuter rail service could require that some existing freight rail lines be upgraded or improved, which would result in construction activity in the railroad right-of-way or adjacent areas.

Key Environmental Impacts

The Draft SEIS describes the affected environment and potential impacts and mitigation for the Current Plan Alternative and the Potential Plan Modifications Alternative. The impact analysis is at a level of detail consistent with the broad, plan-level issues being addressed in the Long-Range Plan Update.

For the Current Plan Alternative, the environmental impact analysis focuses on corridors A through Y, as shown in Figure S-2. A qualitative summary of potential environmental impacts and benefits is depicted in Table S-1 (light rail and commuter rail corridors) and Table S-2 (regional express bus/BRT corridors). For the Potential Plan Modifications Alternative, corridors 1 through 36, as shown on Figures S-3 and S-4, refer to

Table S-4 (light rail and commuter rail corridors) and Table S-5 (regional express bus/BRT corridors). The ratings used in these summary tables reflect a relative comparison between corridors based on the analysis in the Draft SEIS.

Overall, increasing HCT under either the Current Plan Alternative or the Potential Plan Modifications Alternative is generally expected to decrease energy consumption and reduce greenhouse gas and other air emissions in the region as more people choose to use transit instead of travel in single-occupancy vehicles. In addition, an expansion of regional high-capacity transit is consistent with state and regional growth management goals and is consistent with the vast majority of local plans in the region. Other key environmental effects include potential noise and/or vibration impacts to surrounding land uses, impacts to wetlands and streams, adverse effects to historic properties, and the use of parks and recreational facilities.

Overall, increasing transit options is generally expected to decrease energy consumption and reduce greenhouse gas emissions in the region as fewer people travel in single-occupancy vehicles.

The extent to which impacts could occur varies depending on the concentration of resources within a corridor and the transit mode being evaluated. In general, implementing any of the transit modes within existing roadway or railroad rights-of-way would likely have the least amount of environmental impacts. If additional lanes were to be constructed for exclusive BRT lanes or light rail guideways, the potential for impacts to surrounding resources could increase. Light rail, BRT, or commuter rail on new alignments have the highest likelihood of impacts to surrounding land uses or resources; however, such impacts would be avoided and minimized to the extent possible during future project-level planning and environmental reviews.

Earth

- Risks are related to geologic hazards that already exist, including steep slopes that are more prone to erosion or landslides, soft soils, and seismic and liquefaction hazards.
- Depending on location, all modes would have comparable susceptibility to geologic hazards.
- Corridors in areas with the highest susceptibility to certain geologic hazards include N in the Kent Valley along SR 167 and V in the Puyallup River Basin, both in the Current Plan Alternative; and 7 (also in the Kent Valley along SR 167) and 16 between Puyallup and Orting, both in the Potential Plan Modifications Alternative.

Air quality

- The Current Plan Alternative would reduce greenhouse gas and other air emissions in the region as more people choose to use transit instead of travel in single-occupancy vehicles.
- The Potential Plan Modifications Alternative would provide an incremental reduction as transit corridors are added.

Noise

- Commuter rail has the highest maximum noise levels of all transit modes; however, it operates less frequently, with service occurring during peak commute hours. In terms of potential noise impacts, light rail and BRT are similar, although BRT generates more noise for a similar number of passengers served.
- The highest potential for noise impacts occurs in corridors with dense residential development. This includes BRT or light rail corridors along SR 99 such as R (BRT from Seattle to Everett) and 3 (light rail from Ballard to Everett Station), and 20 (BRT from Downtown Seattle to Edmonds).
- Light rail corridor 19 from Tukwila to Downtown Seattle via West Seattle is also very densely developed, potentially resulting in a high number of residences impacted.

Water quality and hydrology

- Runoff from new impervious surfaces can cause bank erosion and increase stream bed depth; however, commuter rail tracks on ballast and ties are not impervious.
- Pollutants on new impervious surfaces can decrease water quality; however, operation of light rail alone is not a pollutant-generating activity.
- Light rail corridors D (Renton to Lynnwood along I-405 under Current Plan Alternative) and 7

Table S-1 Current Plan Alternative summary of impacts—light rail, commuter rail, high-capacity transit

		LIGHT RAIL								COMMUTER RAIL		HCT (LIGHT RAIL)	
		A	B	C	D	E	F	G	H	I	J	K	L
ENVIRONMENTAL RESOURCE	POTENTIAL EFFECTS	Tacoma to Federal Way	Burien to Renton	Bellevue to Issaquah (I-90)	Renton to Lynnwood (I-405)	Renton to Woodinville (ERC)	Downtown Seattle to Ballard	Ballard to UW	Lynnwood to Everett	DuPont to Lakewood	Renton to Woodinville (ERC)	UW to Redmond (via SR 520)	Northgate to Bothell
Earth	Susceptibility to geologic hazards	◔	◔	◔	◕	●	◑	●	◕	●	●	●	●
Air Quality	Benefit from reduction in greenhouse gases	◕	◕	◕	◕	◕	◕	◕	◕	●	●	◕	◕
Noise and Vibration	Potential for noise impacts to residences	●	●	●	◕	◕	◕	○	◕	◕	◔	●	◑
Water	Potential for impacts to streams	◑	◑	◔	○	◔	●	●	◑	◕	◕	◑	◔
Wetlands	Potential for impacts to wetlands	◔	◑	○	◔	◔	◕	●	○	●	●	◑	◔
Ecosystems	Regionally important ecosystem resources	○	●	◑	●	●	●	●	◕	◕	●	◕	●
Energy	Benefit from reduction in energy use	◕	◕	◕	◕	◕	◕	◕	◕	●	●	◕	◕
Environmental Health	Potential for encountering hazardous waste sites	◑	◑	◕	◕	◕	○	●	◑	◕	●	◕	◑
Visual Quality	Potential for impacts to visual setting	◕	◕	◕	◕	◑	◕	◕	◕	●	◑	◕	◕
Land Use	General consistency with plans and policies	●	●	●	●	●	●	●	●	●	●	●	●
Public Services/ Utilities	Potential for conflicts with major utilities	●	◕	●	◕	●	●	●	◕	●	●	●	●
Parks and Recreation	Potential for impacts to parks and recreation areas	◕	◑	◑	◑	◑	○	◔	◕	●	◕	◑	◑
Historic Resources	Potential for impacts to historic properties	◕	●	◕	◕	◕	○	◑	◕	●	●	◕	◕

○ ◔ ◑ ◕ ●

Worst Performance (highest impacts/lowest benefits) ⟷ Best Performance (lowest impacts/highest benefits)

Table S-2 Current Plan Alternative summary of impacts—regional express bus and bus rapid transit

ENVIRONMENTAL RESOURCE	POTENTIAL EFFECTS	HCT (BRT)		BRT							REGIONAL EXPRESS BUS					
		K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
		UW to Redmond (via SR 520)	Northgate to Bothell	Federal Way to DuPont (I-5)	Renton to Puyallup (SR 167)	Bellevue to Issaquah (I-90)	Renton to Woodinville (ERC)	Renton to Lynnwood (I-405)	Seattle to Everett (SR 99)	Lynnwood to Everett (I-5)	Puyallup to DuPont (Via Cross Base Hwy)	Puyallup to Lakewood	Puyallup to Tacoma	Sea-Tac to West Seattle	Redmond to Kirkland	North Bothell to Mill Creek to Mukilteo
Earth	Susceptibility to geologic hazards	●	●	◔	○	◔	●	◕	●	●	●	●	○	●	●	●
Air Quality	Benefit from reduction in greenhouse gases	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕
Noise and Vibration	Potential for noise impacts to residences	◕	◔	●	●	●	◕	◔	○	◔	●	●	●	●	●	●
Water	Potential for impacts to streams	◑	◕	●	◑	◑	◕	◑	●	●	●	●	●	●	●	●
Wetlands	Potential for impacts to wetlands	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ecosystems	Regionally important ecosystem resources	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Energy	Benefit from reduction in energy use	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑
Environmental Health	Potential for encountering hazardous waste sites	●	◑	◕	●	●	●	●	◕	◕	●	●	●	●	●	●
Visual Quality	Potential for impacts to visual setting	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Land Use	General consistency with plans and policies	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Public Services/ Utilities	Potential for conflicts with major utilities	●	●	◕	◕	●	◕	◕	●	◕	●	●	●	●	●	●
Parks and Recreation	Potential for impacts to parks and recreation areas	◕	◕	●	●	◕	◕	●	◕	●	●	●	●	●	●	●
Historic Resources	Potential for impacts to historic properties	●	●	●	●	●	●	●	◕	●	●	●	●	●	●	●

○ ◔ ◑ ◕ ●

Worst Performance (highest impacts/lowest benefits) ⟷ Best Performance (lowest impacts/highest benefits)

Table S-3 Potential Plan Modifications Alternative summary of impacts—light rail, commuter rail, high-capacity transit

		LIGHT RAIL															COMMUTER RAIL			HCT (LIGHT RAIL)		
ENVIRONMENTAL RESOURCE	POTENTIAL EFFECTS	1 Downtown Seattle-Magnolia, Ballard to Shoreline CC	2 Downtown Seattle to West Seattle, Burien	3 Ballard to Everett Station via Aurora Village/Lynnwood	4 Everett to North Everett	5 Lakewood-Spanaway-Frederickson-South Hill to Puyallup	6 DuPont to Downtown Tacoma via Lakewood, Steilacoom, Ruston	7 Puyallup/Sumner to Renton (SR 167)	8 Downtown Seattle along Madison	9 Tukwila to SODO via Duwamish Industrial Area	10 North Kirkland or UW Bothell to Northgate (SR 522)	11 Ballard to Bothell via Northgate	12 Mill Creek connecting to ERC	13 Tacoma to Ruston Ferry Terminal	14 Tacoma to Parkland (SR 7)	15 Lynnwood to Everett serving SW Everett Industrial Center	16 Puyallup/Sumner to Orting	17 Lakewood to Parkland	18 Tacoma to Frederickson	19 Tukwila to Sea-Tac Airport-Burien-Downtown Seattle via West Seattle	20 Downtown Seattle to Edmonds via Ballard, Shoreline CC	21 West Seattle to Ballard via Central District, Queen Anne
Earth	Susceptibility to geologic hazards	◑	◑	●	●	◕	●	○	◕	◔	◔	◔	◔	●	●	●	○	●	●	◕	◑	◑
Air Quality	Benefit from reduction in greenhouse gases	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	●	●	●	◕	◕	◕
Noise and Vibration	Potential for noise impacts to residences	◑	◑	○	◑	◕	◔	●	◑	●	◕	◔	◑	◔	◑	◑	◑	◑	◔	◑	◔	◑
Water	Potential for impacts to streams	●	◕	◕	●	◕	◕	○	●	◕	◔	◔	○	◑	●	◑	◕	●	◕	●	●	●
Wetlands	Potential for impacts to wetlands	◕	◑	◑	◕	◑	◔	○	◕	◑	◔	◔	○	◕	◕	◑	●	◔	●	◑	◑	◕
Ecosystems	Regionally important ecosystem resources	●	●	●	●	◔	○	●	●	●	●	●	●	◕	●	●	●	◑	●	●	◕	●
Energy	Benefit from reduction in energy use	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	●	●	●	◕	◕	◕
Environmental Health	Potential for encountering hazardous waste sites	○	◕	●	●	◕	○	◕	●	◕	◑	◑	●	○	○	◕	●	●	●	◕	◑	◑
Visual Quality	Potential for impacts to visual setting	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◑	◕	◕	◕	●	◕	●	◕	◕	◕
Land Use	General consistency with plans and policies	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	◑	●	●	●	●	●
Public Services/ Utilities	Potential for conflicts with major utilities	●	●	●	●	◕	●	◕	●	●	●	●	◕	●	●	●	◕	●	◕	●	●	●
Parks and Recreation	Potential for impacts to parks and recreation areas	◔	◔	◕	◑	◕	◕	◕	○	◑	◑	◑	◕	◑	◕	◕	◕	●	●	◔	◑	○
Historic Resources	Potential for impacts to historic properties	◔	◔	◕	◔	◕	◕	◕	○	◑	◕	◑	◕	◑	◕	●	●	●	◕	◔	◔	◑

○ Worst Performance (highest impacts/lowest benefits) ◔ ◑ ◕ ● Best Performance (lowest impacts/highest benefits)

Table S-4 Potential Plan Modifications Alternative summary of impacts—light rail, commuter rail, high-capacity transit

		HCT (BRT)			BRT		REGIONAL EXPRESS BUS										REGIONAL EXPRESS BUS/ BRT		
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
ENVIRONMENTAL RESOURCE	POTENTIAL EFFECTS	Tukwila to Sea-Tac Airport-Burien-Downtown Seattle via West Seattle	Downtown Seattle to Edmonds via Ballard, Shoreline CC	West Seattle to Ballard via Central District, Queen Anne	Puyallup vicinity (Meridian Ave)	Downtown Seattle along Madison	Issaquah to Overlake via Sammamish and Redmond	Renton to Seattle	UW Bothell via Sammamish and Redmond	Titlow Beach to Downtown Tacoma	Renton (Fairwood) to Eastgate via Factoria	Along 145th Street from I-5 to SR 522	North Kirkland to Downtown Seattle	Woodinville to Bellevue	Woodinville to Everett	JBLM Connection	Tacoma to Bellevue	Kent to Sea-Tac Airport	Puyallup to Rainier Valley
Earth	Susceptibility to geologic hazards	◕	◑	◑	◕	◕	◑	◑	◑	●	◑	●	◔	●	●	●	◑	◔	◔
Air Quality	Potential for impacts to historic properties	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕
Noise and Vibration	Potential for noise impacts to residences	○	○	◔	◕	●	●	●	●	●	●	●	●	●	●	●	◕	●	◕
Water	Potential for impacts to streams	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	◑	◕	◔
Wetlands	Potential for impacts to wetlands	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	◑	◑
Ecosystems	Regionally important ecosystem resources	●	◕	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	◕
Energy	Benefit from reduction in energy use	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑
Environmental Health	Potential for encountering hazardous waste sites	◕	◕	◕	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Visual Quality	Potential for impacts to visual setting	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Land Use	General consistency with plans and policies	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Public Services/ Utilities	Potential for conflicts with major utilities	●	●	●	◕	●	●	●	●	●	●	●	●	●	●	●	◕	●	◕
Parks and Recreation	Potential for impacts to parks and recreation areas	◕	◕	◕	◕	●	●	●	●	●	●	●	●	●	●	●	●	◕	●
Historic Resources	Potential for impacts to historic properties	◕	◕	◕	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

○ ◔ ◑ ◕ ●

Worst Performance (highest impacts/lowest benefits) ⟷ Best Performance (lowest impacts/highest benefits)

(Puyallup to Renton via SR 167 in the Potential Plan Modifications Alternative) could cross the greatest number of streams. Potential Plan Modifications Alternative corridor 12 (Mill Creek connecting to the Eastside Rail Corridor) could cross the greatest number of streams per mile of corridor.

- Corridors in the Plan area near the Puget Sound shoreline and large rivers (such as the Puyallup, Snohomish, and Duwamish Rivers) are at risk for inundation from rising sea levels that may occur as the result of climate change.
- Fill within floodplains could impede flows and increase the risk of flooding. Climate change could also result in localized flooding in floodplain areas due to increased precipitation from storm events. Corridors in the Current Plan Alternative that include a higher concentration of floodplains include light rail corridors C and D along Lake Sammamish and the Snohomish River, respectively. In the Potential Plan Modifications Alternative, light rail corridor 7 and BRT corridor 36 along SR 167 from Puyallup to Renton, as well as corridor 34 from Tacoma to Bellevue, also have a high concentration of floodplains.

Ecosystems

- The removal, degradation, or fragmentation of habitat could disturb fish and wildlife movement. Areas potentially affected include those with high concentrations of natural resources, high-quality native ecosystems, and major lakes or rivers.
- Current Plan Alternative corridors C (Bellevue to Issaquah) and H (Lynnwood to Everett) and Potential Plan Modifications Alternative corridors 7 (Puyallup/Sumner to Renton) and 12 (Mill Creek connecting to Eastside Rail Corridor) have the greatest density of wetland areas.
- Priority conservation areas within corridors near Cougar Mountain and Issaquah Creek (light rail corridor C, BRT corridor O), Edmonds Point (HCT corridor 20), and a portion of the Joint Base Lewis-McChord between Lakewood and Parkland (commuter rail corridor 17) could be affected.

Energy

- Under either the Current Plan Alternative or the Potential Plan Modifications Alternative, transportation-related energy consumption is generally expected to decrease as more people choose to use transit instead of traveling in single-occupancy vehicles.

Environmental health

- During construction, the disturbance or release of hazardous materials could occur, particularly in areas with high concentrations of contaminants such as industrialized areas. The Current Plan Alternative includes industrialized areas around the Port of Tacoma (corridor A) and Ballard (corridor F). The Potential Plan Modifications Alternative includes industrialized areas around the Port of Tacoma (corridors 6, 13, and 14) and Ballard (corridors 1, 3, 11, and 20).
- Electromagnetic fields (EMF) associated with light rail operations could require mitigation to avoid

impacts to sensitive electronics located in medical and research facilities.

Visual quality

- Transit features, such as walls, stations, at-grade or elevated guideways, infill stations, operation and maintenance facilities, park-and-ride facilities, and other structures, could result in the alteration or removal of some visual resources (such as a view or structure).
- In general, new transportation facilities constructed in existing transportation corridors would be less likely to negatively affect visual quality than those built in new corridors.

Land use

- In general, both alternatives would be consistent with state, regional, county, and municipal plans, policies, and legislation. However, Potential Plan Modifications Alterative corridor 16, commuter rail service from Puyallup/Sumner to Orting, may not be consistent with Orting's goal to preserve its small-town character.
- The alternatives would improve transit service to regional growth centers and manufacturing and industrial centers, and would focus growth within the boundaries of Urban Growth Areas.
- Under the Current Plan Alternative, connections generally would be added between regional centers and/or manufacturing industrial centers. Connections to other smaller communities include Woodinville (corridors E, J, and P), DuPont (corridors I, M, and T), West Seattle (corridor W), Mukilteo (corridor Y), and Issaquah (corridor O).
- Under the Potential Plan Modifications Alternative, connections generally would be added between regional centers and/or manufacturing industrial centers. Connections to other smaller communities include Woodinville (corridors 31 and 32), DuPont (corridor 6), Mill Creek (corridor 12), Ruston (corridor 13), Parkland (corridors 14 and 17), Orting (corridor 16), Sammamish (corridor 26), Titlow Beach (corridor 27), Eastgate (corridor 28), Rainier Valley (corridor 37), West Seattle (corridor 21), and Issaquah (corridor 24).
- Commercial, industrial, and residential land uses could be affected by property acquisitions, displacements, and land use conversions.

Public services and utilities

- Depending on location, all modes would have comparable impacts to public services and utilities. Overall, long-term impacts on utility services and systems are expected to be minimal.
- In the Current Plan Alternative, corridors B (Burien to Renton), D (Renton to Lynnwood), and H (Lynnwood to Everett) cross either natural gas inter/intra state pipelines or transmission lines. In the Potential Plan Modifications Alternative, corridors 5 (Lakewood-Spanaway-Frederickson-South Hill-Puyallup), 7 (Puyallup/Sumner to Renton), 12 (Mill Creek connecting to the Eastside Rail Corridor), 16 (Puyallup/Sumner to Orting), 18 (Tacoma to Frederickson), 22 (Puyallup vicinity), and 36 (Puyallup to the Rainier Valley) cross either natural gas inter/intra state pipelines, petroleum product pipelines, or transmission lines. If necessary, these utilities would be relocated.

Park and recreation facilities

- Both alternatives could result in the acquisition of all or a portion of a park or recreation facility, particularly when other physical constraints limit avoidance or minimization options. King County parks and recreation facilities could be particularly affected given their high density.
- In the Current Plan Alternative, light rail corridors D (Renton to Lynnwood), E (Renton to Woodinville), F (Downtown Seattle to Ballard), and G (Ballard to UW) have the greatest potential to impact park and recreation facilities.
- For the Potential Plan Modifications Alternative, corridors 1 (Downtown Seattle to Shoreline Community College), 2 (Downtown Seattle to West Seattle/Burien), 19 (Tukwila Sounder Station to Downtown Seattle to Ballard), 8 (Downtown Seattle along Madison Street), and 21 (West Seattle to Ballard) have the greatest potential to impact park and recreational facilities.

Historic resources

- Property acquisitions could result in the alteration or demolition of architectural properties.
- Portions of the corridors between downtown Seattle and Northgate and near downtown Tacoma could be particularly affected given the high concentrations of architectural historic properties listed on the National Register of Historic Places.
- In the Current Plan Alternative, light rail corridor F (Downtown Seattle to Ballard) would have the greatest potential to affect historic properties. For the Potential Plan Modifications Alternative,

corridors 1 (Downtown Seattle to Shoreline Community College), 2 (Downtown Seattle to West Seattle/Burien), 4 (Everett to North Everett), 8 (Downtown Seattle along Madison Street), 19 (Tukwila Sounder Station to Downtown Seattle via West Seattle), and 20 (West Seattle to Edmonds) would have the greatest potential to affect historic properties.

- Archaeological sites and traditional cultural properties could be affected by ground-disturbing activities, such as the installation of piers to support elevated rail lines or other activities associated with new stations, park-and-ride facilities, or other support facilities.

Cumulative impacts

- Differences in cumulative impacts between the two alternatives would be relatively minor when considered on a regional scale.
- Both alternatives would offer environmental benefits. These benefits, combined with other regional plans and projects to help manage growth in a more sustainable manner, could result in greater cumulative benefits because they would help to reduce vehicle trips and urban sprawl.

Avoidance, Minimization, and Mitigation Measures

Sound Transit has established programs, best practices, and policies that would guide the implementation of this Long-Range Plan Update and the projects that would follow. These include the agency's commitment to satisfying all applicable laws and regulations and to mitigate significant adverse impacts responsibly and reasonably, consistent with Sound Transit's policies. In addition to meeting environmental commitments, Sound Transit will continue to avoid and minimize impacts where possible. Several environmental elements analyzed in this Draft SEIS are not likely to have significant adverse long-term impacts requiring mitigation after standard project measures are applied, such as earth, air quality, energy, public services, utilities, and water resources. The following text summarizes key areas where mitigation measures are expected to be required. More specific measures would be identified during future project-level environmental reviews.

Transportation

Mitigation would be required to address impacts to local transit service, local roadway and freeway facilities, parking, safety, non-motorized facilities in station areas, and freight movement resulting from plan implementation and project development.

For construction activities affecting freeways, Sound Transit would work with the Washington State Department of Transportation to develop a plan to coordinate construction with incident management, construction staging, and traffic control where the construction could affect freeway traffic, as well as provide construction closure information to the public. Truck access points from the freeway would be identified to minimize impacts on general purpose traffic and interchange operations.

Mitigation for impacts on local roadway facilities, parking, safety, non-motorized facilities, and freight movement would comply with local regulations governing construction mitigation, including traffic control and truck routing. For local transit service and facilities, potential route service changes would be coordinated with affected transit systems. For freight-related items, mitigation would be coordinated with local jurisdictions and affected businesses and operators.

Noise and vibration

Potential measures to control noise and vibration could include acquisition of land for buffer zones, project realignment, bus and roadway design and maintenance, track and wheel design and maintenance for rail systems, minimization of audible warning systems to only the levels necessary, construction of noise walls and other barriers, and sound insulation for buildings. Track sub-base and support structures could be designed to reduce vibration and ground-borne noise levels.

Ecosystems

Sound Transit would mitigate impacts in accordance with applicable federal and state regulations and local critical area ordinances and their permit requirements. Sound Transit is committed to no net loss of wetland functions and wetland areas. Potential measures to minimize impacts could include minimizing land clearing, avoiding sensitive habitat and wetlands, designing fish-passable structures, establishing time-of-year construction restrictions in sensitive areas, enhancing remaining habitat, and compensating or replacing lost wetland areas.

Environmental health

The Current Plan Alternative and the Potential Plan Modifications Alternative would adhere to all applicable regulations regarding hazardous materials handling and spill response during construction and long-term operation. Any hazardous materials sites in the construction area would be identified and addressed to avoid the potential for exposure or spread of hazardous materials during construction. Should EMF impacts from light rail be identified, modified power delivery designs would be expected to mitigate such impacts.

Visual quality and aesthetics

Measures to reduce or minimize adverse long-term impacts on visual quality could include avoidance of visually sensitive areas; design or aesthetic treatments to reduce the impacts of transit facilities by integrating them with existing plans, minimizing their size, making them compatible with their surroundings, and shielding light from reaching surrounding properties; and the provision of landscaping and other screening features.

Land use

Sound Transit would provide relocation assistance and advisory services where property acquisitions and displacements would be unavoidable. The relocation program would be in accordance with state and federal laws and Sound Transit policy.

Parks and recreation

Sound transit would coordinate with the agencies with jurisdiction over parklands to minimize impacts. Mitigation could include restoration of disturbed parks and open space to pre-project conditions, park enhancement, or replacement of acquired parkland. Construction-period mitigation measures could include maintaining access during road and trail closures and providing coordinated information on access options.

Historic resources

Sound Transit would determine appropriate mitigation measures in consultation with the lead federal agencies, the Washington State Department of Archaeology and Historic Preservation, Native American tribes, affected local governments, and other interested parties. Potential mitigation measures could include designing facilities to be compatible with historic resources, employing construction methods to minimize impacts, conducting rehabilitation or relocation to appropriate standards, preparing interpretive information for the public, and fully documenting properties if no alternative to relocation or demolition exists. Mitigation measures for archaeological sites could include performing archaeological testing and monitoring in high-probability areas prior to and during construction and data recovery of significant sites.

Significant Avoidable Adverse Impacts that Cannot be Mitigated

No significant unavoidable adverse impacts to earth, air quality, energy, and public services and utilities are expected with either the Current Plan Alternative or the Potential Plan Modifications Alternative.

With implementation of the avoidance, minimization, and mitigation measures listed above, significant unavoidable adverse impacts to noise and vibration, water quality and hydrology, ecosystems, environmental health, visual quality, parks and recreation facilities, and historic and cultural resources could be minimized for most plan elements under the Current Plan Alternative and the Potential Plan Modifications Alternative. However, significant unavoidable adverse impacts to noise and vibration, environmental health, visual quality, land use, parks and recreation facilities, and historic and cultural resources could occur in some corridors and with some modes. Temporary unavoidable adverse impacts could occur to water quality and hydrology and ecosystems during construction.

Even with the mitigation measures described above, there could be unavoidable adverse transportation impacts, primarily during construction of the corridors and facilities included in the Current Plan Alternative or the Potential Plan Modifications Alternative. Construction impacts could include temporary lane or roadway closures, loss of parking, increased truck traffic and congestion, and reduced access to businesses.

Areas of Controversy and Uncertainty and the Issues to be Resolved

The Sound Transit Board will evaluate many issues as it considers updates to the Long-Range Plan. Those issues include understanding the need for projects, achieving balance among the various service areas of the region, and obtaining funding to make the plans a reality. Unresolved regional issues that may affect the updated Long-Range Plan are discussed below.

Several corridors were analyzed as part of the Potential Plan Modifications Alternative for possible inclusion in the updated Long-Range Plan. Using the transportation and environmental analysis, as well as other studies, the Sound Transit Board may consider adding some of the Potential Plan Modification Alternative corridors to the updated Long-Range Plan.

Sound Transit will consider the specific modes for the HCT corridors included in the Plan. Corridors evaluated in this Draft SEIS include light rail, commuter rail, BRT, regional express bus, and streetcar. Each of the mode technologies has distinct advantages. In some corridors, the mode decision could include two or more possibilities. For example, a corridor may be identified as an HCT corridor and/or designated as a potential future light rail extension in the Long-Range Plan.

Sound Transit can also consider annexing areas into the Sound Transit district or extending services beyond the current district boundary. Annexation and service extensions can occur under the Long-Range Plan Update alternatives as long as the legislatively mandated requirements are met. Extensions of service can occur without changing or annexing the district boundary. During the scoping process, Sound Transit received suggestions both to expand the district boundary and

to extend service outside the current boundary. Sound Transit would work with interested jurisdictions to annex or extend service beyond the current boundary if a proposal is made.

Next Steps: Plan Adoption and Implementation

With publication of this Draft SEIS, Sound Transit is presenting the results of the plan-level environmental impact analysis on updating the Long-Range Plan and starting a public comment period, which will close on July 28, 2014.

After the close of the public comment period, Sound Transit will use the comments received, along with any updated information, to prepare a Final SEIS. As part of the Final SEIS, comments received on this Draft SEIS will be responded to. Following the issuance of the Final SEIS, the Sound Transit Board will make final decisions on updating the Regional Transit Long-Range Plan. The updated Long-Range Plan will then provide the basis for future transit investments. Future system plans would be submitted to voters for approval. If funding is approved, project-level planning and environmental review would be performed, followed by implementation of the projects as appropriate.

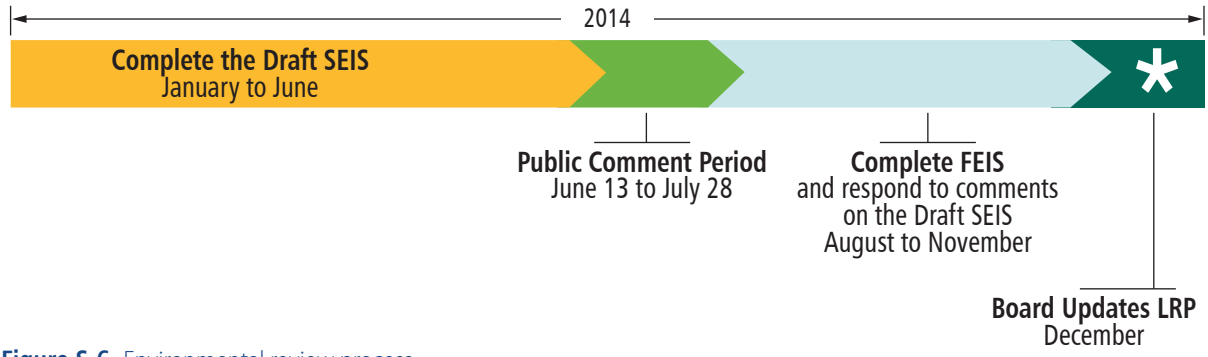


Figure S-6 Environmental review process

Chapter 2
Alternatives Considered

As described in Chapter 1, Sound Transit is preparing this Draft Supplemental Environmental Impact Statement (SEIS) to support Sound Transit's current planning and decision-making efforts for an updated Long-Range Plan and future transit system plan. This is a programmatic SEIS that is considering broad actions throughout the region—transit modes, corridors, types of supporting facilities, programs, and policies.

The Long-Range Plan Update is not reconsidering project-level decisions already made through the *Sound Move* or ST2 programs.

Federal action is not required for the Long-Range Plan Update and Draft SEIS, but these documents are being prepared consistent with federal rules for linking local planning with future federal environmental review under the National Environmental Policy Act (NEPA). It is Sound Transit's intent to rely on decisions made during the Long-Range Plan Update process and any future system planning process to support future project-level NEPA review for individual projects that could be implemented if funded. This could include decisions on choice of transit mode in specific corridors. The last two federal transportation funding authorization acts (the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and Moving Ahead for Progress in the 21st Century Act (MAP-21)) specifically encourage local agencies to link local planning with NEPA by considering environmental factors when they are planning transit systems that could ultimately seek federal funding or approvals.

This Draft SEIS, along with other information developed through the update process, will help ensure that the Long-Range Plan continues to meet Sound Transit goals and supports the decisions of Sound Transit's Board. In turn, the updated plan will support Board decisions about future high-capacity transit investments. If and when there is voter funding approval, any capital projects that make up the next system plan would be subject to project-level environmental review that meets state and federal requirements. Project-level environmental review would evaluate specific alignments, station locations, and other project details, and would include additional public involvement prior to implementing the project.

Scoping and screening activities held in fall and winter 2013/2014 are described in Section 2.2. Based on comments received, reviewed, and screened during that process, two alternatives have been developed for evaluation in this Draft SEIS:

- **Current Plan Alternative (No Action)—**The No Action Alternative, referred to in this Draft SEIS as the Current Plan Alternative, is the existing 2005 Long-Range Plan plus the subsequent Sound Transit Board actions implementing the plan as part of Sound Transit 2 (ST2). The Current Plan Alternative is described further in Section 2.3.

No Action Alternative

WAC 197-11-440(5)(ii) states that: the "no action" alternative shall be evaluated and compared to other alternatives. In this SEIS, the No Action Alternative reflects a continuation of current management direction and is referred to as the *Current Plan Alternative*.

- **Potential Plan Modifications Alternative (Action)—**The Action Alternative, referred to in this Draft SEIS as the Potential Plan Modifications Alternative, is a menu of options that the Sound Transit Board could choose from when updating the Long-Range Plan. The menu of options developed during the scoping and screening steps of the EIS is described in Section 2.4.

These alternatives include a wide range of actions and modes for purposes of updating the Long-Range Plan, which is fiscally constrained (see section 2.2, below). This chapter further defines the alternatives and describes the planning process for the Long-Range Plan Update.

2.1 High-capacity transit technologies evaluated

This section defines the HCT technologies being studied in this Draft SEIS.

Typical Light Rail

2.1.1 Light rail

Sound Transit currently operates two light rail lines. Tacoma Link operates from the Tacoma Dome to S. 9th Street and Commerce Street, making stops at 6 stations. Central Link currently operates from Sea-Tac Airport to Westlake Station in downtown Seattle, making stops at 11 stations. Light rail service under the two alternatives being considered here would be similar to that currently operated by Sound Transit.

Light rail design considerations

At-grade guideways are best suited for areas where the grade is 5 or 6 percent or less and where there is sufficient right-of-way available. While "at-grade guideway" typically refers to ground level, it also includes retained cut-and-fill structures that are used to maintain a consistent grade.

Elevated structures are appropriate where the topography varies more widely or creates barriers, where the light rail system must cross over other physical barriers, such as cross streets and freeway lanes, where the available right-of-way is limited, or where grade separation is required for higher train frequencies.

Tunnels may be appropriate in areas with slopes of more than 5 or 6 percent, where physical barriers must be crossed, where the right-of-way is inadequate, or where there is high building density or high train frequency. Tunnels may also be appropriate where major ridership centers cannot be served in any other way.

Light rail can operate in a mix of surface (at-grade), elevated, or tunnel configurations depending on terrain. Different profiles also allow the light rail guideway to cross over or under highway bridges, streets, or other physical obstacles. Sound Transit would determine the profile during project-level reviews based on criteria that consider (1) topography, (2) physical barriers, (3) available surface right-of-way, (4) operating needs, (5) development density, and (6) cost. Environmental impacts associated with those profiles would also be considered at that time.

Figure 2-1 shows typical types of light rail guideways. Light rail guideways are typically about 30 feet wide, with room for two sets of tracks. This width also includes room for the poles and overhead catenary (contact wire) needed to power the trains. The footprint also contains space for emergency access as well as walls or barriers to restrict other access (e.g., to discourage pedestrians from crossing the guideway).

Stations have many common features regardless of the guideway profile. The boarding platforms are approximately 380 feet long to serve four-car trains. The platform is either on the outer side of the

tracks or in the center with tracks on both sides. Escalators, elevators, and stairs provide access to the platforms. All stations are accessible as required under the Americans with Disabilities Act (ADA). They include features for pedestrian and bicycle access, transit connections, ticket vending machines, and general street/network access. Some stations have parking areas for transit patrons in either a structure or a surface lot.

Sound Transit currently has two light rail operations and maintenance facilities. The Forest Street operations and maintenance facility, located in the industrial district south of downtown Seattle, serves the Central Link light rail trains. The Tacoma operations and maintenance facility, located on E. 25th Street east of the Tacoma Dome Station, services the Tacoma Link light rail trains.

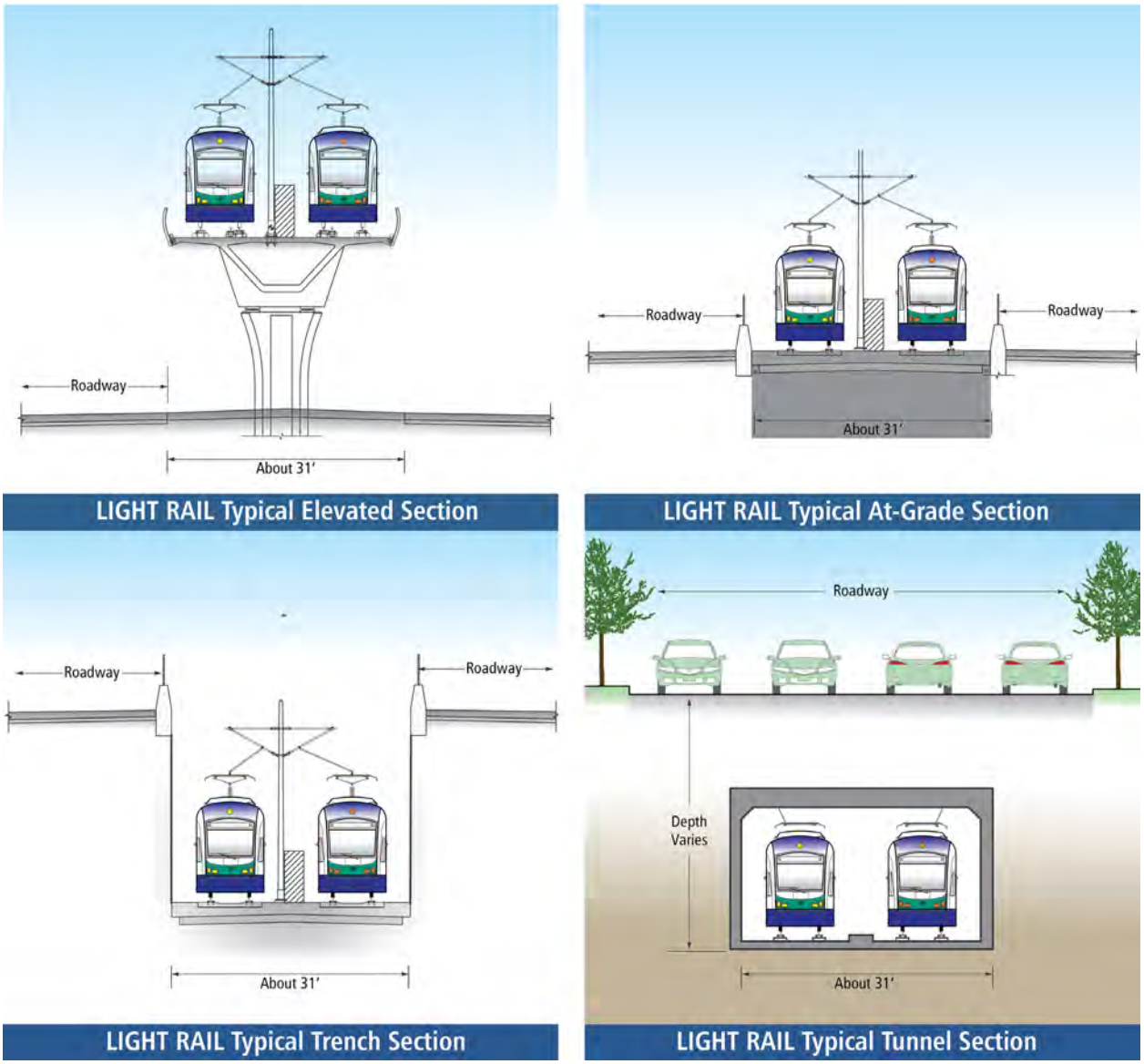


Figure 2-1. Typical light rail guideways

Commuter rail

Sound Transit operates Sounder commuter rail service from downtown Seattle south to Lakewood with stops at nine stations, and from downtown Seattle north to Everett with stops at four stations. Both of the lines stop at King Street Station in Seattle. Sounder commuter rail service operates on existing rail infrastructure owned by Burlington Northern Santa Fe (BNSF) between Everett and Tacoma. Sound Transit owns the rail line and right-of-way between Tacoma and Lakewood. Amtrak and freight railroad services also run on the BNSF line. The existing railroad right-of-way varies throughout the region, but at a minimum is generally 50 feet wide, 25 feet on each side of the tracks.

Typical Commuter Rail

Stations have many common features. The boarding platforms are generally about 500 to 600 feet long serving eight-car trains. The platforms are located on the outer side of the tracks. All stations are accessible as required under the ADA. They include features for pedestrian and bicycle access, transit connections, general street/network access, and ticket vending machines. Stations could have parking areas for transit patrons in either a structure or a surface lot.

Terminus stations have storage tracks or yards for trains. As the number of daily trips expands, additional storage tracks are needed. Areas with storage tracks include Lakewood, Everett, and south of the King Street Station in Seattle. Maintenance for Sounder vehicles is currently conducted in a yard and shop facility south of King Street Station. Sound Transit is working to determine the feasibility of building a new Sounder Yard and Shop for operation and maintenance by 2020.

In commuter rail service, conventional rail passenger coaches can either be pulled by a locomotive or diesel multiple unit (DMU). A DMU is a train that is powered by diesel engines that are incorporated into one or more of the train carriages and does not require a separate locomotive for propulsion. Sound Transit commuter rail trains currently use locomotives for propulsion. For the purposes of this Draft SEIS, new commuter rail corridors and expanded services are assumed to consist of the same commuter rail trains being used to operate the current Sounder service. However, given the long-term nature of the Long-Range Plan, other types of passenger coaches and traction could be used as rail technology advances, service levels increase, or operational plans change.

Current commuter rail service operated by Sound Transit

- Conventional rail passenger coaches are pulled by a locomotive
- Average station spacing is large, enabling higher average speeds compared to other transit services
- Service levels and periods reflect the direction of the majority of commuters' travel

The average station spacing is large enough to allow for higher average speeds and distances traveled compared to other transit services. Typical service levels and periods reflect the direction of the majority of commuters' travel.

Commuter rail service under the two alternatives being considered would be similar to that currently operated by Sound Transit. Rail lines would generally be shared with existing rail traffic for freight and Amtrak intercity rail. In some cases, such as spur lines or other facilities, existing rail rights-of-way that have little to no existing rail traffic could be used.

2.1.2 Regional express bus/bus rapid transit

Regional express bus and bus rapid transit (BRT) are bus systems that provide faster and more reliable service between and to regional centers than local buses. They also provide more flexibility to adjust to a variety of transit demand and corridor conditions than rail systems. Sound Transit currently provides 26 ST Express bus routes, with many of these routes operating in high-occupancy vehicle (HOV) lanes on I-5, I-405, I-90, and SR 520, and in business access and transit (BAT) lanes on SR 522. Many of these ST Express bus routes use direct access ramps from freeways to connect to park-and-rides and transit centers, such as the Eastgate Transit Center off of I-90. As part of the *Sound Move* program, Sound Transit has worked closely with WSDOT to build HOV direct access ramps throughout the region to improve transit access to the HOV lane system.

Typical Regional Express Bus

ST Express buses are currently operated and maintained by local transit operators (Pierce Transit, King County Metro, and Community Transit). Sound Transit is also studying the feasibility of building a new bus base.

As shown in Figure 2-2, BRT systems operate in a variety of rights-of-way, including dedicated busways (such as along freeways), on HOV lanes, and on arterials partly or fully outside general traffic lanes. BRT also has the flexibility to mix these approaches within a given corridor. BRT that operates principally on exclusive rights-of-way with a high degree of grade separation can be considered as regional HCT, while other forms of BRT and Regional Express bus service that do not operate principally on exclusive rights-of-way may in some cases be considered interim services to HCT.

BRT service within the Sound Transit district could range from low-cost priority treatments for buses operating on arterial roadways and BAT lanes, to higher cost fully grade-separated busways. Sound Transit's current ST Express bus service is an example of BRT that currently operates on freeway HOV lanes or managed lanes outside of general traffic lanes for at least a portion of their route.

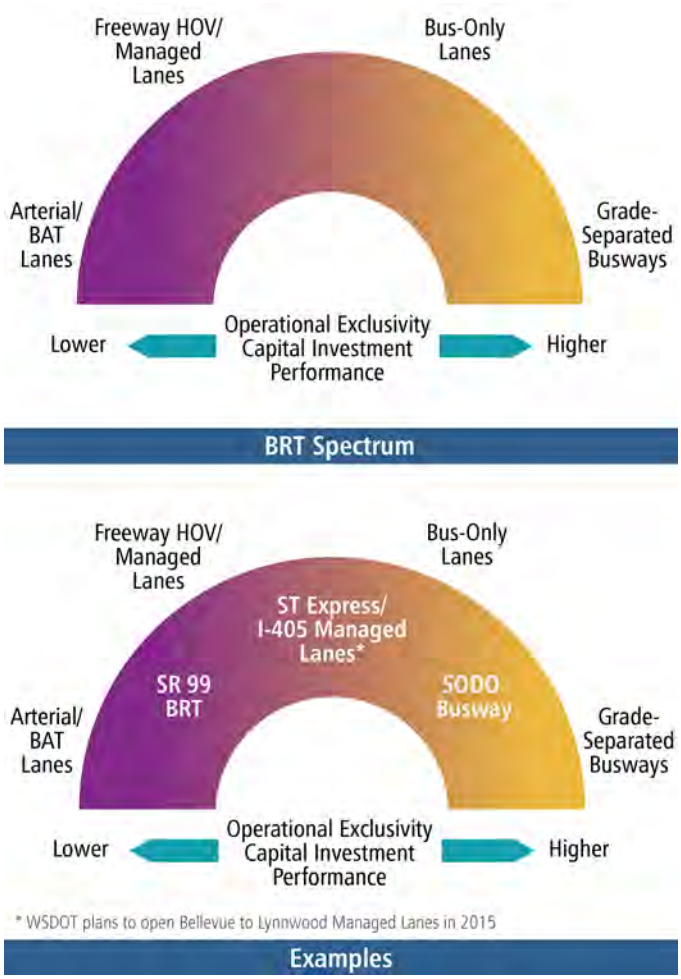


Figure 2-2. BRT spectrum of improvements

At the lower end of the spectrum, buses share lanes with general purpose traffic or other HOVs, and turning traffic and can be impacted by operations in adjacent general purpose travel lanes. At the higher end of the spectrum, busways feature buses operating in exclusive rights-of-way that are not impacted by operations in adjacent general purpose lanes. Figure 2-3 depicts a typical arterial BRT configuration.

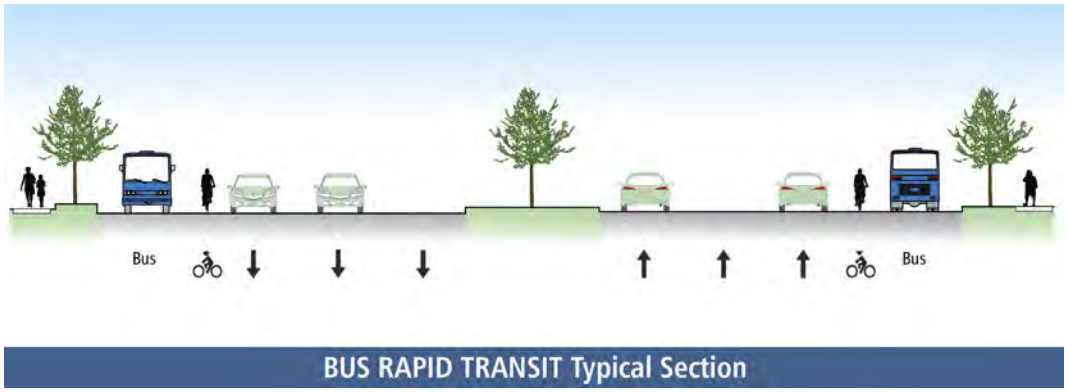


Figure 2-3. Typical arterial BRT configuration

FTA's primary grant program for funding major transit capital investments, such as new and expanded BRT services, is under the New Starts and Small Starts program as authorized by 49 USC 5309. BRT projects eligible for New Starts or Small Starts funding include projects that:

- Operate on a separate right-of-way (such as new or extended fixed guideways)
- Operate BRT in mixed traffic and invest in features such as park-and-ride facilities, transit stations, signal priority, and other features that support the corridor
- Improve capacity

For purposes of this Draft SEIS, the term "regional express bus/BRT" for both alternatives encompasses the full spectrum of BRT, from all forms of regional express bus currently operated under *Sound Move* and ST2 to BRT that would operate in exclusive rights-of-way without other vehicles. Regional express bus/BRT services and facilities could be similar to the existing programs that deliver transit service and direct connections between urban centers throughout the region. Many BRT services build upon the core system of HOV lanes in place or planned by WSDOT. BRT services typically offer a limited number of stops within a given community and provide two-way services all day long. BRT facilities could also include transit centers for convenient connections to rail or local transit. Some stations may also provide park-and-ride facilities.

Regional express bus/BRT services that do not operate principally in exclusive right-of-way may be considered as an interim HCT mode.

2.1.3 Streetcar

Typical Streetcar

The First Hill Streetcar, currently under construction in the City of Seattle between Pioneer Square and Capitol Hill, is a cooperative effort between Sound Transit and the City of Seattle. This line was funded under ST2 because a preferred extension of Central Link as identified by the Sound Transit Board in May 2004 included a First Hill light rail station. However, later technical studies found considerable engineering, geologic, and construction risks at the First Hill Station site. The Sound Transit Board authorized technical work on a potential First Hill transit connector (streetcar and bus), and the ST2 Plan adopted by the Board in 2008 included funding for the First Hill Streetcar to connect downtown Seattle, First Hill, and the future Capitol Hill light rail station. The City of Seattle is planning additional streetcars in accordance with its Transit Master Plan (Seattle 2012).

While streetcars have some similar characteristics to at-grade light rail, typically streetcars operate with less exclusivity than at-grade light rail; stations are typically located closer together; and platforms can be smaller. Streetcars often operate within mixed traffic in non-exclusive rights-of-way. Overhead power and supporting systems for the trains are also needed, along with maintenance and control facilities. Figure 2-4 depicts a typical streetcar configuration.

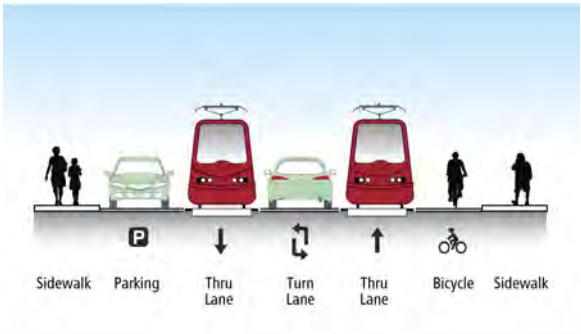


Figure 2-4. Typical streetcar configuration

2.2 Planning process

Sound Transit is updating its Long-Range Plan to establish a long-term vision of transit modes, corridors, and supporting facilities and programs that is consistent with updated local and regional plans. Initial input on that vision was received during the SEIS scoping process, resulting in a wide array of options that are evaluated in this Draft SEIS and that the Board could choose from when updating the Long-Range Plan. An updated plan could incorporate some or all of the suggestions made during scoping.

The Long-Range Plan is "fiscally unconstrained," which means that the transit options contained in the plan are *not* limited by funding availability. In contrast, the system plan that may ultimately by developed by the Sound Transit Board from the Long-Range Plan will be fiscally constrained, with funding subject to voter approval.

The Long-Range Plan is scheduled to be updated by the Sound Transit Board by the end of 2014. If so directed by the Board, the updated Long-Range Plan would then be used as a guide for developing the next system-level plan that builds upon ST2. As noted above, the system plan would be fiscally constrained with funding to be approved by voters. The Board would decide if and when to initiate a ballot measure for a proposed new Sound Transit system plan.

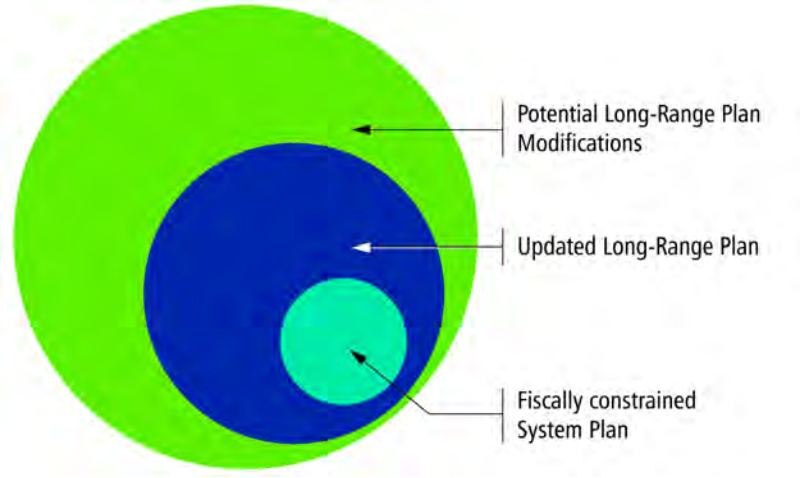


Figure 2-5. Relationship of all proposed modifications to a fiscally constrained system plan

As with previous system plans (*Sound Move* and ST2), the next system plan would encompass a specific set of projects, services, and policies and programs designed to build upon previous phases, consistent with the Long-Range Plan. As shown in Figure 2-5, the potential Long-Range Plan modifications that would be included in a future system plan is small compared to all the suggestions received during the SEIS scoping process.

2.2.1 Scoping

To begin the environmental review process for the Long-Range Plan Update, a scoping notice was issued by Sound Transit on October 18, 2013. Notice was given to federal, state, and local agencies, tribes, and the public to provide an opportunity to participate in the planning process. The public scoping comment period was held between October 25 and November 25, 2013 to:

- Give the public, local jurisdictions, public agencies, tribes, and other stakeholders a chance to learn more about the Long-Range Plan Update and to provide comments
- Help Sound Transit identify a range of HCT improvements to consider in the Draft SEIS and which environmental topics to address when evaluating those improvements

The scoping period was designed to support Washington State Environmental Policy Act (SEPA) review, but the Long-Range Plan Update and subsequent system plan could be relied upon during future project-level NEPA review as well.

Comments made during the scoping process helped Sound Transit determine which improvements and environmental issues would be studied in the Draft SEIS. Those potential Long-Range Plan modifications studied could be selected, in whole or in part, by the Board for inclusion in an updated Long-Range Plan.

Comments made during the official scoping comment period were collected by Sound Transit via mail, email, comment form, and an online survey. Verbal comments were also collected by a court reporter at the public scoping meetings. More than 5,000 scoping comments were received from jurisdictions, agencies, tribes, stakeholder organizations, and the public. Common themes during scoping included:

- **Service—**Commenters expressed support for an enhanced HCT system, integration with other modes and service providers, and enhanced service hours, and they offered bus-related service and route suggestions. Several cities suggested adding or expanding parking at stations.

- **Mode—**Commenters expressed a general preference for rail in the long-term and using BRT as a precursor to light rail.
- **Corridors—**Commenters suggested specific corridors where they would like Sound Transit to consider adding HCT or a supporting service. This included suggestions for extending existing corridors and adding support services or HCT in new or additional corridors.
- **Access—**Commenters expressed a desire for improved access to the Sound Transit system, such as new and expanded park-and-ride facilities, bicycle and pedestrian facilities and circulation improvements, local transit connections, and roadway and direct access connections.
- **Environment—**Commenters shared support for transit-oriented development and focused on sustainability, land use, energy, environmental justice, noise, and air quality/greenhouse gases.

Many suggestions made during scoping were related to services or facilities within corridors that are part of the Current Plan Alternative. These suggestions were presumed to be developable under the Current Plan Alternative. Suggestions for new transit corridors were put through a screening process to develop the Potential Plan Modifications Alternative.

Comments were also received on other topics such as roads and highways, funding, and agency cooperation. The *Scoping Summary Report* for the 2014 Long-Range Plan Update presents additional details about the comments received. These comments have been considered in the screening and alternatives development processes.

Scoping Summary Report

The *Scoping Summary Report* can be found on the Sound Transit website at www.soundtransit.org/Projects-and-Plans/Long-range-Plan-update

2.2.2 Screening

The input received during scoping was used to develop the Potential Plan Modifications Alternative evaluated in this Draft SEIS.

The suggestions received during scoping were reviewed and consolidated to identify new ideas for purposes of modifying the Long-Range Plan. Suggestions that were either (1) not already in the existing Long-Range Plan or (2) could not be implemented under the frame-work of the existing Long-Range Plan were carried forward into the screening process for evaluation to determine if they could become potential plan modifications for an "Action" alternative. The screening criteria used during this process were based on the purpose and need for the Long-Range Plan Update and the goals and objectives described in Chapter 1 of the Draft SEIS.

The following screening criteria were used to determine if a suggestion should be included in the Action alternative:

- Does it meet the statutory definition of HCT or necessary supporting facility or service?
- To what extent does it provide public transportation services to regional growth centers and help facilitate an integrated system of transit services?

- To what extent is it consistent with earlier decisions or actions made as part of *Sound Move* or ST2 and does it avoid duplication of Sound Transit service?
- Is it within the Sound Transit district or represent a reasonable next step for extending HCT service or connecting to the regional HCT system?
- Is it defined in enough detail to be analyzed?

The suggestions that met the screening criteria were included in the Potential Plan Modifications Alternative. Suggestions that did not meet the screening criteria are not evaluated in this Draft SEIS and are discussed in Section 2.6.

2.2.3 Other high-capacity transit system studies

To help inform future decisions for the next phase of HCT system expansion by its Board of Directors, Sound Transit is currently conducting five high-capacity transit corridor studies that will also be completed in 2014. These corridors were all included in the 2005 Long-Range Plan (with the exception of downtown Seattle to West Seattle) and planning-level studies for all corridors are a part of the ST2 Plan:

- Ballard to downtown Seattle HCT Corridor Study
- Central and East HCT Corridor Study
  - Ballard to University District
  - Redmond to Kirkland to University District
  - Kirkland to Bellevue to Issaquah
  - I-405 BRT
  - Eastside Rail Corridor
- Federal Way to Tacoma HCT Corridor Study
- Lynnwood to Everett HCT Corridor Study
- South King County HCT Corridor Study
  - Downtown Seattle to West Seattle to Burien
  - Renton to Tukwila, SeaTac, and on to Burien

All of the corridors listed above are also evaluated in this Draft SEIS. However, the HCT corridor studies and the Long-Range Plan Update Draft SEIS are evaluating potential transit improvements at a different scale. The HCT corridor studies are evaluating options within a more localized area and in greater detail; this Draft SEIS generally identifies its plan-level alternatives and evaluates their impacts at a broader regional level. For example, this Draft SEIS identifies potential HCT improvements in terms of general corridors and considers potential ridership in terms of a large regional system. Alternatively, the HCT corridor studies are evaluating a variety of alternative alignments and mode options within corridors, and considering potential ridership for those specific alternative alignments and mode options. Preferred alignments or modes are not being identified as part of the HCT corridor study process.

The information for the HCT corridor studies is being developed to inform the Sound Transit Board during the Long-Range Plan Update process and future system planning efforts. To the extent possible, this Draft SEIS incorporates information available from these HCT corridor studies, all of which are in progress. After the Long-Range Plan Update

is adopted, information from the HCT studies will be used as Sound Transit develops the next system plan.

2.3 Current Plan Alternative

The Current Plan Alternative constitutes the "no action" alternative required by SEPA. SEPA requires that the "no action" alternative be evaluated and compared to other alternatives (WAC 197-11-440(5)(ii)). It provides the basis for comparing benefits and impacts in the SEPA analysis. The "no action" for non-project proposals is the existing plan with no changes to current management direction. The No Action alternative is referred to in this Draft SEIS as the Current Plan Alternative. This alternative is comprised of:

Primary modes or types of service for HCT in the current Long-Range Plan

Light rail

Commuter rail

Regional Express/ Bus rapid transit

1. The current 2005 Long-Range Plan, and
2. Sound Transit Board actions implementing the plan as described below.

Subsequent to adoption of the 2005 Long-Range Plan, the Sound Transit Board developed the system plan known as Sound Transit 2 (ST2), financing for which was approved by voters in November 2008. As part of the development and implementation of the ST2 Plan, a number of decisions were made by the Sound Transit Board that affected certain corridors in the 2005 Long-Range Plan. These Board actions implementing the Plan are considered as part of the Current Plan Alternative for this Draft SEIS. Key Board decisions that affected corridors listed in the Long-Range Plan included the following:

Primary north-south corridors in the Current Plan

- SR 99 and I-5 from Everett to Tacoma
- SR 167 from Renton to Tacoma
- I-405 from Lynnwood to Tukwila
- Eastside Rail Corridor
- BNSF railway from Everett to Seattle and Tacoma, with a spur to Lakewood and DuPont

Primary east-west corridors in the Current Plan

- I-90 from Seattle to Issaquah
- SR 520 from Seattle to Redmond
- SR 522 from north Seattle to Woodinville

- In 2006 the Sound Transit Board selected light rail (LRT) as the mode from Seattle to downtown Redmond as part of the East Link project. (In the 2005 Adopted Long-Range Plan this segment was listed as "LRT or LRT Convertible BRT.")
- In 2011 the Sound Transit Board selected light rail as the mode from Northgate to Lynnwood as part of the Lynnwood Link project. (In the 2005 Adopted Long-Range Plan this segment was listed as "Potential Rail Extension.")
- In 2013 the Sound Transit Board selected light rail as the mode from SeaTac to Federal Way as part of the environmental review for the Federal Way Link Extension project. (In the 2005 Adopted Long-Range Plan this segment was listed as "Potential Rail Extension.")
- In 2013, the Sound Transit Board selected light rail as the mode and the north downtown Central Corridor (Hilltop via Stadium District) as the preferred corridor for the potential expansion of Tacoma Link.

Figure 2-6 displays Sound Transit's envisioned network of transit services at a corridor-wide level based on the 2005 Long-Range Plan and subsequent Board actions described above. This map includes corridors where service is already operating, under construction, or in project-level design and environmental review. These include corridors that were in *Sound Move* and ST2. The Current Plan Alternative (Figure 2-6) also reflects that—with implementation of light rail generally paralleling I-5 from Lynnwood through Seattle to Federal Way—grade-separated BRT operating in its own exclusive right-of way is no longer included along I-5 in this same corridor.

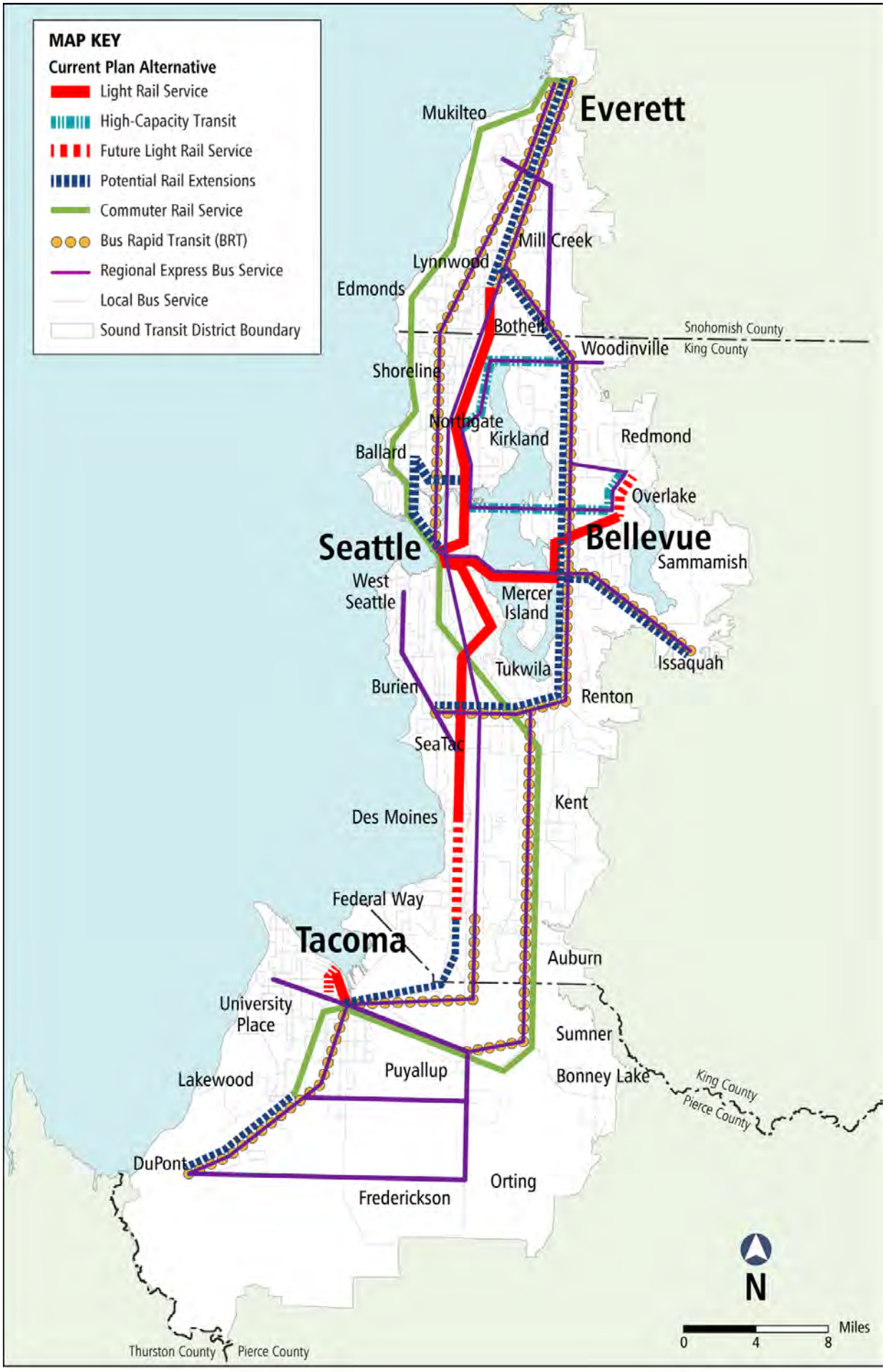
For purposes of analyzing potential impacts on transportation and transit ridership associated with the Current Plan Alternative, the Draft SEIS includes all of those corridors shown in Figure 2-7. The map also includes the types and general location of future regional transit services that, based on the current Long-Range Plan, could be provided in future development phases if they are funded. The 2005 Long-Range Plan explicitly states that "the lines on the map representing future service investments are intended to show general corridors that would be served, and do not represent specific routings or alignments."

On Figure 2-7, the corridors in operation, under construction, or in project-level environmental review are screened back because they have already been or are currently subject to project-level environmental review. This Draft SEIS addresses potential impacts that could occur in the future if infill stations, park and rides, new track, maintenance facilities, or other infrastructure were built along those corridors already in service or some level of implementation. The remaining corridors—those that have not yet advanced—are labeled and further described below. For the Current Plan Alternative, Chapter 4 of this Draft SEIS focuses primarily on potential environmental impacts associated with the development of new transit facilities within the remaining corridors shown in Figure 2-7.

To accommodate additional capacity and service into or through downtown Seattle, additional dedicated transit facilities could be needed. Options could include designating additional surface streets as transit-only, aerial guideway, or a new tunnel under downtown Seattle.

2.3.1 Light rail

Light rail is the highest capacity mode included in the Current Plan Alternative and is intended to serve the core of the regional system where transit ridership is the highest. Light rail is included in the Long-Range Plan to connect and serve the four major regional centers: Everett, Seattle, Tacoma, and Bellevue.



Source: Sound Transit 2014

Figure 2-6. Current Plan Alternative

Source: Sound Transit 2014

Figure 2-7. Current Plan Alternative—corridors analyzed in this Draft SEIS

Many of the light rail elements included in the 1996 and 2005 Long-Range Plans were subsequently funded through *Sound Move* and ST2 and are currently operating, in final design, under construction, or in project-level environmental review as described below. Most of these elements have a service target date no later than 2023, as shown in Figure 2-8.

- **Central Link—**The approximately 16-mile rail line from Sea-Tac Airport to downtown Seattle serves 13 stations. Service on Central Link light rail began in 2009.
- **S. 200th Link Extension—**This 1.6-mile extension from Sea-Tac Airport south to S. 200th Street will serve the new Angle Lake Station. Construction is underway and service is expected to begin in 2016.
- **University Link Extension—**The 3.15-mile extension from downtown Seattle to the University of Washington is under construction. It includes two underground stations, one located on Capitol Hill and the other at Husky Stadium. Service is expected to begin in 2016.
- **Northgate Link Extension—**The 4.3-mile segment will extend north from Husky Stadium and have three stations in the University District, Roosevelt, and Northgate. This extension is under construction with service expected to begin in 2021.
- **Lynnwood Link Extension—**The 8.5-mile extension from Northgate to Lynnwood, authorized by ST2, is undergoing environmental review and preliminary design. The extension could have four to six new stations. The start of service is targeted for 2023.
- **East Link—**This 14-mile extension is in final design and is targeted to begin service in 2023. East Link will connect from the International District Station in Seattle across I-90 to Bellevue and Overlake Village with ten stations. An additional 3.7-mile extension to downtown Redmond with two stations is not funded for construction.
- **Federal Way Link Extension—**Sound Transit is preparing an EIS to evaluate extending light rail about 8 miles from South 200th Street to the Federal Way Transit Center with three to five stations. ST2 included this project; however, funding is only available for construction to the Kent/Des Moines station with service beginning in 2023.
- **Tacoma Link—**The 1.6-mile Tacoma Link line from Tacoma Dome Station to downtown Tacoma serves six stations. ST2 authorized an extension to the west of the current line to the Stadium and Hilltop districts. Environmental review and preliminary design is underway for this potential expansion; however, it would require funding partners and additional funding from federal and other grant sources before it can be built.
- **Operations and maintenance facilities—**Sound Transit has two light rail operations and maintenance facilities. The Forest Street operations and maintenance facility, located in the industrial district south of downtown Seattle, serves the Central Link light rail trains. Sound Transit is currently evaluating four sites (one in Lynnwood and three in Bellevue) for an operations and maintenance satellite facility. This satellite facility is needed to accommodate the expansion of the light rail system. The Tacoma operations and maintenance facility, located on E. 25th Street east of the Tacoma Dome Station, serves the Tacoma light rail trains. The Tacoma Link facility would be expanded as part of the Tacoma Link expansion.

Figure 2-8. Current Plan Alternative—light rail elements

For the above listed corridors, project-level environmental reviews have either been completed or are underway. Therefore, potential environmental impacts within these light rail corridors are only discussed relative to additional infrastructure or service needs that could be implemented in the future (e.g. new infill stations, operations and maintenance facilities, or park-and-ride facilities—see Section 2.3.5 below).

Some of the remaining corridors in the Current Plan Alternative were identified as "Potential Rail Extensions" in the 2005 Long-Range Plan but have not yet been included in a system plan for project development or construction. Therefore, decisions on mode in those corridors have not yet been made but could be light rail. For purposes of analyzing potential impacts associated with the Current Plan Alternative, corridors A through H reflect potential rail extensions that were analyzed as light rail corridors (see Table 2-1 and Figure 2-7). Some of these corridors were also evaluated for commuter rail and/or BRT (see "Commuter rail" and "Regional express bus/bus rapid transit" sections below).

Table 2-1. Potential light rail corridors in the Current Plan Alternative

ID	Corridor location
Potential rail extensions, assumed light rail	
A	Tacoma to Federal Way
B	Burien to Renton
C	Bellevue to Issaquah along I-90
D	Renton to Lynnwood along I-405
E	Renton to Woodinville along Eastside Rail Corridor
F	Downtown Seattle to Ballard
G	Ballard to University of Washington
H	Lynnwood to Everett

These potential rail extension corridors are described below.

A Tacoma to Federal Way—A potential rail extension corridor from the Federal Way Transit Center to the Tacoma Dome Station.

B Burien to Renton—A potential rail extension corridor connecting Burien, Tukwila, and Renton along SR 518 and I-405.

C Bellevue to Issaquah—A potential rail extension corridor along I-90 from Bellevue to Issaquah. This corridor could include tunnel segments.

D Renton to Lynnwood—A corridor connecting Renton, Bellevue, Totem Lake, Woodinville, and Lynnwood along I-405. Also identified in the 2005 Long-Range Plan as a BRT corridor, this "potential rail extension" could be light rail.

E Renton to Woodinville—A corridor connecting Renton, Bellevue, Totem Lake, and Woodinville along the Eastside Rail Corridor (ERC) corridor. This "potential rail extension" could either be a light rail, commuter rail, or BRT corridor. The Central and East HCT Corridor Study is evaluating light rail and commuter rail on the ERC.

Sound Transit has an HCT easement on the Eastside Rail Corridor from Woodinville to Renton.

F Downtown Seattle to Ballard—A potential rail extension corridor from downtown Seattle to Ballard (currently being studied in partnership with the Seattle Department of Transportation). Tunnels could be used along segments or the entire route.

G Ballard to University of Washington—A potential rail extension corridor from Ballard to the University District. A tunnel could be used along the entire route.

H Lynnwood to Everett—A potential rail extension corridor that would continue light rail north from the Lynnwood Link Extension to Everett.

Light rail segments under consideration as part of the Current Plan Alternative are assumed to have substantially the same service characteristics as the Link light rail system implemented as part of *Sound Move* and ST2. Specifically, they are assumed to operate primarily on exclusive rights-of-way (on the surface, below ground, or on elevated structures) or on surface streets with protected rights-of-way. Light rail features two- to four-car trains operating on dual trackways with overhead power sources. Stations, park-and-rides, and supporting facilities, such as vent shafts, traction power substations, storage tracks, and operations and maintenance facilities, could be added to the existing segments currently operating or in implementation and would also be required for future extensions.

For any of the light rail corridors included in the Current Plan Alternative, regional express bus/BRT service could be implemented as an interim HCT mode for all or portions of each corridor until funding becomes available to construct a continuous light rail system in the corridor. This is similar to the current Sound Transit system operating today, where some regional express bus routes are operating in corridors identified for transition to light rail when funding becomes available.

2.3.2 Commuter rail

The Everett–Seattle–Tacoma–Lakewood Commuter rail line (Sounder train) provides peak-period major commute-oriented connections and transit centers on 82 miles of existing rail corridor between Everett, downtown Seattle, Tacoma, and Lakewood. Under the Current Plan Alternative, passenger rail services using existing rail rights-of-way could include increased service levels within and beyond the current commuter-oriented services operated by Sound Transit (up to all-day service). Additional stations and improved station facilities could also be provided along the existing lines, along with related parking and transit transfer facilities (see Section 2.3.5). Increasing the frequency or extending commuter rail service hours could require additional investment in rail infrastructure, such as operations and maintenance facilities, control and communication systems, and expanded rights-of-way for safety and operating efficiency. This could include adding storage tracks or other track capacity improvements such as line extensions to connect to or upgrade existing rail lines. Chapter 4 of the Draft SEIS addresses potential impacts that could occur in the future if new infill stations, new track, or other supporting rail infrastructure were built along the existing Sounder line already in service.

Some of the corridors in the Current Plan Alternative identified as "Potential Rail Extensions" in the 2005 Long-Range Plan have not yet been included in a system plan for construction or the project development phase. These corridors, shown on Figure 2-7 and listed in Table 2-2, could be commuter rail and were evaluated as such for purposes of analyzing potential impacts associated with the Current Plan Alternative.

Table 2-2. Potential commuter rail corridors in the Current Plan Alternative

ID	Corridor location
Potential rail extension, assumed commuter rail	
I	DuPont to Lakewood
J	Renton to Woodinville along Eastside Rail Corridor

These corridors are briefly described below.

I **Lakewood to DuPont—**Commuter rail service could be extended 9 miles south from Lakewood, the southern terminus of the existing Sounder commuter route, to DuPont.

J **Renton to Woodinville—**In the 2005 Long-Range Plan, this is a broad corridor that includes I-405 and the ERC. The ERC is a former BNSF rail corridor. The portion of the ERC identified by Sound Transit as a potential rail corridor stretches from Renton to Woodinville, generally following I-405. Commuter rail, light rail, and BRT could be considered as the HCT mode in the ERC.

2.3.3 Regional express bus/bus rapid transit

The Current Plan Alternative identifies numerous corridors for regional express bus, BRT, or in most cases both. Sound Transit currently operates 26 regional express bus (ST Express) routes, many of which operate in HOV lanes. The corridors they operate on are:

- Seattle to DuPont on I-5
- Seattle to Everett on I-5
- Burien to Bellevue to Lynnwood on I-405
- Seattle to Bellevue to Issaquah on I-90
- Seattle to Woodinville via SR 522
- Federal Way to Auburn to Puyallup on SR 167
- Puyallup to Renton on SR 167

Some of these corridors are also shown as BRT corridors in the 2005 Long-Range Plan and could also be considered for higher performing BRT operating within exclusive rights-of-way where feasible. For example, as part of the Central and East HCT Corridor Study, BRT is being evaluated for I-405 based on the adopted 2002 I-405 WSDOT Master Plan. As part of the same study, BRT is also being evaluated in the adjacent Eastside Rail Corridor. The 2005 Long-Range Plan also shows SR 99 between Seattle and Everett as a BRT corridor. The Current Plan Alternative evaluates higher performing BRT service along portions of I-5, I-405, the Eastside Rail Corridor, I-90, SR 99, and SR 167. BRT was also evaluated along sections of SR 520 and SR 522, where those corridors were identified in the 2005 Long-Range Plan as "HCT corridors" (see section 2.3.4 below).

Six corridors specifically identified exclusively as regional express bus service (no BRT) in the 2005 Long-Range Plan, but not yet in service are:

- Puyallup to DuPont via SR 162 and Cross Base Highway
- Puyallup to Lakewood on SR 512
- Puyallup to Tacoma on SR 167
- West Seattle (near the West Seattle Junction) to SeaTac on arterial roadways
- Kirkland to Redmond on NE 85th Street-Redmond Way (this was in service as Express Route 540 from Redmond to Kirkland to the U-District but was truncated to serve the Kirkland Transit Center to U-District)
- North Bothell to Mill Creek to Mukilteo on SR 527 and SR 526

These corridors are all evaluated in the Current Plan Alternative as regional express bus service only.

For purposes of analyzing most potential impacts associated with the Current Plan Alternative, this Draft SEIS focuses primarily on the potential regional express bus/BRT corridors listed in Table 2-3 and shown on Figure 2-7. The Draft SEIS also discusses potential impacts associated with new supporting bus facilities along existing bus corridors.

Table 2-3. Regional express bus/BRT corridors in the Current Plan Alternative

ID	Corridor location
Bus rapid transit (BRT)	
M	Federal Way to DuPont along I-5
N	Renton to Puyallup along SR 167
O	Bellevue to Issaquah along I-90
P	Renton to Woodinville along Eastside Rail Corridor
Q	Renton to Lynnwood along I-405
R	Seattle to Everett along SR 99
S	Lynnwood to Everett along I-5
Regional express bus	
T	Puyallup to DuPont via Cross Base Highway
U	Puyallup to Lakewood
V	Puyallup to Tacoma
W	SeaTac to West Seattle
X	Redmond to Kirkland
Y	North Bothell to Mill Creek to Mukilteo

Sound Move and ST2 projects have implemented improvements increasing the speed, reliability, and capacity of regional express bus/BRT service. Several expansion and access improvements have also been completed at park-and-ride lots served by regional express bus/BRT.

Under the Current Plan Alternative, regional express bus/BRT services and facilities could continue to provide and expand transit service and direct connections between urban centers throughout the region. They could build upon the core system of HOV lanes in place or planned by WSDOT, or they could be implemented

within their own exclusive rights-of-way. Regional express bus/BRT services could also increase frequencies as well as add more services as future demand warrants. They could also include additional or expanded stations, new or expanded park-and-rides, or transit centers. New or expanded operations and maintenance bases would also be needed to serve larger bus fleets as the system grows. Some of these facilities could be shared or developed in partnership with local transit operators, such as King County Metro, Community Transit, or Pierce Transit.

In the Current Plan Alternative, some of the regional express bus/BRT services could ultimately transition to light rail. This is similar to the current Sound Transit system operating today, where some regional express bus routes are operating in corridors where light rail will be constructed as part of ST2.

2.3.4 High-capacity transit corridors

The Current Plan Alternative includes two corridors identified in the 2005 Long-Range Plan as "HCT," without specifying a particular mode. These corridors could be implemented as light rail or as regional express bus/BRT. For purposes of analyzing potential impacts associated with the Current Plan Alternative, this Draft SEIS evaluates these two HCT corridors, listed in Table 2-4 and shown on Figure 2-7, as both light rail and BRT.

Table 2-4. HCT corridors in the Current Plan Alternative

ID	Corridor location
HCT (mode not specified)	
K	University of Washington to Redmond via SR 520
L	Northgate to Bothell on SR 522

These HCT corridors are briefly described below.

K University of Washington to Redmond—An HCT corridor across SR 520 connecting the University District to Redmond. This corridor could include a short tunnel segment west of Lake Washington.

L Northgate to Bothell—An HCT corridor along SR 522 around the north end of Lake Washington to connect Northgate, Bothell, and Woodinville.

2.3.5 Representative projects, programs, and policies

The Current Plan Alternative assumes that stations, operations and maintenance facilities, access improvements, and other supporting transit facilities may be implemented along any of the transit corridors shown on Figure 2-7. The 2005 SEIS referred to these as "representative projects" since they represent the types of projects that could be built along any existing or future corridor. Building from the list in the 2005 Long-Range Plan SEIS, Appendix A to this Draft SEIS includes an updated list of representative projects for the Current Plan Alternative. This list is not inclusive of all possible projects within the Current Plan Alternative. New or different projects not on the list, but similar to the types of representative projects listed, could be implemented at the project level. Specific projects, locations, operating characteristics, and levels of service would be evaluated and determined during future project-level planning and environmental reviews.

The types of representative projects are further discussed by mode below.

Light rail

Representative infrastructure improvements, services, and supporting facilities associated with light rail include the following:

- **Service expansion—**Expanding service within future corridors such as in Seattle, north of Seattle to Everett, south of SeaTac to Tacoma, and on the Eastside
- **Transit stations and park-and-ride facilities—**New stations along corridors yet to be built or adding new stations where there is infill or expansion of service, including locations such as the Boeing Access Road Station. New stations could create additional opportunities for transit-oriented development. Station modifications could occur at existing facilities such as the International District/Chinatown Station. New park-and-ride facilities or expanded capacity could be added at existing facilities, such as the Tukwila/International Boulevard Station
- **Pedestrian and bicycle access and safety—**Adding or improving pedestrian and bicycle connections could include sidewalks, bike lanes, pedestrian bridges, and bicycle storage. These improvements could occur in any station area
- **Operations and maintenance facilities—**Expanding operations and maintenance capacity by constructing additional regular or satellite facilities to support expanded light rail operations

Commuter rail

System-wide representative projects for commuter rail include the following:

- **Service expansion—** Expanding service to additional locations, such as to DuPont, or adding express service, increasing the number of trains operating per day, or expanding service to operate all-day in both directions
- **Transit stations and park-and-ride facilities—** Adding rail stations in locations such as Shoreline, Georgetown, Ballard, and north downtown Seattle (Broad Street vicinity). Improving existing stations, such as extending station platforms to accommodate longer trains (10 cars), additional surface and structured parking, pedestrian bridges, additional platform canopies, or other access improvements
- **Pedestrian and bicycle access and safety—**Adding or improving pedestrian and bicycle connections could include sidewalks, bike lanes, pedestrian bridges, and bicycle storage. These improvements could occur in any station area
- **Operations and maintenance facilities—**Improving tracks and signals, and expanded or new storage yards and maintenance shops for Sounder

Regional express bus/bus rapid transit

Representative projects or service for regional express bus/BRT facilities include the following:

- **Service expansion—** Expanding service to additional locations and increasing service along existing bus routes
- **Transit stations and park-and-ride facilities—**Adding new or expanding existing transit stations, transit centers, and park-and-ride facilities
- **HOV direct access—**Building direct access ramps or other improvements linking transit facilities to regional freeway HOV system improvements, in accordance with the

long-range HOV system plan defined in PSRC's *Transportation 2040*, including I-405, I-5, I-90, SR 167, SR 522, and SR 520

- **Transit priority treatments—**Implementing signal improvements, arterial HOV lanes, or other transit-priority investments at key intersections or arterials throughout the region to improve transit speed and reliability
- **Rider amenities—**Investing in technologies to provide real-time "next bus" and "next stop" information to customers, off-vehicle fare payment, and level boarding of vehicles
- **Grade or barrier separation—**Separating sections of freeway/arterial transit lanes with grade- or barrier-separation to provide fully exclusive busway facilities

The plan includes representative projects with additional speed, reliability, service frequency, safety, operations and maintenance facilities, and passenger facilities/amenities, as well as vehicle fleet expansion and replacement.

Policies and programs

The Long-Range Plan also addresses policies and programs that the Sound Transit Board has adopted. Appendix A lists some of the programs and policies included in the 2005 Long-Range and those that have subsequently been adopted by the Board. Examples of the policies and programs currently in effect include the following:

- Transit-Oriented Development (TOD) Policy (December 2012)
- Transit-Oriented Development Program Strategic Plan Update (April 2014)
- Sustainability Plan (June 2011)
- System Access Policy (March 2013)
- Updated Bicycle Policy (April 2010)
- Environmental Policy (April 2004)

Sound Transit Policies

Policies and plans are available on Sound Transit's website: www.soundtransit.org

TOD Policy

www.soundtransit.org/Projects-and-Plans/In-Your-Community/Transit-oriented-development

Sustainability Plan and Environmental Policy

www.soundtransit.org/Documents/pdf/about/environment/SustainabilityPlan.pdf

System Access Policy

http://reconnectingamerica.org/news-center/half-mile-circles/2013/sound-transit-system-access-policy/

Updated Bicycle Policy

www.soundtransit.org/About-Sound-Transit/Board-of-Directors/Board-archives/Motions-archive/2010-Motions

The Current Plan Alternative assumes that these policy initiatives and other programs that support major lines of transit service would remain in effect. For example Sound Transit and its partners would continue to work together to make it convenient and easy to move about the region through programs like the ORCA card, which integrated and simplified fare collection among disparate transit agencies. For purposes of this Draft SEIS, these programs and policies are broadly considered.

2.4 Potential Plan Modifications Alternative

The Potential Plan Modifications Alternative assumes implementation of all the elements of the Current Plan and then it adds HCT corridors and services that are potential modifications to the Current Plan. The modifications are suggestions made by jurisdictions, agencies, tribes, stakeholder organizations, the public, and Sound Transit that passed the screening criteria listed in Section 2.2.2. New corridors and modes that comprise the Potential Plan Modifications Alternative are shown in Figure 2-9 and Figure 2-10 and listed under each mode below.

Source: Sound Transit 2014

Figure 2-9. Potential Plan Modifications Alternative—light rail, commuter rail, and high-capacity transit

Source: Sound Transit 2014

Figure 2-10. Potential Plan Modifications Alternative—regional express bus and bus rapid transit

2.4.1 Light rail

New light rail service lines included in the Potential Plan Modifications Alternative are listed in Table 2-5 and shown in Figure 2-9.

Table 2-5. Potential light rail corridors in the Potential Plan Modifications Alternative

ID	Corridor location
Potential rail extensions, assumed light rail	
1	Downtown Seattle to Magnolia/Ballard to Shoreline Community College
2[1]	Downtown Seattle to West Seattle/Burien
3	Ballard to Everett Station via Aurora Village, Lynnwood
4	Everett to North Everett
5	Lakewood to Spanaway to Frederickson to South Hill to Puyallup
6	DuPont to downtown Tacoma via Lakewood, Steilacoom, and Ruston
7	Puyallup/Sumner to Renton via SR 167
8	Downtown Seattle along Madison Street or to Madrona
9	Tukwila to SODO via Duwamish industrial area
10	North Kirkland or University of Washington Bothell to Northgate via SR 522
11	Ballard to Bothell via Northgate
12	Mill Creek, connecting to Eastside Rail Corridor
13	Tacoma to Ruston Ferry Terminal
14	Tacoma to Parkland via SR 7
15	Lynnwood to Everett, serving Southwest Everett Industrial Center (Paine Field and Boeing)

[1] A potential new tunnel under downtown Seattle could also or alternatively support a Ballard-to-Seattle light rail line, which is included in the Current Plan Alternative.

Where new corridors or light rail extensions are being considered, they would have the same characteristics as light rail segments in the Current Plan Alternative. For any of the light rail lines, BRT could be implemented as an interim HCT mode for all or portions of each corridor until funding becomes available. This is how the current Sound Transit system operates today, where some regional express bus routes operate in corridors identified for transition to light rail when funding becomes available.

To accommodate additional capacity and service into or through downtown Seattle, additional dedicated transit facilities could be needed. Options could include designating additional surface streets as transit-only, aerial guideway, or a new tunnel under downtown Seattle.

2.4.2 Commuter rail

Sounder service extensions included in the Potential Plan Modifications Alternative are listed in Table 2-6 and shown in Figure 2-9. There are existing rail lines along Corridors 16 and 18, while there are none along Corridor 17.

Table 2-6. Potential commuter rail corridors in the Potential Plan Modifications Alternative

ID	Corridor location
Potential rail extension, assumed commuter rail	
16	Puyallup/Sumner to Orting
17	Lakewood to Parkland
18	Tacoma to Frederickson

The additional rail segments would have similar physical and operating characteristics to the existing Sounder line.

2.4.3 Regional express bus/bus rapid transit

Additional regional express bus/BRT routes included in the Potential Plan Modifications are listed in Table 2-7 and shown in Figure 2-10.

Table 2-7. Regional express bus/BRT corridors in the Potential Plan Modifications Alternative

ID	Corridor location
Bus rapid transit (BRT)	
22	Puyallup vicinity, notably along Meridian Avenue
23	Madison Street in Seattle
Regional express bus	
24	Issaquah to Overlake via Sammamish and Redmond
25	Renton to downtown Seattle
26	University of Washington Bothell to Sammamish via Redmond
27	Titlow Beach to downtown Tacoma
28	Renton (Fairwood) to Eastgate via Factoria
29	145th Street from I-5 to SR 522
30	North Kirkland to downtown Seattle
31	Woodinville to Bellevue
32	Woodinville to Everett
33	Connection to Joint Base Lewis-McChord
Regional express bus/BRT (mode not specified)	
34	Tacoma to Bellevue
35	Kent to Sea-Tac Airport
36	Puyallup to Rainier Valley

2.4.4 High-capacity transit corridors

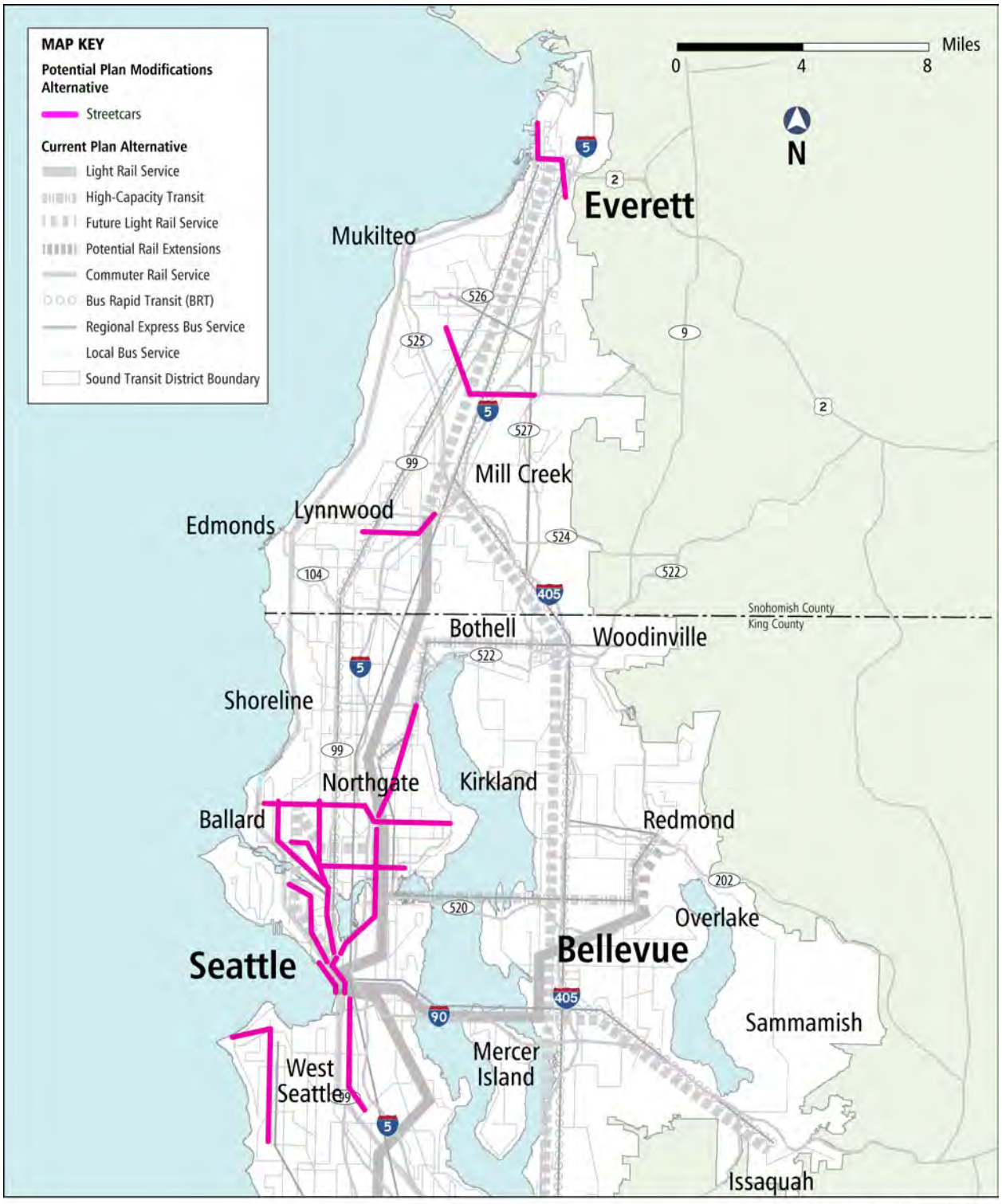
Some suggestions for new HCT corridors or service did not specify a mode. These corridors are listed in Table 2-8 and shown in Figure 2-9. Similar to HCT corridors in the Current Plan Alternative, these new HCT corridors were evaluated as both BRT and light rail corridors.

Table 2-8. HCT corridors in the Potential Plan Modifications Alternative

ID	Corridor location
HCT (mode not specified)	
19	Tukwila Sounder station to downtown Seattle via Sea-Tac Airport, Burien, and West Seattle
20	Downtown Seattle to Edmonds via Ballard and Shoreline Community College
21	West Seattle to Ballard via Central District and Queen Anne

2.4.5 Streetcar

Streetcars are an option to connect areas to regional transit hubs. Potential streetcar corridors in the Potential Plan Modifications Alternative are shown in Figure 2-11 and include increased service to locations such as Phinney Ridge, Lake City, Roosevelt, Ballard, E. Marginal Way, and West Seattle.



Source: Sound Transit 2013

Figure 2-11. Potential Plan Modifications Alternative—streetcars

2.4.6 Representative projects, programs, and policies

Projects

Appendix A includes a list of representative projects that could be implemented along the corridors that comprise the Potential Plan Modifications Alternative. Similar to the list for the Current Plan Alternative, this list reflects the types of projects or support facilities that could be implemented in the future if, and when, any of the HCT corridors (as shown in the Potential Plan Modifications Alternative map) are implemented.

Representative light rail and commuter rail projects associated with these new corridors could include new rail transit service, adding express tracks, new stations, new operations and maintenance facilities, new park-and-ride facilities, and access improvements to stations. New service lines into or through downtown Seattle would require additional capacity, which may include a tunnel, aerial guideway, or designating space on surface streets as transit-only.

Representative projects along regional express/BRT corridors could include new bus bases, park-and-ride facilities, modifying or extending routes, increasing service frequency, expanding service, and adding stops.

Policies and programs

The Potential Plan Modifications Alternative would build upon the existing program and policies and could include new initiatives for the following:

- System access
- Demand management
- Research and technology

2.5 Annexation and extension of Sound Transit services

Sound Transit must follow legislatively mandated steps before annexing areas into the Sound Transit District or extending services beyond the current district boundary. Extensions of service can occur without changing or annexing the district boundary. The Long-Range Plan describes the process and requirements, which are summarized in Sections 2.5.1 and 2.5.2.

Annexation and service extensions can occur under the Long-Range Plan Update alternatives as long as the requirements set forth below are met. During the scoping process, Sound Transit received suggestions both to expand the district boundary and to extend service outside the current boundary, including the following:

- Expand the district boundary to the east and southeast of Kent
- Expand the district boundary between Woodinville and Snohomish to incorporate communities around the northern portions of the Eastside Rail Corridor
- Expand the district boundary to the north to include more of Snohomish County
- Extend Sounder commuter rail to Olympia to the south and to the City of Snohomish to the north
- Extend HCT east to North Bend

Sound Transit would work with interested jurisdictions to annex or extend service beyond the current boundary if a proposal is made.

2.5.1 Annexation

According to state law, the Sound Transit Board could approve resolutions calling for elections to annex areas outside, but contiguous with, the Sound Transit district after consultation with affected transit agencies and concurrence of the local legislative authority. Only those areas that would benefit from the services provided by Sound Transit may be included, and services or projects proposed for the area must be consistent with the regional transportation plan (RCW 81.112.050). Citizens in annexed areas would vote on annexation and the imposition of the taxes that are applied within the district boundaries. If the Sound Transit district changes, a change in the make-up of the Sound Transit Board may be required.

Because no jurisdictions are proposing annexations at this time, Chapter 4 of the Draft SEIS does not review the potential environmental effects of suggestions made for annexing the Sound Transit district.

2.5.2 Service extension beyond district boundary

Sound Transit can extend new services beyond its boundaries to make connections to significant regional destinations if it can reach agreements with local government agencies on how such service extensions would be funded through intergovernmental partnerships (RCW 81.104.050). This would allow areas outside the Sound Transit district to function as part of the regional system. Examples of service beyond the district boundary that are in operation today are ST Express routes 592 and 595, which partially serve and are partially funded by areas outside the Sound Transit district.

Sound Transit can also enter into agreements with agencies beyond the district boundary to integrate fares and allow flexible transfers between various transit operators. This would prevent citizens who live outside the district from being penalized for making regional trips via transit instead of an automobile. A current example would be Sound Transit's participation in the ORCA program, which provides a one-card pass/payment system covering rides on Sound Transit, Community Transit, Pierce Transit, Metro Transit, Everett Transit, Washington State Ferries, and Kitsap Transit.

During scoping for the SEIS a number of suggestions were made for extending service beyond the existing Sound Transit district boundary. Of these, reasonable locations for extending HCT service within PSRC's urban growth areas could include:

- Black Diamond
- Buckley
- City of Snohomish
- Covington
- Enumclaw
- Gig Harbor
- Gold Bar
- Kitsap County
- Lake Stevens
- Maple Valley
- Marysville
- Monroe
- North Bend
- Redmond Ridge/Novelty Hill/Union Hill

Reasonable locations for extending HCT service to areas that are not within the PSRC urban growth areas but have an existing rail corridor near the Sound Transit district could include:

- Cottage Lake in Woodinville
- Communities adjacent to the ERC in southeast Snohomish County between Woodinville and Snohomish
- Olympia

High-capacity transit service extensions could be in the form of light rail, commuter rail, or BRT. The potential environmental effects of such extensions would be consistent with those described for each mode in Chapter 4. More detailed analyses of potential impacts would be assessed during future project-level environmental reviews as appropriate.

2.6 Other alternatives considered but not carried forward

A wide variety of transit corridors and technology alternatives have been evaluated for the Central Puget Sound region, ever since regional transit planning began in the 1970s. Both the 1993 Final EIS on the Regional Transit System Plan and the 2005 Final SEIS on the Regional Transit Long-Range Plan reviewed a wide range of alternatives before screening the alternatives for detailed evaluation. Many of these same alternatives were suggested again during the scoping process for this SEIS. Most were not carried forward for detailed review in the SEIS because they were not a reasonable means for meeting the goals and objectives of Sound Transit's Long-Range Plan.

The screening criteria described in Section 2.2.2 were used to consider suggestions from the SEIS scoping process in order to identify reasonable actions for achieving the objectives of the Long-Range Plan Update. For example, one of the criteria considered the extent to which a suggestion was consistent with previous Sound Transit Board decisions. Sound Transit is not reconsidering the actions and commitments already underway with *Sound Move* or ST2, financing for which were approved by the region's voters in 1996 and 2008. Actions or alternatives inconsistent with *Sound Move* or ST2 would not be consistent with the Purpose and Need for the Long-Range Plan Update. For example, some scoping comments were focused on re-doing elements of projects already underway or replacing services already in place as part of *Sound Move* or ST2, such as replacing East Link light rail with BRT. These suggestions were considered but were not carried forward into this Draft SEIS because they were not consistent with the objectives of the Long-Range Plan update.

Application of the screening criteria to suggestions pertaining to different transit technologies or new transit corridors is discussed below.

2.6.1 Alternative technologies

The 2005 Long-Range Plan Update reaffirmed earlier findings from the 1996 Long-Range Vision, which concluded that the most viable HCT technologies for the Sound Transit regional transit system were light rail, regional express bus/BRT, and commuter rail. After reviewing HCT technologies, Sound Transit found the most viable HCT options to connect regional centers are light rail and BRT, along with commuter rail and possibly DMU in selected corridors. Additionally, streetcars could also be considered as an HCT option if it operates primarily in its own right-of-way and it meets the corridor capacity.

As part of this Long-Rang Plan Update, a qualitative assessment and review of potential HCT technology options and current issues was conducted by Sound Transit in 2014 so that the most appropriate technology options are included (*High-Capacity Transit Technologies Issue Paper* (Sound Transit 2014e)) in the Long-Range Plan. Transit technologies not carried forward are summarized in Table 2-9. Sound Transit's assessment of technology alternatives updated the work of the Puget Sound Regional Council, which was originally prepared in 2004.

Table 2-9. Summary of transit technologies not carried forward

High-capacity transit technology	Application	High-capacity transit capability	Reason not carried forward
Monorail	Regional	Moderate	Requires grade separation; capacity and operational limitations
SkyTrain	Regional	High	Requires grade separation
Heavy rail	Regional	High	Requires grade separation
High-speed rail/Maglev	Interregional	High	Not regional HCT service, requires grade separation
People movers/airport circulators	Local/Circulation	Low	Not regional HCT service
Gondola/aerial tram	Local/Circulation	Low to Moderate	Not regional HCT service
Personal rapid transit	Local/Circulation	Low	Not regional HCT service

An important measure of effectiveness of the regional HCT system is the degree to which the various components interact with one another. For riders, reducing the number of transfers and improving the quality of transfers can increase ridership and satisfaction with a transit system. For Sound Transit, well designed and implemented system integration can result in more efficient maintenance and operations and administration of transit services. Adding new technologies that are not part of Sound Transit's current operations would require separate new operations and maintenance facilities.

Technologies were carried forward if they allowed Sound Transit to maintain, operate, and expand regional HCT services in an efficient manner, or if they supported and built upon the existing regional HCT system. The technologies that failed to do so were not carried forward for further consideration.

2.6.2 Alternative corridors or locations

Scoping comments suggested specific new corridors or other project-specific locations where Sound Transit could consider adding or extending HCT or supporting services. Corridors, service, and projects that were not already in the Current Plan Alternative and that met the screening criteria described in Section 2.2.2 were added to the Potential Plan Modifications Alternative and are listed in Appendix A.

Some suggestions did not provide enough detail to be analyzed, for example, a request to add a streetcar in Bellevue that did not include a specific location. Examples of suggested corridors that were not carried forward include ones that duplicate connections that can be made using corridors already in the Current Plan Alternative, such as rail service from

Ballard to Capitol Hill; and ones that revisit corridors previously considered, such as rail service across Lake Washington from Sand Point to Kirkland (examined during the Trans-Lake Washington Study). Proposals that called for reconsideration of projects already underway as part of *Sound Move* or ST2 (e.g., replacing East Link light rail with BRT) were also not considered further because these decisions and commitments have already been made and are not the subject of the Long-Range Plan Update.

During the scoping process, Sound Transit also received suggestions both to expand the district boundary and to extend service outside the boundary. Annexation and service extensions can occur under the Long-Range Plan Update alternatives as long as certain requirements are met. Annexations and service extensions are described in Section 2.5, including reasonable locations for extending HCT service. Suggested locations that are not considered reasonable for extending HCT service include the following:

- Anacortes
- Ellensburg
- Portland, Oregon
- Skykomish
- Tulalip
- Vancouver, B.C.

These locations are well beyond the Sound Transit service district and do not represent a reasonable next step for extending HCT service or connecting to the regional HCT system at this time.

2.7 Environmental commitments and sustainability

As an agency that has built and operated light rail, commuter rail, and regional express bus service in multiple Puget Sound communities, Sound Transit has established programs, best practices, and policies that are assumed as part of the Long-Range Plan Update. These include the agency's environmental and sustainability program and a commitment to satisfying all applicable laws and regulations and to mitigate significant adverse environmental impacts responsibly and reasonably. In addition to meeting environmental commitments, Sound Transit will continue to avoid and minimize impacts where possible. Where adverse impacts cannot be avoided, this Draft SEIS identifies potential measures to mitigate the adverse impacts of the Long-Range Plan.

The key goal of Sound Transit's sustainability and environmental management program is to protect the environment and create a healthy community and economy. The agency's core mission of moving people on transit is the most important action the agency can take to improve the local environment, connect communities, reduce sprawl, and enable citizens to thrive within their means by saving dollars on transportation. As the agency delivers transit projects and services, it is also working to conserve resources and incorporate sustainability into everyday operations.

In 2004, the Sound Transit Board adopted an Environmental Policy for the agency that applies to all activities, from planning and design to construction and operations. The policy commits Sound Transit to protect the environment for present and future generations, and directs the agency to:

1. Be in full compliance with all environmental laws and regulations and strive to exceed compliance by continually improving its environmental performance through cost-effective innovation and self-assessment.
2. Restore the environment by providing mitigation and corrective action, and monitor to ensure that environmental commitments are implemented.
3. Improve the ability to manage and account for environmental risk.
4. Avoid environmental degradation by minimizing releases to air, water, and land. Prevent pollution and conserve resources by reducing waste, reusing materials, recycling, and preferentially purchasing materials with recycled content.
5. Continue to educate the public about the environmental benefits of the transit system and build relationships with contractors, vendors, consultants, and transit partners during planning, design, construction, and operation to protect and enhance the environment.

In 2007, the Board approved a Sustainability Initiative directing the CEO to integrate sustainable practices and strategies throughout the entire agency. In addition to setting yearly targets for sustainability, in 2011, Sound Transit adopted a Sustainability Plan establishing long-term and short term priorities. The plan's environmental-focused targets and performance measures included areas such as energy use, water use, stormwater management, wetland mitigation, air quality improvements including greenhouse gas emissions, toxic materials, materials consumption, and solid waste. These areas are to be considered in all of the agency's activities, including planning, design, operation, and maintenance of investments.

One aspect of Sound Transit's sustainability program is its design and operation standards that incorporate guidelines from the United States Green Building Council's Leadership in Energy and Environmental Design (LEED) certification system. The agency design criterion includes a checklist of required and voluntary measures with specific, measurable standards to help maximize sustainability opportunities for the project during design, construction, and operation. While some of these sustainability opportunities may also support permit requirements or help mitigate environmental impacts, others can help maximize and extend the environmental and public benefits of the project.

The Sustainability Plan is implemented through Sound Transit's internationally certified Environmental and Sustainability Management System. Since 2007, Sound Transit has been one of a select number of transit agencies nationwide to achieve certification to the international ISO 14001 standard. This system holds the agency accountable for identifying and controlling environmental impacts, setting and achieving objectives and targets, and demonstrating continual improvements in performance.

2.8 Benefits and disadvantages of delaying action

It has been almost 10 years since the Long-Range Plan was last updated. In that time conditions described in the 2005 plan have changed, such as those related to ST2 decisions. In addition, ten more years of economic and population growth have occurred, along with accompanying changes in the regional transportation system. Many local and regional governments have also updated their long-term land use and transportation plans, and revised their forecasts for future growth. If Sound Transit delayed an update to the Long-Rang Plan, the changed conditions since 2005 would not be reflected in the Long-Range Plan. This could influence development of the next system plan and make it more difficult for other jurisdictions to coordinate their planning to focus growth on centers that would ultimately be served by future high capacity transit investments.

This Long-Range Plan Update will also help inform Sound Transit and its partners as they prepare future transit system plans, including potential funding measures for voter approval. The Long-Range Plan is part of the central Puget Sound region's *Transportation 2040* strategy. The strategy is based on a vision of urbanized centers linked by a regional rapid transit system. Substantial delay in implementing the Long-Range Plan could inhibit the ability of the region to accommodate growth as planned. Economic development goals also could be affected, including those related to the development of convenient housing and employment opportunities. Related decisions about transportation improvements by other parties could also be delayed, which could worsen transportation conditions. In addition, development pressure could increase on available rights-of-way or rights-of-way could be used for other purposes, resulting in an increased impacts and cost of implementing the regional transit system.

Potential funding implications would be associated with delaying plan implementation. Sound Transit could miss the opportunity to obtain federal funding or receive a lower amount of federal funding. In addition, any delays in plan implementation would likely result in higher construction costs as a result of inflation. Given the high likelihood of increased development in the region, delays in implementation could result in more impacts to surrounding properties where increased development may occur.

If implementation of projects under an updated Long-Range Plan were delayed, the primary potential benefit would be to delay adverse construction and operation impacts of HCT projects identified in the plan. However, delays would have the disadvantage of slowing the development of HCT projects and their associated benefits. Delay could create transportation and land use concerns as a result of the failure to realize the benefits of HCT projects and not implementing a major component of the region's long-range vision for managing growth and transportation.

APPENDIX A

Current Plan and Potential Plan Modifications Alternatives: Corridors and Representative Projects/ Programs/Policies

June 2014

SoundTransit

Contents

Tables

This Appendix includes a list of the HCT corridors that make up the Current Plan Alternative and the Potential Plan Modifications Alternative described in Chapter 2 of the Draft SEIS. For both alternatives, it also includes a list of representative projects associated with these corridors for purposes of modeling and impact analysis. Specific projects, locations, operating characteristics, and levels of service would be determined and evaluated at the project-level in the future as appropriate. Accordingly, new or different projects not listed below, but that are similar to the types of representative projects listed, could be implemented at the project-level. The order of listing below does not imply rank or preference.

1 Current Plan Alternative

The 1993 long-range vision and 2005 long-range regional transit plan identified broadly defined corridors for commuter rail, light rail, BRT and regional express bus service, thus creating a vision for transit in the central Puget Sound Region. *Sound Move* in 1996 and Sound Transit 2 (ST2) in 2008 created a more refined blueprint for specific projects and services for which voters approved funding. These projects and services were a subset of the 1993 and 2005 long-range plans. Sound Transit has been in the process of building these projects in a phased manner. The following list for the Current Plan Alternative includes corridor segments with projects (including service, stations, and other infrastructure projects) that as part of *Sound Move* or ST2 have either (1) been built, (2) are in construction or in final design, or (3) in project development (project-level preliminary design and environmental review is either underway or complete). Since these projects have already been evaluated (or are being evaluated) through a more detailed environmental review process, they are generally not evaluated in this Draft SEIS with regard to potential environmental impacts.

This list also includes commuter rail, light rail, BRT and regional express bus corridors included in the 2005 Long-Range Plan that are not yet (1) approved in a system plan, (2) approved by voters for funding, and (3) entered into the project development phase (preliminary design and environmental review). Since project-level environmental review of these corridors sections has not previously been completed or initiated, the impact analysis for the Current Plan Alternative in this Draft SEIS (see Chapter 4) largely focuses on environmental effects within these corridors.

Also included below is a list of representative projects that could be implemented within any of the HCT corridors that comprise the Current Plan Alternative regardless of whether service is already in operation along those corridors. For example, this Draft SEIS also broadly considers the potential impacts of additional projects that might occur along existing Link light rail or Sounder commuter rail lines, such as infill stations or sections of new railroad track for storage. In fact, many of the suggestions for specific projects that came out of the 2013 scoping process for this Draft SEIS were within corridors already in operation, in final design or construction, or currently undergoing project-level environmental reviews. Those suggestions are included in this list of representative projects for the Current Plan Alternative.

Table A-1. Current Plan Alternative—Link Light Rail and Tacoma Link corridors and service

Chapter 4 map letter	Name	Status	Note/operational status	Counties served
	SeaTac Airport to Westlake	*Sound Move*/ST2	In Operation	King
	Tacoma Link	*Sound Move*/ST2	In Operation	Pierce
	Westlake to University of Washington (University Link Extension)	*Sound Move*/ST2	Under Construction	King
	University of Washington to Northgate (Northgate Link Extension	*Sound Move*/ST2	Under Construction	King
	Northgate to Lynnwood (Lynnwood Link Extension)	*Sound Move*/ST2	Under Environmental Review and In Preliminary Design	Snohomish, King
	Seattle to Overlake (East Link Extension)	*Sound Move*/ST2	In Final Design	King
	Overlake to Redmond (East Link)	*Sound Move*/ST2	Project development completed or in process; construction not funded.	King
	SeaTac Airport to South 200th Street (South 200th Link Extension)	*Sound Move*/ST2	Under Construction	King
	SeaTac Airport to Kent/Des Moines (Federal Way Link Extension)	*Sound Move*/ST2	Under Environmental Review and In Preliminary Design	King
	Kent/Des Moines to Federal Way (Federal Way Link Extension)	*Sound Move*/ST2	Project development completed or in process; construction not funded.	King
	Tacoma Link Expansion	*Sound Move*/ST2	Under environmental review; construction not yet fully funded.	Pierce
H	Lynnwood to Everett	Long-Range Plan Corridor		Snohomish
D	Lynnwood to Renton along I-405 Corridor	Long-Range Plan Corridor		Snohomish, King
C[1]	Renton to Burien	Long-Range Plan Corridor		King
E	Bellevue to Issaquah	Long-Range Plan Corridor		King
G[1]	Ballard to University District	Long-Range Plan Corridor		King
F[1]	Downtown Seattle to Ballard	Long-Range Plan Corridor		King
B	Federal Way to Tacoma	Long-Range Plan Corridor		King, Pierce

[1] Portions of these corridors could be constructed in tunnels

Table A-2. Current Plan Alternative—Sounder corridors and service

Chapter 4 map letter	Name	Status	Note/operational status	Counties served
	North Line (Seattle to Everett)	*Sound Move*/ST2	In Operation	Snohomish, King
	South Line (Seattle to Lakewood)	*Sound Move*/ST2	In Operation	King, Pierce
P	Renton to Woodinville	Long-Range Plan Corridor		King
A[1]	Lakewood to DuPont	Long-Range Plan Corridor		Pierce

[1] Indicated as "Potential Rail" in Long-Range Plan; assumed as Sounder extension

Table A-3. Current Plan Alternative—HCT corridors and service

Chapter 4 map letter	Name	Status	Note/operational status	Counties served
	HCT Corridor Studies	*Sound Move*/ST2		Systemwide
I	U.W. to Redmond via SR 520	Long-Range Plan Corridor		King
J	Northgate to Bothell via SR 522	Long-Range Plan Corridor		King

Table A-4. Current Plan Alternative—bus corridors and service

Chapter 4 map letter	Name	Status	Note/operational status	Counties served
	ST Express Route 510 Everett–Seattle	*Sound Move*/ST2	In Operation	Snohomish, King
	ST Express Route 511 Ash Way–Seattle	*Sound Move*/ST2	In Operation	Snohomish, King
	ST Express Route 512 Everett–Seattle	*Sound Move*/ST2	In Operation	Snohomish, King
	ST Express Route 513 Everett–Seattle	*Sound Move*/ST2	In Operation	Snohomish, King
	ST Express Route 522 Woodinville–Seattle	*Sound Move*/ST2	In Operation	King
	ST Express Route 532 Everett–Bellevue	*Sound Move*/ST2	In Operation	Snohomish, King
	ST Express Route 535 Lynnwood–Bellevue	*Sound Move*/ST2	In Operation	Snohomish, King
	ST Express Route 540 Kirkland–University District	*Sound Move*/ST2	In Operation	King
	ST Express Route 542 Redmond–University District	*Sound Move*/ST2	In Operation	King
	ST Express Route 545 Redmond–Seattle	*Sound Move*/ST2	In Operation	King
	ST Express Route 550 Bellevue–Seattle	*Sound Move*/ST2	In Operation	King
	ST Express Route 554 Issaquah–Seattle	*Sound Move*/ST2	In Operation	King
	ST Express Route 555 Issaquah–Northgate	*Sound Move*/ST2	In Operation	King
	ST Express Route 556 Issaquah–Northgate	*Sound Move*/ST2	In Operation	King
	ST Express Route 560 Bellevue–Sea-Tac–W. Seattle	*Sound Move*/ST2	In Operation	King
	ST Express Route 566 Auburn–Overlake	*Sound Move*/ST2	In Operation	King
	ST Express Route 567 Kent–Overlake	*Sound Move*/ST2	In Operation	King
	ST Express Route 574 Lakewood–SeaTac	*Sound Move*/ST2	In Operation	King, Pierce
	ST Express Route 577 Federal Way–Seattle	*Sound Move*/ST2	In Operation	King
	ST Express Route 578 Puyallup–Seattle	*Sound Move*/ST2	In Operation	King, Pierce
	ST Express Route 586 Tacoma–U. District	*Sound Move*/ST2	In Operation	King, Pierce
	ST Express Route 590 Tacoma–Seattle	*Sound Move*/ST2	In Operation	King, Pierce
	ST Express Route 592 Olympia/DuPont–Seattle	*Sound Move*/ST2	In Operation	King, Pierce
	ST Express Route 594 Lakewood–Seattle	*Sound Move*/ST2	In Operation	King, Pierce
	ST Express Route 595 Gig Harbor–Seattle	*Sound Move*/ST2	In Operation	King, Pierce
	ST Express Route 596 Bonney Lake–Sumner	*Sound Move*/ST2	In Operation	Pierce
	First Hill Streetcar	*Sound Move*/ST2	Under Constr	King
K[1]	BRT or ST Express along SR-167 corridor from Renton to Puyallup	Long-Range Plan Corridor		King, Pierce
L	BRT or ST Express along I-5 corridor from DuPont to Federal Way	Long-Range Plan Corridor		King, Pierce
M	BRT or ST Express along I-90 corridor from Bellevue to Issaquah	Long-Range Plan Corridor		King
N	BRT or ST Express along SR 99–Seattle to Everett	Long-Range Plan Corridor		Snohomish, King

Table A-4. Current Plan Alternative—bus corridors and service (continued)

Chapter 4 map letter	Name	Status	Note/operational status	Counties served
O	BRT or ST Express along I-5 corridor from Lynnwood to Everett	Long-Range Plan Corridor		Snohomish
Q	BRT or ST Express—eastside in vicinity of I-405 from Lynnwood I-5/I-405 junction to Burien	Long-Range Plan Corridor		Snohomish, King
R	Regional Express Redmond to Kirkland	Long-Range Plan Corridor		King
S	Regional Express Puyallup to Lakewood in vicinity of SR 512	Long-Range Plan Corridor		Pierce
T	Regional Express Puyallup to DuPont via Cross Base Highway	Long-Range Plan Corridor		Pierce
U	Regional Express Puyallup to Tacoma	Long-Range Plan Corridor		Pierce
V	Regional Express SeaTac to West Seattle Junction	Long-Range Plan Corridor		King
W	Regional Express North Bothell to Millcreek to Mukilteo	Long-Range Plan Corridor		Snohomish

[1] A portion of this corridor could be constructed in tunnels

Table A-5. Current Plan Alternative—policies and programs

Program Element	Name	Status	Note/ operational status
Access (Non-Motorized; Connections with Other Transit; Parking)	Sound Transit System Access Policy	Current Policies	In Operation
Sustainability	Sound Transit Sustainability Initiative	Current Policies	In Operation
Transit Oriented Development	Sound Transit Transit-Oriented Development Policy	Current Policies	In Operation
Research and Technology	Off-board payments	Current Policies	In Operation
Connections with Other Services and Facilities	Support high-capacity feeder services	Long-Range Plan Policy/Program	
Connections with Other Services and Facilities	Better integrate transit transfer areas and operations	Long-Range Plan Policy/Program	
Transit Oriented Development	Support transit-oriented development	Long-Range Plan Policy/Program	
Connections with Other Services and Facilities	Improve passenger facilities	Long-Range Plan Policy/Program	
Transit Oriented Development	Support transit-oriented development through station design and placement	Long-Range Plan Policy/Program	
Connections with Other Services and Facilities	Support multi-modal connections	Long-Range Plan Policy/Program	
Connections with Other Services and Facilities	Provide improved system access	Long-Range Plan Policy/Program	
Planning, TSM, TDM, Other	Help fund TDM/market development programs	Long-Range Plan Policy/Program	
Research and Technology	Provide real-time information displays	Long-Range Plan Policy/Program	
Research and Technology	Technology advancements and upgrades	Long-Range Plan Policy/Program	

The first four policies in this table have been adopted by the ST Board as separate policies, while the others are policy statements included in the current Long-Range Plan.

Table A-6. Current Plan Alternative—representative projects and programs

Program Element	Name	Counties served
Link Light Rail		
Station	Everett Waterfront	Snohomish
Station	Hewitt Ave.	Snohomish
Station	Everett	Snohomish
Station	Broadway	Snohomish
Station	Everett Mall	Snohomish
Station	128th Street	Snohomish
Station	164th Street SW/ Ash Way	Snohomish
Station	Lynnwood CBD (Alderwood Mall)	Snohomish
Station	220th Street Southwest	Snohomish
Station	Damson/SR 524	Snohomish
Station	Canyon Park	Snohomish
Station	NE 155th St.	King
Station	NE 130th St.	King
Station	Convention Place	King
Station	S Graham Street	King
Station	Boeing Access Rd.	King
Station	NW Market and 15th NW	King
Station	NW Market and 8th NW	King
Station	N 46th and Fremont N	King
Station	N 45th and Wallingford Way N	King
Station	NE 45th and Thackeray NE	King
Station	Memorial Stadium at Seattle Center	King
Station	Thomas Street	King
Station	Mercer and Westlake	King
Station	S 133rd Street	King
Station	S. 216th Street	King
Station	S. 260th Street	King
Station	Tukwila	King
Station	Southcenter	King
Station	S Renton	King
Station	Bothell	King
Station	Brickyard	King
Station	Totem Lake	King
Station	Kirkland	King
Station	Houghton	King
Station	I-90/I-405 Transfer	King
Station	Newport/112th	King
Station	N 44th St.	King
Station	N Renton	King
Station	Wilburton	King
Station	Eastgate	King
Station	Lakemont	King
Station	Issaquah (Downtown)	King
Station	North Issaquah	King
Station	Issaquah Highlands	King
Station	70th Avenue	Pierce

Table A-6. Current Plan Alternative—representative projects and programs (continued)

Program Element	Name	Counties served
Station	54th Ave. E	Pierce
Station	Tacoma Dome	Pierce
Other Infrastructure	Park & Ride in southeast Seattle/Rainier Beach	King
Other Infrastructure	Provide improved transfers and pedestrian connections at Mount Baker Station	King
Other Infrastructure	Improve pedestrian access to Tukwila/International Blvd Station from International Blvd	King
Other Infrastructure	Non-motorized bridge between North Seattle Community College and Northgate Link Station	King
Other Infrastructure	Non-motorized bridge between 156th Ave. NE and Inbound on-ramp to SR 520 via Overlake Transit Center	King
Other Infrastructure	Renovate International District/Chinatown Station to add center platforms	King
Other Infrastructure	Increase parking capacity at Tukwila/International Blvd Station	King
Other Infrastructure	Operation and Maintenance facilities	Systemwide
Tacoma Link		
Station	Tacoma Link Extension Station(s)	Pierce
Sounder		
Service	Add Express Service	Snohomish, King, Pierce
Service	Increase service frequency	Snohomish, King, Pierce
Service	All-day, two-way service	Snohomish, King, Pierce
Station	Shoreline/Richmond Beach	King
Station	Ballard	King
Station	Interbay	King
Station	Broad St.	King
Station	Georgetown	King
Station	Boeing Access Road	King
Station	Woodinville	King
Station	Bothell	King
Station	Kirkland/Totem Lake	King
Station	Bellevue	King
Station	Newcastle	King
Station	Renton	King
Station	N. Sumner/Pacific	King, Pierce
Station	Station Between Puyallup and Sumner	Pierce
Station	Joint Base Lewis-McChord (JBLM)	Pierce
Station	DuPont	Pierce
Infrastructure Improvement	Extend all station platforms to 10-cars	Systemwide
Infrastructure Improvement	Additional parking at stations	Systemwide
Infrastructure Improvement	Construct rail line between Argo Yard and Tacoma to increase operations during off-peak periods	King, Pierce
Infrastructure Improvement	Track and Signal Improvements	Systemwide
Infrastructure Improvement	Maintenance Facilities	Systemwide
Infrastructure Improvement	Eastside Rail Corridor Yard & Shops Facilities	King
Infrastructure Improvement	Pierce County Yard & Shops	Pierce
Infrastructure Improvement	Improve non-motorized access to Tukwila Sounder Station	King
Infrastructure Improvement	Improve Puyallup Sounder Station access	Pierce
Infrastructure Improvement	Tacoma Dome Station improvements	Pierce

Table A-6. Current Plan Alternative—representative projects and programs (continued)

Program Element	Name	Counties served
Infrastructure Improvement	South Tacoma Station pedestrian bridge	Pierce
Infrastructure Improvement	Layover facility at DuPont	Pierce
Bus		
HOV Direct Access[1]	I-5/128th Street SE/SW Direct Access (Mariner Park-and-Ride)	Snohomish
HOV Direct Access[1]	I-5/I-405 HOV Direct Access near Lynnwood	Snohomish
HOV Direct Access[1]	Completion of north half of HOV ramps at Ash Way	Snohomish
HOV Direct Access[1]	SR 525 at 164th (Swamp Creek) HOV Access Ramps	Snohomish
HOV Direct Access[1]	SR 527 HOV, 208th-228th SW	Snohomish
HOV Direct Access[1]	I-5 to SODO Busway Direct Access at S Industrial Way	King
HOV Direct Access[1]	Direct HOV Access Ramps on SR 167 in Kent (e.g., at Smith St.)	King
HOV Direct Access[1]	I-405/I-90 Interchange HOV Direct Access	King
HOV Direct Access[1]	I-90 HOV Ramps to SR 900	King
HOV Direct Access[1]	Issaquah HOV crossing with I-90 Direct Access	King
HOV Direct Access[1]	SR 520 Direct Access to Downtown Redmond	King
HOV Direct Access[1]	SR 520 at NE 31st St. HOV Access	King
HOV Direct Access[1]	SR 520 at 108th Ave. NE direct HOV access (to/from East)	King
HOV Direct Access[1]	I-405/SR 520 Interchange HOV Direct Access (West leg to North leg)	King
HOV Direct Access[1]	Newcastle (112th SE) I-405 Center HOV Direct Access	King
HOV Direct Access[1]	Flyer station on I-405 at N. 30th Street in Renton	King
HOV Direct Access[1]	Renton Rainier Ave. at I-405 Center HOV Direct Access	King
HOV Direct Access[1]	Kirkland at 85th HOV Center Direct Access	King
HOV Direct Access[1]	Houghton Freeway Station	King
HOV Direct Access[1]	Houghton (Kirkland) I-405 Center HOV Direct Access	King
HOV Direct Access[1]	Brickyard (NE 160th) I-405 Center HOV Direct Access	King
HOV Direct Access[1]	Direct Access at UW-Bothell (195th)	King
HOV Direct Access[1]	Direct HOV access ramps on I-405 in the vicinity of the Tukwila Sounder station (e.g., at SR 181/Interurban Ave. S.)	King
HOV Direct Access[1]	I-5 Direct access to Tacoma Dome Station	Pierce
HOV Direct Access[1]	I-5 Direct access to Lakewood Park-and-Ride	Pierce
HOV Direct Access[1]	I-5/North Pierce HOV Access Ramp near 54th Ave. E	Pierce
Transit Center	North Everett Transit Center	Snohomish
Transit Center	Everett Station Transit Center and parking expansion	Snohomish
Transit Center	Mill Creek Town Center Transit Center	Snohomish
Transit Center	King Street Multimodal Hub Improvements	King
Transit Center	Westlake Multimodal Hub Improvements	King
Transit Center	Northgate Multimodal Hub Improvements	King
Transit Center	West Seattle Transit Hub	King
Transit Center	Husky Stadium/SR 520 Multimodal Hub Improvements	King
Transit Center	Aurora Village Hub Improvements	King
Transit Center	Federal Way Hub Improvements	King
Transit Center	Newcastle Transit Center (on-street transit center)	King
Transit Center	Brickyard (NE 160th) I-405 in-line freeway station	King
Transit Center	Totem Lake/128th Transit Center	King
Transit Center	Totem Lake/128th Freeway Station	King
Transit Center	Kirkland Transit Center	King
Transit Center	Redmond Transit Center	King
Transit Center	Bothell Transit Center	King

Table A-6. Current Plan Alternative—representative projects and programs (continued)

Program Element	Name	Counties served
Transit Center	Woodinville CBD Transit Center	King
Transit Center	Renton Transit Center	King
Transit Center	Enhance S. Kirkland Park-and-Ride to major regional transit hub	King
Infrastructure Improvement	Everett Station Bus Layover	Snohomish
Infrastructure Improvement	Widen SR 99 at SR 104 to provide bus lanes	Snohomish
Infrastructure Improvement	SR 99 Signal/Queue Bypass, Airport Road to Everett	Snohomish
Infrastructure Improvement	Northgate Way/5th Ave. NE Signal/Queue Bypass	King
Infrastructure Improvement	15th Avenue NE/NE 45th St LT Signal/Queue Bypass	King
Infrastructure Improvement	I-90 D2 Transitway ramps	King
Infrastructure Improvement	SR 522 BAT Lanes: NE 145th to Bothell/I-405	King
Infrastructure Improvement	SR 99 BAT Lanes: Aurora Village to Seattle CBD	King
Infrastructure Improvement	Improve I-5/145th Street interchange	King
Infrastructure Improvement	Add connection from SODO busway to Downtown Seattle surface streets	King
Infrastructure Improvement	SR 516/W Meeker Signal Priority	King
Infrastructure Improvement	S 272nd/S 277th Signal Priority/Queue Bypass, SR 99 to E. Valley Highway	King
Infrastructure Improvement	SR 522 BAT lanes: re-design lanes from 130th to 145th	King
Infrastructure Improvement	156th Avenue HOV, Overlake Transit Center to NE 24th	King
Infrastructure Improvement	Woodinville Arterial HOV enhancements	King
Infrastructure Improvement	NE 8th Signal Priority at 112th	King
Infrastructure Improvement	NE 6th Signal Priority, 108th to 114th	King
Infrastructure Improvement	NE 85th Street Signal/Queue Bypass, Willows Rd to I-405	King
Infrastructure Improvement	Bus Ramp over Redmond Way	King
Infrastructure Improvement	Improve 98th Avenue NE & NE 185th Street in Bothell, including bus priority treatments	King
Infrastructure Improvement	SR 522 HOV Woodinville-Bothell	King
Infrastructure Improvement	Leary Way HOV from Redmond Way	King
Infrastructure Improvement	SR 900 HOV Lane, I-5 to S 129th	King
Infrastructure Improvement	Avondale Rd. HOV, Avondale Way to SR 202	King
Infrastructure Improvement	SW 27th Street/Strander Blvd. Extension	King
Infrastructure Improvement	SR 161 Arterial HOV and/or signal priority/queue bypass—176th E to SR 512	Pierce
Infrastructure Improvement	Bus Maintenance Facilities	Systemwide
Infrastructure Improvement	Bus Midday Storage Facilities	Systemwide
Infrastructure Improvement	Surveillance, Control & Driver Information (systemwide)	Systemwide
Regional Express Service	ST Express South Everett to Overlake via SR 527	Snohomish
Service	Improve connections to east of Everett	Snohomish
Service	Midday shadow bus service for Sounder South Stations (Tukwila, S. Tacoma)	Pierce
Restructured or Enhanced Regional Express Bus	Improve bus service to Sea-Tac Airport	King
Restructured or Enhanced Regional Express Bus	Revise/enhance ST Express Route 522 (e.g., to full BRT, to serve NE 185th in Bothell, to serve Roosevelt Link)	King
Restructured or Enhanced Regional Express Bus	Restructure or improve routes (e.g., 540, 554)	King
Restructured or Enhanced Regional Express Bus	Enhance to full BRT service levels routes 545, 532	Snohomish, King
Restructured or Enhanced Regional Express Bus	Modify ST Express routes between Everett and Bellevue (532) to serve Lynnwood Transit Center, UW Bothell, and NE 128th Street	Snohomish, King

Table A-6. Current Plan Alternative—representative projects and programs (continued)

Program Element	Name	Counties served
Restructured or Enhanced Regional Express Bus	ST Express Route 550—delete or enhance to full BRT service levels	King
Restructured or Enhanced Regional Express Bus	Add stop to ST Express Route 560 at Tukwila/International Blvd Station	King
Restructured or Enhanced Regional Express Bus	ST Express Route 560—restructure or improve route, or enhance to full BRT service levels	King
Restructured or Enhanced Regional Express Bus	Restructure or enhance ST Express Routes 555/566/567	King
Restructured or Enhanced Regional Express Bus	Increase ST Express route 574 frequency	King, Pierce
Restructured or Enhanced Regional Express Bus	Extend ST Express Route 590 further, into South Lake Union	King, Pierce
Restructured or Enhanced Regional Express Bus	Reroute ST Express route 594 to serve Federal Way Transit Center, skip SODO	King, Pierce
Restructured or Enhanced Regional Express Bus	Expand service between UW Tacoma and UW Seattle campus	King, Pierce
Restructured or Enhanced Regional Express Bus	Restructure transit service in Southeast Seattle possibly towards Renton	King
Restructured or Enhanced Regional Express Bus	Add bus stop to the northbound Olive Way onramp	King
Restructured or Enhanced Regional Express Bus	Consider revision of bus operations at Montlake Triangle	King
Multiple Modes		
Parking	Swamp Creek Park-and-Ride Lot Expansion	Snohomish
Parking	Mariner Park-and-Ride Lot Expansion	Snohomish
Parking	SR 525, Mukilteo Park-and-Ride lot	Snohomish
Parking	McCollum Park-and-Ride expansion	Snohomish
Parking	Expansion of Ash Way Park-and-Ride (garage)	Snohomish
Parking	Park-and-Ride between Mill Creek and Canyon Park	Snohomish
Parking	Canyon Park Park-and-Ride expansion	Snohomish
Parking	NE 145th/SR 522 Park-and-Ride Lot	King
Parking	I-5/NE 145th	King
Parking	Shoreline Park-and-Ride Lot Expansion	King
Parking	I-5/NE 185th St, Shoreline	King
Parking	Lake Forest Park Park-and-Ride Lot	King
Parking	Husky Stadium/SR 520 Multimodal Hub	King
Parking	Burien Park & Ride expansion	King
Parking	Issaquah Highland Park & Ride	King
Parking	Bothell Park-and-Ride Expansion	King
Parking	Kenmore Park-and-Ride Lot Expansion	King
Parking	Brickyard Park-and-Ride Lot Expansion	King
Parking	Newport Hills Park-and-Ride Lot Expansion, I-405 at 112th SE	King
Parking	Renton Boeing/Park/8th Expansion	King
Parking	S. Renton Park-and-Ride Lot, Strander Blvd at E Valley Hwy	King
Parking	Newcastle Park-and-Ride Lot	King
Parking	N. 44th Park-and-Ride Lot	King
Parking	Bothell Park-and-Ride at Kaysner Way Expansion	King
Parking	SR 522 at 68th NE Park-and-Ride Lot	King
Parking	Wilburton Park-and-Ride Lot Expansion	King
Parking	Kingsgate Park-and-Ride Lot Expansion	King

Table A-6. Current Plan Alternative—representative projects and programs (continued)

Program Element	Name	Counties served
Parking	N. Sumner Station Parking	Pierce
Parking	SR 99 at 54th Ave. E. Station Parking	Pierce
Policies, Programs, and Services		
Parking	Increase costs for Park & Ride use	Systemwide
Parking	Provide increased Park & Ride capacity	Systemwide
Parking	Stop building new Park & Ride capacity	Systemwide
Parking	Evaluate Eastside Park & Ride capacities and locations	King
Parking	Provide parking mitigation to cities with stations	Systemwide
Connections with Other Services and Facilities	Improve feeder services (e.g., to Federal Way Transit Center from Auburn, Puyallup and nearby park-and-rides)	Systemwide
Connections with Other Services and Facilities	Complete a transit access study on SR 522 (improve access to transit)	King
Connections with Other Services and Facilities	Support transit speed and reliability projects	Systemwide
Connections with Other Services and Facilities	Pedestrian access and circulation information/wayfinding	Systemwide
Connections with Other Services and Facilities	Provide increased bus layover capacity at stations and hubs	Systemwide
Connections with Other Services and Facilities	Consider revision of bus operations at Montlake Triangle	King
Connections with Other Services and Facilities	Improve connections between HCT and regional centers	Systemwide
Connections with Other Services and Facilities	Provide improved bicycle storage, including bike share	Systemwide
Connections with Other Services and Facilities	Improve non-motorized access to stations	Systemwide
Planning, TSM, TDM, Other	Transit Flow & Safety	Systemwide
Planning, TSM, TDM, Other	Computer Systems/Enhancements	Systemwide
Planning, TSM, TDM, Other	System Access Study	Systemwide
Planning, TSM, TDM, Other	Evaluate and implement effective technologies	Systemwide
Planning, TSM, TDM, Other	Partner with WSDOT on demand management	Systemwide
Planning, TSM, TDM, Other	Support transit-oriented development through density incentives	Systemwide
Sustainability	Emphasize sustainability for buildings and operations	Systemwide
Sustainability	Renewable energy in buildings/ stations	Systemwide

[1] HOV direct access in this table includes ramps, freeway stations, or overpasses

2 Potential Plan Modifications Alternative

Following is a list of new HCT corridors and modes for consideration to potentially modify the current plan. These corridors and modes were suggestions provided primarily by the local jurisdictions, agencies, tribes, stakeholder organization, and the public during the Draft SEIS scoping process. This section also includes a list of representative projects, policies, programs, and services identified in this Draft SEIS for purposes of modeling and impact analysis. Specific projects, locations, operating characteristics, and levels of service would be determined and evaluated at the project level. Accordingly, new or different projects not listed below, but that are similar to the types of representative projects listed, could be implemented at the project-level. Projects or programs that Sound Transit could advance in future system planning under the current Long-Range Plan are not included below as potential plan modifications. The order of listing below does not imply rank or preference.

Table A-7. Potential Plan Modifications Alternative—Link Light Rail corridors and service

Chapter 4 Map #	Name	Status	Counties served
1	Link line north/south –downtown Seattle to Magnolia/Ballard to Shoreline Community College	New Corridor	King
2[1]	Link line between downtown Seattle, West Seattle, and Burien	New Corridor	King
3	Link line from Ballard to Everett Station via Aurora Village, Lynnwood	New Corridor	Snohomish, King
4	Link line extension from Everett to North Everett	New Corridor	Snohomish
5	Link line from Lakewood to Spanaway to Frederickson to South Hill to Puyallup	New Corridor	Pierce
6	Link line from DuPont to downtown Tacoma via Lakewood, Steilacoom, and Ruston	New Corridor	Pierce
7	Link line from Puyallup/Sumner to Renton via SR 167	New Corridor	King, Pierce
8	Link line east/west—from downtown Seattle along Madison Street or to Madrona	New Corridor	King
9	Link line from Tukwila to SODO via Duwamish industrial area	New Corridor	King
10	Link line from North Kirkland or UW Bothell to Northgate via SR 522	New Corridor	King
11	Link line from Ballard to Bothell via Northgate	New Corridor	King
12	Link line to Mill Creek, connecting to Eastside Rail Corridor	New Corridor	Snohomish, King
13	Extend Tacoma Link to Ruston Ferry Terminal	New Corridor	Pierce
14	Link line on SR 7 from Tacoma to Parkland	New Corridor	Pierce
15	Link line between Lynnwood and Everett that serves Southwest Everett Industrial Center (Paine Field, Boeing)	New Corridor	Snohomish

[1]A portion of this corridor could be constructed in a tunnel.

Table A-8. Potential Plan Modifications Alternative—Sounder corridors and service

Chapter 4 Map #	Name	Status	Counties served
16	Sounder line from Puyallup/Sumner to Orting	New Corridor	Pierce
17	Sounder line between Lakewood and Parkland	New Corridor	Pierce
18	Sounder line Tacoma to Frederickson	New Corridor	Pierce

Table A-9. Potential Plan Modifications Alternative—HCT corridors and service

Chapter 4 Map #	Name	Status	Counties served
19	HCT line from Tukwila Sounder station to Sea-Tac Airport to Burien to Downtown Seattle via West Seattle	New Corridor	King
20	HCT line from downtown Seattle to Edmonds via Ballard, Shoreline Community College	New Corridor	Snohomish, King
21	HCT line from West Seattle to Ballard via Central District, Queen Anne	New Corridor	King

Table A-10. Potential Plan Modifications Alternatives—bus corridors and service

Chapter 4 Map #	Name	Status	Counties served
22	BRT routes in Puyallup vicinity, notably along Meridian Avenue	New Corridor	Pierce
23	BRT route along Madison Street in Seattle from Colman Dock to 23rd Street.	New Corridor	King
24	ST Regional Express route between Issaquah and Overlake via Sammamish, Redmond	New Corridor	King
25	ST Regional Express route between Renton and downtown Seattle	New Corridor	King
26	ST Regional Express route connecting UW Bothell to Sammamish via Redmond	New Corridor	King
27	ST Regional Express route from Titlow Beach to downtown Tacoma	New Corridor	Pierce
28	ST Regional Express route from Renton (Fairwood) to Eastgate via Factoria	New Corridor	King
29	ST Regional Express on 145th Street from I-5 serving SR 522	New Corridor	King
30	ST Regional Express route from North Kirkland to downtown Seattle	New Corridor	King
31	ST Regional Express route Woodinville to Bellevue service	New Corridor	King
32	ST Regional Express route Woodinville to Everett service	New Corridor	Snohomish, King
33	Connection to Joint Base Lewis-McChord (JBLM)	New Corridor	Pierce
34	Regional Express Bus/BRT service between Tacoma and Bellevue	New Corridor	King, Pierce
35	Regional Express Bus/BRT service between Kent and Sea-Tac Airport	New Corridor	King
36	Regional Express/BRT between Puyallup and Rainier Valley	New Corridor	King, Pierce

Table A-11. Potential Plan Modifications Alternative—representative projects, policies, and programs

Name	Counties served
Bus	
Improved east-west service in Shoreline, connecting SR 99 BRT, I-5 LRT, and SR 522 HCT	King
Totem Lake to Redmond service	King
Provide frequent, direct bus service to Overlake Transit Center	King
Improve NE 145th Street, including multimodal/bus priority treatments (e.g. BAT Lanes)	King
Add bus priority treatments to east-west bus corridors in Snohomish County (e.g., 128th, 164th, 196th)	Snohomish
Arterial HOV/Transit Signal Priority (TSP) bus lane improvements on 128th	Snohomish
SR 99 Signal/Queue Bypass, Airport Road to Everett	Snohomish
NE 124th HOV, I-405–SR 202	King
Priority treatment—156th St. Left Turn Queue Bypass, eastbound 8th to NB 156th	King
Priority treatment—SR 202 HOV, SR 520–Sahalee Way	King
Priority treatment—148th NE, Bel-Red Rd.–SR 520	King
Priority treatment—148th NE, Bel-Red Rd. to Bellevue Community College Perimeter Rd.	King
SR 7 Arterial HOV, Roy Wye–SR 512	Pierce

Table A-11. Potential Plan Modifications Alternative—representative projects, policies, and programs (continued)

Name	Counties served
Bus Ramp over Union Hill Road	King
HOV/Bus Rapid Transit (BRT) Tunnel from SR 520 to Pacific St.	King
HOV Access Ramp at 1st Ave. S Bridge	King
Bellevue College Connection Improvements (e.g., improvements to non-motorized facilities and bus stops)	King
Additional Regional Express bus maintenance facilities & storage yards for Plan Modifications	Systemwide
Streetcar	
Rapid streetcar from Roosevelt to downtown Seattle via University District	King
Rapid streetcar from North Ballard to downtown Seattle via Fremont	King
Extend streetcar from Westlake Center to King Street Station via 1st Avenue	King
Streetcar along Phinney Ridge	King
Streetcar from Lake City to Roosevelt	King
Streetcar from Golden Gardens to Magnuson Park	King
Streetcar from Ballard to University Village	King
Streetcar from Alki to SW Trenton Street in Seattle	King
Streetcar on Seattle Waterfront	King
Streetcar from SODO to E Marginal Way	King
Streetcar from W Dravus Street to W Mercer Street	King
Streetcar from Alderwood Mall to Edmonds Community College via Lynnwood Transit Center	Snohomish
Streetcar from Everett Waterfront to Lowell via Everett Station	Snohomish
Streetcar from Paine Field to SR 527 via Airport Road/SR 96	Snohomish
Link Light Rail	
Additional Link maintenance facilities & storage yards for Plan Modifications	Systemwide
Multiple Modes	
Vehicles, commuter rail cabs, coaches and locomotives.	Systemwide
Stations and supporting facilities and services for corridor level Plan Modifications.	Snohomish, King, Pierce
Additional Sounder maintenance facilities & storage yards for Plan Modifications	Systemwide
Colman Dock Multimodal Hub Passenger Facilities	King
SR 99 and 118th St. Station Parking	Snohomish
Beverly Rd. Station Parking	Snohomish
Boeing Paine Field Station Parking	Snohomish
175th St. E at Canyon Rd. Station Parking	Pierce
Portland Ave. E at SR 512 Station Parking	Pierce
Policies, Programs, and Services	
Study integration of Swift with Link LRT to maximize the transportation benefit of both modes	Snohomish
Support BRT programs of other agencies, with goal of ITDP Bronze BRT standard	Systemwide
Support implementation of the Growing Transit Communities partnership	Systemwide
Financially support construction of transit-oriented development	Systemwide

Regional Transit Long-Range Plan Update

High-Capacity Transit Technologies Issue Paper

SOUND TRANSIT
401 South Jackson Street
Seattle, WA 98104-2826

June 2014

Contents

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Appendix

Acronyms and Abbreviations

BAT	business access transit
BRT	bus rapid transit
DMU	diesel multiple unit
FRA	Federal Railroad Administration
HCT	high-capacity transit
HOT	high-occupancy toll
HOV	high-occupancy vehicle
LRT	light rail transit
PSRC	Puget Sound Regional Council
RCW	Revised Code of Washington
ROW	right-of-way
ST	Sound Transit
ST2	Sound Transit 2

1 Long-Range Plan Update: Transit Technologies Issues

Sound Transit (ST) is updating its Long-Range Plan for high-capacity transit (HCT) projects and services in the Central Puget Sound Region. As part of the update, a variety of HCT technologies could be considered for inclusion in the plan and in Sound Transit's next phase of system planning. The HCT technologies and interim services identified in Sound Transit's 2005 Long-Range Plan include light rail transit (LRT), commuter rail, bus rapid transit (BRT), and ST Express bus service. Additionally, some corridors in the 2005 plan were identified without specifying a desired transit technology, namely "Potential Rail Extension" (light rail or commuter rail technology) and HCT (any HCT technology included in the Long-Range Plan).

This issue paper provides a review and qualitative assessment of what constitutes an HCT technology, definitions of current transit technologies, and current issues for the update of Sound Transit's Long-Range Plan and for the next phase of HCT system planning. The following sections summarize considerations relating to specific HCT technology options and their appropriateness for inclusion in the Long-Range Plan Update and for potential implementation by Sound Transit.

1.1 Purpose

Periodic review of transit technologies is important given the emergence of new technologies, the evolution of existing technologies, and the changing needs of potential transit corridors. Evaluating various potential HCT technologies ensures that Sound Transit can:

- Identify what considerations need to be made before adding services that use technologies that would be new to the agency, and
- Choose the most appropriate technologies to meet its regional goals.

1.2 High-capacity transit corridors in the Long-Range Plan

Figure 1-1 shows the HCT corridors in the adopted 2005 Long-Range Plan, including projects funded by voters through the Sound Move and Sound Transit 2 (ST2) ballot measures. For several of these corridors, the Long-Range Plan identified rail as the preferred technology; BRT was identified in other corridors; and express bus services were also included. As Sound Transit updates its Long-Range Plan again in 2014, the agency is studying a range of HCT technologies. The update will consider a variety of performance characteristics, such as speed, reliability, and capacity, as well as state requirements that guide Sound Transit in its development of the regional HCT network.

1.2.1 High-capacity transit technology under state law

High-capacity transit is defined in the legislation that created Sound Transit—in Chapter 81.104 Revised Code of Washington (RCW). Within this legislation, regional transit authorities are directed to develop and implement an HCT system plan.

RCW 81.104.015(2) defines an HCT system as the following:

> "High capacity transportation system means a system of public transportation services within an urbanized region operating principally on exclusive rights-of-way, and the supporting services and facilities necessary to implement such a system, including interim express services and high occupancy vehicle lanes, which taken as a whole, provides a substantially higher level of passenger capacity, speed, and service frequency than traditional public transportation systems operating principally in general purpose roadways."

Source: Sound Transit 2013

Figure 1-1. Current Plan Alternative

Under this definition, HCT's key characteristic is that it operates principally in its own right-of-way (ROW). Additionally, an HCT system should provide greater capacity, speed, reliability, and frequency than existing local transit services. Accordingly, for HCT services that Sound Transit implements or plans to implement, consideration should be given to whether that service operates principally in an exclusive right-of-way or meets the other elements of an HCT system.

1.3 Puget Sound Regional Council study of high-capacity transit corridors and technology

In 2004, as part of its assistance to Sound Transit for updating the Regional Transit Long-Range Plan, the metropolitan planning organization for King, Pierce, Snohomish, and Kitsap Counties— the Puget Sound Regional Council (PSRC)—evaluated four HCT corridors and surveyed a wide variety of technology options that could be considered for the HCT corridors. As described in more detail later in this document, these options included enhanced bus, BRT, LRT, monorail, SkyTrain (e.g., automated rail transit operating in Vancouver, BC; primarily aerial), diesel multiple-unit (DMU), commuter rail, heavy rail, maglev/high-speed rail, personal rapid transit, and automated people movers. This information was presented in the *Central Puget Sound Regional High Capacity Transit Corridor Assessment, Technical Workbook* (PSRC, 2004). This work is summarized and updated in Appendix A.

As described in the assessment, some of the technologies evaluated are better suited for local or interregional travel than for the regional travel required by the Sound Transit system. Such technologies are therefore not considered as suitable for Sound Transit to consider as HCT technologies, even though they may be capable of carrying large ridership volumes. For example, maglev/high-speed rail technologies are more appropriate for interregional travel across long distances, while gondolas/aerial trams and automated people movers are more appropriate for local travel over shorter distances.

2 Regional and Local Applications

Sound Transit operates regional light rail, commuter rail, and express bus services in the central Puget Sound region. With the current Long-Range Plan Update, new services and corridors could be added into the plan. This section reviews the applications of different transit technologies, focusing on their service characteristics (regional versus local service). It also reviews the spectrum of technologies and their characteristics for rail and bus services, including bus rapid transit.

2.1 Applications

Different transit technologies are better suited for some applications than others, and service characteristics will inform the determination of which technology is most appropriate in a given situation. The types of service characteristics to be considered are described in this section.

2.1.1 Regional transit service

Regional centers exhibit a high demand for travel between them and are best served by HCT, which is more effective for longer-distance trips. Local trips, being shorter, typically do not require the speed, reliability, and capacity provided by a HCT system. Potential regional transit service should include higher operating speeds and a greater amount of service operating outside of mixed traffic. Demand should be great enough to justify providing exclusive ROW and the higher costs needed to construct infrastructure improvements. This investment in speed, reliability, and efficiency improvements as part of providing HCT service for moving a large volume of riders could reduce per-rider operating and maintenance costs for the system as a whole as new regional HCT service replaces existing non-HCT service.

Regional service can be provided through a variety of methods. In the central Puget Sound region, Link light rail, Sounder commuter rail, and BRT/ST Express buses provide regional connectivity and capacity. The express bus services from Sound Transit provide interim HCT services that meet existing transit demand to connect regional centers while leveraging available supporting facilities that improve transit speed and reliability, such as high-occupancy vehicle (HOV) lanes, high-occupancy toll (HOT) lanes, direct-access ramps, and Business Access Transit (BAT) lanes.

2.1.2 Local transit service

Local transit services provide connections to neighborhoods, urban centers, and to HCT lines. Local services typically have frequent stops while operating on arterials, leading to performance levels that are lower than those services that connect regional centers. These services are not likely to be high-capacity because of stop spacing, insufficient demand to justify exclusive ROW, and ROW constraints (e.g., narrow streets, parking demand) that do not allow for some level of transit exclusivity. Therefore, many local transit services are subject to effects of operating in a mixed-traffic environment, such as traffic congestion and intersection delay.

Circulation service

Circulation services are a sub-type of local service, with some special characteristics to emphasize circulation within a regional center. This type of service focuses on connectivity and simplicity more than speed and capacity. Examples of circulator service are seen in many downtowns across the nation. These services provide relatively easy-to-understand service, connecting portions of urban centers with themselves and with HCT service, along with relatively frequent service, frequent stops, and slow speeds. The operating environments vary greatly, from buses to mixed-traffic buses and streetcars to grade-separated people movers.

Circulation service examples in this region include the South Lake Union streetcar (circulating between downtown Seattle and South Lake Union) and King County Metro Route 99 (circulating between Belltown and the International District via 1st Avenue).

2.2 Rail spectrum

Rail-based technologies have a variety of characteristics that influence their classifications along a spectrum from streetcar to light rail to heavy rail. (See Appendix A for definitions of each technology.) Defining characteristics of various rail technologies are shown in Figure 2-1.

The primary defining characteristic of a rail technology is its operating environment, which in turn affects its capacity, speed, and reliability. The operating environment can be described as the following (from the *Transit Capacity and Quality of Service Manual* (TRB 2013)):

- **Mixed traffic**—Shared lane with general-purpose traffic (e.g., South Lake Union Streetcar)
- **Semi-exclusive**—A lane partially reserved for transit use but available to other vehicle classes at certain times, locations, or vehicular movements (e.g., San Francisco Muni J Church, where taxis are also allowed to use transit-only lanes with turning restrictions)
- **Exclusive**—A lane or portion of the right-of-way reserved for exclusive transit use but with some locations that allow for controlled at-grade crossings, such as intersections or pedestrian crossings (e.g., ST Link light rail along Martin Luther King Jr. Way S. between the Mt. Baker and Rainier Beach Stations)
- **Grade-separated**—A transit-only facility with no at-grade crossings (e.g., ST Link light rail from Rainier Beach to SeaTac Airport Stations)

As shown by the examples above, LRT can operate in multiple operating environments. By contrast, streetcars typically operate in mixed-traffic conditions and at slower speeds than LRT. Heavy rail transit, however, operates only in grade-separated conditions, allowing for use of a third rail power system.

Other key defining characteristics of a rail technology are also shown in Figure 2-1 and included on the following list.

- **Vehicle capacity**—The size of the vehicle and the ability to combine vehicles to create longer trains (also known as consists)
- **Operating speed**—Operating speed between stations, along with maximum vehicle speed
- **Service frequency**—Vehicle headways
- **Station spacing**—Distance between stations, varying from several stations per mile to one station every few miles
- **Vehicle automation**—Ability to operate with driverless vehicles
- **Span of service**—Hours of the day for which service is provided

As the characteristics trend toward the right on Figure 2-1, it is more likely that a transit line would be considered as heavy rail; although not all characteristics need to be at one end or the other to be considered streetcar, light rail, or heavy rail.

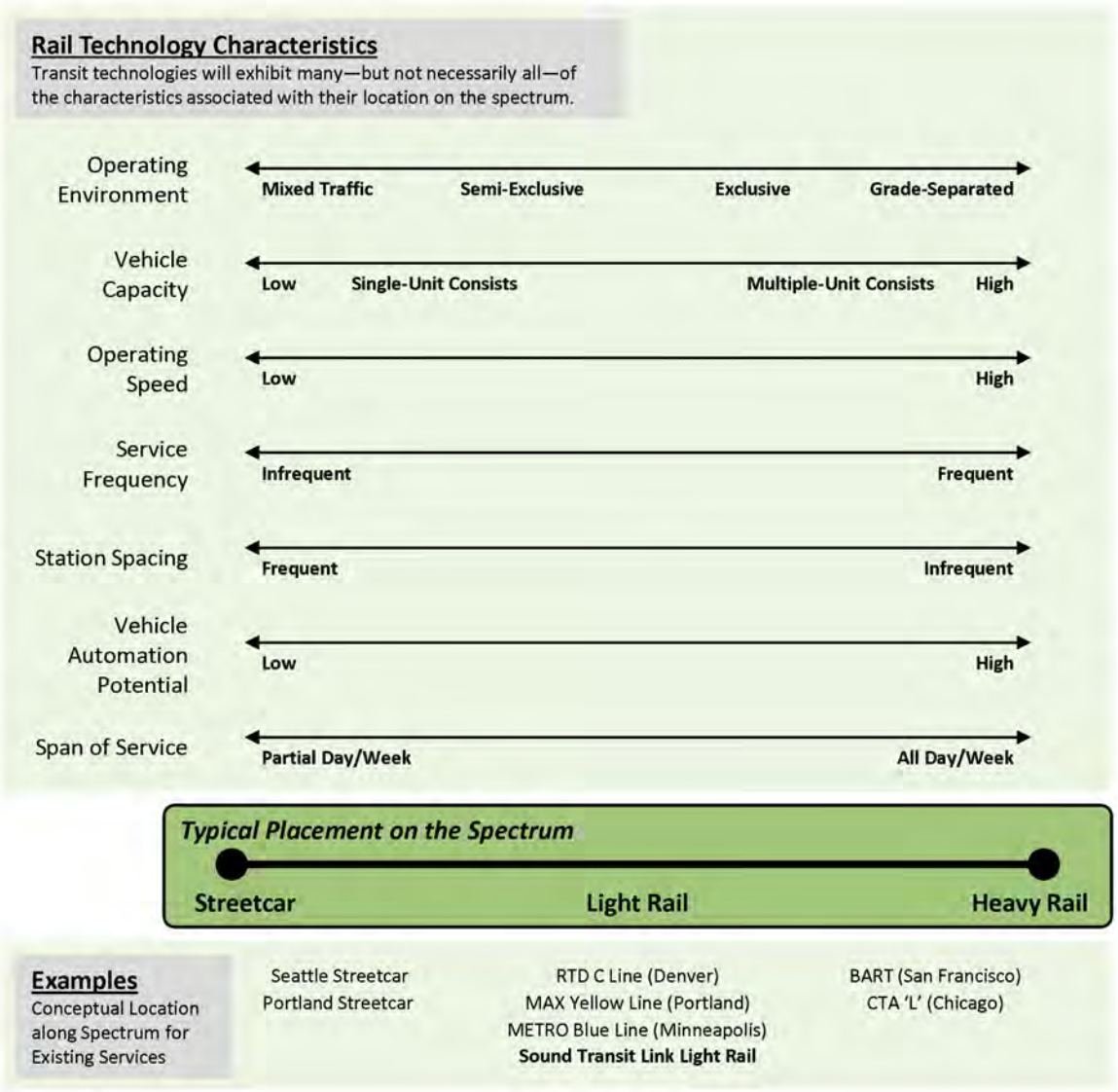


Figure 2-1. Rail technologies spectrum and characteristics

2.3 Bus spectrum

Bus services can also be defined across a spectrum, ranging from local bus to BRT operating in its own exclusive, grade-separated right-of-way, as shown in Figure 2-2.

The characteristics used for this bus-related comparison are similar to those used for defining rail technologies; however, in practical application, the range of vehicle capacity is much lower among the various bus types, and complete automation of bus services is extremely difficult and has currently not been implemented anywhere.

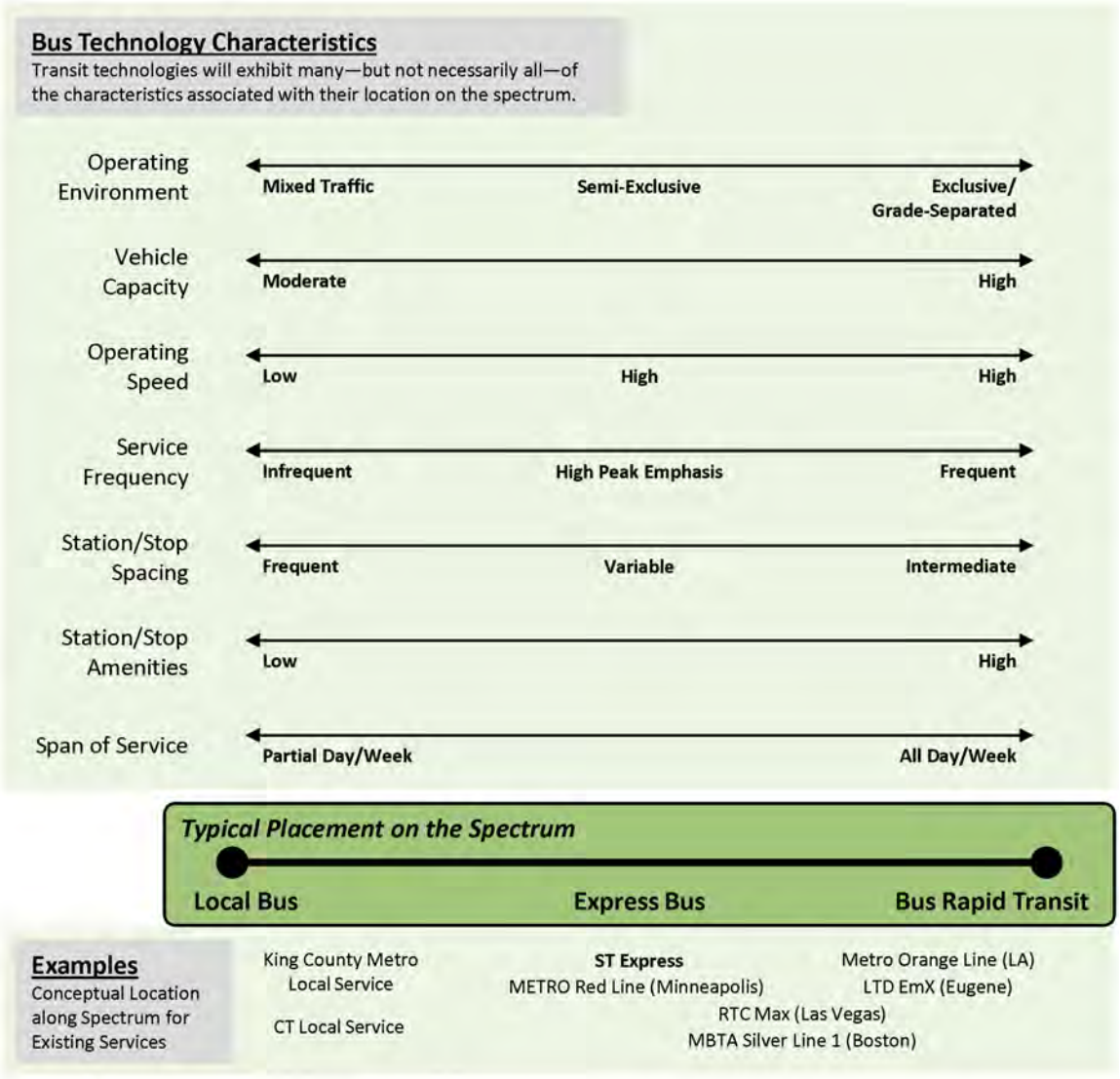


Figure 2-2. Bus technologies spectrum and characteristics

Express bus is placed in the middle of the spectrum, although express buses do not stop frequently and spacing does not necessarily fit linearly along those characteristics when compared to local buses and BRT. This variation in characteristics is also representative of bus services in general, which can act as more than one type of service depending on the local operating environment. For example, Boston's Silver Line 1 operates in a grade-separated environment with off-board fare payment and multiple-door boarding for a portion of the route; in another portion of the route, it provides local bus service, operating in mixed traffic with front-door boarding and payment.

2.3.1 Bus rapid transit spectrum

As shown in Figure 2-3, BRT systems operate in a variety of rights-of-way, including dedicated busways, on HOV lanes, and on arterials partly or fully outside general traffic lanes. BRT also has the flexibility to mix these approaches within a given corridor. BRT that operates principally on exclusive rights-of-way with a high degree of grade separation can be considered as regional HCT, while other forms of BRT and Regional Express bus service that do not operate principally on exclusive rights-of-way may in some cases be considered interim services to HCT.

BRT service within the Sound Transit district could range from low-cost priority treatments for buses operating on arterial roadways and BAT lanes, to higher-cost fully grade-separated busways. Special branding of routes, vehicles, and station stops is typical for BRT systems.

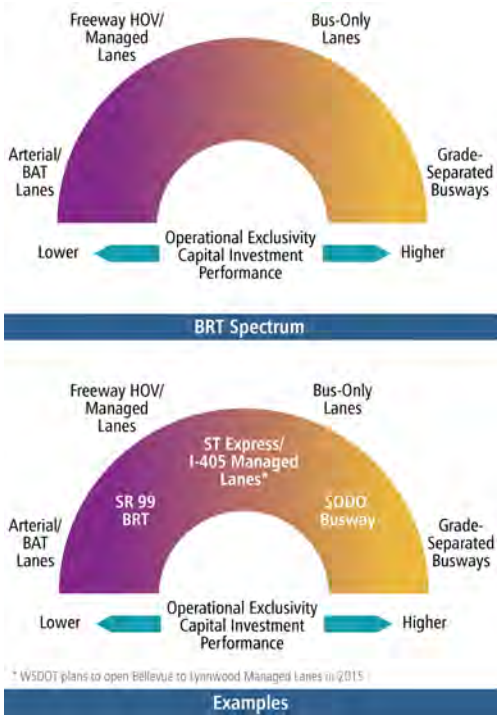


Figure 2-3. BRT spectrum of improvements

3 Practical Consideration of Technologies within the High-Capacity Transit Network

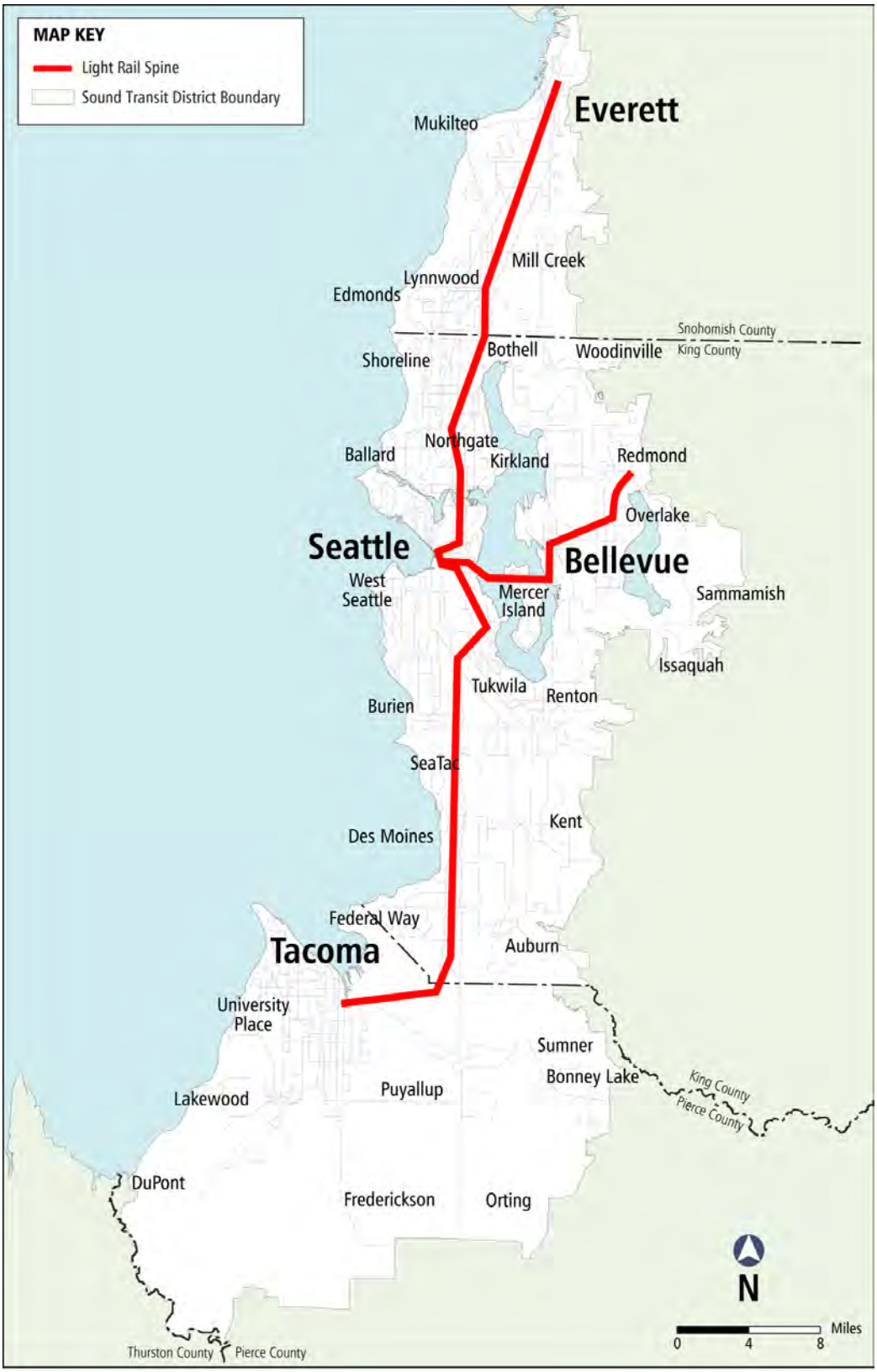
This section reviews several practical considerations relating to the technologies evaluated for the HCT system. These considerations include how well the various technologies of the transit system are integrated, as well as operations and maintenance requirements. This section evaluates these considerations for both rail and bus technologies.

3.1 System integration

An important measure of effectiveness of the regional HCT system is the degree to which the various components interact with one another. Integrating the system from the rider perspective involves whether transfers are needed between different transit lines of the same or different technology, and the experience of the transfer. Reducing the number of transfers and improving the quality of transfers can increase ridership and satisfaction with a transit system. Transfers can be improved through both the passenger environment and through connections between frequent, reliable transit services. Well-designed and implemented system integration can also result in more efficient maintenance and operations and administration of transit services, thus reducing costs relative to operating a variety of dissimilar services.

3.1.1 Rail service

ST's Link light rail and its currently funded expansion to Lynnwood, Redmond, and Kent/Des Moines will use a common type of light-rail vehicle and traction power system. This LRT network, plus the potential extensions to Everett, Tacoma, and downtown Redmond, is referred to as the Sound Transit Link light rail "spine," shown in Figure 3-1. To reduce complexity of operation and rider itinerary, the vehicles and traction power along the spine should be compatible with the existing track and system infrastructure, such as power requirements, dimensions (especially at station platforms), and vehicle speed characteristics. Such compatibility is currently planned for the network expansion. However, the manufacturer and vehicle model would



Source: Sound Transit 2013

Figure 3-1. Sound Transit Link light rail transit "spine"

not necessarily need to be the same, as demonstrated by Portland, which uses four different LRT vehicle models from the same manufacturer, and by Minneapolis, which operates vehicles from two different manufacturers.

Off-spine service

Other potential rail corridors not directly interlined with the planned "spine" could use alternative technologies and vehicles, and the agency could consider whether doing so would prove a more cost-effective method for serving the needs within those corridors. Since markets served by these rail corridors could have lower demand than the planned spine, options with lower transit capacity could be considered. Options for these off-spine corridors could include operations with shorter light-rail consists using current or different vehicle types or with a different technology, such as a higher-capacity single-consist streetcar (as used in Nice, France), or DMUs.

However, consideration should be given to whether these technologies provide the cost-effectiveness, flexibility, and reliability to meet future needs. For example, line capacity could be an issue if a line is designed for a certain capacity but demand becomes much higher than initially estimated. Line capacity, including related factors such as vehicle capacity and platform lengths, should be sufficient to meet long-term demand to avoid operational issues and potential future redesigns to support longer trains and platforms. This is important for at-grade streetcar or LRT lines that could approach operational limits as train length or frequency is expanded beyond original plans. This is also an important consideration for grade-separated systems, as lengthening platforms in a tunnel or on an elevated segment can be extremely expensive.

In addition, some transit technologies require full grade-separation in order to support power systems, unique guideways, at-grade power systems (e.g., third rail), or very frequent service. One or more of these conditions exists for monorail, SkyTrain, and heavy rail. The capacity of these modes (except for monorail) is also likely greater than what would be needed on non-spine transit lines. The ability to operate with at-grade crossings could be appropriate for a corridor, depending on land use, topography, available transportation right-of way, capacity, and service frequency needed, leading to more cost-effective design and construction. Monorail has additional operational issues related to track switching that could reduce capacity, even though it is fully grade-separated.

Additionally, new transit technologies for Sound Transit, especially non-standard or unconventional technologies, would likely require additional separate operations and maintenance facilities, as described in Section 3.2.

Finally, maximizing system integration and operational flexibility discourages the use of multiple technologies in the same corridor. Substantively different variations within a transit technology (e.g., LRT with different power requirements) or between technologies (e.g., LRT and monorail) prevents interlining transit lines, forcing transfers between lines. In any transit network, some transfers may be required, but thoughtful transit technology and vehicle selection can reduce unnecessary transfers.

Diesel multiple unit service

DMU service could provide options for operating service on freight rail or light rail corridors. In corridors without existing active freight or LRT service, modern DMU vehicles could provide rail transit service without the need for electrification infrastructure or the higher capacity trains provided by conventional commuter rail equipment.

Interlining of DMU service with existing electric LRT service would be unlikely because of limited capacity of the completed "spine" and potentially incompatible fire/life/safety requirements in tunneled portions, such

as those needed to accommodate its fuel source and emissions. However, DMU service could be a possibility for new lines with all-day demand that are not on the "spine."

Additionally, along the existing Sounder corridors, many modern DMU vehicles (such as those commonly used in Europe) do not meet the crashworthiness standards to operate on the same lines at the same time as other commuter passenger and freight vehicle traffic. In order to provide this type of service in those corridors, DMUs that meet the Federal Railroad Administration (FRA) safety requirements must be used, such as in Portland, or a waiver from the FRA must be received, which was the case in Denton County, Texas. However, in the future as the FRA continues to evaluate the potential for allowing more types of DMU vehicles and existing freight rail vehicles to interact to a greater degree, these trains could provide commuter rail service at lower capital and operating costs than traditional Sounder commuter rail equipment. In particular, this transit technology would allow for commuter rail service to be provided in corridors or at times of day where demand is not high enough to justify commuter rail consists, such as those currently used on Sounder service.

3.1.2 Bus service

ST Express bus and BRT services can use existing bus technologies. These include standard buses as well as BRT vehicles that include enhanced features over standard buses, such as additional doors, enhanced seating and standee areas, and other amenities. As bus service evolves, Sound Transit could adopt new vehicle types into its fleet, as it has in the past with the addition of hybrid-electric buses and, more recently, the addition of double-decker buses into the fleet.

Bus services of various technologies can be effectively integrated with the existing transit infrastructure, such as HOV lanes, park-and-ride lots, and direct access ramps. For these bus services, it may be necessary to require transfers to rail to better utilize rail capacity and avoid duplication of service in the same corridors as LRT or Sounder. In requiring these transfers, the trade-offs between a one-seat-ride convenience for the rider, overall ridership levels, and operational cost should be evaluated. The impacts of a transfer on riders can be mitigated through frequent and reliable service and improved passenger facilities.

3.2 Operations and maintenance requirements

All transit vehicles and the facilities they operate on require periodic maintenance. Vehicle maintenance is fundamental to providing safe, clean, and reliable service. Rail and other fixed-guideway transit services also require a transit agency to provide for maintenance of the guideway on which the rail line operates.

For all transit technologies, the capacity and distribution of maintenance facilities are key factors in planning for system expansion and particularly for the consideration of new technologies. While expanded maintenance functions for existing technologies can often be accommodated at a few system wide facilities distributed regionally, a new technology might require a stand-alone facility, requiring not just an additional facility, but technology- and vehicle-specific training for staff, different maintenance procedures, and different part procurement requirements. Expanding maintenance functions for existing technologies provides economies of scale in both capital (land, equipment) and operations (training, procedures, staffing). The following paragraphs discuss operations and maintenance issues specific to rail service and bus service.

3.2.1 Rail service

Existing maintenance for Sound Transit's rail services is performed at vehicle maintenance facilities and along existing rail corridors. Link light-rail vehicle maintenance is performed at Sound Transit-owned maintenance facilities in SODO and in Tacoma, while Sounder commuter rail vehicle maintenance is contracted to Amtrak and performed at the line termini and at Amtrak's maintenance facility in SODO. Rail line maintenance

(a.k.a., maintenance of way) is performed by Sound Transit for Link and by BNSF for most of Sounder, except the Lakewood subdivision owned and maintained by Sound Transit.

For substantial expansions of fixed-guideway transit (such as light rail and commuter rail) and potential new services, new or expanded maintenance facilities for vehicles would likely be needed. The siting and services of these facilities would need to consider integration with the existing rail services, such as line configuration and service levels, and vehicle constraints, such as matching vehicle power systems and compatible maintenance requirements. Rail-based services require vehicle maintenance and storage facilities adjacent to the rail corridor because of the rail infrastructure needed to connect the corridor to the location of the vehicle maintenance facility; any expansion of rail service would require this adjacency or a connection to an existing rail corridor with a vehicle maintenance facility that has sufficient capacity for additional vehicles. Additionally, track maintenance equipment could be shared between similar services, given that a rail connection is provided between them.

3.2.2 Bus service

Unlike maintenance for rail vehicles, bus maintenance bases do not require siting near the location where service is operated. However, increased distance of a base from the start or end of a bus route increases operating costs.

Existing ST Express buses are operated, maintained, and stored through contracted arrangements with partners at King County Metro, Community Transit, and Pierce Transit. These agencies currently have the capacity to maintain and store buses needed for the service.

Expansion of ST Express bus services up to a certain level could be accommodated with the existing partner agencies. However, if the partner agencies no longer have the capacity to maintain and store Sound Transit buses, either because of growth in Sound Transit's or the partner agencies' fleet sizes, Sound Transit may need to use other maintenance facilities and/or providers of bus maintenance services. This could require Sound Transit to develop one or more new stand-alone, agency-owned maintenance facilities.

Additionally, as the various partner agencies operate buses that are similar to those of their own fleet, efficiencies are created for maintenance, including staff training, maintenance procedures, and parts procurement. As one partner agency approaches maintenance capacity, the shifting of maintenance responsibilities to another agency could prove problematic since they may not be properly equipped to effectively maintain the vehicles because of variations in manufacturers and vehicle type (e.g., hybrid, double-decker); moreover, the location of their maintenance facility could be less than optimal for cost-effective operations planning and route deployment. Long non-revenue travel times between a bus maintenance facility and the start or end of a route could lead to higher operation costs. Vehicle procurement and operation and maintenance agreements should consider how to avoid potential issues related to agency-specific vehicle types.

4 High-Capacity Transit Technologies to Include in Long-Range Plan Update and System Planning

This section summarizes the HCT technologies that appear to be most suitable to include in Sound Transit's updated Regional Transit Long-Range Plan and its future system planning. Technologies that do not meet the definition of HCT or technologies that are otherwise not considered appropriate (for the reasons described in this paper and summarized in Appendix A) are not carried forward for further consideration. As described below, only a handful of technologies appear suitable for inclusion in Sound Transit's Long-Range Plan Update or for consideration in the agency's next system planning efforts.

4.1 HCT transit technology review

Based on this and previous reviews of HCT technologies, the most viable HCT options to connect regional centers are LRT and BRT that operate principally on exclusive rights-of-way, including grade-separation, along with commuter rail and DMU in selected corridors. Streetcars as typically operated may not be viable as an HCT technology; however, if they operate principally on exclusive rights-of-way, they may be considered HCT.

Transit technologies, their best scale of application, their HCT capability, and whether carried forward for further study are summarized in Table 4-1, with additional detail for each technology provided in Appendix A.

Table 4-1. Summary of transit technologies

High-capacity transit technology	Application	High-capacity transit capability	Viability for HCT implementation
Express Bus	Regional	Low	Yes, provides interim express service
Bus Rapid Transit	Regional	Low to moderate	Yes, if sufficient ROW exclusivity and capacity
Streetcar	Local or regional	Low to moderate	Yes, if sufficient ROW exclusivity and capacity
Light rail	Regional	High	Yes, existing ST high-capacity transit technology
Monorail	Regional	Moderate	No, requires full grade separation; capacity and operational limitations
SkyTrain	Regional	High	No, requires full grade separation
DMU	Regional	Moderate	Yes, if sufficient capacity
Commuter rail	Regional	High	Yes, existing ST high-capacity transit technology
Heavy rail	Regional	High	No, requires full grade separation
High-speed rail/Maglev	Interregional	High	No, not regional HCT service, requires grade separation
People movers/airport circulators	Local/circulation	Low	No, not regional HCT service
Gondola/aerial tram	Local/circulation	Low to Moderate	No, not regional HCT service
Personal rapid transit	Local/circulation	Low	No, not regional HCT service

The findings above are based primarily on the requirements for Sound Transit to provide HCT services operating principally on exclusive rights-of-way, along with other services and improvements that provide a higher level of regional service to passengers than do traditional public transportation systems.

In the case of streetcar, express bus, or some BRT technologies, these technologies frequently operate in mixed traffic, in which case they would not be considered an HCT technology. However, a streetcar or BRT design that operates principally in exclusive ROW could be considered as an HCT technology. System integration constraints and in some cases new and separate maintenance facilities would be additional factors to consider when evaluating the appropriateness of HCT technologies.

4.2 Transit technologies considered but not carried forward

Transit technologies were not carried forward where they were less suitable for Sound Transit to maintain, operate, and expand regional HCT services in an efficient manner or where they did not support and build upon the existing regional HCT system. The technologies not carried forward for further consideration are as follows:

- **Monorail**—Monorail was studied in the 2005 Regional Long-Range Plan SEIS but not included in the 2005 Long-Range Plan. Monorail is not carried forward for this study because it lacks the flexibility to operate at-grade and it would introduce operational challenges, such as being able to provide necessary headways and have vehicles switch tracks. In addition, monorail would involve system incompatibility issues where it would intersect with the rail lines due to unique tracks and vehicle types.
- **SkyTrain**—This technology is not considered further because it requires complete grade separation. It would also involve operational and systems integration challenges where it connects with other modes due to vehicle automation.
- **Heavy rail**—Heavy rail was not considered further because it is more appropriate for systems requiring higher capacities. Additionally, requirements for full grade-separation limit flexibility in design and limit options for efficiencies of operating in at-grade environments.
- **High-speed rail/maglev**—High speed rail systems were not considered further because they are more appropriate for inter-regional connections rather than for intra-regional service. Additionally, requirements for full grade-separation limit flexibility in design and limit options for efficiencies of operating in at-grade environments.
- **People movers/airport circulators**—People-mover systems were not carried forward because they operate at a local circulation level rather than along regional corridors, and they lack the capacity, speed, and operational efficiencies of the other technologies.
- **Gondola/aerial tram**—Gondolas and aerial trams were considered but not carried forward because they operate on a local circulation level, lack regional applications, and each application would require new supporting facilities and services.
- **Personal rapid transit**—This is not considered a high-capacity transit technology because it serves a limited number of passengers and focuses on local circulation rather than serving regional corridors.

Appendix A: Transit Technologies Assessment

This appendix summarizes the characteristics of various transit technologies. This summary is based on a more detailed evaluation prepared by PSRC, which was published in the *Central Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook*: 2004. The summary provided here supplements the PSRC document and adds up-to-date information on all of the technologies evaluated previously. It also adds streetcar and gondola technologies to the evaluation summary.

Costs for each technology are not provided since the cost for a transit line will vary greatly based on the technology and a variety of other factors, such as the operating environment, service capacity, and urban density of a transit line. For example, Link light rail costs-per-mile were relatively low in the exclusive operating section in SODO as compared to the grade-separated section between the Westlake and University of Washington Stations.

Express bus/enhanced bus

	Performance	General information and regional application
Example	ST Express	
High-capacity transit capabilities	Low	Not considered high-capacity transit because of amount of mixed and semi-exclusive operations. For Sound Transit, this is an interim express service that can lead to bus rapid transit or light rail transit as service expands.
Capacity	Up to 100 passengers/vehicle	Includes standing capacity, which is not desirable on buses given length of regional transit trips. Line capacity is insufficient for corridors with high-capacity transit needs.
Operating speeds	Max: 60 mph; Avg: 5–15 mph	Average can vary widely depending on corridor type (e.g., freeway, arterial), traffic congestion, and station spacing.
Station spacing	0 to 2 miles Longer for service connecting high-demand centers.	Spacing can change because of changes in development, events, etc.
Typical headway	15–45 minutes, peak	Typically less frequent than other modes
System integration	Seamless integration with existing bus system. Barriers to implementation in dense urban areas with high levels of congestion.	Flexibility allows for roles as feeder service to other services.
Land use	Wide range of station investment possible.	Flexibility allows for expansion into rapidly-developing areas. Technology seen as impermanent and not supporting long-term development.
Implementation risk	Very Low Risk: operating in many regions and cities in US. Many established suppliers and manufacturers. High number of experienced drivers and mechanics.	
Schedule reliability	Low to Moderate, especially when running in mixed traffic.	
Infrastructure requirements	Low to High infrastructure required, depending on scale of added high-occupancy vehicle lanes, high-occupancy toll lanes, and/or direct access ramps.	Uses existing general purpose, high-occupancy vehicle, and bus lanes.

Sources: Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook: 2004 ; Transit Capacity and Quality of Service Manual, 3rd Edition: TRB, 2013

Bus rapid transit

	Performance	General information and regional application
Example	Metro Orange Line (Los Angles)—High SR 99 BRT—Moderate	Orange Line operates with mostly exclusive ROW in its own corridor, off-board fare payment.
High-capacity transit capabilities	Low to Moderate	Depends on level of exclusive ROW, capacity, frequency, and speed. For Sound Transit, this could be considered a high-capacity transit technology, given sufficient exclusive ROW and capacity.
Capacity	Up to 100 passengers/vehicle	Includes standing capacity, which can be higher depending on seat configuration. Possibility that line capacity would be insufficient even with frequent service.
Operating speeds	Max 60 mph; Avg: 20–45 mph	Average can vary depending on corridor type (e.g., freeway, arterial), traffic congestion, station spacing, and bus rapid transit features implemented.
Station spacing	0.25–2 miles	Spacing can change because of changes in development. More permanent stops and stations than other bus service.
Typical headway	5–15 minutes, peak	Higher frequencies possible, but constrained by ability to space them through use of exclusive or semi-exclusive ROW.
System integration	Seamless integration with existing bus system. Barriers to implementation in dense urban areas with high levels of congestion.	Flexibility allows for roles as feeder service to other services. Bus rapid transit with exclusive lanes may compete with other higher-capacity transit technologies for limited system ROW.
Land use	Moderate volumes create some activity around stations. More permanent stations promote moderate density development.	Flexibility allows for expansion into rapidly-developing areas. Technology seen as more permanent than regular bus.
Implementation risk	Low Risk: Some established suppliers, manufacturers, operators, and maintainers.	
Schedule reliability	Moderate to Good, through use of high-occupancy vehicle or high-occupancy toll lanes. Greater reliability with exclusive ROW. Off-board fare collection, signal priority, and level boarding improve reliability.	
Infrastructure requirements	Low to High infrastructure required. Depending on type of implementation, surface treatments, level of exclusivity, tunnel or elevated structures are required. Special branding is typical.	New bus-only infrastructure in some areas in addition to existing general purpose, high-occupancy vehicle, and bus lanes.

Sources: Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook: 2004; Transit Capacity and Quality of Service Manual, 3rd Edition: TRB, 2013

Streetcar

	Performance	General information and regional application
Example	South Lake Union Streetcar—Local service Portland Streetcar—Local service Nice/Lyon Trams in France—HCT	
High-capacity transit capabilities	Low to Moderate	Depends on level of exclusive ROW, capacity, frequency, and speed. Existing streetcar lines in US do not typically provide high-capacity service. However, for Sound Transit this could be considered as a high-capacity transit technology if designed principally in its own ROW.
Capacity	Up to 170 passengers/car—Local Up to 300 passengers/car—HCT	Typically operates in a single-car consist. Highest capacity only achieved with streetcars that are similar to LRT vehicle lengths.
Operating speeds	Max: 44 mph; Avg: 5–25 mph	Average can vary depending on traffic congestion and station spacing.
Station spacing	0.25–1.0 mile	
Typical headway	5–20 minutes, peak	
System integration	Integrates well with existing streetcar systems. Regional use would require transfers at light rail transit and commuter rail stations.	Power systems, maintenance capacity needs should be evaluated with expansion.
Land use	Permanent stations promote dense development.	Passenger volumes are not as high as high-capacity transit technologies, so effect is less than those technologies.
Implementation risk	Low-Moderate Risk: Some established suppliers, manufacturers, operators and maintainers.	
Schedule reliability	Low to good. Lowest when running in mixed traffic; best in exclusive ROW.	Issues with mixed-traffic reliability can be partially addressed with transit priority or semi-exclusive operations at known congestion points.
Infrastructure requirements	Moderate infrastructure required. Little to no space needed for streetcar operations, but platforms, power systems, and maintenance facilities are needed.	Needs mostly exclusive ROW and capacity to support future demand to be considered high-capacity transit.

Sources: Seattle Transit Master Plan, 2012; Seattle Streetcar Fact Sheet; Transit Capacity and Quality of Service Manual, 3rd Edition: TRB, 2013

Light rail

	Performance	General information and regional application
Example	ST Link light rail TriMet MAX (Portland) RTD Light Rail (Denver) METRO Light Rail (Minneapolis)	
High-capacity transit capabilities	High	Typically high-capacity transit; depends on level of exclusive ROW, capacity, frequency, and speed. For Sound Transit, this is an existing high-capacity transit technology.
Capacity	Up to 200 passengers/car Up to 800 passengers/consist	Cars can be placed into consists for additional capacity. Link light rail can operate with 1—4 cars per consist.
Operating speeds	Max: 65 mph; Avg: 20–40 mph	Average can vary depending on operating environment, geometry, and station spacing. Dwell times shorter than with buses. Link light rail operates at up to 55 mph.
Station spacing	0.25–2 miles	Station placement is inflexible to changing development.
Typical headway	2–10 minutes, peak	Timing should meet capacity needs at busiest points. Additional frequency can be easily provided for events.
System integration	Seamless integration with other currently funded ST Link lines	Capacity constraints may limit the ability of new lines to share tracks with Link's spine.
Land use	Large passenger volumes create activity around stations. Permanent stations promote dense development.	Barriers for pedestrians, bicycles, and cars may be created at stations or along the tracks for safety needs.
Implementation risk	Low Risk: Currently operating in region and in dozens of US cities. Many established suppliers and manufacturers. High number of experienced drivers and mechanics.	Existing service provided by Sound Transit in King and Pierce Counties reduces risk of implementation.
Schedule reliability	Good to excellent reliability depending on profile. Reliability improves when operating on dedicated running way.	
Infrastructure requirements	Moderate infrastructure required; more with grade-separation or when exclusive ROW requires rebuilding full corridor. Traffic conflicts depend on design (elevated, underground or at-grade in mixed traffic).	At-grade exclusive ROW has notable requirements, though cost can be reduced relative to tunnels or elevated. Underground segments require little ROW after construction. Elevated guideways also limit ROW requirements to stations, columns, and air rights.

Sources: Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook: 2004; Transit Capacity and Quality of Service Manual, 3rd Edition: TRB, 2013; ST2 Benefits Costs, Revenues, Capacity and Reliability, Sound Transit, 2008.

Monorail

	Performance	General information and regional application
Example	Seattle Center Monorail	
High-capacity transit capabilities	Moderate	Typically high-capacity transit; depends on level of capacity, frequency, and speed. For Sound Transit, this is considered a less suitable high-capacity transit technology since monorail requires complete grade-separation and would have integration challenges. Additionally, monorail would likely have operational or capacity limitations (e.g., challenges with track switching and ability to add cars) that do not constrain more suitable high-capacity transit modes such as light rail.
Capacity	Up to 125 passengers/vehicle	Line capacity may be limited by track switching, which requires movement or rotation of relatively-large rail beams. This switching requires some time, limiting headway. Monorail does not typically use consists.
Operating speeds	Max: 50 mph; Avg: 20—30 mph	Grade-separated operations allows for faster speeds than most modes operating at-grade.
Station spacing	0.25–2 miles	Station placement is inflexible to changing development. Elevated stations require large footprint.
Typical headway	2–30 minutes, peak	Automation can provide frequency but is limited by track and system complexity.
System integration	Regional use would require transfers at existing light rail transit and bus stations. Some barriers to station size needs and set train length and frequency may limit capacity.	
Land use	Large passenger volumes create activity around stations. Permanent stations promote dense development.	
Implementation risk	Moderate Risk: Primarily used for tourist operations only in Seattle. Operating in few locations in the US and world. Few established suppliers and manufacturers.	There are no active agencies working to develop new monorail service in Seattle.
Schedule reliability	Excellent reliability. Dedicated elevated running ways avoid congestion.	
Infrastructure requirements	Moderate infrastructure required. No cross-traffic conflicts. Primarily only elevated service.	Elevated guideways limit ROW requirements to stations, columns, and air rights. Though mode operates on a single rail, could require larger structure for emergency access, etc.

Sources: Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook: 2004; Transit Capacity and Quality of Service Manual, 3rd Edition: TRB, 2013

SkyTrain

	Performance	General information and regional application
Example	Vancouver, BC	
High-capacity transit capabilities	High	Typically high-capacity transit; depends on level of capacity, frequency, and speed. For Sound Transit, this is a less suitable high-capacity transit technology since SkyTrain requires complete grade-separation and would have some integration challenges.
Capacity	Up to 150 passengers/car Up to 600 passengers/consist	Vehicles can be combined into consists, which are typically short due to high frequency service.
Operating speeds	Max: 50 mph; Avg: 25 mph	Grade-separated operations allows for higher speeds than most technologies operating at-grade.
Station spacing	< 1 mile	Station placement is inflexible to changing development. Elevated stations require large footprint.
Typical headway	2–4 minutes, peak	Automation can provide high frequency.
System integration	Different technology from existing high-capacity transit systems. Regional use would require transfers at all existing stations. Some barriers because of stations size needs.	
Land use	Large passenger volumes create activity around stations. Permanent stations promote dense development.	
Implementation risk	Moderate Risk: Well-established system operating in a major urban area outside of US. Similar technology to a few established suppliers and manufacturers. Automated system.	
Schedule reliability	Excellent reliability. Dedicated elevated running ways and tunnels avoid congestion. Fully automated system.	
Infrastructure requirements	Extensive infrastructure required. No cross-traffic conflicts because of profile (tunnel or elevated).	Automation requires fully grade-separated operations. Underground segments require little ROW after construction. Elevated guideways also limit ROW requirements to stations, columns, and air rights.

Sources: Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook: 2004; TransLink Fleet Pictorial, TransLink, 2012.

Diesel multiple unit

	Performance	General information and regional application
Example	NCTD Sprinter (San Diego)—LRT-type NJ Transit River Line (New Jersey)—LRT-type TriMet West Side Express (Portland)—Commuter DCTA A-Train (Denton, County Texas)—Commuter	
High-capacity transit capabilities	Moderate	Depends on capacity, frequency, and speed. For Sound Transit, this could be considered a high-capacity transit technology, given sufficient exclusive ROW and capacity.
Capacity	Up to 100 passengers/car	Can vary depending on consists, ranging from one to a few cars.
Operating speeds	Max: 79 mph; Avg: 20-35 mph	Average may be slower with more frequent station spacing.
Station spacing	2–5 miles	Station placement is inflexible to changing development.
Typical headway	Depends on operations.	Can be used as commuter rail service with infrequent trips, timed transfers. Can also be operated with frequent service, more similar to light rail transit.
System integration	Different technology from existing high-capacity transit systems. Regional use would require transfers at all existing stations.	Recent changes to Federal Railroad Administration guidelines could allow for the use of this mode on corridors with existing freight service.
Land use	Moderate volumes create some activity around stations. Impact on land use depends on existing rail alignment.	
Implementation risk	Moderate Risk: Some established suppliers and manufacturers, with very limited number in US. Similar enough to existing rail technologies that existing drivers and mechanics could adapt relatively easily.	Risk may decrease as other agencies adopt this technology, partly due to Federal Railroad Administration waiver options.
Schedule reliability	Good reliability. Dedicated surface and tunnel running ways avoid roadway congestion. ROW issues related to the use of freight corridors.	
Infrastructure requirements	Unless already available—extensive infrastructure is required. Graded rail serves as partial barrier to cross-traffic mobility.	Use of existing rail corridors reduces most ROW needs. These corridors are mostly at-grade in this region.

Sources: Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook: 2004; Transit Capacity and Quality of Service Manual, 3rd Edition: TRB, 2013

Commuter rail

	Performance	general information and regional application
Example	ST Sounder Metrolink (Los Angeles)	
High-capacity transit capabilities	High	Typically high-capacity transit. For Sound Transit, this is an existing high-capacity transit technology.
Capacity	Up to 250 passengers/car Up to 2,000 passengers/consist	Cars typically placed into consists for additional capacity. Consist size varies based on region and demand. For Sounder, between 2 and 7 cars per consist are typically used.
Operating speeds	Max: 55—100 mph; Avg: 25–50 mph	Grade-separated operations allow for higher speeds than most technologies operating at-grade. Sounder operates at speeds up to 79 mph.
Station spacing	2–5 miles	Acceleration and deceleration for commuter rail restricts frequency of station placement.
Typical headway	20–40 minutes, peak	In this region, operates only during peak periods, with no or little service during off peak. Since tracks are owned by BNSF, headways are constrained by freight demand needs and signal design. Commuter rail is operated with some all-day service in some regions.
System integration	Transfers required at multi-modal hub locations. Barriers associated with existing and potential freight movement.	Seamless integration with Sounder commuter rail where freight rail connections and capacity exist.
Land use	Large passenger volumes at suburban center parking stations can facilitate low to moderate density development.	
Implementation risk	Low Risk: Currently operating in region and many US cities. Large number of established suppliers and manufacturers. Large number of experienced drivers and mechanics.	
Schedule reliability	Good reliability. Dedicated surface and tunnel running ways avoid roadway congestion. ROW issues related to the use of freight corridor.	
Infrastructure requirements	Extensive infrastructure required. Graded rail serves as partial barrier to cross-traffic mobility. Surface or tunnel.	Use of existing rail corridors reduces most ROW needs. These corridors are mostly at-grade in this region.

Sources: Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook: 2004; Transit Capacity and Quality of Service Manual, 3rd Edition: TRB, 2013

Heavy rail

	Performance	General information and regional application
Example	BART (San Francisco) Metro Red/Purple Lines (Los Angeles)	
High-capacity transit capabilities	High	Always high-capacity transit. For Sound Transit, this is a less suitable high-capacity transit technology since light rail transit provides sufficient capacity without the need for complete grade-separation (a defining characteristic of heavy rail).
Capacity	Up to 250 passengers/cars Up to 2,500 passengers/consist	Cars typically placed into consists for additional capacity. Line capacity is highest of regional high-capacity transit technologies. Typically 6—10 cars/consist, but can be as low as 1 or 2.
Operating speeds	Max: 55-75 mph; Avg: 35–45 mph	Grade-separated operations allows for higher speeds than most technologies operating at-grade.
Station spacing	0.5–3 miles	Closer spacing in dense areas. Station placement is inflexible to changing development.
Typical headway	2–10 minutes peak	
System integration	Different technology from existing high-capacity transit systems. Regional use would require transfers at all existing stations. Some barriers because of station size needs. Federal Railroad Administration guidelines may apply.	Third rail power system or automation would require fully grade-separated operations.
Land use	Very large passenger volumes create activity around stations. Permanent stations promote dense development.	
Implementation risk	Low Risk: Well-established systems operating in other major urban areas. Large number of established suppliers and manufacturers. Large number of experienced drivers and mechanics.	
Schedule reliability	Excellent reliability. Dedicated running ways and tunnels avoid congestion. ROW issues related to the construction of new rail facilities.	
Infrastructure requirements	Extensive new infrastructure required. Grade-separated rail serves as partial barrier to cross-traffic mobility. Elevated or tunnel.	Underground segments require little ROW after construction. Elevated guideways also limit ROW requirements to stations, columns, and air rights.

Sources: Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook: 2004; Transit Capacity and Quality of Service Manual, 3rd Edition: TRB, 2013

High-speed rail/Maglev

	Performance	General information and regional application
Example	TGV (France) InterCity Express (Germany)	
High-capacity transit capabilities	High	Used primarily for long distance inter-regional travel. Not suitable for Sound Transit for intra-regional HCT.
Capacity	Up to 800 passengers/consist	High line capacity for long-distance (intercity or inter-region travel), but limited due to headways and limited standing room.
Operating speeds	Max: >200 mph	
Station spacing	Approximately 10 miles or more	Very inflexible once built. Vehicle acceleration and deceleration requirements affect station spacing.
Typical headway	Approximately 20 minutes	
System integration	Different technology from existing high-capacity transit systems. Regional use would require transfers at all existing stations. Severe barriers because of wide station spacing required for long-distance high-speed travel.	
Land use	Very large passenger volumes create activity around stations. Permanent stations promote dense development.	Due to limited number of stations and fewer daily users, the effect on land use is less than local technologies.
Implementation risk	*High-Speed Rail*—Moderate Risk: Safe, efficient travel in Japan and Europe for 40 years. Limited system in Northeast Corridor; planning, design, and construction ongoing in California. *Maglev*—High Risk: Very limited number of suppliers and manufacturers. Few experienced drivers and mechanics.	
Schedule reliability	*High-Speed Rail*—Excellent. Dedicated running ways and tunnels avoid congestion. *Maglev*—Unknown.	
Infrastructure requirements	Extensive new infrastructure required. No cross-traffic conflicts because of profile (tunnel or elevated).	

Sources: Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook: 2004; Transit Capacity and Quality of Service Manual, 3rd Edition: TRB, 2013

People movers/airport circulators

	Performance	General information and regional application
Example	SeaTac Airport Minneapolis-St. Paul Airport	
High-capacity transit capabilities	Low	Primarily local circulator. Not suitable for Sound Transit for intra-regional HCT.
Capacity	Up to 100 passengers/vehicle	Seating primarily provided for those with disabilities.
Operating speeds	Max: 6–50 mph; Avg: 4–20 mph	
Station spacing	<1 mile	Primarily local circulation function.
Typical headway	1–4 minutes, peak	
System integration	Different technology from existing high-capacity transit systems. Regional use would require transfers at all existing stations. Severe barriers because of low capacity and low speeds.	Limited integration and applications on a local or regional context.
Land use	Low passenger volumes create little activity around stations. Stations have little impact on land use.	
Implementation risk	High Risk: Only operated in small airport systems. Moderate number of suppliers and manufacturers. Automated system.	
Schedule reliability	Excellent reliability. Dedicated, elevated running ways avoid congestion. Fully automated system.	
Infrastructure requirements	Extensive infrastructure required. No cross-traffic conflicts because of profile (tunnel or elevated).	

Sources: Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook: 2004; Transit Capacity and Quality of Service Manual, 3rd Edition: TRB, 2013

Gondola/aerial tram

	Performance	General information and regional application
Example	Peak 2 Peak (Whistler)– Gondola Kitzbuehel Wagstättbahn (Austria)—Gondola Portland Aerial Tram—Aerial Tram	Gondolas have multiple cabins that can detach from the traction cable for boarding/alighting. Trams have only two cabins that operate simultaneously in opposite directions.
High-capacity transit capabilities	Low to Moderate	Primarily local circulator. Not suitable for Sound Transit for intra-regional HCT.
Capacity	Up to 35 people/cabin	Gondola's multiple cabins can be used concurrently, for total capacities exceeding 2,000 people per hour per direction; tram capacity more limited.
Operating speeds	10–15 mph	
Station spacing	As needed	Typically only two stations per line, within a couple miles of each other.
Typical headway	As low as 40 seconds	Much less frequent for aerial trams.
System integration	Different technology from existing high-capacity transit systems. Regional use would require transfers at all existing stations.	Each line is independent from others, requiring transfers.
Land use	Permanent stations promote dense development.	
Implementation risk	High. Few existing systems outside of recreational, especially in urban areas.	
Schedule reliability	Excellent reliability. Dedicated, elevated running ways avoid congestion.	
Infrastructure requirements	Moderate infrastructure required. No cross-traffic conflicts because of profile.	Towers and stations require ROW. Air space rights and privacy would need to be addressed.

Sources: Burnaby Mountain Gondola Transit Project Information Boards & Alternatives Assessment, TransLink, 2011; 10 EUB Wagstättbahn Galerie, Bergbahn Kitzühel, 2013; Peak 2 Peak Technical Details, Whistler Blackcomb, 2013

Personal rapid transit

	Performance	General information and regional application
Example	Morgantown, WV	
High-capacity transit capabilities	Low	Primarily local circulator. Not suitable for Sound Transit for intra-regional HCT.
Capacity	Up to 13 passengers/vehicle	
Operating speeds	30 mph	
Station spacing	Close: <0.5 mile	Low traffic—All cars stop at all stations High traffic—Cars can bypass stations
Typical headway	15 seconds	
System integration	Different technology from existing high-capacity transit systems. Regional use would require transfers at all existing stations. Severe barriers because of low capacity per vehicle, infrastructure needs, and complex merging characteristics.	Primarily local circulation function.
Land use	Minor passenger volumes created limited activity around stations. Stations have little impact on land use.	
Implementation risk	High Risk: Only operated in one location in US. Very limited number of suppliers and manufacturers. Complicated automated system.	Each potential application of personal rapid transit is designed to specific needs, so each line or system would be unique from the next.
Schedule reliability	Good to excellent reliability. Dedicated elevated running ways avoid congestion, but complex merging creates point capacity constraints at high-use locations. Fully automated system.	
Infrastructure requirements	Extensive infrastructure required. No cross-traffic conflicts because of profile (elevated only).	

Sources: Puget Sound Region High Capacity Transit Corridor Assessment, Technical Workbook: 2004; Transit Capacity and Quality of Service Manual, 3rd Edition: TRB, 2013

Chapter 3
Transportation Impacts and Mitigation

This chapter describes the existing regional transportation system and the system in Sound Transit 2 (ST2). It then analyzes the impacts to those systems resulting from the Current Plan Alternative and the Potential Plan Modifications Alternative. Potential mitigation measures for those impacts are also discussed. The analysis of impacts involves assessment of the two plan scenarios for a future (2040) baseline transportation system. Further information on transportation-related impacts is located in Appendix K of this Draft Supplemental Environmental Impact Statement (SEIS).

3.1 Background

When possible, information in this chapter is presented for the Plan area, which consists of those portions of Snohomish, King, and Pierce Counties within the Sound Transit district boundary. For some items presented in this section, the data is not available except at the county level and will include information for areas in Snohomish, King, and Pierce Counties that are beyond the Sound Transit district boundary. For other items in this section, information reflects the four-county central Puget Sound region (Snohomish, King, Pierce, and Kitsap Counties).

Travel demand in the region, including within the Plan area, has been influenced by road congestion, trends in employment, housing, development patterns, the economy, transportation options, and the cost of fuel. The following sections further identify these trends.

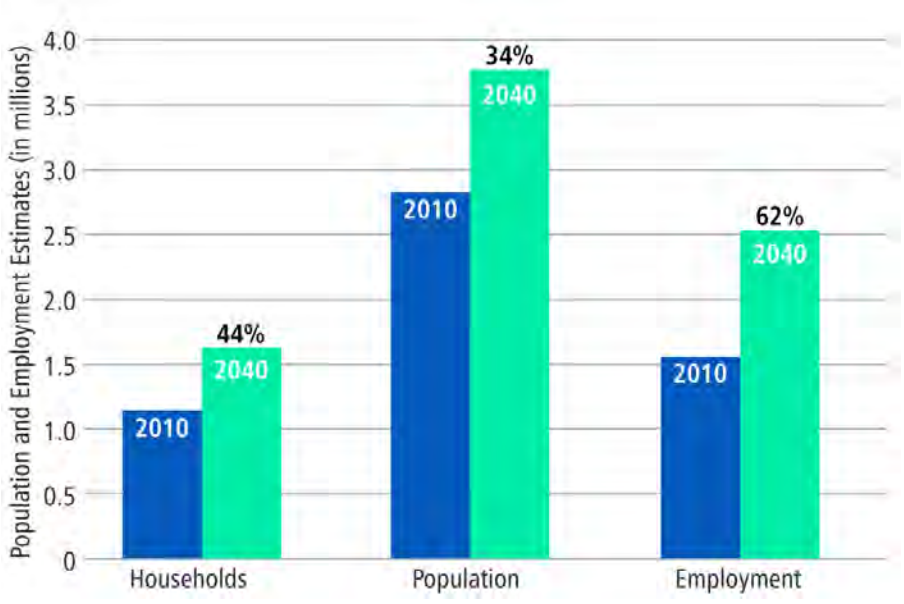
3.1.1 Highway system congestion

The region's existing highway system is at capacity on key corridors such as I-5, I-405, SR 520, and I-90 for multiple hours of the a.m. and p.m. peak-period commutes. These conditions have resulted in greater incentives to use alternative travel modes, such as public transit.

3.1.2 Growth in population, households, and employment

Growth trends for the Plan area are shown in Figure 3-1 and include the following:

- Between 2010 and 2040, households in the Plan area are expected to grow by 44 percent, from approximately 1.13 million to 1.63 million.
- Population is estimated to increase by 34 percent, from 2.81 million in 2010 to approximately 3.77 million people in 2040.
- Employment in the Plan area will grow at a higher rate than population and households. By 2040, employment will grow by 62 percent, from approximately 1.55 million in 2010 to 2.52 million in 2040.



Source: PSRC 2013a, 2013b

Figure 3-1. Households, population, and employment growth rate in the Plan area, 2010 to 2040

According to the Puget Sound Regional Council (PSRC) forecasting model, all of these new households, people, and jobs are expected to boost demand for travel within and through the Plan area by about 25 percent in terms of vehicle miles traveled between 2012 and 2040.

3.1.3 Changes in demographics

Changes in demographics and lifestyle preferences affect transit use. For example, the number of people reaching retirement age and those with disabilities are increasing. The growing preference by many younger people is to live in urban areas. Many people are also choosing transit for quality of life factors or concern for the environment. The combined result of these changing demographic patterns could affect demand for public transit services beyond what would result from estimated growth in population, households, and employment described above.

3.1.4 Effect of growth on the highway and arterial system

The growth in population, households, and employment is projected to exceed the planned capacity improvements on the regional highway and arterial system. Overall, future congestion and delay will exceed today's conditions, even with investments in key transportation corridors (PSRC 2010a). Travel-time reliability will also be worse as accidents, disabled vehicles, and severe weather impacts are magnified by increased traffic volumes.

3.1.5 Regional growth strategy

In PSRC's *VISION 2040,* the Regional Growth Strategy focuses the majority of the four-county central Puget Sound region's employment and housing growth into Regional Growth Centers that include Metropolitan Cities (Bellevue, Bremerton, Everett, Seattle, and Tacoma) and Core Cities (Auburn, Bothell, Burien, Federal Way, Kent, Kirkland, Lakewood, Lynnwood, Puyallup, Redmond, Renton, SeaTac, Silverdale, and Tukwila). All these cities, except Bremerton and Silverdale, are located in the Plan area. The Regional Growth Centers located

in the Plan area are shown in Figure 1-1 in Chapter 1 of this Draft SEIS. As a regional transit provider, Sound Transit focuses its services on providing connections between the Regional Centers located within the Plan area. Of the regional growth that is projected to occur between 2010 and 2040, 32 percent will occur in the five Metropolitan Cities and 22 percent will occur in the Core Cities.

3.2 Ridership forecasting methodology and assumptions

Information in this section updates the transportation analysis conducted for the 2005 Final SEIS on the Regional Transit Long-Range Plan. The methodology for the ridership forecasting included in this analysis generally follows that used in the 2005 Final SEIS. The Sound Transit ridership forecasting model has been updated and revalidated twice since the 2005 Long-Range Plan—once in 2006 for ST2, and most recently in 2012 for the Lynnwood Link Extension EIS. Likewise, PSRC has twice updated its regional population and employment forecasts, most recently in August 2013.

For purposes of this Draft SEIS, the Sound Transit ridership forecasting model was used to compare transit ridership for Year 2040 between ST2, the Current Plan Alternative, and the Potential Plan Modifications Alternative. ST2 is the funded program of high-capacity transit (HCT) expansion approved for financing by the voters in 2008, which in this analysis includes subsequent amendments made through Board actions.

The year 2040 is the most distant future year for which regionally adopted population and employment forecasts are available and it matches the horizon year for PSRC's adopted Metropolitan Transportation Plan, known as *Transportation 2040*. There is not an expected completion date for any potential elements of the existing or updated Long Range Plan.

The Sound Transit ridership model methodology is described in more detail in the *Transit Ridership Forecasting Methodology Report* (Sound Transit 2014d). For several key inputs, the methodology relies on the PSRC regional travel demand forecasting model currently in use on major projects by the Washington State Department of Transportation (WSDOT). The model also relies on transit passenger counts and survey data from the region's transit operators as well as data from the employer Commute Trip Reduction surveys (WSDOT) and the American Community Survey (U.S. Census).

The ridership model methodology must include the adopted PSRC population and employment forecasts. Accordingly, while new transit infrastructure can, over the long-term, affect land use and travel patterns and development density, the Sound Transit ridership forecasting model assumes that land use, travel patterns, and overall travel demand remain constant when comparing alternative 2040 scenarios. The methodology approach, therefore, does not allow for a comparison of how different transit options may contribute to possible changes in land use and travel patterns. Similarly, assumptions regarding future transit fares, parking prices, regional incomes, and regional highway tolling (as assumed in PSRC's *Transportation 2040*) are held constant when comparing the Current Plan Alternative and the Potential Plan Modifications Alternative.

The methodology used for the ridership forecast is in accordance with Sound Transit's standard practice when preparing forecasts in cooperation with the Federal Transit

Administration (FTA) for major transit investments. FTA guidelines are described in its *New and Small Starts Evaluation and Rating Process: Final Policy Guidance* (FTA 2013b).

3.3 Affected environment

3.3.1 Transit service and infrastructure

A variety of regional and local public transit services operate in the Plan area, as shown in Table 3-1. Information on services and facilities presented in this Draft SEIS represent operations in 2014. Ridership information is the most recent available from the American Public Transportation Association's *Public Transportation Ridership Report* (APTA 2013) and the National Transit Database administered by FTA (FTA 2014).

Table 3-1. Public transit services operating in the Sound Transit service area

Transit agency	Types of transit service							
	Light rail	Commuter rail	Express bus/bus rapid transit	Local bus	Streetcar	Ferry	Monorail	Paratransit
Sound Transit	✔	✔	✔					✔
Community Transit			✔	✔				✔
Everett Transit			✔	✔				✔
King County Metro			✔	✔				✔
King County Marine Division						✔		
City of Seattle					✔		✔	
Pierce Transit			✔	✔				✔
Washington State Ferry System						✔		

Regional (Sound Transit)

Sound Transit currently provides three modes of regional HCT service—light rail transit (Central Link and Tacoma Link), commuter rail (Sounder), and regional bus (ST Express). Figure 3-2 shows the existing Sound Transit HCT services, and Figure 3-3 shows the 2008 adopted ST2. Updated elements of ST2 are noted as follows:

In 2013, Sound Transit HCT services had approximately 30.3 million boardings. These boardings included:

- 10.7 million on light rail (Central Link and Tacoma Link)
- 3.0 million on commuter rail
- 16.6 million on regional express bus routes

Source: Sound Transit Ridership Report, 4th Quarter 2013

- The light rail extension from Sea-Tac Airport to S. 200th, shown as In Design, is now under construction.
- Further definition on a potential extension of light rail in Tacoma was addressed in an alternatives analysis/environment assessment of potential options. The preferred alternative is a 2.4 mile, 5 station extension of rail within Tacoma.

Source: Sound Transit 2014

Figure 3-2. Existing Sound Transit high-capacity transit services

Source: Sound Transit 2008

Figure 3-3. Sound Transit 2 (ST2), as adopted in 2008

Light rail service and facilities

Service

Link light rail service operates between downtown Seattle and Sea-Tac Airport (Central Link), and between the Tacoma Dome Station and downtown Tacoma (Tacoma Link). In 2013, there were 9.7 million boardings on Central Link and another 1.0 million boardings on Tacoma Link. Sound Transit also has a complementary paratransit obligation in connection with light rail service. In 2013, 27,000 paratransit trips were provided.

Most of Sound Transit's light rail service currently operates in exclusive rights-of-way located in tunnels, on aerial guideways, and on surface streets. For surface streets, light rail trains cross side streets and are affected by traffic signals and cross-traffic conditions.

Central Link light rail operates 20 hours per day and seven days per week between the Westlake Station at the north end of downtown Seattle and Sea-Tac Airport. It also serves communities in Beacon Hill, the Rainier Valley, and Tukwila. The total travel time for the full length of the Central Link line is 38 minutes. Weekday time between trains, or *headways,* are 7.5 minutes during the morning and afternoon peak commute, 10 minutes mid-day, and 15 minutes early morning and late evening.

Tacoma Link light rail is a 1.6-mile segment that serves downtown Tacoma, with headways approximately every 12 minutes. The majority of this service operates in exclusive rights-of-way.

Light rail service between downtown Seattle and Sea-Tac Airport operates along a variety of guideway types, including the Downtown Seattle Transit Tunnel (DSTT), the Beacon Hill Tunnel, and elevated guideways. Light rail also operated on exclusive right-of-way on surface streets such as Martin Luther King Jr. Way. Light rail operations on these surface streets also cross surface streets and are affected by traffic signals and cross-traffic conditions.

The DSTT is 1.3 miles long and includes four light rail stations: Westlake, University Street, Pioneer Square, and International District/Chinatown. A turnback track for light rail trains is provided in the tunnel located north of the Westlake Station. Currently, transit operations in the DSTT involve a mix of buses and light rail trains. The Convention Place Station is served by buses only. Station platform length for the existing system limits trains to a maximum of four cars.

Several light rail projects identified in *Sound Move* and ST2 are currently under construction. As part of *Sound Move*, University Link is being constructed via a tunnel alignment from downtown Seattle to Capitol Hill and Husky Stadium at the University of Washington. Light rail service on this extension will open in 2016. Several projects included in ST2 are also under construction. These projects include the extension of University Link north from Husky Stadium to the Northgate Transit Center. This extension, which will open in 2021, will be mostly underground except just south of the Northgate Transit Center. ST2 also includes construction of the Central Link extension from Sea-Tac Airport south to the Angle Lake Station. This extension will be on an elevated guideway and will include one additional elevated station at Angle Lake that will open in 2016.

ST2 also includes an extension of light rail north from the Northgate Transit Center to the Lynnwood Transit Center, east from downtown Seattle to Overlake/Redmond, and south from Sea-Tac Airport to Kent/Des Moines. These extensions will begin operation in 2023. In Pierce County, ST2 identified expansion of Tacoma Link and included funding for a partnership to explore options for expanding Tacoma Link. A project-level environmental study is currently underway to continue project development of this extension. The light rail extension projects under ST2 are shown in Figure 3-3.

As rail headways increase to every 4 minutes by 2023, it is Sound Transit's planning assumption that only rail service will operate within the tunnel, with rail services equally divided between north to east operations (Lynnwood Transit Center to Overlake) and north to south operations (Lynnwood Transit Center to Kent/Des Moines). Meeting fire/life safety standards with 4-car light rail operation limits headways to no less than 3 minutes (Core Light Rail System Plan Review, Sound Transit 2012). This limit would be met by the service pattern referred to as the "spine" (light rail lines serving Everett, Tacoma, and Redmond). It has been the assumed policy that once the system requires 3-minute headways in the tunnel, there will be no operational capacity to add more lines from outside the core system.

Support facilities

All light rail vehicles are owned by Sound Transit. Maintenance and storage facilities for Central Link light rail cars are located at Forest Street in the SODO district. This facility is owned by Sound Transit. Both Link operations and maintenance services are provided by King County Metro under contract to Sound Transit. The SODO operations and maintenance facility will not be large enough to accommodate the additional light rail vehicles as light rail service expands under ST2. Accordingly, Sound Transit plans to build an operations and maintenance support facility. The site alternatives for this facility have been identified and a project-level environmental review is underway (*Link Light Rail Operations and Maintenance Satellite Facility Draft Environmental Impact Statement*, 2014 (Sound Transit 2014f)).

Sound Transit also owns a rail maintenance facility in Tacoma for Tacoma Link. Maintenance staff at this facility are Sound Transit employees.

Support facilities for light rail also include park-and-ride lots or garages and access improvements for pedestrians and bicyclists. For pedestrian and bicycle access, support facilities include bicycle parking at rail stations. Bicycles can be accommodated on light rail vehicles. Access for pedestrians has been accommodated through sidewalks and signage at stations. At some stations such as Sea-Tac Airport, pedestrian bridges have been provided.

Sound Transit regional express bus service and support facilities

Service

Sound Transit has ST Express bus service on 26 routes and provides frequent regional service to major urban centers using major arterials, freeways, and high-occupancy vehicle (HOV) lanes. Local transit agencies operate the routes under contract to Sound Transit. Community Transit currently operates 6 ST Express routes; King County Metro

operates 8 ST Express routes; and Pierce Transit operates 12 ST Express routes. Typical weekday peak-period headways are 5 to 15 minutes and range from 15 to 60 minutes off peak.

Most of Sound Transit's regional express routes operate within the agency's service area. Exceptions include two routes that extend outside of the Plan area and are partially funded by partner agencies. One is Route 592, which provides peak-period service between Olympia and downtown Seattle with connections at the Lakewood commuter rail station, DuPont, the SR 512 park-and-ride facility, and the Tacoma Dome. The operational costs for the service outside of the Plan area are partially paid for by Intercity Transit. In addition, Route 595 provides peak-period service between Gig Harbor in Pierce County and downtown Seattle with a connection at the Tacoma Community College Transit Center. The operational costs for this service are partially paid for by Pierce Transit. In 2013, regional express bus services had approximately 16.6 million boardings.

Currently, several regional express bus services operate in the DSTT. The routes serve the five stations in the tunnel: Convention Place, Westlake, University Street, Pioneer Square, and International District/Chinatown. For buses operating in the DSTT, staging areas are located at each end of the DSTT. The tunnel has bi-directional access to the reversible, one-way I-5 express lanes at the north end. For buses traveling to and from the east, bus-only ramps connect the south entrance of the DSTT to the I-90 express lanes, which are HOV-only from Fifth Avenue to Rainer Avenue S. For buses traveling to and from the south, the SODO Busway is available.

Support facilities

Support facilities for regional express service include park-and-ride lots, transit centers, operations and maintenance facilities, bicycle and pedestrian amenities, and access improvements such as direct access ramps.

HOV lanes provide exclusive right-of-way for Sound Transit regional express bus routes. However, these buses operate in mixed traffic in general purpose lanes located between HOV lanes and freeway ramps.

Many regional express bus routes operate in the region's HOV and general purpose lanes as well as arterials. While the HOV lanes provide exclusive operations along a portion of their routes, buses also operate in mixed traffic including traffic in general purpose lanes located between HOV lanes and freeway on- and off-ramps. HOV lanes are available on most segments of I-5, I-405, I-90, and SR 167. In addition, SR 522 has bus-only shoulder or BAT lanes for certain segments.

In general, the region's HOV lanes are currently designated as 2+ carpools, except at the westbound approach to the SR 520 floating bridge, which is designated for 3+ carpools. These designations are assumed to continue in the future until the entire highway shifts to full roadway tolling, as assumed in PSRC's *Transportation 2040* plan.

A network of park-and-ride facilities in the Plan area also provides access for regional express bus services. Several of these facilities existed prior to implementation of Sound Transit regional express service. However, as part of *Sound Move*, funding was provided for new and expanded park-and-ride facilities. Examples of new facilities include the Federal Way Transit Center park-and-ride garage and expansion of park-and-ride

capacity at the Lynnwood Transit Center. Funding for expanded facilities was provided for the Burien Transit Center park-and-ride garage, the Mercer Island park-and-ride, and for parking at Everett Station.

For pedestrian and bicycle access, support facilities include bicycle parking at transit centers and park-and-ride lots. Storage racks for bicycles have been provided on all regional express vehicles. Access for pedestrians has been provided through sidewalks and signage. At some facilities pedestrian bridges have been provided.

Sound Transit does not currently own operations and maintenance facilities for regional express bus service. Instead, the fleet is operated and maintained under contract with Sound Transit's transit partners: Community Transit, King County Metro, and Pierce Transit. However, Sound Transit is designing a midday bus storage facility near downtown Seattle that will be used to store regional express buses that operate between Tacoma and Seattle during off-peak periods. As part of ST2, Sound Transit is also exploring development of its own operations and maintenance facilities to support regional express bus service.

Sound Transit commuter rail service and support facilities

Service

In 2013, Sound Transit's commuter rail service (Sounder) had approximately 3.0 million boardings. Sounder operates on two lines, the South Line and the North Line. The South Line connects Lakewood in Pierce County and downtown Seattle with stations at Lakewood, South Tacoma, Tacoma, Puyallup, Sumner, Auburn, Kent, Tukwila, and King Street in Seattle. Ten round trips per day are provided between King Street Station on the south end of downtown Seattle and the Tacoma Dome Station on the south end of downtown Tacoma, with six of these trips extending to the Lakewood Station south of Tacoma. Service expansion as part of ST2 will increase the number of round trips to a total of 13 in 2017, with 9 of these serving Lakewood. In addition, commuter rail service is provided between Pierce County and Seattle during selected weekend events, such as Seahawks and Mariners games and Sounders matches.

ST2 identified four additional commuter rail round trips between downtown Seattle and Pierce County. One of these trips was implemented in 2013 and the remaining three will be in place by 2017. Of the trips to be added, at least one will provide reverse commute service to Lakewood; southbound in the AM peak and northbound in the PM peak. Some of the added commuter rail trips will operate to Lakewood; however, final determination regarding these trips will be affected by WSDOT plans for track capacity expansion south of Tacoma.

On the North Line, commuter rail operates between downtown Seattle and Everett, with stops at King Street, Edmonds, Mukilteo, and Everett. There are four trains southbound for the morning commute and four trains northbound for the afternoon commute. Each station, except for King Street, includes park-and-ride facilities.

Commuter rail operations are provided under contract with Burlington Northern Santa Fe (BNSF), and fleet maintenance is provided under contract by Amtrak at its facility south of downtown Seattle. For both the South and North Lines, Sound Transit

purchased easements from BNSF to use its main line and invests in track and signal improvements. Sound Transit has separate operating agreements with BNSF for Seattle-Tacoma (Freighthouse Square), Seattle-Everett, and Tacoma-Lakewood operations.

For the next phase of the Sounder Yard Expansion in Tacoma, Sound Transit is determining the feasibility of building a new yard and shop facility. The facility would support in-house maintenance of existing and future Sounder train service.

The region includes a large network of active rail freight lines, as shown in Figure 3-4. Some of the rail lines shown in Figure 3-4 are also used by passenger trains. Both the Sounder North Line and South Line commuter rail operate on a BNSF rail line from Tacoma to Everett and on a triple-track segment south of downtown Seattle that is shared between BNSF and Union Pacific. Sound Transit owns and operates track between Tacoma (Freighthouse Square) and Lakewood, and owns track south to Nisqually (11 miles south of Lakewood) where Amtrak has plans to operate by 2017.

Amtrak intercity rail service operates on several active rail lines in the Plan area and beyond. Amtrak will shift operation to Sound Transit-owned right-of-way between the Thurston County line and Tacoma when the Point Defiance bypass project is completed.

The Eastside Rail Corridor at one time included a network of active freight rail lines. It is a 42-mile rail corridor from north Renton to Snohomish. It was owned by BNSF but now is in ownership by several public entities including Sound Transit, King County, Port of Seattle, City of Kirkland, and City of Redmond. Sound Transit has a high-capacity transit easement on the Eastside Rail Corridor within the Sound Transit district from Woodinville to North Renton and the spur between Woodinville and Redmond. The portion of the Eastside Rail Corridor from Renton to Woodinville, and the entirety of the Redmond Spur, was "railbanked" under the federal National Trails Act, which is also known as the Rails to Trails Act.

Railbanking preserves disused portions of interstate rail lines by allowing them to be used for trails for an indefinite but interim period. All interim uses of railbanked corridors are subject to reactivation of potential interstate freight rail service. BNSF retained 5 miles of the corridor from the BNSF mainline to Coulon Park in Renton to serve the Boeing Plant.

Support facilities

Commuter rail stations at Lakewood, South Tacoma, Tacoma, Puyallup, Sumner, Auburn, Kent, and Tukwila have park-and-ride facilities. Support facilities for commuter rail include park-and-ride lots located at all stations except King Street in downtown Seattle. Support facilities include bicycle parking at stations. Access for pedestrians has been provided through sidewalks and signage. At the Auburn, Lakewood, and Kent Stations, pedestrian bridges that span the tracks have been provided.

Figure 3-4. Existing active rail freight lines

Local transit

Several agencies provide public transportation in the Plan area. Sound Transit provides regional high-capacity transit service, stations, and supporting facilities. The agencies' partners, Community Transit, Everett Transit, King County Metro, and Pierce Transit, provide local or countywide service, paratransit service, and express bus service. The City of Seattle currently operates monorail and streetcar service. The City of Seattle has initiated streetcar service in South Lake Union, and an additional streetcar line funded by Sound Transit to connect the Capitol Hill Link station with the International District Station is expected to start service in 2014. These services are described below.

Community Transit

Community Transit operates within Snohomish County and to Bothell, the University of Washington (Seattle and Bothell campuses), and downtown Seattle. Community Transit operates local, subscription or paratransit, Swift BRT, and commuter express bus service. Commuter service operates to destinations in King County weekdays in the peak period and peak direction with typical headways of 30 minutes. In 2013, Community Transit had 8.2 million boardings.

Everett Transit

Everett Transit provides local and paratransit service within the City of Everett and to some locations just outside the city limits. Typical weekday headways are from 20 to 60 minutes. Everett Transit offers limited service on weekends. Everett Transit had 2.1 million boardings in 2013.

King County Metro

King County Metro provides transit service within King County. Service includes local and express bus service, RapidRide, and paratransit. Paratransit services (ACCESS) and Dial-A-Ride Transit (DART) using vans or smaller vehicles are operated on fixed routes or with advance reservations. RapidRide service is a frequent, limited stop bus service operating on 10- to 15-minute headways. Five RapidRide lines are currently operating; one more (Line F) will begin operation in 2014. Metro had 118.6 million boardings in 2013.

City of Seattle

The City of Seattle constructed the South Lake Union streetcar line, which operates between Lake Union and Westlake Center. The service operates every 15 minutes except during weekday PM peak periods when 10-minute service is provided. This streetcar line, which is operated under contract by King County Metro, was funded by the City of Seattle and a local improvement district. The South Lake Union streetcar had approximately 761,000 boardings in 2013.

The First Hill Streetcar, funded as part of ST2, is under construction with operations scheduled to begin by the end of 2014. ST2 included funding for the First Hill Streetcar as a mitigation measure because a First Hill Link light rail station did not move forward due to constructability risks. A First Hill light rail station was initially identified for the University Link extension from downtown Seattle to the University of Washington. The streetcar service will provide a rail connection between the Sound Transit Capitol Hill

light rail station, First Hill, and regional HCT services at the International District/ Chinatown Station and King Street Station.

The Seattle Center Monorail is owned by the City of Seattle and operated by Seattle Monorail Services. The monorail had approximately 2.1 million boardings in 2012.

Pierce Transit

Pierce Transit provides local bus service, paratransit service, vanpools, and commuter express bus service within Pierce County. Service is also provided to Federal Way in King County and Olympia in Thurston County. Peak headways range from 15 to 60 minutes. Off-peak and weekend headways range from 15 minutes to 2 hours.

Pierce Transit had 10.3 million annual boardings in 2013.

Ferry service

Washington State Ferries provides vehicle and passenger service from Seattle and Tacoma to Vashon Island; from Mukilteo to Whidbey Island; from Edmonds and Vashon Island to Kitsap County; and from downtown Seattle to Bainbridge Island and Bremerton, also in Kitsap County. Some loading docks include HOV lanes to give priority to buses and carpools at peak commute periods. The routes listed above had 19.7 million boardings in 2013 (WSF 2014).

The King County Marine Division operates ferry service known as *water taxis* to West Seattle and Vashon Island from Pier 50 in downtown Seattle. Water taxis currently serve West Seattle during peak periods seven days a week. The service to Vashon Island is provided during peak periods on weekdays only. The water taxi had 445,000 boardings in 2013.

In Pierce County, the Pierce County Ferry links Steilacoom to Ketron Island and Anderson Island. This service, which is available seven days a week, is operated by the Pierce County Public Works and Utilities Department and had 183,000 boardings in 2013.

Other transit services connecting to service area

Some bus services originate outside of the Plan area but serve locations in the area. Service is provided from:

- **Island County—**Island Transit provides service to the Everett Station where it connects with Sound Transit commuter rail, Community Transit express bus service, and Everett Transit local bus routes. Schedules are designed to meet start and finish times for Everett Boeing employees.
- **Skagit County—**Skagit Transit provides service to the Everett Station where it connects with Sound Transit commuter rail, Community Transit express bus service, and Everett Transit local bus routes.
- **Kitsap County—**Several Kitsap Transit routes serve Gig Harbor where connections are available to Sound Transit regional express bus service to Tacoma and downtown Seattle.

- **Thurston County—**Several Intercity Transit routes serve downtown Olympia where connections are available to Sound Transit regional express bus service to DuPont and downtown Seattle.

3.3.2 Transit fares

Fares for Sound Transit's services operating in the Plan area are paid using the ORCA card or cash. The ORCA card is read by devices located at light rail and Sounder stations, some King County RapidRide stations, as well as on buses. The cards can also be used to pay fares on Community Transit, Everett Transit, King County Metro, the South Lake Union Street-car, Kitsap Transit, Pierce Transit, King County Water Taxis, and Washington State Ferries. A monthly pass is available with payment based on the trip length and time-of-day the trip was taken.

3.3.3 Transit ridership

Table 3-2 presents transit ridership trends for Snohomish, King, and Pierce Counties, as well as population trends between 2008 and 2013 (PSRC 2013d). This information reflects the three-county area; however, most of this population and transit ridership occurred in Sound Transit's district. The numbers below reflect transit boardings from all transit providers in these counties.

Transit ridership in the Plan area continues to increase. This increase reflects added services and overall population and employment growth.

Table 3-2. Transit ridership and population trends in Snohomish, King, and Pierce Counties, 2008 to 2013

Year	Annual boardings for King, Sound Transit, Pierce, Community, and Everett Transit[1]	Population[2]				Ridership (boardings) per capita
		Snohomish	King	Pierce	Three-county total	
2008	163,437,952	699,330	1,891,125	794,330	3,384,785	48.3
2009	157,723,596	705,894	1,909,205	796,900	3,411,999	46.2
2010	158,042,986	713,335	1,931,249	795,225	3,439,809	45.9
2011	161,117,997	717,000	1,942,600	802,150	3,461,750	46.5
2012	164,463,944	722,900	1,957,000	808,200	3,488,100	47.2
2013	176,340,000	730,500	1,981,900	814,500	3,526,900	50.0

Sources:

[1] PSRC, Puget Sound Trends May 2013; APTA Public Transportation Ridership Report, Fourth Quarter 2013

[2] Puget Sound Trends October 2013, Appendix B; U.S. Census 2010; OFM 2011, 2012, 2013

Along with job losses during the recession from late 2007 to mid-2009, total annual boardings declined by 3.7 percent—from approximately 163.4 million in 2008 to 157.7 million in 2009. Since 2009, transit boardings have gradually increased, with 2013 transit boardings well above 2008 levels. In 2013, approximately 176.3 million annual boardings occurred, with King County Metro accounting for about 70 percent of these boardings. Sound Transit combined rail and bus services contributed about 17 percent; Pierce Transit, Community Transit, and Everett Transit accounted for the remaining 13 percent.

Although population in the three-county area grew between 2008 and 2013, transit ridership increased at a higher rate. This resulted in a higher level of boardings per capita (50.0) than during the pre-recession (48.3 in 2008).

3.3.4 Transit travel times

Table 3-3 shows estimated (2012) AM peak-period transit travel times between selected activity centers in the region. Transit travel time includes all transit trips from one point to another, but only includes in-vehicle time and does not include time spent waiting for and transferring between routes. A range of travel times is presented since they represent estimates based on the Sound Transit ridership forecasting model.

Table 3-3. Estimated AM peak transit travel times, 2012

Origin \ Destination	Seattle CBD travel time (minutes)	Bellevue CBD travel time (minutes)	Kent CBD travel time (minutes)	Everett CBD travel time (minutes)	Tacoma CBD travel time (minutes)
Everett	65–70	60–65	110–115		120–125
Paine Field	45–50	40–45	90–95	30–35	120–125
Edmonds	30–35	60–65	50–55	45–50	90–95
Lynnwood	30–35	45–50	95–100	35–40	100–105
Bothell	40–45	10–15	65–70	45–50	115–120
Woodinville	40–45	10–15	65–70	45–50	110–115
Kirkland	35–40	10–15	60–65	45–50	105–110
Overlake	35–40	15–20	65–70	75–80	105–110
Redmond	45–50	10–15	70–75	70–75	115–120
Bellevue	35–40		50–55	60–65	95–100
Issaquah	35–40	25–30	75–80	85–90	95–100
Northgate	20–25	30–35	85–90	80–85	90–95
Ballard	20–25	50–55	85–90	70–75	95–100
U District	10–15	30–35	80–85	50–55	85–90
Capitol Hill	5–10	30–35	75–80	60–65	80–85
Seattle CBD		30–35	65–70	70–75	70–75
West Seattle	20–25	55–60	80–85	95–100	85–90
Renton	20–25	45–50	40–45	100–105	65–70
Burien	35–40	25–30	15–20	85–90	70–75
Tukwila	40–45	40–45	20–25	100–105	50–55
SeaTac	35–40	55–60	25–30	115–120	55–60
Federal Way	55–60	75–80	20–25	130–135	25–30
Kent	25–30	50–55		110–115	40–45
Tacoma CBD	65–70	90–95	40–45	145–150	
Puyallup	50–55	70–75	20–25	130–135	25–30
Lakewood	85–90	115–120	60–65	165–170	40–45
DuPont	85–90	110–115	55–60	165–170	20–25

Source: Sound Transit Ridership Forecasting Model

CBD = central business district

3.3.5 Roadway infrastructure

Express bus service provided by Sound Transit and its transit partners operates on a network of highways that include general-purpose lanes, HOV lanes, high-occupancy toll (HOT) lanes, and Business Access and Transit (BAT) lanes on arterials. The following section further describes these elements.

HOV lanes

HOV lanes can improve transit, carpool and vanpool speed and reliability compared to vehicles traveling in adjacent general purpose lanes. However, HOV lanes can and do experience congestion in along travel corridors. Congested conditions occur where HOV demand exceeds capacity or where speeds in adjacent lanes are so slow that drivers in the HOV lane will not travel at the posted speed limit. The slower speeds are due to concerns over potential merging traffic from a slow-moving adjacent lane. Some regional HOV facilities do not meet WSDOT performance standards during peak commute hours. These standards are further described in Section 3.3.6.

Sound Transit has invested in HOV direct access ramps that connect HOV lanes with transit stations, park-and-rides, and other transit facilities.

HOV projects completed and open to traffic, or that are being implemented as part of ST2, are as follows:

- Downtown Bellevue HOV Access (serving Bellevue Transit Center)—opened 2004
- Lynnwood HOV Access (serving Lynnwood Transit Center)—opened 2004
- Ash Way Transit Access (serving Ash Way Park-and-Ride)—opened 2005
- Eastgate HOV Access (serving Eastgate Park-and-Ride)—opened 2006
- Federal Way HOV Access (serving Federal Way Transit Center)—opened 2006
- Totem Lake Freeway Station and HOV Direct Access (serving Kingsgate Park-and-Ride)—opened 2007
- Downtown Everett HOV Access—opened 2008
- I-90 Two-Way Transit and HOV Operations, Stage 1 (serving Mercer Island and South Bellevue Park-and-Rides)—opened 2008
- South Everett Freeway Station—opened 2008
- Mountlake Terrace Freeway Station (serving Mountlake Terrace Transit Center)—opened 2011
- I-90 Two-Way Transit and HOV Operations, Stage 2 (serving Mercer Island and South Bellevue Park-and-Rides): (2012), Stage 3 (part of ST2)—in final design

High occupancy toll lanes

WSDOT has begun implementing HOT lanes (also called express toll lanes) in the Plan area. The initial project is the development of HOT lanes along SR 167, which are used by drivers in single-occupant vehicles who pay a toll. Carpools/vanpools and buses can use the HOT

Business access and transit (BAT) lanes are located on several arterials in the Plan area. These facilities, located in the right-hand lanes, are restricted to buses and drivers accessing businesses located along the arterial. While preferred elements for these facilities include easy boarding and enhanced bus stops, these features are not provided along all BAT lanes.

lanes without paying a toll. The toll varies by level of congestion in the HOT lane to manage demand and maintain operational performance. The first phase of I-405 express toll lanes is currently being constructed between Bellevue and Lynnwood, with a planned opening date of mid-2015. Similar to the SR 167 HOT lanes, the I-405 express toll lanes would give drivers the choice to use the carpool lanes by paying a toll while allowing toll-free trips for transit and vanpools. WSDOT is preparing a Draft EIS, to be issued in mid-2014, for potential I-90 tolling.

BAT lanes

BAT lanes on arterials can also provide improved speed and reliability for bus routes. BAT lanes currently exist on SR 99 in South and North King County and Snohomish County, on Elliott Avenue/15th Avenue W. in Seattle, and on SR 522 in north King County. Preferred design elements for transit facilities to accompany BAT lanes include enhanced transit stops with easy boarding and transit signal priority systems. King County Metro RapidRide service on 15th Avenue W. in Seattle is an example of this type of treatment. SR 522, as an example, is a BAT lane with few of these types of treatments.

3.3.6 Regional travel conditions

Vehicle miles of travel

Vehicle miles of travel (VMT) represents a measure that quantifies the total number of miles traveled each day by drivers in the region. In 2011, there were 79.4 million VMT daily in the four-county Puget Sound region (PSRC model).

Traffic volumes on the urban interstate and highway system are at capacity for multiple hours of the day on many segments of the highway system. Many arterials are over capacity during the morning and evening commutes, on weekends, and during large special events.

Travel time reliability

Travel time reliability for buses is affected by conditions on the highway systems. These conditions involve general-purpose and HOV facilities. While a large number of express bus routes operate in HOV lanes, they must still use general-purpose lanes for some of their service. The following sections summarize these general-purpose and HOV conditions.

A 95th percentile travel time represents the amount of time a person would have to allow to guarantee arriving on time 19 out of 20 times. For the 19 high-demand commutes, the average of the 95th percentile travel time is about 2.5 times greater than the travel time would be if a driver could travel at the posted speed limit.

General-purpose facilities

During the peak commute periods, congestion exists on many freeways, highways, and arterials within the four-county region. Congestion and reduced speeds result in unreliable travel times throughout the region.

As a measure of congestion and travel time reliability, WSDOT has identified 19 high-demand commutes on Puget Sound regional highways and calculates both travel time variability, as shown by the 95th percentile travel time, and extreme congestion, as evidenced by the frequency of speeds less than 36 miles per hour (mph), which is 60 percent of the posted speed limit. For the 19 high-demand commutes, the average of

the 95th percentile travel time is about 2.5 times greater than the travel time would be if a driver could travel at the posted speed limit.

For example, a trip from Federal Way to Seattle should take about 22 minutes at the posted speed. However, due to the high levels of congestion and speed variability on that section of I-5 during peak periods, one would have to allow 58 minutes for the trip in order to have a high reliability of arriving on time. Similarly, the frequency of extreme congestion (speeds less than 36 mph) reflects a congested highway system in the central Puget Sound region. On average, for any of the 19 high-demand commute routes in the region, about 40 percent of peak-period trips will experience speeds of less than 36 mph.

HOV facilities

Although WSDOT guidelines state that HOV lanes should operate with a volume-to-capacity ratio no greater than 0.7 and speeds of at least 45 mph for at least 90 percent of the time during the morning and afternoon rush hour, conditions on several HOV lane segments are below these guidelines. As indicated in Table 3-4, most of the major corridor segments operate below the speed goal of 45 mph.

In addition, for WSDOT's planned I-405 Express Toll Lanes, WSDOT is directed to ensure that average vehicle speeds in toll lanes remain above 45 mph at least 90 percent of the time during peak hours (RCW 47.56.880).

Table 3-4. AM Peak-hour high-occupancy vehicle lane operations, 2012

Route	Route description	Percent of time HOV lane speed maintained at 45 mph or better
Morning peak-direction commutes		
I-5	Everett to Seattle	54%
I-5	Federal Way to Seattle	51%
I-405	Lynnwood to Bellevue	76%
I-405	Tukwila to Bellevue	93%
I-90	Issaquah to Seattle	100%
SR 520	Redmond to Bellevue	51%
SR 167[1]	Auburn to Renton	96%
Evening peak-direction commutes		
I-5	Seattle to Everett	68%
I-5	Seattle to Federal Way	63%
I-405	Bellevue to Lynnwood	56%
I-405	Bellevue to Tukwila	43%
I-90	Seattle to Issaquah	100%
SR 520	Redmond to Bellevue	54%
SR 167[1]	Renton to Auburn	98%

Source: WSDOT 2013 Corridor Capacity Report, p. 67

Red = below guideline of 90%

White = meets guideline

[1] SR 167 is a HOT lane

3.4 Long-term impacts

Potential changes to the HCT system as a result of either alternative would affect transportation characteristics such as travel times and transit demand levels. The changes could also impact the transportation system in the region, including existing public transit service and facilities, roadways, and the bicycle and pedestrian network.

Long-term impacts on the characteristics of the regional transit system, including transit travel times, will represent potential levels of investments that could be made. Accordingly, this section describes impacts to the transportation system for the Current Plan Alternative and compares results with the adopted ST2. In addition, the analysis in this section presents the net effects of changes to the HCT system with the Potential Plan Modifications Alternative as compared to the Current Plan Alternative. Potential mitigation measures for these impacts are also presented in this section.

The long-term impact analysis is based on forecasting of travel demand and additional data analysis. More detailed information on travel demand forecasting is provided in the *Transportation Technical Report* (Appendix K). The *Transportation Technical Report* also briefly summarizes the HCT corridor studies being conducted to help further inform the Board prior to updating the Long-Range Plan.

3.4.1 Impacts on transit ridership

The transit ridership changes that result from the Current Plan and Potential Plan Modifications Alternatives will be influenced by several factors. These include future conditions of the roadway system and how various corridors identified in the Current Plan and Potential Plan Modifications Alternatives would affect transit travel times. These factors are further described below.

Future transportation conditions

Changes in roadway system

The forecasting of transit ridership and performance measures for the Current Plan Alternative and the Potential Plan Modifications Alternative in 2040 includes changes to the roadway system as adopted in the *Transportation 2040* plan using the financially constrained system. Major elements of that plan influencing transit speed, reliability, and ridership are listed below.

- Completion of the new SR 520 Bridge, including connections with I-5 and Eastside improvements
- Completion of the I-90 two-way transit and HOV lanes
- The funded I-405 program and ramp improvements at I-90
- I-5 northbound peak-period transit lane from Olive Way to SR 520
- Systemwide tolling on all limited access facilities (freeways)

Tolling of lanes

A key difference between the roadway system assumed for the 2005 Long-Range Plan SEIS and this Draft SEIS is the potential system of tolling that would affect traffic conditions in the Plan area. PSRC's *Transportation 2040* assumes tolling all lanes (including HOV lanes) on all limited access facilities (freeways). The intent is to set tolls

by time of day and direction of travel to levels sufficient to minimize congestion and maintain good traffic flow without unnecessarily diverting traffic to other facilities, thereby minimizing overall network travel times (PSRC 2000). This procedure, also known as congestion pricing, was implemented in a version of the current PSRC travel demand model that has been used for WSDOT's project level planning and tolling/revenue analysis.

Current Plan Alternative—transit travel times

Transit travel time is a key service characteristic that affects transit ridership. The various HCT corridors and services included in the Current Plan Alternative would have a range of impacts on transit services operating in the Plan area. In some locations, there would be no impacts or very low impacts on transit travel times. For others, moderate travel time changes would occur. For several other locations, there would be substantial changes, such as faster transit travel times.

This section describes the estimated changes in transit travel times with the Current Plan Alternative for the origin-destination pairs identified in Table 3-5. One major change under the Current Plan Alternative is reduced transit travel times as compared to the transit travel times under ST2. Figure 3-5 shows the changes in 2040 transit travel times between selected origins and destinations in the Plan area. The changes shown in the figure involve 20 percent or more variations in transit travel times and the changes in transit travel times between central business districts (CBD).

With the Current Plan Alternative, substantial transit travel time savings would occur for several markets as a result of new HCT corridors. These corridors include new light rail service to downtown Tacoma, which would decrease transit travel times to the Tacoma CBD from locations such as SeaTac, Federal Way, and Bellevue. As a result of higher-level bus service, including improved freeway access to and from bus lanes, transit travel times also would be affected by bus rapid transit (BRT) service on I-5 between Federal Way and DuPont. Along SR 167, BRT would be operating along its full length, from Renton to Puyallup.

With HCT on the Eastside Rail Corridor, which include features to improve transit travel times or BRT on I-405, several markets in South King and East King County would have substantial transit time savings. These markets include trips to the Bellevue CBD from Tukwila, Burien, Federal Way, and Lynnwood.

Extension of light rail service from downtown Seattle to Ballard would result in substantially reduced transit travel times along the affected corridor. In addition, trips between Ballard and Edmonds, Lynnwood, Kirkland, Northgate, and the Everett CBD would also have reduced transit travel times.

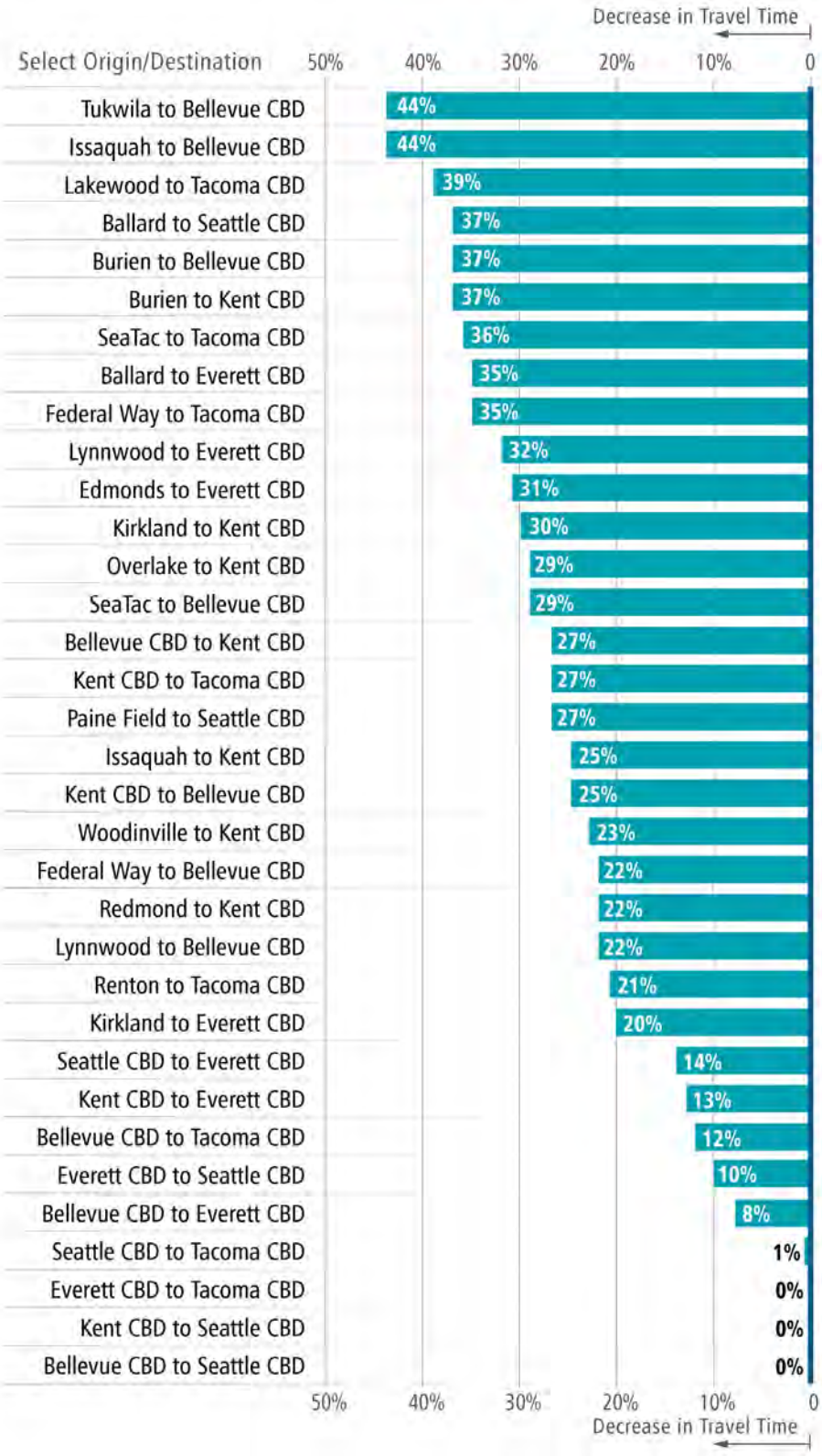
Table 3-5. AM peak travel times—2040 Current Plan Alternative vs. 2040 ST2

Origin \ Destination	Seattle CBD		Bellevue CBD		Kent CBD		Everett CBD		Tacoma CBD	
	Travel time (minutes)	Change with Current Plan Alternative	Travel time (minutes)	Change with Current Plan Alternative	Travel time (minutes)	Change with Current Plan Alternative	Travel time (minutes)	Change with Current Plan Alternative	Travel time (minutes)	Change with Current Plan Alternative
Everett	55—60	-10%	60—65	-9%	120—125	0%			120—125	0%
Paine Field	50—55	-27%	40—45	0%	105—110	0%	20—25	0%	120—125	-8%
Edmonds	30—35	0%	45—50	0%	50—55	0%	50—55	-31%	90—95	0%
Lynnwood	25—30	0%	50—55	-22%	90—95	0%	35—40	-32%	95—100	0%
Bothell	35—40	0%	10—15	0%	70—75	-10%	40—45	-13%	95—100	0%
Woodinville	35—40	0%	10—15	-7%	70—75	-23%	45—50	-1%	95—100	-5%
Kirkland	30—35	0%	10—15	0%	65—70	-30%	60—65	-20%	95—100	-10%
Overlake	35—40	0%	10—15	0%	65—70	-29%	75—80	-9%	95—100	0%
Redmond	40—45	4%	15—20	-4%	70—75	-22%	80—85	-10%	100—105	0%
Bellevue	20—25	0%			55—60	-27%	60—65	-8%	85—90	-12%
Issaquah	30—35	0%	30—35	-44%	65—70	-25%	95—100	-11%	90—95	0%
Northgate	10—15	0%	35—40	0%	80—85	0%	45—50	-17%	80—85	0%
Ballard	20—25	-37%	45—50	-14%	85—90	0%	80—85	-35%	100—105	-9%
U District	5—10	0%	30—35	0%	75—80	0%	50—55	-16%	75—80	0%
Capitol Hill	<5	0%	25—30	0%	70—75	0%	55—60	-14%	70—75	0%
Seattle CBD			20—25	0%	65—70	0%	60—65	-14%	75—80	-1%
West Seattle	25—30	0%	40—45	0%	85—90	0%	90—95	-10%	75—80	0%
Renton	20—25	0%	35—40	0%	40—45	0%	85—90	-10%	60—65	-21%
Burien	40—45	0%	30—35	-37%	20—25	-37%	90—95	-7%	60—65	-11%
Tukwila	15—20	0%	50—55	-44%	20—25	0%	85—90	0%	45—50	0%
SeaTac	30—35	0%	50—55	-29%	30—35	0%	95—100	-9%	55—60	-36%
Federal Way	50—55	-3%	65—70	-22%	25—30	0%	110—115	-8%	30—35	-35%
Kent	25—30	0%	40—45	-25%			90—95	-13%	40—45	-27%
Tacoma CBD	65—70	0%	85—90	-11%	40—45	-5%	125—130	0%		
Puyallup	45—50	0%	65—70	-16%	20—25	0%	110—115	-8%	15—20	0%
Lakewood	75—80	0%	90—95	-11%	50—55	0%	140—145	-6%	45—50	-39%
DuPont	75—80	0%	90—95	-1%	50—55	0%	140—145	0%	25—30	0%

Source: Sound Transit Ridership Forecasting Model

Transit travel times only include in-vehicle travel times.

CBD = central business district



Includes travel time changes for major markets and where there are changes exceeding 20%.

Figure 3-5. Changes in transit travel times—Current Plan Alternative vs. ST2

Potential Plan Modifications Alternative—transit travel times

This section describes the estimated changes in transit travel times with the Potential Plan Modifications Alternative within the Plan area for the origin-destination travel markets indicated in Table 3-6. Destinations consist of five CBDs in the Plan area. Four of these CBDs—Seattle, Bellevue, Everett, and Tacoma—comprise a substantial portion of daily transit demand in the Plan area. Kent is also included given its proximity to major employment centers in South King County and current concentrations of both regional express bus and commuter rail services.

The origins addressed in the transit travel time analysis, a total of 27, represent a cross-section of locations along corridors in the Current Plan and Potential Plan Modifications Alternatives.

Table 3-6 describes the estimated transit travel time changes of the Potential Plan Modifications Alternative compared to the Current Plan Alternative for selected origin-destination pairs. For travel between the five CBDs, the transit travel time reduction for the most part will be 15 percent or less. The one exception is between Bellevue and Kent at 23 percent less travel time. Figure 3-6 provides an overview of the more notable changes (+20 percent decrease and +8% increase) in transit travel times for selected origins and destinations. In most cases, the changes in transit travel times reflect added rail service under the Potential Plan Modifications Alternative.

The following text presents key findings of the transit travel time analysis. For key outcomes relating to travel times, major elements of the Potential Plan Modifications Alternative are presented to help explain the results. Corridors referenced by number in the sections below are described in Chapter 2.

Seattle CBD

As indicated by Table 3-6, there would be no major differences between the Current Plan Alternative and the Potential Plan Modifications Alternative for many transit trips to the Seattle CBD. These include trips from north of downtown Seattle, such as the University District and Capitol Hill; Eastside communities, including Bellevue and Overlake; and locations along the I-405 corridor, such as Woodinville and Kirkland.

Although the Potential Plan Modifications Alternative includes HCT elements north of Seattle (e.g., corridor 3—Ballard to North Everett via Aurora Village and Lynnwood) and on the Eastside (e.g., corridor 34—HCT south of I-90 along I-405), they would not reduce travel time to the Seattle CBD as compared to operating conditions in the Current Plan Alternative. For example, direct light rail service between downtown Seattle, Bellevue, and Overlake would be provided under the Current Plan Alternative, and no HCT elements in the Potential Plan Modifications Alternative would result in lower transit travel times between the Seattle CBD and these locations.

Table 3-6. AM peak travel times—2040 Potential Plan Modifications Alternative vs. Current Plan Alternative

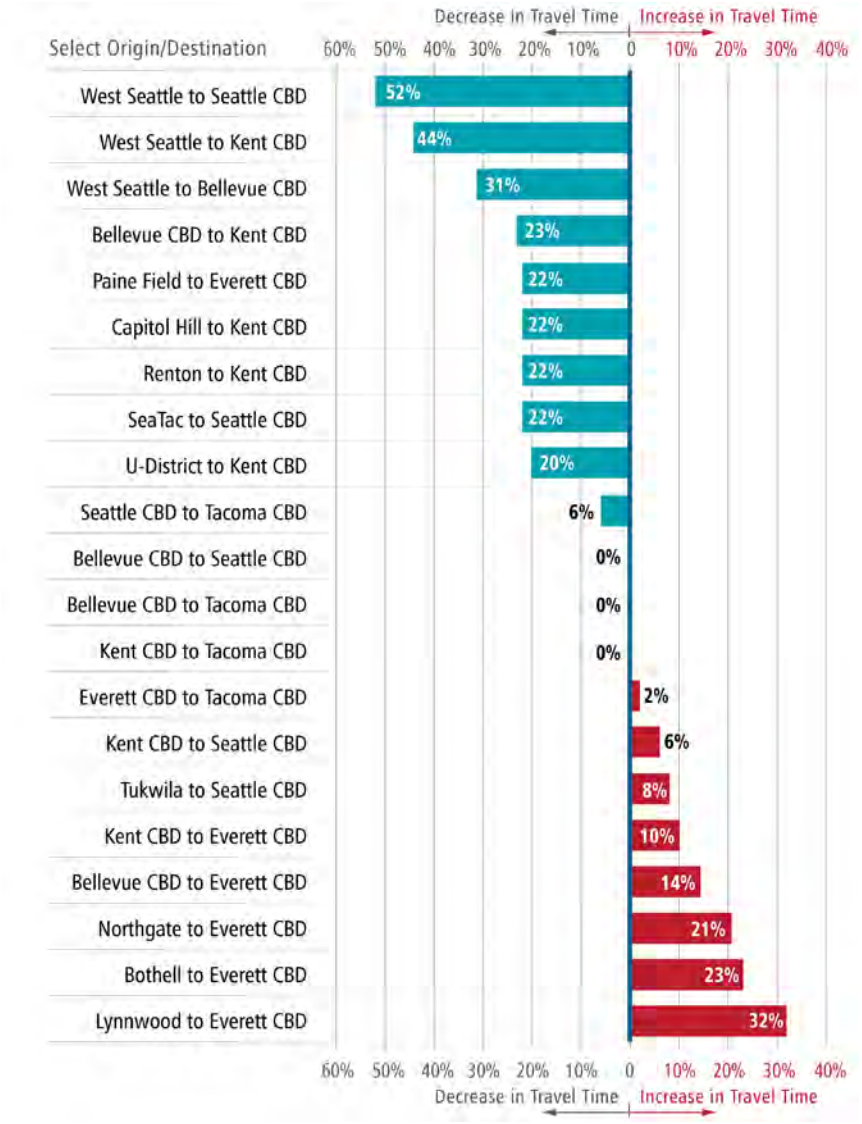
Origin \ Destination	Seattle CBD		Bellevue CBD		Kent CBD		Everett CBD		Tacoma CBD	
	Travel time (minutes)	Change from Current Plan Alternative	Travel time (minutes)	Change from Current Plan Alternative	Travel time (minutes)	Change from Current Plan Alternative	Travel time (minutes)	Change from Current Plan Alternative	Travel time (minutes)	Change from Current Plan Alternative
Everett CBD	50–55	15%	55–60	14%	120–125	–13%			120–125	2%
Paine Field	35–40	0%	40–45	0%	105–110	–8%	20–25	–22%	110–115	0%
Edmonds	30–35	0%	45–50	0%	50–55	0%	35–40	0%	90–95	0%
Lynnwood	25–30	2%	40–45	0%	90–95	–19%	20–25	32%	95–100	1%
Bothell	35–40	–15%	10–15	0%	60–65	–5%	35–40	23%	95–100	0%
Woodinville	35–40	0%	10–15	0%	55–60	–6%	45–50	17%	90–95	0%
Kirkland	30–35	0%	10–15	0%	45–50	–7%	50–55	16%	85–90	0%
Overlake	35–40	0%	10–15	0%	45–50	–8%	65–70	0%	95–100	0%
Redmond	40–45	0%	15–20	0%	55–60	–6%	70–75	0%	100–105	0%
Bellevue CBD	20–25	0%			40–45	–23%	55–60	14%	70–75	0%
Issaquah	30–35	0%	15–20	0%	50–55	–7%	85–90	9%	90–95	0%
Northgate	10–15	0%	35–40	2%	80–85	–18%	35–40	21%	80–85	1%
Ballard	15–20	0%	40–45	–7%	85–90	–10%	50–55	0%	90–95	–8%
U District	5–10	0%	30–35	0%	75–80	–20%	40–45	18%	75–80	1%
Capitol Hill	<5	0%	25–30	0%	70–75	–22%	50–55	16%	70–75	1%
Seattle CBD			20–25	0%	65–70	–8%	50–55	15%	70–75	–6%
West Seattle	25–30	–52%	40–45	–31%	85–90	–44%	80–85	–7%	75–80	–14%
Renton	20–25	0%	35–40	0%	40–45	–22%	75–80	10%	50–55	0%
Burien	40–45	–15%	15–20	0%	10–15	–6%	85–90	9%	55–60	0%
Tukwila	15–20	8%	25–30	0%	20–25	0%	85–90	8%	45–50	0%
SeaTac	30–35	–22%	35–40	0%	30–35	0%	85–90	9%	35–40	0%
Federal Way	50–55	–15%	50–55	0%	25–30	0%	105–110	1%	20–25	0%
Kent CBD	25–30	6%	30–35	0%			80–85	10%	30–35	0%
Tacoma CBD	65–70	–1%	75–80	0%	40–45	0%	125–130	3%		
Puyallup	45–50	–6%	50–55	0%	20–25	0%	100–105	5%	15–20	0%
Lakewood	75–80	–4%	80–85	–5%	50–55	0%	130–135	4%	25–30	0%
DuPont	75–80	0%	90–95	–3%	50–55	0%	140–145	4%	25–30	0%

Source: Sound Transit Ridership Forecasting Model

Transit travel times only include in-vehicle travel times.

CBD = central business district

The increases in transit travel times affecting the Everett CBD would occur if an alternative light rail alignment between Lynnwood and Everett that serves the Southwest Everett Industrial Area (including Paine Field and Boeing) is substituted for the Lynnwood to Everett light rail alignment in the Current Plan Alternative.



Includes travel time changes for major markets and where there are changes over 20%.

Figure 3-6. Changes in AM peak transit travel times—Potential Plan Modifications Alternative vs. Current Plan Alternative

Corridor 9 (light rail from Tukwila to SODO via Duwamish industrial area) in the Potential Plan Modifications Alternative is an alternative corridor for light rail service operating between SODO and Tukwila that does not go through the Rainier Valley (refer to Figure 2-7). This corridor would provide substantial transit travel-time savings for those traveling between SODO and Tukwila but not traveling to or from the Rainier Valley. However, maintaining the desired service headways of light rail with this rail corridor also could result in the reduction of light rail service frequencies in the Rainier Valley or the introduction of a new transfer to reach downtown Seattle.

With the Potential Plan Modifications Alternative, some improvements in transit travel times would occur for travel to the Seattle CBD from locations in Pierce County, such as Lakewood, Puyallup, and DuPont. These travel-time savings would result from new HCT connections south of downtown Seattle. These connections would be provided by

corridor 9—a SODO light rail line that would connect with the light rail line to Tacoma and new rail segments in south Pierce County (corridors 13, 14, and 18, refer to map in Figure 2-7). It should be noted that for long-distance corridors, the end-to-end absolute travel times would be relatively high, such as from the Tacoma CBD to the Seattle CBD. Therefore, any transit travel time changes would show as relatively small percentage reductions in travel time.

As shown in Table 3-6, major improvements in transit travel times to the Seattle CBD would occur from West Seattle, SeaTac, and Federal Way. Travel time savings from these areas, particularly West Seattle, to the Seattle CBD range from 10 to 15 minutes. For West Seattle to the Seattle CBD, this represents a 52 percent reduction in travel time. These savings would result from the new light rail connection in the Potential Plan Modifications Alternative with corridor 2 (downtown Seattle to West Seattle and Burien).

In addition, reduced transit travel times from Bothell and Edmonds to the Seattle CBD would occur with corridor 10 (Bothell/Kirkland to Northgate) and corridor 20 (Edmonds/Shoreline Community College/Seattle).

Bellevue CBD

Rail service under the Current Plan Alternative includes light rail from Seattle to Bellevue and Redmond, and potential rail along the entire Eastside from Burien to Lynnwood (for example corridor E along either I-405 or the in Eastside Rail Corridor). BRT service could include Renton to Lynnwood along I-405 (corridor Q). These elements affect travel to the Bellevue CBD from other locations on the Eastside, most Seattle locations, and South King County communities. As indicated by Table 3-6, transit travel times to the Bellevue CBD from most of the selected locations would have relatively small decreases in transit travel times as a result of the Potential Plan Modifications Alternative.

An exception is transit travel time from West Seattle to the Bellevue CBD. The Potential Plan Modifications Alternative would reduce travel time to or from West Seattle as a result of a new light rail connection from West Seattle to downtown Seattle (corridor 2) with a one-transfer connection to light rail serving Bellevue.

Kent CBD

For several locations in South King and Pierce Counties, there would be relatively small decreases in transit travel times as a result of the Potential Plan Modifications Alternative. These include Tukwila, SeaTac, the Tacoma CBD, and Lakewood.

However, with the Potential Plan Modifications Alternative, major reductions in travel times would occur from origins in Seattle, such as downtown Seattle, Capitol Hill, the University District, and Northgate. As indicated by Table 3-6, improvements in travel times to the Kent CBD would also occur from origins along the I-405/I-5 corridors (e.g., the Bellevue CBD, Renton, Lynnwood, and Everett). These reduced transit travel times would result from direct light rail service operating under the Potential Plan Modifications Alternative between Kent and locations to the north. The light rail station would be adjacent to the Kent CBD; however, rail travel times and frequent service under the Potential Plan Modifications Alternative would provide benefits to riders. The

line would operate through downtown Seattle while also providing transfer opportunities to other light rail lines downtown, as well as downtown Renton and the existing Tukwila International Boulevard light rail station.

With the Potential Plan Modifications Alternative, relatively low levels of travel-time savings would occur between locations in South King County and Pierce County. These relatively small changes in transit travel times would be due in part to operating characteristics of a new light rail line along the SR 167 corridor. This line would include more stations in the corridor compared to what would be served by commuter rail under the Current Plan Alternative. These include added stations between Puyallup and Sumner, Sumner and Auburn, and Tukwila and downtown Seattle. Serving these additional rail stations would result in longer transit travel times as compared to the Current Plan Alternative.

Several elements of the Potential Plan Modifications Alternative would reduce transit travel times affecting Everett CBD. However, substituting a potential Lynnwood to Everett via Paine Field light rail line for a Lynnwood to Everett light rail line would result in additional transit travel times for some travel pairs.

Everett CBD

The Potential Plan Modifications Alternative includes HCT elements serving Everett from several communities in the region (e.g., a new light rail line from Ballard to Everett Station via Aurora Village (corridor 3) and a new regional express route between Woodinville and Everett (corridor 32)). The Potential Plan Modifications Alternative also realigns light rail between Lynnwood and Everett so it serves the Southwest Everett Industrial Area including Paine Field and Boeing (corridor 15).

The alignment of corridor 15 has an overall effect of increasing travel time between most origins and Everett, as compared to the Current Plan Alternative due to serving additional stations along a longer corridor (approximately 3 additional miles compared to the light rail corridor under the Current Plan Alternative). The added travel time would also result from slower speeds associated with curves along the alignment. Compared to the Current Plan Alternative, only four origins—West Seattle, Redmond, Paine Field, and Edmonds—would realize faster transit travel-time to the Everett CBD under the Potential Plan Modifications Alternative. While the potential new light rail corridor to Paine Field would increase transit travel times, it would also provide direct HCT access to a major employment area from several locations in the Plan area. The specific alignments that could serve this corridor would be examined within a project-level environmental study.

The greatest transit travel time savings affecting the Tacoma CBD involves trips from downtown Seattle and North Seattle. These savings would be attributable to new light rail service and more express bus connections to the airport.

Tacoma CBD

As described below, for travel from various communities in the region to the Tacoma CBD, there would be no travel time savings with the Potential Plan Modifications Alternative, while for others there would be modest savings. One location would experience substantial travel time savings.

As shown in Table 3-6, with the Potential Plan Modifications Alternative there would be no transit time savings for trips to the Tacoma CBD from Puyallup, Lakewood, and DuPont in Pierce County. No transit travel savings would occur for several locations in South King County, including Federal Way, Kent, and Puyallup. Most new light rail lines in Pierce County, as identified in the Potential Plan Modifications Alternative, would be located along corridors outside of the Tacoma CBD or they would use similar alignments as current ST Express bus service.

With the Potential Plan Modifications Alternative, the greatest transit-time reduction (29 percent) would occur for trips from West Seattle to the Tacoma CBD. This time saving is a direct result of a new light rail line (corridor 2) that would be located between West Seattle, downtown Seattle, and Burien, and connect with the more direct rail line between SODO and Tukwila (corridor 9) and rail service connecting to Pierce County.

For several locations, including the Seattle CBD and Northgate, there would be some transit travel-time reductions under the Potential Plan Modifications Alternative. As indicated previously, these travel-time reductions would be due to a new, more direct light rail line located between the south area of downtown Seattle and Tukwila.

Systemwide transit ridership estimates

Table 3-7 shows estimated 2040 transit ridership for ST2, for the Current Plan Alternative, and for the Potential Plan Modifications Alternative. Ridership in this context is defined as all public transit systems operating in Snohomish, King, and Pierce Counties. For the Current Plan Alternative and Potential Plan Modifications Alternative, ridership information is presented in ranges since corridors in these alternatives do not have detailed characteristics for station locations, right-of-way, and operations plans. There are also uncertainties relating to future tolling. For ST2, a narrower range of transit boardings information is presented since more detailed system characteristics are known. However, a range of transit ridership results is still necessary to reflect uncertainties relating to estimated long-term ridership forecasts.

Table 3-7. Transit ridership estimates in 2040—Snohomish, King, and Pierce Counties

	2040 ST2	2040 Current Plan Alternative	2040 Potential Plan Modifications Alternative
Annual total transit boardings (in millions)	330-370	330–460	340–520
Annual light rail boardings (in millions)	100-110	120–190	180–280
Annual bus[1] boardings (in millions)	200-230	170–250	120–180
Annual commuter rail boardings (in millions)	10-20	10–20	10–20
Annual streetcar boardings (in millions)	<10	<10	30-40
Annual service hours (in millions)	5.7	6.1	6.9

[1] Bus mode includes local buses, regional express buses, and bus rapid transit operated by all transit systems.

Since the Sound Transit Plan area includes most of the developed areas of these counties, it is likely that most of this demand would occur in the Plan area. Information is presented for annual boardings by light rail, bus (regional express/BRT), commuter rail, streetcar, and local bus service. In addition, annual service hours are presented for bus service and rail systems.

Annual transit demand in Table 3-7 includes a variety of transit modes. However, in the Potential Plan Modifications Alternative, light rail transit boardings exceed bus transit boardings with the addition of about 100 miles of light rail transit beyond that provided by the Current Plan Alternative. The following discussion reflects data that are in the mid-point of the ranges presented in Table 3-6.

With the Current Plan Alternative, annual service hours (bus and light rail) would increase by 7 percent, and total ridership in 2040 would increase by approximately 9 percent as compared to ST2. With the Potential Plan Modifications Alternative, annual service hours (bus and light rail) would increase by 13 percent, and total ridership in 2040 would increase by approximately 10 percent as compared to the Current Plan Alternative. Since a range is presented, actual projected results could vary, including the extent of growth for both bus and rail ridership.

As compared to ST2, forecasted annual light rail boardings under the Current Plan Alternative would grow by almost 48 percent. Annual bus boardings would decline by 3 percent, and annual streetcar boardings would remain about the same.

As compared to the Current Plan Alternative, annual light rail boardings under the Potential Plan Modifications Alternative would grow by almost 50 percent. Annual bus boardings would decline by 38 percent, and annual streetcar boardings would increase considerably from less than 10 million to over 30 million. This decline reflects a major shift in Sound Transit service supply from bus to light rail and to streetcar services with the Potential Plan Modifications Alternative as compared to the Current Plan Alternative. While the Current Plan Alternative would include a substantial network of rail service, the Potential Plan Modifications Alternative would add substantially more to this network. This additional rail service would result in added transit ridership as well as a shift in demand from buses to rail.

System productivity, measured by boardings per service hour, would generally be similar between ST2, the Current Plan Alternative, and the Potential Plan Modifications Alternative. These productivity levels represent a mix of bus and rail operations and resulting ridership.

Screenline transit ridership estimates

Background

Screenlines provide an effective method of portraying the effects of the alternatives with greater geographic specificity, as compared to transit ridership information for the region as a whole. A typical method of measuring the effects of transportation projects is to estimate the average weekday ridership crossing a screenline at key locations throughout the Plan area. For this Draft SEIS, 21 locations were selected as screenlines to show estimated changes in ridership associated with the proposed corridors crossing that screenline.

Key considerations regarding screenline volume changes

The screenline data for the Current Plan Alternative and the Potential Plan Modifications Alternative are shown in ranges that represent a ±20 percent variation for the results generated by the ridership forecasting model. There are several reasons why this range is appropriate for a programmatic SEIS:

- The level of project definition at this stage of analysis is much more general than at either a planning-level study or at the project level. For example, alignments and station locations have not been defined or evaluated.
- Ridership forecasting requires the development of systemwide operating plans. At the Long-Range Plan level of analysis, corridors have not been assembled and optimized as a package as they would be at the system planning level.
- PSRC's *Transportation 2040* adopted plan calls for region-wide tolling on limited access highways and proposes that tolls are implemented in phases over the next 30 years. However, there is no definite schedule for the phasing in of region-wide tolling at this time.
- Some screenline results could be affected by the performance of bus/BRT corridors that operate on limited access highways. How buses would actually perform on these managed facilities depends on how successfully WSDOT is able to maintain managed lane speeds of 45 mph at least 90 percent of the time during peak hours without diverting significant traffic to arterials and other local streets.

Screenline volume changes

This section shows the ridership increases for the Current Plan Alternative as compared to ST2 and the increases with the Potential Plan Modifications Alternative as compared to the Current Plan Alternative. Screenline volumes represent the number of transit trips from all transit services, not just Sound Transit services, crossing that line. Hence, the model output shown in the screenlines takes into account shifts that could occur from existing service (e.g., a current bus line) to a proposed light rail line.

Changes in transit volumes at any given screenline reflect many factors, including reduced transit travel times and the potential for multiple HCT elements to affect a single screenline. The following sections discuss the transit ridership changes shown in Table 3-8 and the likely associated contributing elements.

Ridership changes—Current Plan Alternative compared to ST2

Ridership increases shown in Table 3-8 represent net increases in the volume of transit riders resulting from the Current Plan Alternative as compared to ST2. Figure 3-7 shows locations and associated changes in ridership levels at each screenline.

The changes in transit volumes at a screenline reflect a variety of factors, including reduced transit travel times, market conditions influencing transit ridership, and the potential for multiple HCT elements to affect a single screenline. Table 3-9 identifies the estimated increases in transit ridership volumes at screenlines affected by corridors included in the Current Plan Alternative and the likely related corridors that are affecting these ridership volumes. The corridor letters are also included in the map presented in Figure 2-7 in Chapter 2 of the SEIS.

Table 3-8. Difference in daily screenline transit rider volumes—2040 ST2 and 2040 Current Plan Alternative

Location number	Screenline	Direction of travel	2040 ST2	2040 Current Plan Alternative relative to 2040 ST2	
				Change[1]	Percent change[2]
1	Ship Canal	North/South	172,000 to 190,000	+ 10,000	5%
2	North of Spokane Street	North/South	162,000 to 179,000	+ 5,000	5%
3	West Seattle Bridge	East/West	24,000 to 26,000	*	*
4	King/Snohomish Line: East	North/South	4,000	+ 5,000	125%
5	North of SR 526	North/South	23,000 to 25,000	+ 5,000	25%
6	King/Snohomish Line: West	North/South	66,000 to 72,000	+ 10,000	15%
7	SR 522	North/South	5,000	*	*
8	Crosslake: SR 520 and I-90 Bridges	East/West	52,000 to 58,000	*	*
9	West of 148th	East/West	38,000 to 42,000	*	*
10	North of Totem Lake	North/South	7,000	+ 5,000	45%
11	East of Lake Sammamish	North/South	< 1,000	*	*
12	North of Renton	North/South	6,000	+ 5,000	115%
13	North of SR 518	North/South	6,000	*	*
14	West of SR 167/Rainier Avenue	East/West	11,000 to 13,000	+ 10,000	85%
15	South of Renton	North/South	39,000 to 43,000	*	*
16	King/Pierce Line: West	North/South	25,000 to 27,000	+ 15,000	55%
17	King/Pierce Line: East	North/South	29,000 to 32,000	*	*
18	North of S. 72nd Street	North/South	18,000 to 20,000	*	*
19	East of Canyon Road E.	East/West	18,000 to 20,000	+ 5,000	15%
20	Wallingford	East/West	10,000 to 12,000	+15,000	135%
21	North of downtown Bellevue	North/South	12,000 to 14,000	*	*

[1] Calculated absolute change using midpoints of ranges then rounded to the nearest 5,000

[2] Calculated percent change using absolute change prior to rounding; then rounded the percent change to the nearest 5%

* Less than 3,000 daily transit riders

Figure 3-7. Daily transit ridership changes at selected screenlines—Current Plan Alternative vs. ST2

Table 3-9. Estimated added screenline transit volumes and key contributing elements of the Current Plan Alternative ordered by largest increase in transit volume

Screenline	Added transit volumes	Related corridors in the Current Plan Alternative (Chapter 2 of the SEIS, Figure 2-7)	Key factors affecting relative changes in transit volumes
16 King/Pierce County Line West	15,000	A Light rail extension between Tacoma and Federal Way M BRT between Federal Way and DuPont on I-5	Faster transit travel times to Tacoma from locations primarily in King County Availability of service with via light rail vs. commuter rail
20 Wallingford	15,000	G Light rail extension between Ballard and the University of Washington (UW)	Faster transit travel times between Ballard and UW High-density travel corridors; serves UW Connecting with University Link
1 Ship Canal	10,000	F Light rail between downtown Seattle and Ballard H Light rail between Lynnwood and Everett R BRT between Seattle and Everett along SR 99	Faster transit travel times to Seattle from Everett, Paine Field, and Ballard High-density travel corridors
14 West of SR 167/ Rainier Avenue	10,000	B Light rail between Burien and Renton	Faster transit travel times between Burien and the east side of Lake Washington High-density travel corridors; serves Southcenter (Tukwila Center), Connecting with light rail at Tukwila International Boulevard
6 King/Snohomish County Line West	10,000	H Light rail extension between Lynnwood and Everett R BRT along SR 99 between Seattle and Everett	Faster transit travel times between Seattle and Everett Expanded availability of service with light rail vs. commuter rail
5 North of SR 526 south of Everett	5,000	H Light rail extension between Lynnwood and Everett R BRT along SR 99 between Seattle and Everett S BRT between Lynnwood and Everett along I-5 Y Regional express bus between North Bothell, Mill Creek and Mukilteo	Faster transit travel times to downtown Everett from Lynnwood, Seattle, Bellevue, Renton, and Kent Expanded availability of service with light rail vs. commuter rail Light rail, BRT and regional express bus elements serving one screenline
12 North of Renton	5,000	D Light rail between Renton and Lynnwood along I-405 E Light rail between Renton and Woodinville along Eastside Rail Corridor J Rail extension (assumed commuter rail) between Renton and Woodinville along Eastside Rail Corridor P BRT between Renton and Woodinville along Eastside Rail Corridor Q BRT between Renton and Lynnwood along I-405	Multiple light rail, commuter rail and BRT elements serving one screenline Faster transit travel time from Renton to Everett
2 North of Spokane Street	5,000	A Light rail extension between Tacoma and Federal Way	High-density travel corridor Faster transit travel times to Tacoma from Seattle CBD

Table 3-9. Estimated added screenline transit volumes and key contributing elements of the Current Plan Alternative ordered by largest increase in transit volume (continued)

Screenline	Added transit volumes	Related corridors in the Current Plan Alternative (Chapter 2 of the SEIS, Figure 2-7)	Key factors affecting relative changes in transit volumes
4 King County/ Snohomish Line East	5,000	D Light rail between Renton and Lynnwood along I-405 Q BRT between Renton and Lynnwood along I-405	Multiple light rail, BRT and regional express bus elements serving one screenline Faster transit travel times from Lynnwood to Bellevue and Kirkland to Everett
10 North of Totem Lake	5,000	D Light rail between Renton and Lynnwood along I-405 E Light rail between Renton and Woodinville along Eastside Rail Corridor J Rail extension (assumed commuter rail) between Renton and Woodinville along Eastside Rail Corridor P BRT between Renton and Woodinville along Eastside Rail Corridor Q BRT between Renton and Lynnwood along I-405	Multiple light rail, commuter rail and BRT elements serving one screenline Faster transit travel times from Lynnwood to Bellevue and Kirkland to Everett
19 East of Canyon Road E.	5,000	T Regional express bus between Puyallup and DuPont via Cross Base Highway U Regional express bus between Puyallup and Lakewood V Regional express bus between Puyallup and Tacoma	Multiple BRT and regional express bus elements serving one screenline Faster transit travel times from Puyallup to Tacoma New connection via Cross Base Highway
3 West Seattle Bridge	Low additional demand	None	No additional transit service provided across this screenline
7 SR 522	Low additional demand	L HCT between Northgate and Bothell	Corridor is served by express bus service in ST2
8 Crosslake: SR 520 and I-90 Bridges	Low additional demand	C Light rail between Bellevue and Issaquah along I-90 K HCT between UW and Redmond via SR 520	Low-density development along Bellevue-Issaquah corridor, which is served by express bus service provided in ST2 HCT between the UW and Redmond duplicates existing express bus service
9 West of 148th Avenue	Low additional demand	C Light rail extension between Bellevue and Issaquah along I-90 K HCT between UW and Redmond via SR 520 O BRT between Bellevue and Issaquah along I-90 X Regional express bus between Redmond and Kirkland	Low-density development along Bellevue-Issaquah corridor, which is served by express bus service provided in ST2 HCT between the UW and Redmond duplicates existing express bus service
11 East of Lake Sammamish	Low additional demand	None	No additional transit service provided across this screenline
13 North of SR 518	Low additional demand	W Regional express bus between SeaTac and West Seattle	Corridor is served by express bus service in ST2
15 South of Renton	Low additional demand	N BRT between Renton and Puyallup along SR 167	Low-density development along corridor that is currently served by Sounder commuter rail

Table 3-9. Estimated added screenline transit volumes and key contributing elements of the Current Plan Alternative ordered by largest increase in transit volume (continued)

Screenline	Added transit volumes	Related corridors in the Current Plan Alternative (Chapter 2 of the SEIS, Figure 2-7)	Key factors affecting relative changes in transit volumes
17 King County/Pierce County East	Low additional demand	N BRT between Renton and Puyallup along SR 167	Low-density development along corridor that is currently served by Sounder commuter rail
18 North of S. 72nd Street	Low additional demand	I Rail extension (assumed commuter rail) between DuPont and Lakewood M BRT between Federal Way and DuPont on I-5	Corridor is served by express bus service in ST2
21 North of downtown Bellevue	Low additional demand	D Light rail between Renton and Lynnwood along I-405 E Light rail between Renton and Woodinville along I-405 J Commuter rail between Renton and Woodinville along Eastside Rail Corridor P BRT between Renton and Woodinville along Eastside Rail Corridor Q BRT between Renton and Lynnwood along I-405	Corridor is served by express bus service in ST2

Screenlines with increases greater than 15,000 daily riders

The highest absolute levels of transit ridership increases (approximately 15,000) would occur at:

- **King/Pierce Line West (screenline 16)—**The increases in ridership associated with the Current Plan Alternative would result from light rail from Federal Way to downtown Tacoma (corridor A) and BRT on I-5 between Federal Way and Tacoma (corridor M).
- **Wallingford (screenline 20)—**The increases in ridership associated with the Current Plan Alternative would result from light rail between Ballard and the University District (corridor G).

Screenlines with increases greater than 10,000 daily riders

Increases in daily screenline volumes of approximately 10,000 transit trips associated with the Current Plan Alternative would occur at the following locations:

- **Ship Canal (screenline 1)—**The increase in transit rider volumes at this screenline is primarily associated with a new direct light rail connection between downtown Seattle and Ballard (corridor F). In addition, and to a smaller degree, the added transit ridership would be affected by BRT between Seattle and Everett (corridor R).
- **King/Snohomish County Line West (screenline 6)—**The increase in rider volumes at this screenline is primarily associated with the light rail extension between Tacoma and Federal Way (corridor H) and BRT on SR 99 between Seattle and Everett (corridor R).
- **West of SR 167/Rainier (screenline 14)—**The increase in rider volumes at this screenline is associated with rail between Burien and Renton (corridor B). Added ridership at screenline 14 would also be influenced by highly developed mixed land uses as well as connection to other HCT services.

Screenlines with increases greater than 5,000 daily riders

Increases in daily screenline volumes of approximately 10,000 transit trips associated with the Current Plan Alternative would occur at the following locations:

- **North of Spokane Street (screenline 2)—**The increase in ridership associated with the Current Plan Alternative would result from light rail extending from Tacoma to Federal Way (corridor A).
- **King/Snohomish County Line East (screenline 4)—**The increase in ridership associated with the Current Plan Alternative would result from light rail between Renton and Lynnwood (corridor D), BRT along I-405 between Renton and Lynnwood (corridor Q), and regional express bus between North Bothell, Mill Creek, and Mukilteo.

- **North of SR 526 (screenline 5)—**The increase in ridership associated with the Current Plan Alternative would result from several items, including light rail extension from Lynnwood to Everett (corridor H), BRT along SR 99 between Seattle and Everett (corridor R), BRT between Lynnwood and Everett along I-5 (corridor S), and regional express bus between North Bothell, Mill Creek, and Mukilteo (corridor Y).
- **North of Totem Lake (screenline 10)—**The increase in ridership associated with the Current Plan Alternative would result from several items, including light rail between Renton and Lynnwood along I-405 (corridor D), light rail between Renton and Woodinville along the Eastside Rail Corridor (corridor E), rail extension (assumed commuter rail) between Renton and Woodinville along the Eastside Rail Corridor (corridor J), BRT between Renton and Woodinville along the Eastside Rail Corridor (corridor P), and BRT between Renton and Lynnwood along I-405 (corridor Q).
- **North of Renton (screenline 12)—**The increase in transit ridership would be attributable to light rail between Renton and Lynnwood along I-405 (corridor D), light rail between Renton and Woodinville along the Eastside Rail Corridor (corridor E), rail extension (commuter rail) between Renton and Woodinville along the Eastside Rail Corridor (corridor P), and BRT on I-405 between Renton and Lynnwood.
- **East of Canyon Road E (screenline 19)—**The increase in transit ridership would be attributable to BRT between Renton and Puyallup along SR 167 (corridor N), regional express bus between Puyallup and DuPont via the Cross Base Highway (corridor T), regional express bus between Puyallup and Lakewood (corridor U), and regional express bus between Puyallup and Tacoma (corridor V).

Screenline with increases less than 3,000 daily riders

For several screenlines, there would be a relatively small number of additional transit riders between the Current Plan Alternative and ST2. The number of additional transit trips at these locations would be at a level that would likely fall within a statistical margin of error for the ridership forecasting model. Locations with small numbers of ridership increases are as follows:

- **West Seattle Bridge (screenline 3)—**No major HCT services would affect this corridor under the Current Plan Alternative.
- **SR 522 (screenline 7)—**Under the Current Plan Alternative, HCT between Northgate and Bothell, (corridor L) would replace regional express bus service.
- **Crosslake: SR 520 and I-90 Bridges (screenline 8)—**Ridership at this screenline would be affected by a potential rail extension from Ballard to the U-District (corridor G).
- **West of 148th Avenue (screenline 9)—**U-District to Redmond HCT (corridor K) would replace regional express service.

- **East of Lake Sammamish (screenline 11)—**No major HCT services would affect this corridor under the Current Plan Alternative.
- **North of SR 518 (screenline 13)—**No major HCT services would affect this corridor under the Current Plan Alternative.
- **South of Renton (screenline 15)—**BRT between Renton and Puyallup along SR 167 (corridor N) would replace several regional express routes.
- **King/Pierce Line East (screenline 17)—**BRT between Renton and Puyallup along SR 167 (corridor N) would replace several regional express routes. In addition, the low-density land use in this market would affect potential transit demand growth.
- **North of S. 72nd Street (screenline 18)—**Federal Way to DuPont BRT (corridor M) would replace several regional express routes. In addition, the low-density land use in this market would affect potential transit demand growth.
- **North of downtown Bellevue (screenline 21)—**Several HCT corridors (D, E, J, P, and Q) would replace regional express service. The added service would not result in major increases in transit ridership at screenline 21.

Corridor Effects on Transit Ridership Changes

The estimated changes in Year 2040 daily transit ridership at selected screenlines would be attributable to corridors included in the Current Plan Alternative. The following discussion summarizes the relative effectiveness of notable individual corridors (shown in Chapter 2, Figure 2-7) in influencing transit ridership changes. The effectiveness of any corridor would be particularly high if it has one or more of the following characteristics: (1) it is resulting in a relatively high increase in daily transit ridership (5,000 or greater) at one or more screenlines, (2) it results in transit ridership increases at more than one screenline or (3) if it is the only corridor affecting transit ridership at a screenline. At most screenlines, multiple corridors are affecting transit ridership changes.

- **Corridor A—Light rail between Tacoma and Federal Way:** Corridor A would contribute to a major increase in daily transit ridership (15,000) at the King County/Pierce County Line West (screenline 16). Corridor A also would increase ridership (5,000) at North of Spokane Street (screenline 2).
- **Corridor B—Light rail between Burien and Renton:** Corridor B would result in the relatively large increase in daily transit ridership (10,000) at West of SR 167/Rainier Avenue (screenline 14).
- **Corridor F—Light rail between downtown Seattle and Ballard:** Corridor F would contribute to substantial increases of approximately 10,000 riders crossing the Ship Canal (screenline 1).
- **Corridor G—Light rail extension between Ballard and the University of Washington (UW):** Corridor G would result in a substantial increase of approximately 15,000 riders across the Wallingford screenline (screenline 20).

- **Corridor H—Light rail transit extension from Lynnwood Transit Center to Everett:** Corridor H would contribute to relatively large increases in transit ridership (10,000) at the Ship Canal 9 (screenline 1). In addition, corridor H would also contribute to major transit ridership increases (10,000) at the King County/ Snohomish County Line West (screenline 6).
- **Corridor D—Light rail from Renton to Lynnwood along I-405:** Corridor D would contribute to transit ridership increases (5,000) at King County/Snohomish County Line East (screenline 4), North of Totem Lake (screenline 10), and North of Renton (screenline 12).

For other transit corridors in the Current Plan Alternative, several would contribute to ridership increases at a single screenline. Other corridors would be contributing to ridership increases at screenlines affected by the corridors described above.

Several transit corridors in the Current Plan Alternative would result in relatively low transit ridership increases (less than 3,000) at the selected screenlines. These corridors are as follows:

- Corridor C—Light rail between Bellevue and Issaquah along I-90
- Corridor I—Rail extension (assumed commuter rail) between DuPont and Lakewood
- Corridor K—HCT between UW and Redmond via SR 520
- Corridor L—HCT between Northgate and Bothell
- Corridor M—BRT between Federal Way and DuPont on I-5
- Corridor N—BRT between Renton and Puyallup along SR 167
- Corridor O—BRT between Bellevue and Issaquah along I-90
- Corridor X—Regional express bus between Redmond and Kirkland
- Corridor W—Regional express between SeaTac and West Seattle

Ridership changes—Potential Plan Modifications Alternative compared to Current Plan Alternative

Ridership increases shown in Table 3-10 represent net increases in the volume of transit boardings resulting from the Potential Plan Modifications Alternative. Figure 3-8 shows location of the screenlines and the associated changes in transit ridership at each location.

The changes in transit volumes at screenline are influenced by a variety of factors, including reduced transit travel times, market conditions influencing transit ridership, and the potential for multiple HCT elements to affect a single screenline. The discussion of results is organized into four groups of screenlines with the following relative transit volume increases:

- Greater than 20,000 daily riders
- Greater than 10,000 daily riders
- Greater than 5,000 daily riders
- Less than 3,000 daily riders

Table 3-10. Difference in daily screenline transit rider volumes—2040 Current Plan Alternative and 2040 Potential Plan Modifications Alternative

Location number	Screenline	Direction of travel	2040 Current Plan Alternative	2040 Potential Plan Modifications Alternative relative to 2040 Current Plan Alternative	
				Change[1]	Percent change[2]
1	Ship Canal	North/South	172,000–229,000	+ 5,000	<5%
2	North of Spokane Street	North/South	162,000–210,000	+ 20,000	10%
3	West Seattle Bridge	East/West	24,000–29,000	+ 20,000	70%
4	King/Snohomish Line: East	North/South	7,000–11,000	*	
5	North of SR 526	North/South	24,000–36,000	*	
6	King/Snohomish Line: West	North/South	66,000–94,000	*	
7	SR 522	North/South	5,000	+ 5,000	100%
8	Crosslake: SR 520 and I-90 Bridges	East/West	52,000–62,000	*	
9	West of 148th	East/West	38,000–5,0000	*	
10	North of Totem Lake	North/South	8,000–12,000	+ 5,000	40%
11	East of Lake Sammamish	North/South	< 1,000	*	
12	North of Renton	North/South	10,000–16,000	*	
13	North of SR 518	North/South	6,000–10,000	+ 10,000	125%
14	West of SR 167/Rainier Avenue	East/West	18,000–26,000	+ 10,000	45%
15	South of Renton	North/South	39,000–48,000	+ 10,000	25%
16	King/Pierce Line: West	North/South	32,000–48,000	*	
17	King/Pierce Line: East	North/South	29,000–34,000	+ 10,000	30%
18	North of S. 72nd Street	North/South	18,000–24,000	+ 5,000	25%
19	East of Canyon Road E.	East/West	18,000–26,000	+ 5,000	15%
20	Wallingford	East/West	21,000 to 31,000	- 10,000	-40%
21	North of downtown Bellevue	North/South	12,000 to 18,000	*	

[1] Calculated absolute change using midpoints of ranges then rounded to the nearest 5,000

[2] Calculated percent change using absolute change prior to rounding; then rounded the percent change to the nearest 5%

* Less than 3,000 daily transit riders

Table 3-11 identifies the estimated increases in transit ridership volumes at screenlines affected by corridors included in the Potential Plan Modifications Alternative. The following sections describe in more detail how the corridors included in the Potential Plan Modifications Alternative are contributing to the transit ridership changes.

Figure 3-8. Daily transit ridership changes at selected screenlines—Potential Plan Modifications Alternative vs. Current Plan Alternative

Table 3-11. Estimated added screenline transit volumes and key contributing elements of the Potential Plan Modifications Alternative ordered by largest increase in transit volume

Screenline		Added transit volumes	Related corridors in the Potential Plan Modifications Alternative (Chapter 2, Figures 2-9 and 2-10)		Key factors affecting relative changes in transit volumes
2	North of Spokane Street	20,000	2 9 19 25	Light rail between downtown Seattle, West Seattle, and Burien, potentially including a new tunnel under downtown Seattle Light rail from Tukwila to SODO via Duwamish industrial area HCT line from Tukwila Sounder station to Sea-Tac Airport to Burien to downtown Seattle via West Seattle Regional express bus between Renton and downtown Seattle	Lower transit travel times More connections with three light rail/HCT elements serving one screenline High-density travel corridors
3	West Seattle Bridge	20,000	2 19	Light rail between downtown Seattle, West Seattle, and Burien, potentially including a new tunnel under downtown Seattle HCT line from Tukwila Sounder station to Sea-Tac Airport to Burien to downtown Seattle via West Seattle	Lower transit travel times More connections with two light rail/HCT elements at one screenline High-density corridors
13	North of SR 518	10,000	2 7 19	Light rail between downtown Seattle, West Seattle, and Burien, potentially including a new tunnel under downtown Seattle Light rail from Puyallup/Sumner to Renton via SR 167 HCT line from Tukwila Sounder station to Sea-Tac Airport to Burien to downtown Seattle via West Seattle	Lower transit travel times More connections with three light rail/HCT elements at one screenline High-density corridors
14	West of SR 167/ Rainier Avenue	10,000	2 7 19 35 36	Light rail between downtown Seattle, West Seattle, and Burien, potentially including a new tunnel under downtown Seattle Light rail between Puyallup/Sumner and Renton via SR 167 HCT between Tukwila Sounder station and downtown Seattle via Sea-Tac Airport, Burien, and West Seattle Regional express bus/BRT between Kent and Sea-Tac Airport Regional express bus/BRT between Puyallup and Rainier Valley	Lower transit travel times High-density travel corridor
15	South of Renton	10,000	7 35 36	Light rail from Puyallup/Sumner to Renton via SR 167 Regional express bus/BRT between Kent and Sea-Tac Airport Regional express bus/BRT between Puyallup and Rainier Valley	Lower transit travel times Expanded availability of service with light rail vs. commuter rail
17	King County/Pierce County East	10,000	7 36	Light rail from Puyallup/Sumner to Renton via SR 167 Regional express bus/BRT between Puyallup and Rainier Valley	Lower transit travel times Expanded availability of service with light rail vs. commuter rail
1	Ship Canal	5,000	1 11	Light rail north/south–downtown Seattle to Magnolia/Ballard to Shoreline Community College Light rail from Ballard to Bothell via Northgate	Lower travel times More connections with two light rail/HCT elements at one screenline High-density corridors

Table 3-11. Estimated added screenline transit volumes and key contributing elements of the Potential Plan Modifications Alternative ordered by largest increase in transit volume (continued)

Screenline	Added transit volumes	Related corridors in the Potential Plan Modifications Alternative (Chapter 2, Figures 2-9 and 2-10)	Key factors affecting relative changes in transit volumes
7 SR 522	5,000	10 Light rail from North Kirkland or UW Bothell to Northgate via SR 522 11 Light rail from Ballard to Bothell via Northgate 29 Regional express bus on 145th Street from I-5 to SR 522	Lower travel times More connections with two light rail/HCT elements at one screenline High-density corridors
10 North of Totem Lake	5,000	10 Light rail from North Kirkland or UW Bothell to Northgate via SR 522 12 Light rail to Mill Creek, connecting to Eastside Rail Corridor 26 Regional express bus between University of Washington Bothell and Sammamish via Redmond 30 Regional express bus between North Kirkland and downtown Seattle 31 Regional express bus between Woodinville and Bellevue	More connections with two light rail/HCT elements at one screenline Lower travel times
18 North of S. 72nd Street	5,000	6 Light rail from DuPont to downtown Tacoma via Lakewood, Steilacoom, and Ruston 14 Light rail between Tacoma and Parkland via SR 7 18 Commuter rail between Tacoma and Frederickson	Lower travel times along corridor Low-density development along corridor
19 East of Canyon Road E.	5,000	5 Light rail from Lakewood to Spanaway to Frederickson to South Hill to Puyallup 33 Connection to Joint Base Lewis-McChord	Lower travel times along corridor Low-density development along corridor
4 King County/ Snohomish Line East	Low additional demand	32 Regional express bus route Woodinville to Everett service	Lower transit travel times
5 North of SR 526 south of Everett	Low additional demand	3 Light rail from Ballard to Everett Station via Aurora Village, Lynnwood 4 Light rail between Everett and North Everett 15 Light rail between Lynnwood and Everett that serves Southwest Everett Industrial Area (Paine Field, Boeing) 32 Regional express bus between Woodinville and Everett	Because new light rail on SR 99 would duplicate in part rail service between downtown Seattle and Everett in the Current Plan Alternative, there would not be a substantial increase in ridership Light rail service via Paine Field (corridor 15) substituted for the Lynnwood to Everett light rail service in the Current Plan Alternative would slow transit travel times for some O/D pairs
6 King/Snohomish County Line West	Low additional demand	3 Light rail from Ballard to Everett Station via Aurora Village, Lynnwood 15 Light rail between Lynnwood and Everett that serves Southwest Everett Industrial Area (Paine Field, Boeing) 20 HCT between downtown Seattle and Edmonds via Ballard and Shoreline Community College	New light rail would duplicate in part rail service between downtown Seattle and Everett in the Current Plan Alternative. Without substantial improvement in transit service, there would not be major increases in transit ridership Light rail service via Paine Field (corridor 15) substituted for the Lynnwood to Everett light rail service in the Current Plan Alternative would slow transit travel times for some O/D pairs

Table 3-11. Estimated added screenline transit volumes and key contributing elements of the Potential Plan Modifications Alternative ordered by largest increase in transit volume (continued)

Screenline	Added transit volumes	Related corridors in the Potential Plan Modifications Alternative (Chapter 2, Figures 2-9 and 2-10)	Key factors affecting relative changes in transit volumes
8 Crosslake: SR 520 and I-90 Bridges	Low additional demand	30 Regional express bus route from North Kirkland to downtown Seattle	Since it duplicates light rail on SR 522 from north Kirkland, and existing express bus routes on the corridor, the corridor would not result in a substantial increase in ridership
9 West of 148th Avenue	Low additional demand	26 Regional express bus route connecting UW Bothell to Sammamish via Redmond	Low-density development along corridor
11 East of Lake Sammamish	Low additional demand	24 Regional express bus route between Issaquah and Overlake via Sammamish and Redmond	Low-density development along corridor
12 North of Renton	Low additional demand	28 Regional express bus between Renton (Fairwood) and Eastgate via Factoria 34 Regional express bus/BRT service between Tacoma and Bellevue	Since it duplicates rail lines in Current Plan Alternative, the corridor would not result in a substantial increase in ridership
16 King/Pierce County Line West	Low additional demand	34 Regional express bus/BRT service between Tacoma and Bellevue	Duplicates rail lines in Current Plan Alternative
20 Wallingford	-10,000	11 Light rail between Ballard and Bothell via Northgate	Does not provide light rail service from Ballard to the UW (which is included in the Current Plan Alternative) Duplicates rail line in Current Plan Alternative
21 North of downtown Bellevue	Low additional demand	12 Light rail between Mill Creek and Bothell, connecting to Eastside Rail Corridor	Duplicates rail lines in Current Plan Alternative

Screenlines with increases greater than 20,000 daily riders

The highest absolute levels of transit ridership increases (approximately 20,000) would occur at screenlines 2 (north of Spokane Street) and 3 (West Seattle Bridge). Maps showing Potential Plan Modifications Alternative corridors are provided in Chapter 2, Figure 2-7 and Figure 2-8. Increases in ridership associated with the Potential Plan Modifications Alternative would in part result from three proposed new corridors:

- **North of Spokane Street (screenline 2)—**The increase in transit rider volumes at this screenline is primarily associated with corridor 2—a new direct light rail connection between downtown Seattle, West Seattle, and Burien; corridor 9—a direct light rail line from Tukwila to the SODO area of Seattle via the Duwamish Industrial Area (only affects screenline 2); and corridor 19—an HCT line between the Tukwila Sounder station and SeaTac, Burien, West Seattle, and downtown Seattle. Corridors 2 and 19 overlap along that portion of their lines located between downtown Seattle and West Seattle.

  Corridor 9—a direct light rail line from Tukwila to the SODO area of Seattle via the Duwamish Industrial Area—would provide a shorter rail connection between downtown Seattle and Tukwila than the existing Central Link route. However, this corridor could require a reduction in service through Rainier Valley, or an additional transfer, since the lines would join before entering the DSTT. Overall, the modeling analysis indicates that the addition of the light rail connection from Tukwila to SODO via the Duwamish Industrial Area (corridor 9) would likely have little effect on overall transit usage to and from downtown Seattle. Also, when modeled with corridor 2—light rail connection between downtown Seattle, West Seattle, and Burien—corridor 9 would increase daily light rail volumes by approximately 3,000 but have no effect on total transit ridership crossing screenline 2 east of Fourth Avenue South. For Fourth Avenue South and westward (including First Avenue South, SR 99 and the light rail corridor), the daily transit volume increase is estimated at over 20,000, reflecting transit ridership increases primarily from West Seattle, White Center, and Burien.

- **West Seattle Bridge (screenline 3)—**The increase in transit rider volumes at this screenline is primarily associated with corridor 2—a new direct light rail connection between downtown Seattle, West Seattle, and Burien, and corridor 19—an HCT line between the Tukwila Sounder Station and SeaTac, Burien, West Seattle, and downtown Seattle. Corridors 2 and 19 overlap along that portion of their lines located between downtown Seattle and West Seattle.

Screenlines with increases greater than 10,000 daily riders

Increases in daily screenline volumes of approximately 10,000 transit trips associated with the Potential Plan Modifications Alternative would occur at the following four locations:

- **North of SR 518 (screenline 13)—**The increase in transit rider volumes at this screenline is primarily associated with corridor 2—a new direct light rail connection between downtown Seattle, West Seattle, and Burien.

- **West of SR 167/Rainier Avenue (screenline 14)—**The increase in rider volumes at this screenline is primarily associated with an additional potential connection between the proposed light rail between West Seattle and Renton (corridor 2), light rail between Puyallup/Sumner and Renton via SR 167 (corridor 7), HCT from Tukwila Sounder station and downtown Seattle via Sea-Tac Airport, Burien, and West Seattle (corridor 19), regional express bus/BRT between Kent and Sea-Tac Airport (corridor 35), and the potential rail extension between Renton and Burien included in the Current Plan Alternative.

- **South of Renton (screenline 15)—**The proposed light rail line between Renton, Sumner, and Puyallup via SR 167 (corridor 7) provides the primary source of new riders for this screenline. Although Sumner and Puyallup are currently served by commuter rail, light rail would provide more frequent service and additional connections. The new commuter rail connection between Tacoma and Frederickson (corridor 18) and the regional express/BRT between Kent and Sea-Tac Airport (corridor 35) would also be factors, but the added ridership would be low.

- **King County/Pierce Line (East) (screenline 17)—**The proposed light rail line between Renton, Sumner, and Puyallup via SR 167 (corridor 7) would provide the primary source of new riders for this screenline. Although Sumner and Puyallup are currently served by commuter rail, light rail would provide more frequent service and additional connections. Regional express/BRT between Puyallup and Rainier Valley (corridor 36) would also be a factor.

Screenlines with increases greater than 5,000 daily riders

Approximately 5,000 added trips per day would occur at five screenline locations: one in North King County, two in East King County, and two in Pierce County, as follows:

- **Ship Canal (screenline 1)—**This screenline shows relatively modest increases in daily riders as the proposed corridors represent relatively small upgrades to service already assumed in the Current Plan Alternative.

- **On SR 522 (screenline 7)—**The combined effect of operating proposed corridors 10, 11, and 29 provides some upgrade in service and coverage that results in a modest increase in forecasted ridership when compared to the network in the Current Plan Alternative. This network includes a potential rail extension from Northgate to Bothell and North Kirkland.

- **North of Totem Lake (screenline 10)—**The combined effect of operating proposed corridors 10 and 12 (light rail from North Kirkland to Northgate via SR 522, light rail from Mill Creek connecting to the Eastside Rail Corridor) provides a modest increase in service and coverage when compared to services on the north I-405 corridor assumed in the Current Plan Alternative. Other factors would include regional express bus between the University of Washington, Bothell, and Sammamish via Redmond (corridor 26).

- **North of S. 72nd Street (screenline 18)—**The large light rail network proposed as corridors 14 and 6 between DuPont, Southeast Tacoma, and downtown Tacoma generate modest ridership primarily due to the demographic characteristics of the market, limited travel time savings afforded by transit, and relatively low parking costs in employment centers.
- **East of Canyon Road E. (screenline 19)—**The effect of operating corridor 5 generates relatively modest travel increases due to the limited market potential of the area and the nature of travel patterns in the area.

Screenline with increases less than 3,000 daily riders

For several screenlines, there would be a relatively small number of additional transit riders between the Potential Plan Modifications Alternative and the Current Plan Alternative. The number of additional transit trips at these locations would be at a level that would likely fall within a statistical margin of error for the ridership forecasting model. Locations with small numbers of ridership increases are:

- **King/Snohomish Line (East) (screenline 4)—**A new regional express bus route in the Potential Plan Modifications Alternative between Woodinville and Everett (corridor 32) would partially duplicate light rail service in the Current Plan Alternative between Renton and Lynnwood along I-405 (corridor D) and BRT between Renton and Lynnwood via I-405 (corridor Q).
- **North of SR 526 (screenline 5)—**The new light rail on SR 99 would duplicate in part rail service between downtown Seattle and Everett in the Current Plan Alternative. The light rail between Lynnwood and Everett (corridor 15) that serves the Southwest Everett Industrial Area (Paine Field, Boeing) represents an alternative corridor compared to the Current Plan Alternative corridor H between Lynnwood and Everett. While this line provides a new rail connection to a major employment center, it also increases travel time between Everett and Seattle by about 5 to 8 minutes. Other factors are the light rail between Everett and North Everett (corridor 4) and regional express bus between Woodinville and Everett (corridor 32).
- **King/Snohomish Line (West) (screenline 6)—**The new light rail on SR 99 would duplicate, in part, rail service between downtown Seattle and Everett in the Current Plan Alternative. In addition, the alternative light rail corridor via Paine Field (corridor 15) would slow transit travel time for some higher-ridership origin-destination pairs. The light rail from Ballard to Everett Station via Aurora Village and Lynnwood (corridor 3) is in close proximity to the planned line contained in the Current Plan Alternative. HCT between downtown Seattle and Edmonds via Ballard and Shoreline Community College (corridor 20) duplicates, in part, existing Sounder service connecting downtown Seattle and Edmonds.

- **Crosslake (screenline 8)—**Plan modifications duplicate HCT on SR 520 and SR 522 and bus service on the corridor included in the Current Plan Alternative. This screenline would consider the regional express route from North Kirkland to downtown Seattle (corridor 30), crossing the SR 520 bridge. This proposed corridor does not provide enough of a difference from the services assumed in the Current Plan Alternative to generate significant ridership increases.
- **West of 148th Avenue (screenline 9)—**Low-density development along corridor 26.
- **East of Lake Sammamish (screenline 11)—**This screenline's volumes primarily reflect a single regional express route between Issaquah and Overlake via Sammamish and Redmond (corridor 24). In addition, the land use in these corridors is characterized by low-density development, which is not conducive to high transit ridership.
- **North of Renton (screenline 12)—**The Potential Plan Modifications Alternative duplicates rail lines in the Current Plan Alternative, such as link service between Tacoma and Seattle with connections to East Link. Only two corridors are counted in this screenline for the Potential Plan Modifications Alternative, the regional express bus between Renton (Fairwood) and Eastgate via Factoria (corridor 28) and regional express Bus/BRT service between Tacoma and Bellevue (corridor 34). These proposed corridors do not provide enough of a difference from the services assumed in the Current Plan Alternative to generate significant ridership increases.
- **King/Pierce County (West) (screenline 16)—**Plan modifications duplicate rail lines in the Current Plan Alternative, such as link service between Tacoma and Seattle with connections to East Link. Similar to screenline 12, only one corridor is applicable to this screenline for the Potential Plan Modifications Alternative, the regional express bus/BRT service between Tacoma and Bellevue (corridor 34).
- **Wallingford (screenline 20)—**A decrease in ridership is due to the lack of light rail service from Ballard to the UW (which is included in the Current Plan Alternative). In addition, plan modifications duplicate, in part, rail lines in the Current Plan Alternative, such as light rail between Ballard and Bothell via Northgate (corridor 11).
- **North of downtown Bellevue (screenline 21)—**The Potential Plan Modifications Alternative transit service on I-405 and the Eastside Rail Corridor would duplicate HCT items in the Current Plan Alternative, such as BRT.

Corridor Effects on Transit Ridership Changes

As described in the previous sections, estimated changes in Year 2040 daily transit ridership at selected screenlines would be attributable to corridors included in the Potential Plan Modifications Alternative (shown in Chapter 2, Figures 2-9 and 2-10). The following sections summarize the relative effectiveness of corridors in the Potential Plan Modifications Alternative in increasing transit ridership. As is the case with corridors included in the Current Plan Alternative, the effectiveness of any corridor

would be particularly high if it has one or more of the following characteristics: (1) it is resulting in a relatively high increase in daily transit ridership (5,000 or greater) at one or more screenlines, (2) it is resulting in transit ridership increases at more than one screenline and (3) it is the only corridor affecting transit ridership at a screenline (at most screenlines, multiple corridors are affecting transit ridership changes).

- **Corridor 2—Light rail between downtown Seattle, West Seattle, and Burien:** Corridor 2 would contribute to transit ridership increases at four locations, North of Spokane Street (screenline 2), West Seattle Bridge (screenline 3), North of SR 518 (screenline 13), and West of SR 167/Rainier Avenue (screenline 14). The extent of ridership changes is relatively high—between 10,000 and 20,000 per location. At three locations, other corridors are helping to contribute to the ridership increases, but at West of SR 167/Rainier Avenue (screenline 14), corridor 2 would be the only one contributing to the ridership increases.
- **Corridor 19—HCT line from Tukwila Sounder Station to Sea-Tac Airport to Burien to downtown Seattle via West Seattle:** Corridor 19 would contribute to the relatively high transit ridership increases (20,000) at North of Spokane Street (screenline 2) and West Seattle Bridge (screenline 3). Corridor 19 also would contribute to ridership increases (10,000) North of SR 518 (screenline 13).
- **Corridor 7—Light rail from Puyallup/Sumner to Renton via SR 167:** Corridor 7 would contribute to ridership increases North of SR 518 (screenline 13). Corridor 7 also would contribute to ridership increases at two other locations: South of Renton (screenline 15) and King County/Pierce County Line East (screenline 17). At all locations the added daily transit ridership is 10,000 at each screenline.
- **Corridor 10—Light rail from North Kirkland or UW Bothell to Northgate via SR 522:** Corridor 10 would increase ridership at SR 522 (screenline 7) and North of Totem Lake (screenline 10). Daily transit ridership increases at each screenline would be approximately 5,000.
- **Corridor 11—Light rail from Ballard to Bothell via Northgate:** Corridor 11 would contribute to transit ridership increases at two locations, Ship Canal (screenline 1) and SR 522 (screenline 7). Daily transit ridership increases at each screenline would be approximately 5,000.
- **Corridor 20—HCT line from downtown Seattle to Edmonds via Ballard and Shoreline Community College:** Corridor 20 would contribute to transit ridership increases (5,000) at the Ship Canal.

For other transit corridors in the Potential Plan Modifications Alternative, several would contribute to ridership increases at a single screenline. Other corridors would be contributing to ridership increases at screenlines affected by the corridors described above.

Several corridors in the Potential Plan Modifications Alternative would result in relatively low transit ridership increases (less than 3,000) at the selected screenlines. These corridors are as follows:

- Corridor 3—Link light rail from Ballard to Everett Station via Aurora Village, Lynnwood.
- Corridor 15—Link light rail between Lynnwood and Everett that serves Southwest Everett Industrial Park (Paine Field, Boeing). It should be noted that the specifics of how the alignment could serve this corridor would be examined within a project-level environment study.
- Corridor 24—Regional express route between Issaquah and Overlake via Sammamish and Redmond.
- Corridor 26—Regional express route connecting UW Bothell to Sammamish via Redmond.
- Corridor 30—Regional express route from North Kirkland to downtown Seattle.
- Corridor 34—Regional express/BRT service between Tacoma and Bellevue.

Ridership changes—Potential Plan Modifications Alternative compared to ST2

Ridership increases shown in Figure 3-9 represent net increases in the volume of daily transit ridership at screenlines that would result from the Potential Plan Modifications Alternative compared to ST2. Figure 3-9 shows the location of the screenlines and the associated changes in transit ridership at each location. The Potential Plan Modifications Alternative would include HCT corridors that are in addition to those in the Current Plan Alternative, and the Current Plan Alternative has corridors in addition to ST2. Therefore, substantial changes in daily transit ridership would occur at several screenlines.

The largest increase in daily transit ridership (approximately 25,000) would occur at North of Spokane Street (screenline 2). Other major increases in transit ridership (approximately 20,000) would occur at the West Seattle Bridge (screenline 3) and West of SR 167/Rainier Avenue (screenline 14). Ridership would increase by over 10,000 at the Ship Canal (screenline 1), North of SR 518 (screenline 13), South of Renton (screenline 15), and the King/Pierce Line–West (screenline 16). All but two of the remaining screenlines would experience increases of more than 5,000 riders.

3.4.2 Access to transit

How people get to transit is an important consideration that affects the transportation system as a whole. From home, people may walk or bike to their bus stop or light rail station, drive to a park-and-ride lot, or catch a local bus and then transfer onto the regional transit system. Sound Transit's System Access Policy (Resolution No. R2013-03—Attachment A) establishes a framework to guide Sound Transit's management of, and investment in, infrastructure and facilities to provide customer access to its transit services. The policy aims to encourage convenient and safe connections to Sound Transit services through all access modes, including connecting transit and ferry services, paratransit, pedestrian access, bicycle access, private vehicle pick-up and drop-off, and parking for transit users.

Figure 3-9. Daily transit ridership changes at selected screenlines—Potential Plan Modifications Alternative vs. ST2

The travel forecasting carried out for this Draft SEIS identified variations in auto access for the Year 2040 between ST2, the Current Plan Alternative, and the Potential Plan Modifications Alternative. Other access modes would include a combination of walking or biking to reach regional transit service, or using local bus service to access the regional transit service.

As indicated in Table 3-12, there would be little to no change in the extent of auto access between the Current Plan Alternative and the Potential Plan Modifications Alternative. This would be attributable to large networks under each alternative of existing park-and-ride facilities and lack of available local bus/walk access.

Table 3-12. Peak auto access share estimates for transit trips

Subarea	2040 ST2	2040 Current Plan Alternative	2040 Potential Plan Modifications Alternative
Snohomish County	30%	31%	30%
North King County	5%	5%	4%
East King County	32%	33%	32%
South King County	29%	30%	29%
Pierce County	28%	28%	26%
Systemwide	19%	19%	18%

Source: Sound Transit Ridership Forecasting Model

Further information on access mode cannot be determined under the programmatic-level impact analysis addressed in this Draft SEIS. For example, because locations of rail stations have not yet been determined, access mode by local transit cannot be determined.

3.5 Impacts of alternatives on the regional transportation system

While the previous section described effects relating to transit ridership, the following section presents information on how implementation of the Current Plan and Potential Plan Modifications Alternatives would impact physical components of the multi-modal transportation system, including public transit, operations of freeways and local streets, parking, non-motorized modes (pedestrian and bicycle facilities), safety, and freight.

This assessment of potential impacts is a high level overview of what could occur. No specific alignments have been selected for any transit mode, and there is no determination as to corridor profile (whether any particular element would be underground, at grade, or elevated).

In addition to impacting regional travel conditions, including added transit volumes, the Potential Plan Modifications Alternative would affect elements of the transportation system. Examples include potential traffic conditions in the area of HCT stations and the potential need for added bicycle and pedestrian capacity in station areas.

3.5.1 Public transit

Light rail operations and facilities

Operating conditions of the Potential Plan Modifications Alternative are similar to the Current Plan Alternative but with greater coverage of service throughout the region. In each alternative, the average speed for light rail service would be 30 to 35 mph, with a top speed of 55 mph.

Expansion of light rail service would impact the capacity of Sound Transit operations and maintenance facilities. The extent of potential service expansion and the associated expansion of the fleet would likely require operations and maintenance facility capacity expansion.

Commuter rail operations and facilities

The Sound Transit commuter rail system would operate every 20 to 30 minutes during peak commute periods (and potentially up to a similar frequency during non-commute periods), with an average speed of 35 to 40 mph and a top speed of 79 mph. On the Eastside Rail Corridor, speeds would be slower than the average speed due to curves. In addition, extensions of commuter rail lines with the Potential Plan Modifications Alternative, as well as resulting additional ridership and service, could require negotiations for easements with freight railroads that own and use the tracks.

Expansion of commuter rail service would increase operations and maintenance activities. This additional demand for operations and maintenance support could be obtained through modifications to agreements with Sound Transit's current service providers or through the development of new operations and maintenance facilities.

Regional express bus/bus rapid transit operations and facilities

The Current Plan Alternative and the Potential Plan Modifications Alternative would add BRT and regional express bus routes throughout the Sound Transit service area. The average speed for regional express bus service on arterials would be approximately 15 to 25 mph. For buses operating on freeways, the modeling assumptions are consistent with *Transportation 2040*, which includes tolling of all lanes on limited-access facilities and operation of limited-access facilities as managed lanes. For modeling purposes bus operations on bus/BAT lanes would be 60 to 70 percent of posted speeds and, for bus operations on freeways, buses would operate 20 percent slower than general-purpose traffic. This variation reflects potential operating conditions faced by bus operators that would result in slower speeds as compared to speeds by general-purpose.

Expansion of regional express bus service would impact the capacity of operations and maintenance facilities. The extent of potential service expansion and the associated expansion of the fleet would likely require some level of operations and maintenance base capacity expansion.

Streetcar operations and facilities

Streetcars usually operate in mixed traffic and at-grade on surface streets. The travel speed of streetcars, as with buses in general-purpose lanes, would be affected by the number of stops as well as roadway operations if they are in mixed traffic. The existing South Lake Union Streetcar has a maximum operating speed of 35 mph, while the average operating speed is

5.3 mph (FTA 2012). The streetcar's level platform and multiple doors offer more efficient boarding and alighting than standard buses with steps.

Expansion of streetcar service would impact the capacity of streetcar operations and maintenance facilities. The extent of potential service expansion and the associated expansion of the fleet will require some level of streetcar operations and maintenance base capacity expansion.

Local bus service

New BRT and regional express bus service included in the Potential Plan Modifications Alternative would result in more restructuring of express bus service provided by local transit agencies than would the Current Plan Alternative. Regional express bus/BRT could replace some transit services provided by local transit agencies, freeing service hours for the local transit provider to use elsewhere. Service would be restructured to avoid duplication of bus services. The replacement of express routes with regional express/BRT could also have a net effect of reduced transit ridership levels by the local transit system. However, if transit ridership is reduced, transit agencies may adjust service levels and focus on other travel markets.

Demand could increase for local bus service to connect to new light rail and commuter rail stations and regional express bus/BRT services. Potential modifications to specific bus routes would be identified and coordinated with local transit agencies upon implementation of the Potential Plan Modifications Alternative.

New light rail service with the Current Plan Alternative and the Potential Plan Modifications Alternative could result in new bus transit centers, which would be major transit hubs at new light rail and other HCT stations. Also with the Long-Range Plan alternatives, there could be the need for new or expanded bus transit centers and park-and-ride facilities at existing light rail and other HCT stations. The need for these transit centers would result from transit ridership at the stations that would potentially require access by local bus service. New bus transit stations and bus stops would be developed with enhancements to pedestrian and bicycle access, which would result in a net benefit to pedestrian and bicycle mobility.

Expansion of local bus service would impact capacity of operations and maintenance facilities. The extent of potential service expansion and the associated expansion of the fleet would likely require some level of operations and maintenance base capacity expansion.

3.5.2 Highway and road operations

A relatively small decrease in highway and road demand would occur with the Current Plan Alternative as compared to ST2 and the Potential Plan Modifications Alternative as compared to the Current Plan Alternative. With the Current Plan Alternative, there would be approximately 99.0 million VMT per day by 2040. With the Potential Plan Modifications Alternative, there would be approximately 98.4 million VMT per day. These VMT estimates are for the four-county region. In addition, the tolling of regional facilities has been assumed for each alternative, which is consistent with *Transportation 2040*.

Highway system

The relatively small decrease in regional VMT with the Potential Plan Modifications Alternative would result in comparably small reductions in congestion on regional roadways

compared to the Current Plan Alternative. Reductions of traffic under the Potential Plan Modifications Alternative could also have some beneficial effects on congested intersections.

In the Current Plan Alternative and the Potential Plan Modifications Alternative, consistent with *Transportation 2040*, HOV lanes would be converted to managed lanes and operate like the other lanes on these facilities. With these potential changes, the assumption used for the travel forecasting analysis is that all lanes would be managed for volume and speed, and buses would travel with the flow of traffic. Current WSDOT policy with managed lanes is to maintain a 45 mph operating speed at least 90 percent of the time during the morning and afternoon peak periods.

The effect of tolled managed lanes is the same for the Current Plan Alternative and the Potential Plan Modifications Alternative where express bus service is operated within limited-access facilities. Bus operations, like general-purpose traffic, are modeled to operate consistent with this policy. However, if these lanes are not managed in this fashion on limited access roadways, then speeds for buses on freeways could be much lower in some cases.

With increases in regional traffic congestion in the forecast year, bus operating speeds are expected to continue to deteriorate under the Current Plan Alternative and the Potential Plan Modifications Alternative where buses operate in mixed traffic.

Local street system

Although specific alignments and designs have not been identified, the Current Plan Alternative and the Potential Plan Modifications Alternative include new rail and bus lines that, depending on the alignment and design, could impact local streets. These impacts could include use of lane capacity for high capacity transit guideways, at-grade crossings for rail or BRT, and increased congestion around stations and park-and-ride facilities. At-grade and elevated light rail alignments could result in arterial modifications, such as permanently eliminating two-way left-turn lanes, and changes or limitations to local access.

New light rail and commuter rail stations could result in local traffic impacts associated with access, including transit riders using park-and-ride facilities at the stations. The additional traffic that would be generated by new Sounder stations with park-and-ride facilities and expansion of park-and-ride capacity with the Potential Plan Modifications Alternative could impact local traffic.

The addition of streetcar rail lines on local roads could result in limiting left-turn movements and could remove parking on one or both sides of the street to provide for the streetcar right-of-way and connect to the station platforms.

3.5.3 Parking

Future project-level planning and environmental reviews would assess parking needs at facilities and mitigate potential impacts. The System Access Policy states that parking provided by Sound Transit is intended for and restricted to customers of transit services at the facility, although exceptions may be allowed in some cases. Sound Transit may implement parking management tools, such as designated parking for HOVs, parking fees, and parking management systems, to increase ridership and efficiency in the parking facilities.

If park-and-ride facilities are not sized large enough under the Current Plan Alternative and the Potential Plan Modifications Alternative to accommodate demand, increased traffic could result in parking spillover onto residential streets. With the expanded rail service under each alternative, decreased on-street parking in some corridors could occur due to displacement of roadway capacity to accommodate new guideways and stations. Impacts such as these could be mitigated as part of future project-level planning.

3.5.4 Safety

Rail and BRT facilities could create safety impacts for at-grade crossings or where operating in mixed traffic. Projects include safety features and often upgrades for unprotected pedestrian crossings on commuter rail lines.

With the Current Plan Alternative and the Potential Plan Modifications Alternative, there would be a higher level of service frequency involving light rail and streetcar operations that could include at-grade crossings of intersections. These at-grade crossings could increase traffic congestion and the risk of accidents between trains and other modes of transportation.

With new rail and bus service, there would be increased vehicular, walk, and bike activity in station areas, potentially impacting the safety of roadway and non-motorized systems.

3.5.5 Non-motorized systems—pedestrian and bicycle facilities

Sound Transit is committed to encouraging and providing pedestrian and bicycle access and has a formal policy of investing in access infrastructure and providing access on transit vehicles, consistent with passenger safety and service quality standards. With expanded transit operations under each alternative, there could be potential impacts on pedestrian and bicycle facilities.

Both the Current Plan Alternative and the Potential Plan Modifications Alternative include potential pedestrian and bicycle facilities that improve access to transit facilities. Sound Transit could add new or improved sidewalks in the immediate vicinity of new transit facilities to link activity centers to transit. Transit facilities that require a substantial change in grade between access and boarding areas generally include ramps, elevators, or escalators.

The Current Plan Alternative and the Potential Plan Modifications Alternative likely would allow bicycles to continue to be carried on streetcars, local bus, regional express bus, commuter rail, and light rail. Sound Transit may support bicycle usage at its stations and facilities through bicycle-related infrastructure, equipment, services, usage fees, and agreements with outside parties. Transit centers, stations, and parking facilities would include safe and convenient bicycle parking/storage; in many cases, such facilities would be weather-protected. Transit facilities would be designed to enhance current pedestrian and bicycle access across rights-of-way.

These improvements would facilitate the use of bicycles for regional trips. Additional services offering on-board bicycle access and new transit facilities with bicycle and pedestrian improvements also could add riders to the system and remove some additional single-occupant vehicle trips from the region's roadways.

3.5.6 Freight movement

With expanded streetcar, light rail, and commuter rail services under the Current Plan Alternative and the Potential Plan Modifications Alternative, there could be impacts on delivery of goods. Commuter and light rail could affect freight mobility if trains impede truck routes, particularly in urban industrial areas. Depending on the frequency, speed, and station stops, trains could temporarily block truck routes at at-grade crossings more frequently and for a longer duration than under current conditions.

In some cases, new guideways and stations could reduce access to driveways serving businesses. In addition, the streetcar and light rail development could displace on-street loading capacity for trucks delivering goods. With increases in commuter rail service, there could be impacts associated with added train operations on existing freight lines, including the need for revised or new operating agreements between Sound Transit and rail operators. Future project-level planning and environmental reviews would assess freight access needs and mitigate potential impacts.

3.6 Construction impacts

This section discusses the potential construction impacts of the Current Plan Alternative and the Potential Plan Modifications Alternative. These impacts involve both service facilities, such as a light rail extension, and infill construction along existing corridors, as well as supporting operations and maintenance facilities for all modes.

3.6.1 Local bus service

Buses that use streets or freeways undergoing construction of new transit facilities could temporarily travel more slowly or be detoured to adjacent streets. Local bus service could be temporarily affected by the increase in congestion, reduced lane widths, and construction activity. Detours during lane closures and closures of freeway overcrossings could require revised bus routes that could increase transit, walking, or bicycling travel times.

During construction, existing transit centers, park-and-ride bus facilities, and bus stops may need to be closed or moved to temporary locations. Pedestrian and bicycle travel routes could be temporarily affected by construction activities resulting in increased travel time and lower quality walking and biking facilities.

3.6.2 Roadway system

Freeways

Construction of HCT could occur on or adjacent to the freeway system in several different locations, which could temporarily close freeway lanes for short or long durations reducing lane capacity, lower speeds, and increase congestion, and require detours diverting traffic from the freeway system to alternative routes. For potential light rail construction, freeway interchanges could be affected if rail is constructed along freeway segments or in the median, or if the alignment crosses freeway lanes. Freeway overcrossings could be closed for short or long durations.

Construction activities that reduce lane or shoulder widths or alter freeway lanes would impact freeway traffic operations temporarily. Access to construction areas could be from

the freeway shoulder. Shoulders could be closed to provide space for construction activities and construction access points.

Some construction activities, such as in locations where HCT crosses the freeway, could result in nighttime closures in each direction of the freeway mainline with traffic detours to adjacent streets. Haul routes for construction activities would be identified during project-level analysis and environmental review. These haul routes could impact freeways.

Local streets

In addition to freeway congestion, construction could temporarily increase congestion on arterials and the local street system as some trips are diverted from freeways to these roadways. Construction of transit facilities could result in short-term disruptions within and adjacent to the roadway.

Construction of rail and BRT along arterials or local streets, at-grade or above grade, would affect traffic operations on arterials with temporary or long-term lane closures. Building at-grade alignments could also temporarily or permanently block access from intersecting streets. Aerial structures could have temporary impacts during construction where they block lanes or turning movements. Local street overcrossings and interchange ramps could be realigned or reconfigured to accommodate light rail or BRT. Lane closures and construction activities could result in congestion on the street where construction occurs, as well as on nearby streets. Access to residents and businesses would be maintained as much as practical.

Construction of rail or BRT could also require utility relocations along the alignment and near stations. Utility relocations could require temporary lane closures and traffic control plans to maintain property access and circulation. Construction of rail tracks and stations could result in long-term lane closures and detours, as well as increased congestion on nearby streets.

Tunnel construction could generate more excavated rock or dirt than at- or above-grade construction and could require increased truck traffic to dispose of earth. Construction could also require temporary arterial lane closures if cut-and-cover tunnel construction is used. In areas where tunnels are constructed by mining (including boring), disruption would be limited to portal and station areas. Impacts such as increased traffic, congestion, and impaired access to businesses could be greater where cut-and-cover methods are used. Although specific alignments and designs for corridors (shown in Chapter 2, Figures 2-7, 2-9, and 2-10) would be identified during future project-level planning and environmental reviews, examples of corridors that could involve tunnel construction include corridor C (Bellevue to Issaquah), corridor F (Ballard to downtown Seattle), corridor G (Ballard to UW), and corridor K (UW to Redmond) from the Current Plan Alternative, and corridor 2 (downtown Seattle, West Seattle, and Burien) in the Potential Plan Modifications Alternative.

The Potential Plan Modifications Alternative also could include a new tunnel in downtown Seattle. In addition, particular constraints for other corridors, such as hills, could require tunneling. Haul routes for construction activities would be identified during project-level environmental review and permitting. These haul routes could impact local streets. Generally, construction trucks traveling to construction sites would use local streets to access the freeway system. Construction access from local streets would likely be required. Peak

truck trips are expected to occur during earthwork operations and during concrete delivery for either of the alternatives.

Multiple work zones could be used during peak construction operations that would result in higher total project peak truck trips; however, these trips would generally not overlap with each other on the same local streets.

3.6.3 Parking

Parking by construction workers would be provided on-site where possible. This parking could occur on local streets where parking is unrestricted.

Loss of parking on-street and at park-and-ride facilities could be expected during guideway and station construction and where new or expanded park-and-ride facilities occur. Temporarily displaced existing park-and-ride spaces could result in reduced access for patrons, increased travel times, shifted demand to other park-and-ride facilities, or increased spillover parking at other locations in the vicinity, including local streets where unrestricted.

3.6.4 Non-motorized system—pedestrian and bicycle facilities

Construction could temporarily close or restrict pedestrian and bicycle facilities such as sidewalks, bike lanes, and trails. Construction also would temporarily result in other localized impacts, such as increased congestion, restricted access to facilities, and a lower quality pedestrian and bicycle environment.

Sound Transit would minimize potential impacts on pedestrian and bicycle facilities by providing detours or clearly delineated routes through construction areas, such as protected walkways. Pedestrians would be accommodated on the existing street where possible, at times on one side only, and the pedestrian environment would be of lower quality during construction. Out-of-direction travel, such as crossing to the opposite side of the street to avoid construction, then later crossing back to the original side, may be required in some cases. Although bicyclists could be allowed to use the same accommodations made for vehicular traffic during construction, they could be required or encouraged to detour.

On-site activities could impact transit passengers as a result of having longer walking distances or a lower quality walking environment. Pedestrians and bicyclists would be affected by the increase in congestion, reduced lane widths, and construction activity.

Detours during lane closures and closures of freeway overcrossings could require revised sidewalk and bicycle facilities that could result in longer than normal walking and bicycling travel times.

3.6.5 Freight movements

With the Current Plan Alternative and the Potential Plan Modifications Alternative, streetcar and light rail construction could result in temporary disruptions to freight movements along local streets. In addition, regional express and BRT development could temporarily disrupt freight movement along arterials and highways in the Plan area.

For commuter rail construction, such as new service and stations, existing freight rail lines could require some upgrade or improvements that would lead to construction activity in the railroad right-of-way or adjacent areas. Access to construction areas could be from adjacent

streets and within the railroad right-of-way. Construction activities involving tracks or within the railroad right-of-way could potentially affect freight operations temporarily.

3.7 Cumulative impacts

The transportation analysis is predicting future transportation conditions that are inherently cumulative because they already reflect past trends, current transportation conditions, as well as future actions such as planned transportation projects, land use changes, and population growth through 2040 in order to predict future transportation conditions. Appendix I of the Draft SEIS lists the projects identified as funded in *Transportation 2040*, which, along with regionally adopted land use and population targets, are the basis of the transportation forecasts reported in the Draft SEIS.

There is the potential for different cumulative transportation effects if some of the other planned actions in the region do not occur as expected. For example, the region's new tolling policy assumed in PSRC's *Transportation 2040* plan is to toll all limited access (freeway) facilities in the region. While this action is assumed, it is not yet in place. If tolling does not occur regionally or if it affects a more limited set of facilities, this could affect future levels of congestion, the amount of vehicle miles traveled, and the use of other modes such as transit. Similarly, the actual changes in land use patterns or the amount and distribution of population growth may be different than what is now regionally planned, and this could alter transportation conditions locally or regionally.

In any case, the Current Plan Alternative and the Potential Plan Modifications Alternative would support improved mobility over the long-term because each would help reduce the use of automobiles, improve transit travel times and levels of service, with positive effects on regional transportation conditions. Therefore, even if other projects and actions occur differently than expected, the implementation of the Long-Range Plan would likely be a benefit and would not worsen transportation conditions.

More localized differences in cumulative effects could occur where other developments and actions would be in close proximity to the Long Range Plan's corridors. However, these differences would generally be further identified at a project-level review as compared to the plan-level of analysis used for this Draft SEIS. This is also true of the construction-related transportation impacts that could occur with Long-Range Plan projects or the projects of others. These activities could cumulatively affect traffic levels, parking supply, or other localized transportation conditions.

Localized and regional cumulative benefits could also be expected as other parties provide links to transit service, create new connections for bicycle and pedestrian travel, or develop transit-oriented or transit-supportive projects near HCT corridors.

3.8 Potential mitigation measures

3.8.1 Long-term mitigation

The Current Plan Alternative and the Potential Plan Modifications Alternative would increase transit ridership and benefit the regional transportation system. This benefit would occur by enhancing regional mobility through improved travel time and reliability and providing an alternative to travel on congested roadways. In addition, added station area

improvements and local street reconstruction could result in net enhancements to local bus service, streets, and non-motorized facilities.

Mitigation would be required, however, to address impacts to local transit service, local roadway facilities, parking, safety, non-motorized facilities in station areas, and freight movement. The types of mitigation measures that could be implemented are discussed below. More specific measures would be identified during future project-level environmental reviews.

Local bus service

To address potential impacts on local bus service, Sound Transit could include transit funding partners in the planning and design process for HCT stations. This process would include identification of bus operations and required design features at the station that would conveniently accommodate local bus access. These bus services could serve as feeder access to HCT stations.

Local street system/level of service

Mitigation could include street enhancements to keep park-and-ride or station traffic out of neighborhoods. Intersection improvements could be made near stations and park-and-ride facilities to maintain acceptable traffic conditions, and also where at-grade rail or BRT crossings occur.

Parking

Parking impacts in station areas could be addressed through a station area parking management strategy developed during project-level planning. Sound Transit would work with the local jurisdiction to assess available on-street parking supplies, evaluate potential environmental impacts, and determine whether parking management and enforcement, such as the use of residential parking zones or other strategies, could be implemented to minimize impacts.

Some jurisdictions could choose to limit parking supply as a strategy to encourage station access by transit, walking, and bicycling, as well as reduce the negative impacts of traffic to and from a park-and-ride facility. Potential parking-related impacts would also recognize Sound Transit efforts in parking management, including the current pilot program relating to parking management at some park-and-ride facilities.

Safety

Implementation of improvements such as new sidewalks, improved traffic signals, crossing refuges, and other pedestrian amenities, would mitigate potential pedestrian safety impacts and could provide an improvement over existing conditions. Special message signing, advance information, and safety plans for pedestrians and bicyclists could be prepared by Sound Transit and local agencies. Traffic safety mitigation may include grade-separated crossings, restricting turning movements, intersection design, and signal improvements.

Non-motorized system—pedestrian and bicycle facilities

Mitigation for the non-motorized system could include improving pedestrian and bicycle facilities on streets in station areas and discouraging automobile access at stations. Mitigation efforts could also include coordination of Sound Transit rail and bus station design efforts with design of non-motorized facilities by local jurisdictions in affected station areas.

Freight movement

Potential mitigation for impacts to freight movement could include alternative access points and potential consolidation of multiple access locations. In some cases, grade-separated crossings may be considered on truck routes that would experience increased delays due to commuter or light rail train crossings. Mitigation would be coordinated with local jurisdictions, and affected businesses and operators could be consulted.

Mitigation for impacts to rail freight from commuter rail service could include track improvements such as additional track, track rehabilitation, new high speed turnouts, updates to existing signals, construction of new signals, and widening existing bridge crossings. Freight mitigation improvements would be developed in coordination with BNSF and Union Pacific railroads and in consultation with the ports, including the Port of Seattle, Port of Tacoma, and Port of Everett.

3.8.2 Construction mitigation

Mitigation of construction impacts would be the same for the Current Plan Alternative and the Potential Plan Modifications Alternative, except that there would be more construction activity with the Potential Plan Modifications Alternative.

For construction activities affecting freeways, Sound Transit would work with WSDOT to develop a plan to coordinate construction with incident management, construction staging, and traffic control where the construction could affect freeway traffic. Sound Transit would also coordinate with WSDOT to disseminate construction closure information to the public as needed. Access points from the freeway would be identified to provide adequate acceleration and deceleration for trucks and to minimize impacts on general purpose traffic and interchange operations.

Mitigation for traffic impacts would comply with local regulations governing construction traffic control and truck routing. Mitigation measures for traffic impacts due to construction of transit facilities could include the following:

- Develop a construction traffic management plan that would reduce the need for, or duration of, shoulder closures and lane reductions to minimize impacts.
- Develop a plan to communicate public information through tools such as print, radio, posted signs, websites, social media, and email to provide information regarding street closures, hours of construction, business access, trail closures, and parking impacts.
- Post truck prohibition signs on streets with a high likelihood of cut-through truck traffic.
- Coordinate access closures in person with affected businesses and residents.
- Encourage patronage of affected businesses by including signage for businesses announcing that they are open for business during construction and encouraging workers to eat locally while on the construction site.
- Provide parking areas for construction workers, where necessary, which could be the responsibility of the contractor. This could include providing remote parking with

shuttle service to and from the construction site if sufficient on-site parking cannot be provided.

- Post advance notice signs prior to construction in areas where surface construction activities would affect access to surrounding businesses.
- Provide signed detour routes for pedestrians and bicycles through construction areas.
- Keep multiuse trails that could be affected by construction open for use, if possible, but detours would be provided if trails are closed unless they are closed for short durations or in areas where a detour option is not feasible.

Mitigation measures could also be applied to transit service, parking, freight rail service, and construction site safety:

- Impacts to transit service would also be mitigated by working with local transit agencies to prepare a construction mitigation plan. Transit service could be rerouted, transit stops relocated, and—where warranted—a transit center could be temporarily relocated or modified during construction. The temporary loss of park-and-ride spaces could be mitigated through leasing of nearby off-site spaces or developing temporary replacement parking.
- Sound Transit would coordinate with railroad owners to mitigate construction impacts on freight operations.
- To address safety-related construction impacts, contractors would be required to follow Sound Transit policies regarding safety in construction zones.

3.9 Significant unavoidable adverse impacts

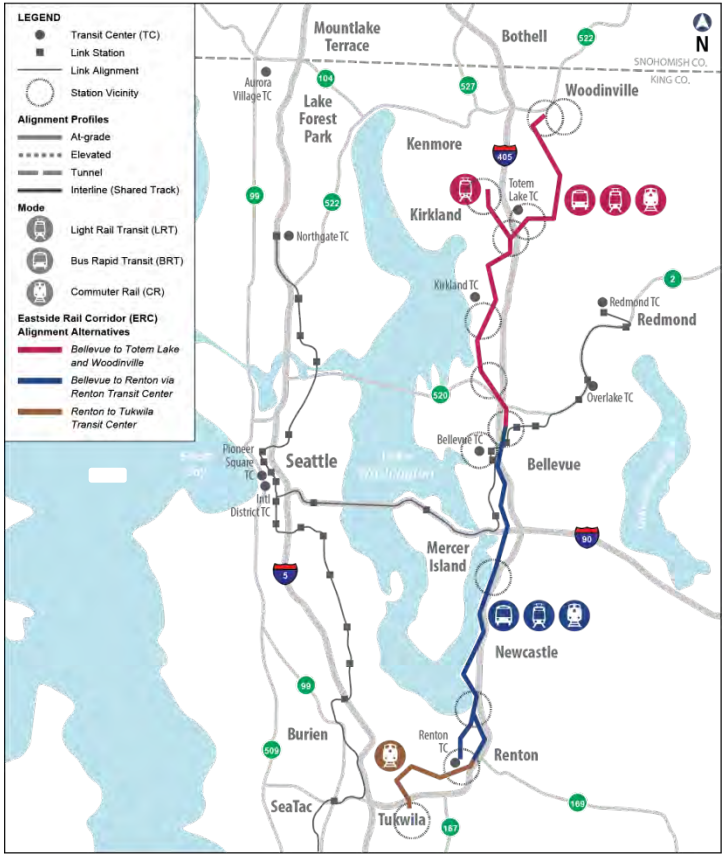
Even with the mitigation measures described above, there could be unavoidable adverse transportation impacts primarily during construction of the corridors and facilities included in the Current Plan or Potential Plan Modifications Alternatives. Construction impacts could include temporary lane or roadway closures, loss of parking, increased truck traffic and congestion, and reduced access to businesses.

Central and East HCT Corridor Study

Executive Committee: Level 2 Briefing on ERC and I-405 Corridors

May 1, 2014

Eastside Rail Corridor



Alternatives

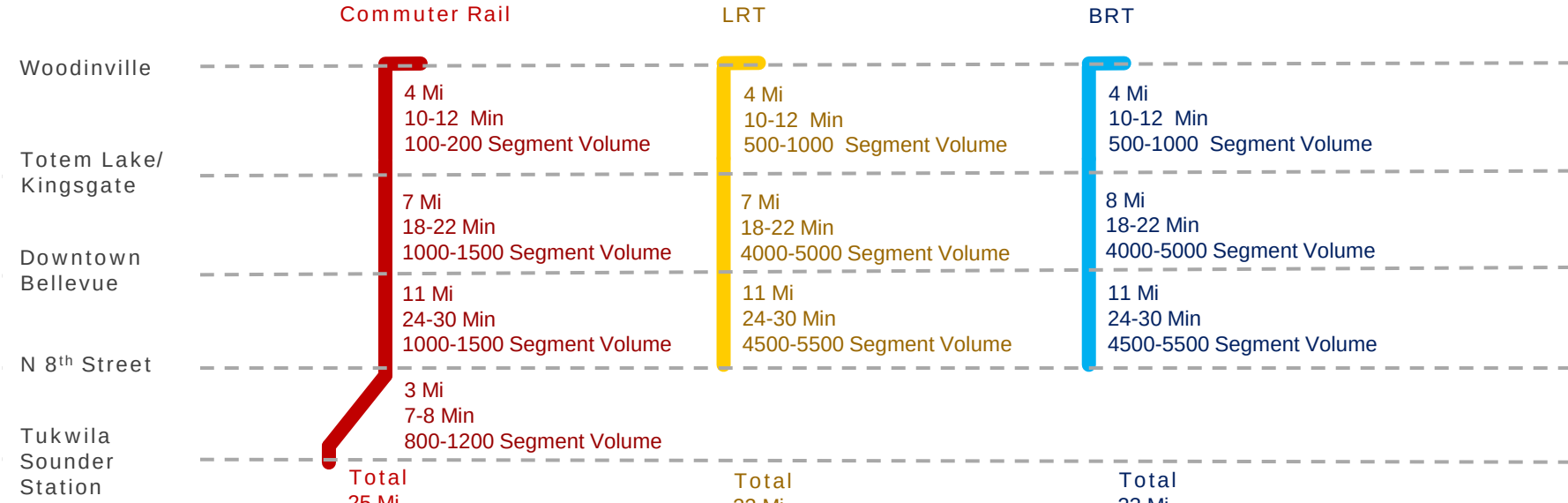
- LRT
  - Totem Lake terminus option
- Busway BRT
- Commuter Rail

- Connection from Renton to Tukwila Sounder Station
  - Commuter Rail

General Findings

- Limited ridership across corridor – strongest south of Totem Lake, maximized with shorter headways
- Strong reliability across modes due to exclusive ROW
- Moderate connectivity and development potential – more opportunities from Bellevue north
- Constrained ROW and possible encroachments increase potential impacts
- Trail/utility relocation increases cost and complexity
- Commuter rail less expensive and complex to build, but more costly to operate than BRT or LRT

Alternatives Compared



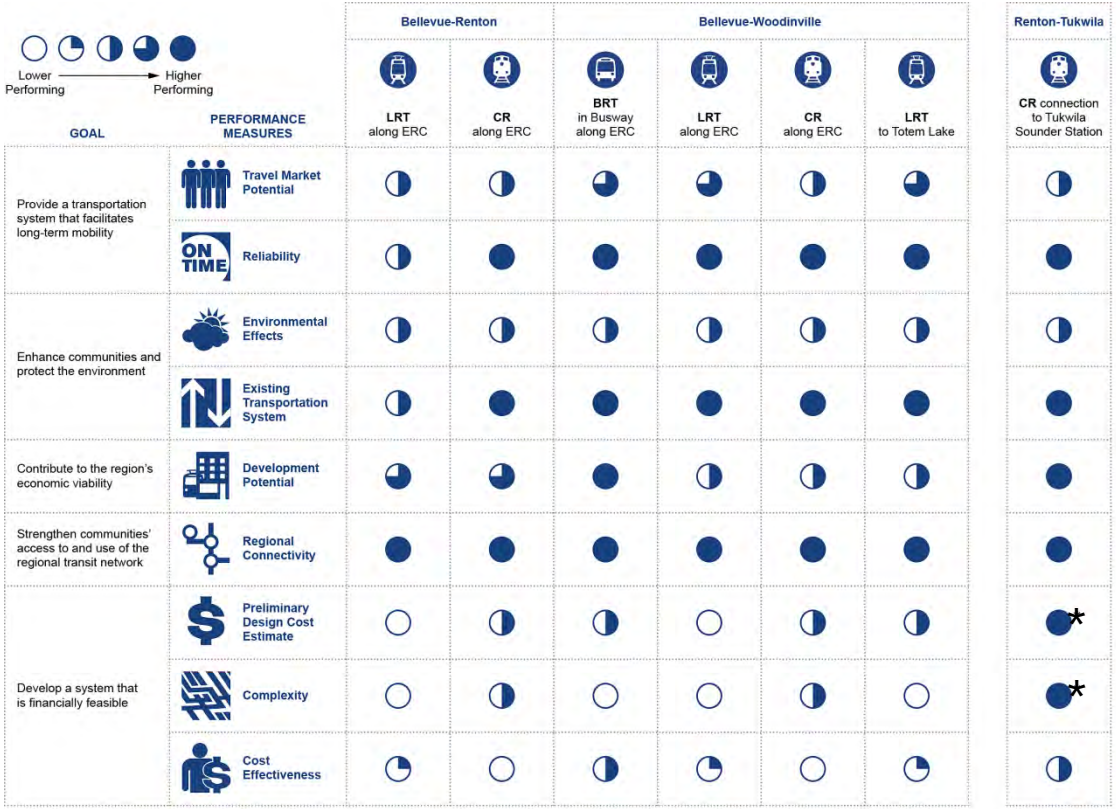
Commuter Rail
Total
25 Mi
60-72 Min
3500-5000 Daily Riders
$1200-$1570M
O&M Cost: $71M/Year

LRT
Total
22 Mi
52-64 Min
9000-11000 Daily Riders
$1980-$2640M
O&M Cost: $24M/Year

With Totem Lake terminus:
19 Mi
42-52 Min
8500-10500 Daily Boardings
$1670-$2220M
O&M Cost: $26M/Year

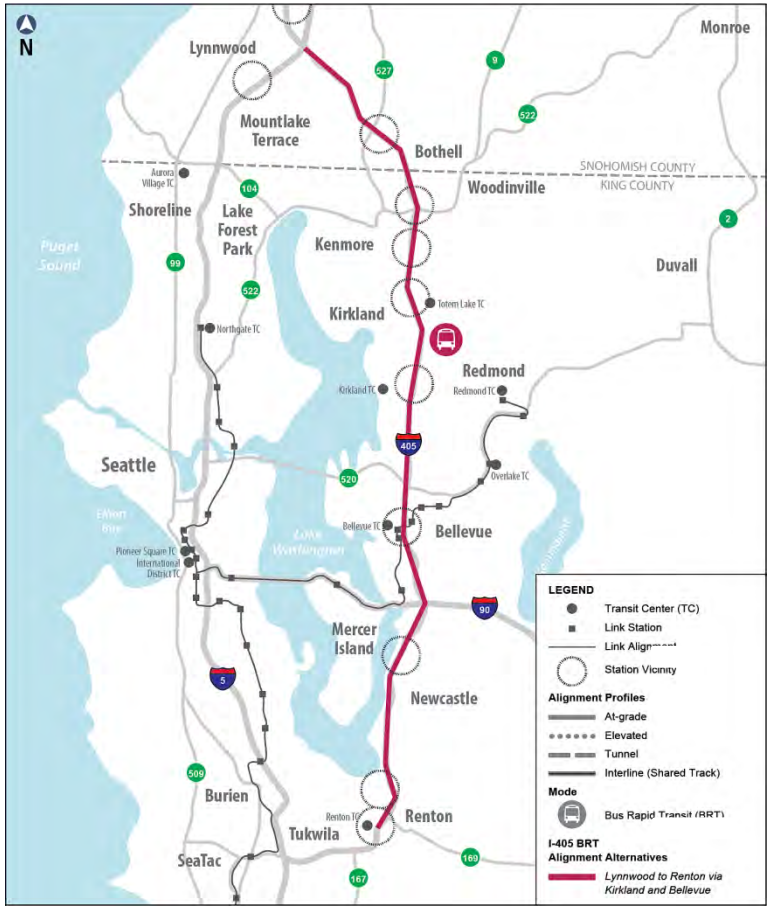
BRT
Total
23 Mi
52-64 Min
9000-11000 Daily Riders
$1070-$1440M
O&M Cost: $17M/Year

Level 2 Evaluation results



* Does not include cost or complexity of acquiring BNSF easements

I-405 Bus Rapid Transit



With full build out of WSDOT I-405 Master Plan

- Single route BRT
- Trunk and branch BRT

With WSDOT I-405 Master Plan Phased Plan

- Single route BRT
- Trunk and Branch BRT

ST Investments in I-405 Corridor

Sound Transit Projects completed in the I-405 Corridor

- Ash Way park and ride
- Ash Way transit access
- Lynnwood HOV direct access ramp
- Lynnwood Transit Center/Park and Ride
- Canyon Park freeway station
- Totem Lake Transit Station/direct access ramp
- Totem Lake Transit Center
- Bellevue NE 6th HOV direct access ramp
- Bellevue Transit Center
- Tukwila Sounder Station

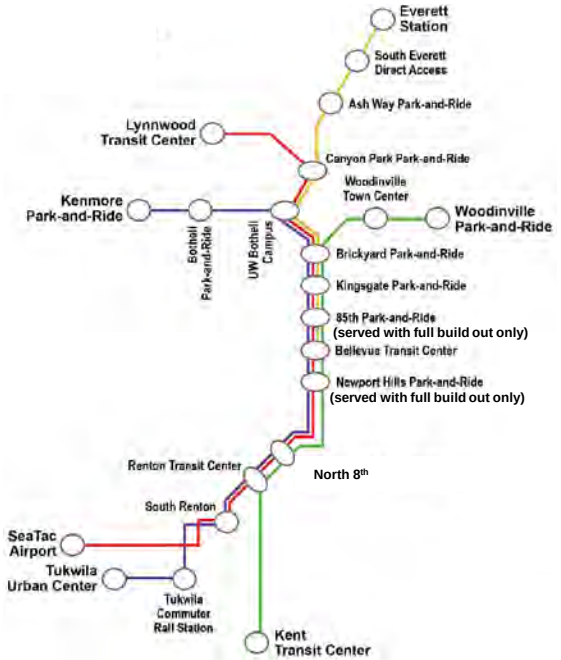
WSDOT Master Plan Elements

Projects	Full Build-Out	Next Phase of Full Build out Plan
Freeway to freeway direct connectors	I-405 to I-90 I-405 to SR 167 SR 520 to I-405 I-405 to I-5 (Tukwila and Lynnwood)	I-405 to I-90 (WB to SB, NB to EB, WB to NB, SB to EB) I-405 to SR167 (SB to SB, NB to NB) SR 520 to I-405 (WB to SB, NB to EB)
Express toll lanes	Two lanes each direction	2 lanes south of SR 522, 1 lane north of SR 522
Direct access ramps	Canyon Park 240th Street SE SR 522 NE 160th Street (Brickyard) NE 85th Street NE 6th Street Extension N 8th Street (Renton) Rainier Ave Tukwila Sounder station	-- -- Planned by WSDOT -- -- Planned by WSDOT and Bellevue Planned by WSDOT and ST -- --
In line BRT station	112th Ave SE	--

BRT Service Options

Single Route Service

- 10 minute headways all day
- Operates in Express Toll Lanes
- 85th and Newport Hills not served under With WSDOT I-405 Master Plan Phased Plan



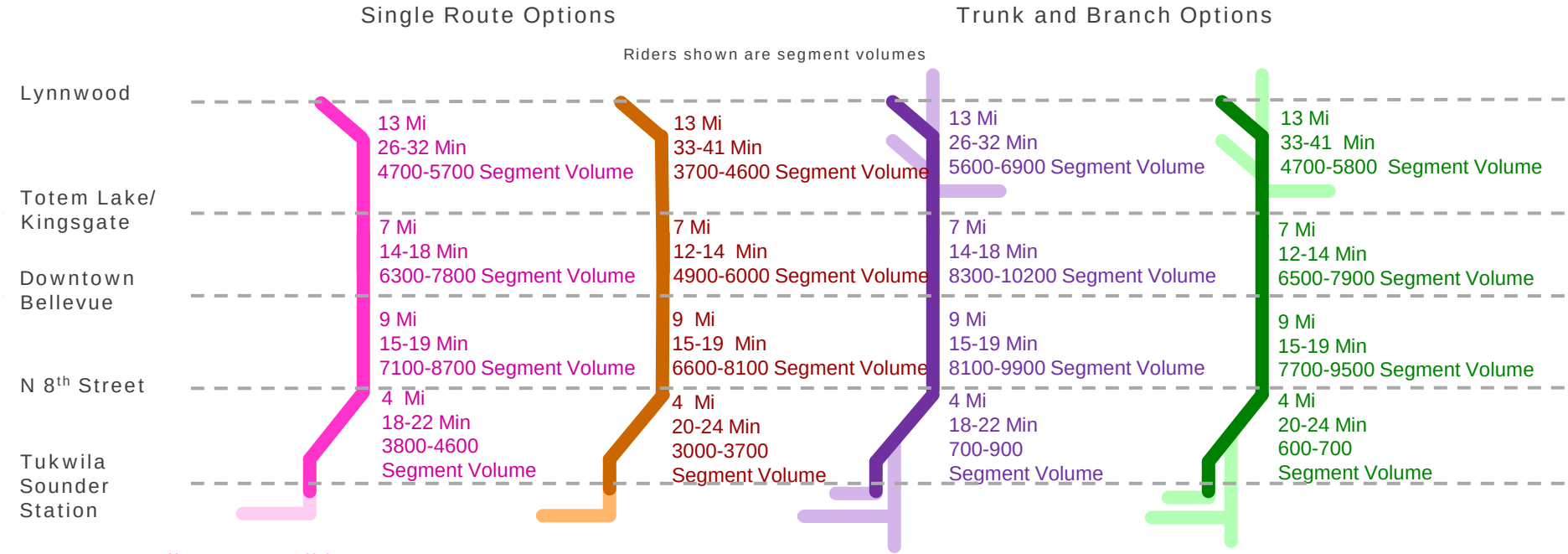
Trunk and Branch Service

- 5-7 minute trunk headways, 20 minute branch headways
- Operates in Express Toll Lanes on I-405, in mixed traffic on arterial streets
- 85th and Newport Hills not served under WSDOT I-405 Master Plan Phased Plan

General Findings

- Moderate ridership across all options
- No exclusive ROW
- Reliance on WSDOT implementation of I-405 Master Plan elements and 45 MPH operation of Express Toll Lanes
- Strong access to activity centers and development potential, especially in Bellevue and Renton
- Cost to operate trunk and branch service substantially higher than single route service due to increased bus platform hours

Alternatives Compared



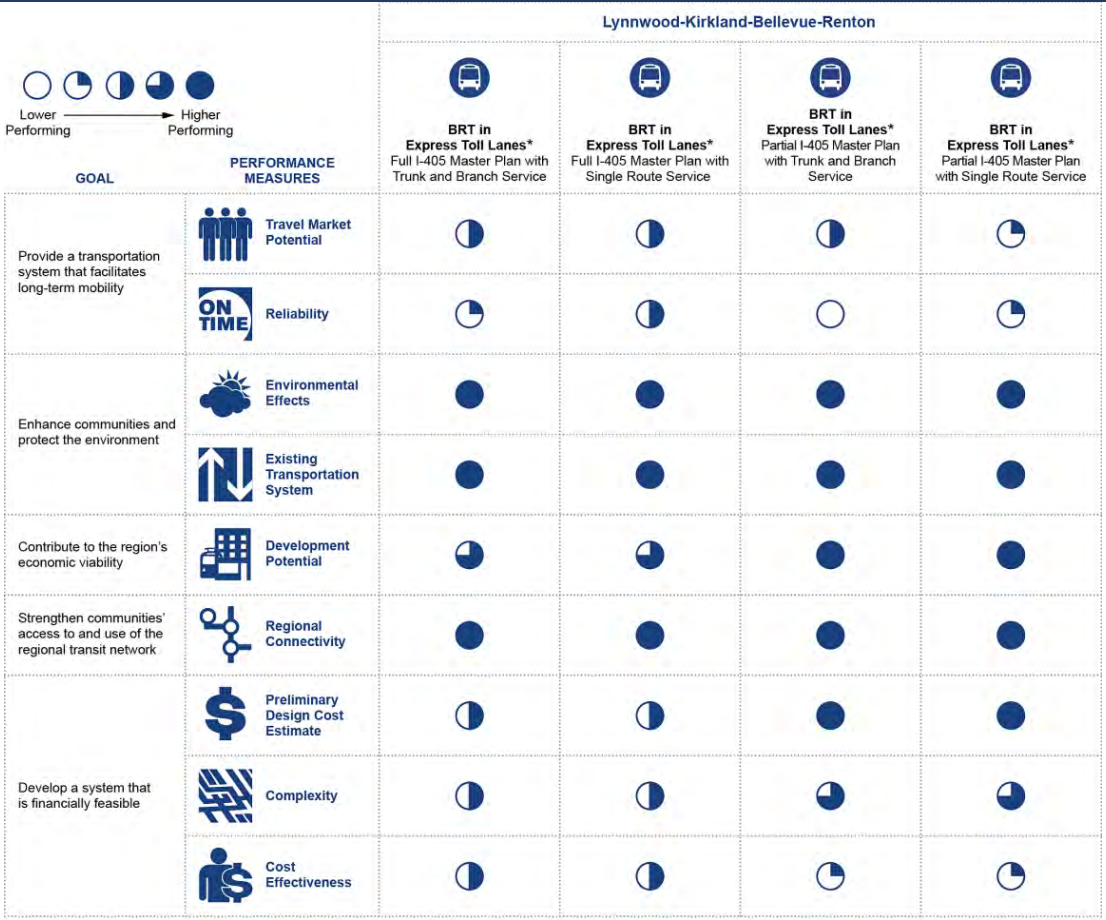
Full WSDOT Build Out
33 Mi
73-91 Min
17000-21000 Daily Riders
Capital Cost: $1280-$1670M
O&M Cost: $24M/Year

WSDOT Phased Plan Build Out
33 Mi
80-98 Min
14000-17000 Daily Riders
Capital Cost: $680-$920M
O&M Cost: $23M/Year

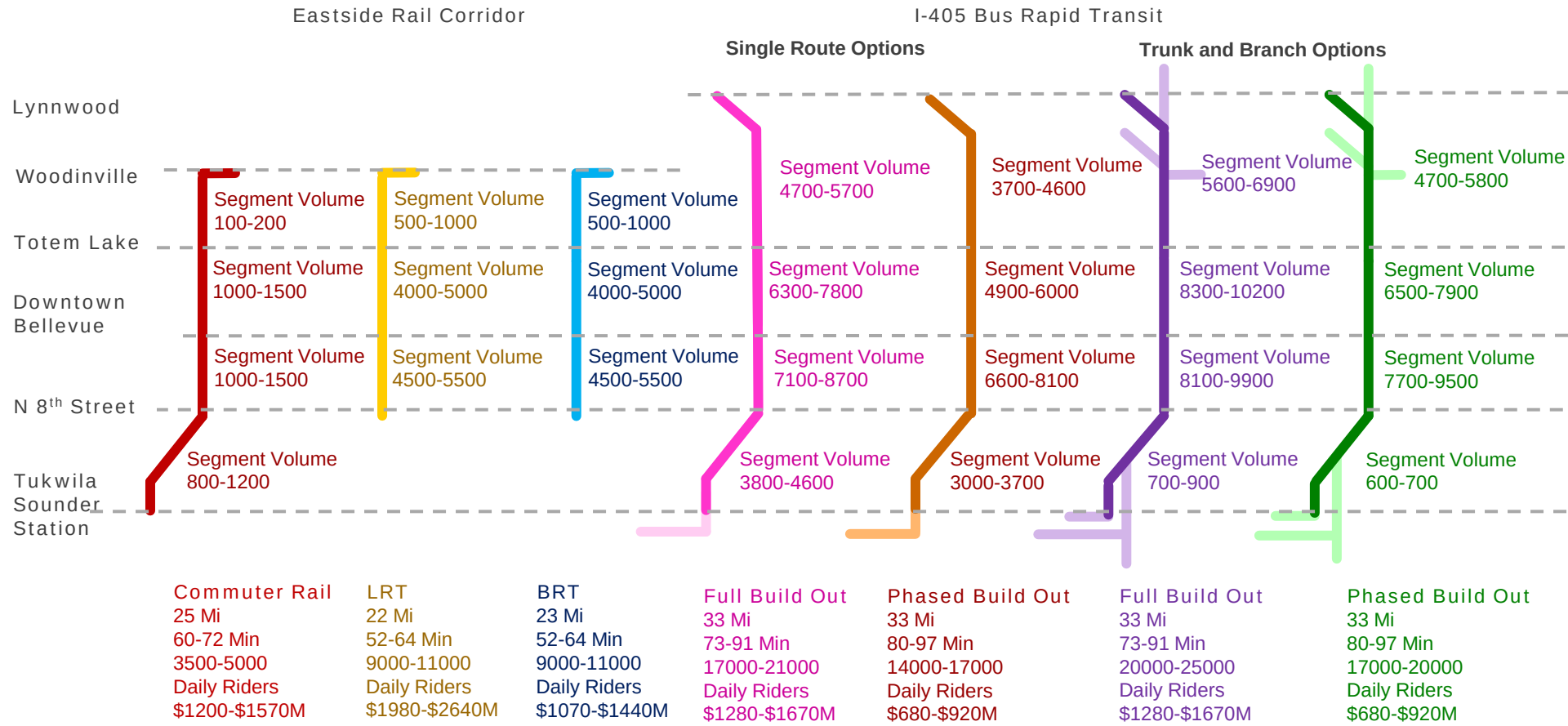
Full WSDOT Build Out
33 Mi
73-91 Min
20000-25000 Daily Riders
Capital Cost: $1280-$1670M
O&M Cost: $44M/Year

WSDOT Phased Plan Build Out
33 Mi
80-98 Min
17000-20000 Daily Riders
Capital Cost: $680-$920M
O&M Cost: $40M/Year

Level 2 Evaluation Results



*Note: all options assume 45MPH operation of Express Toll Lanes

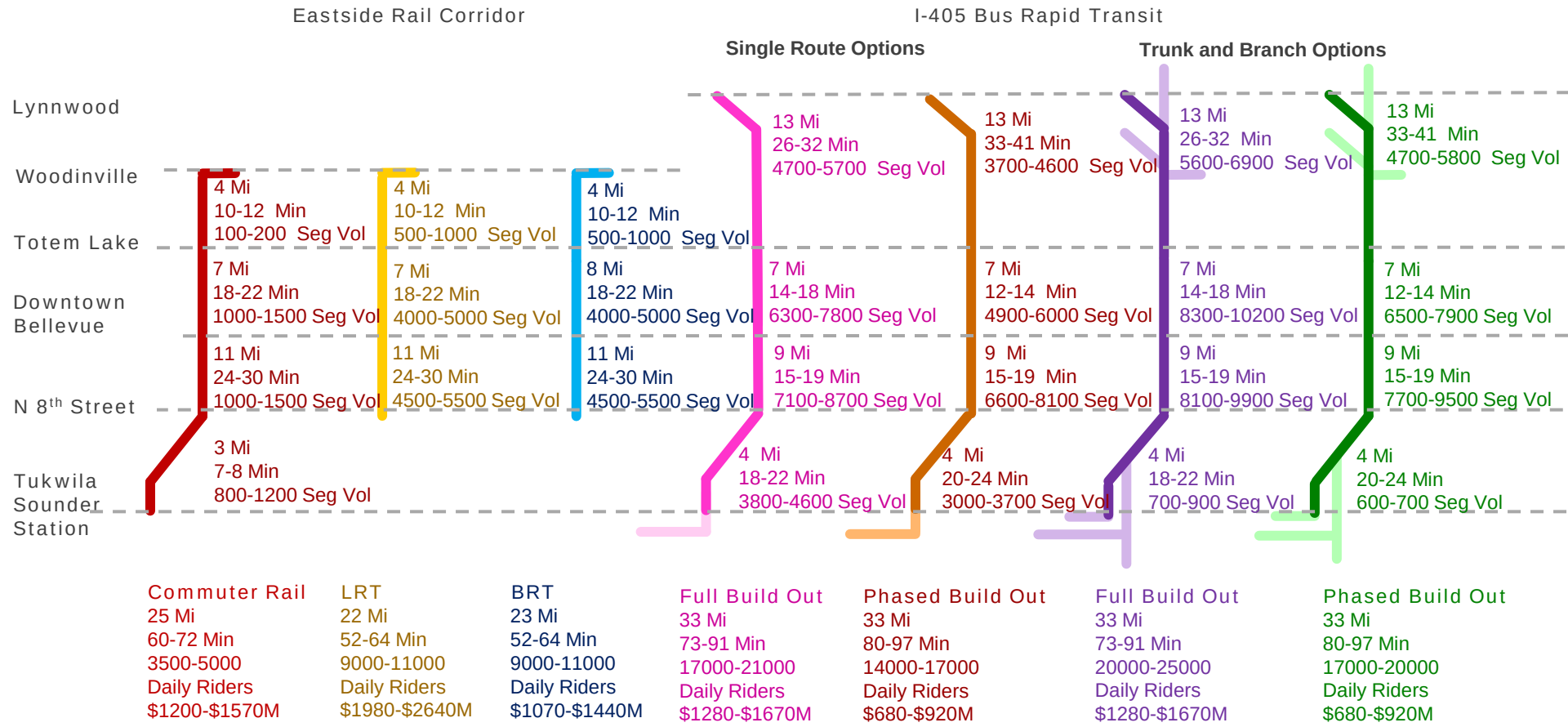

Eastside Rail Corridor
I-405 Bus Rapid Transit
Single Route Options
Trunk and Branch Options
Lynnwood
Woodinville
Totem Lake
Downtown Bellevue
N 8th Street
Tukwila Sounder Station
Segment Volume 100-200
Segment Volume 1000-1500
Segment Volume 1000-1500
Segment Volume 800-1200
Segment Volume 500-1000
Segment Volume 4000-5000
Segment Volume 4500-5500
Segment Volume 500-1000
Segment Volume 4000-5000
Segment Volume 4500-5500
Segment Volume 4700-5700
Segment Volume 6300-7800
Segment Volume 7100-8700
Segment Volume 3800-4600
Segment Volume 3700-4600
Segment Volume 4900-6000
Segment Volume 6600-8100
Segment Volume 3000-3700
Segment Volume 5600-6900
Segment Volume 8300-10200
Segment Volume 8100-9900
Segment Volume 700-900
Segment Volume 4700-5800
Segment Volume 6500-7900
Segment Volume 7700-9500
Segment Volume 600-700
Commuter Rail
25 Mi
60-72 Min
3500-5000
Daily Riders
$1200-$1570M
LRT
22 Mi
52-64 Min
9000-11000
Daily Riders
$1980-$2640M
BRT
23 Mi
52-64 Min
9000-11000
Daily Riders
$1070-$1440M
Full Build Out
33 Mi
73-91 Min
17000-21000
Daily Riders
$1280-$1670M
Phased Build Out
33 Mi
80-97 Min
14000-17000
Daily Riders
$680-$920M
Full Build Out
33 Mi
73-91 Min
20000-25000
Daily Riders
$1280-$1670M
Phased Build Out
33 Mi
80-97 Min
17000-20000
Daily Riders
$680-$920M

Next Steps

Ballard to U-District, U-District to Kirkland and Redmond, Kirkland to Bellevue and Issaquah:

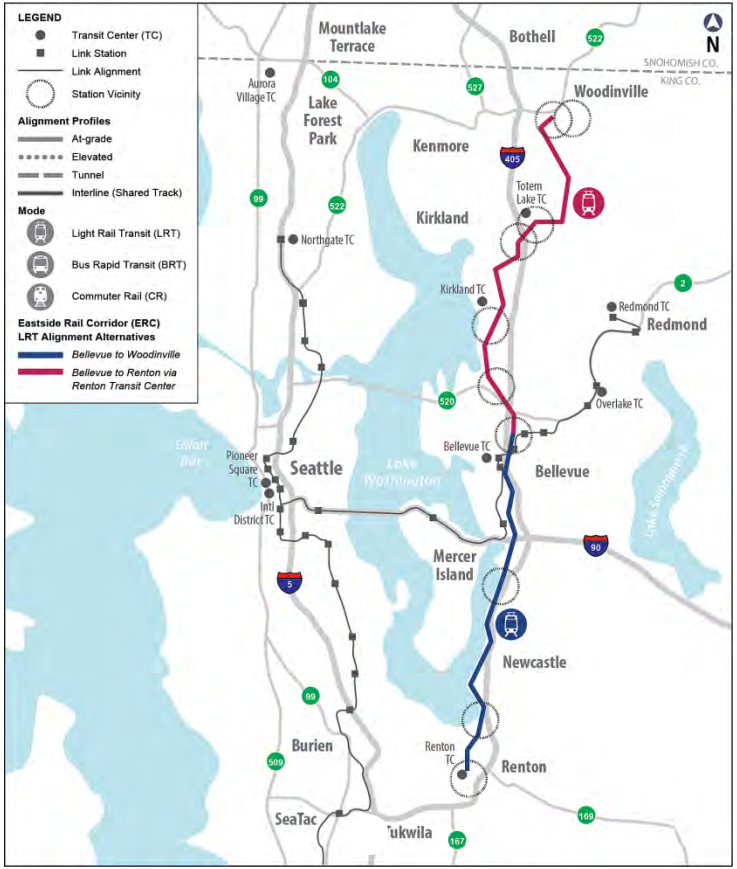
- Executive Committee 6/5


SOUNDTRANSIT



Commuter Rail	LRT	BRT	Full Build Out	Phased Build Out	Full Build Out	Phased Build Out
25 Mi	22 Mi	23 Mi	33 Mi	33 Mi	33 Mi	33 Mi
60-72 Min	52-64 Min	52-64 Min	73-91 Min	80-97 Min	73-91 Min	80-97 Min
3500-5000 Daily Riders	9000-11000 Daily Riders	9000-11000 Daily Riders	17000-21000 Daily Riders	14000-17000 Daily Riders	20000-25000 Daily Riders	17000-20000 Daily Riders
$1200-$1570M	$1980-$2640M	$1070-$1440M	$1280-$1670M	$680-$920M	$1280-$1670M	$680-$920M

Light Rail



Assumptions:

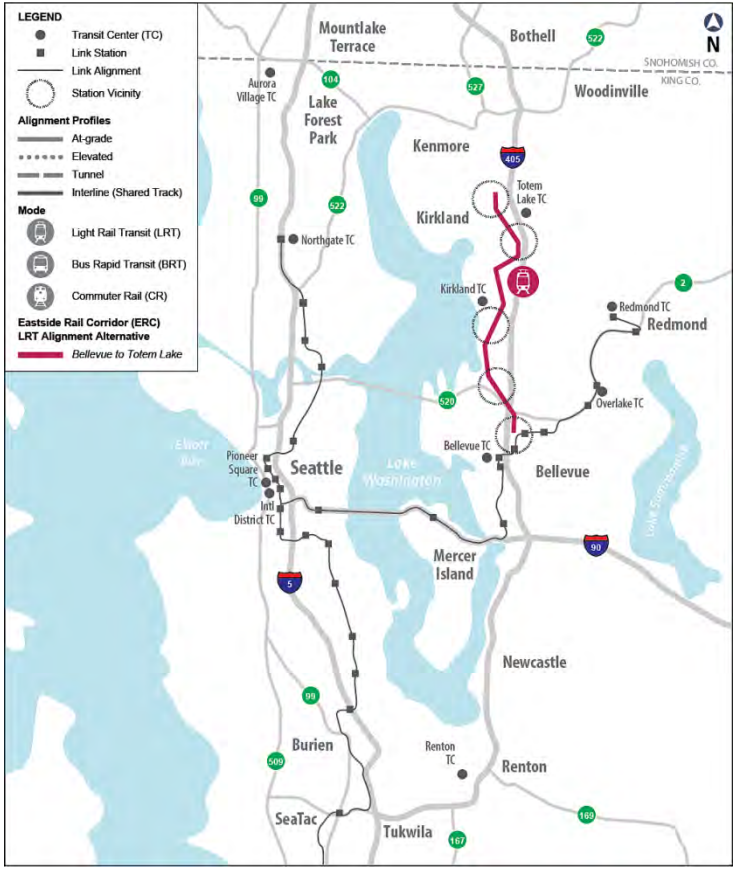
- ❑ 10 minute headways, all-day service, two-car trains
- ❑ Double tracked except in Renton from Coulon Park to the Ripley Lane N Bridge
- ❑ In-street operation on Logan Avenue in Renton

	Renton to Bellevue	Bellevue to Woodinville	Total
Mileage	11	11	22
Ridership			9,000-11,000
Travel Time	24-30 min	28-34 min	52-64 min
Cost	$930-$1250M	$1,050-$1,390M	$1,980-$2,640M

Key findings

- Shorter headways maximize ridership
- Moderate property impacts for trackway and stations, may increase if trail/utility relocation is required
- Power system and double tracked crossings/structures increase cost and complexity of LRT

Light Rail – Bellevue to Totem Lake



Assumptions:

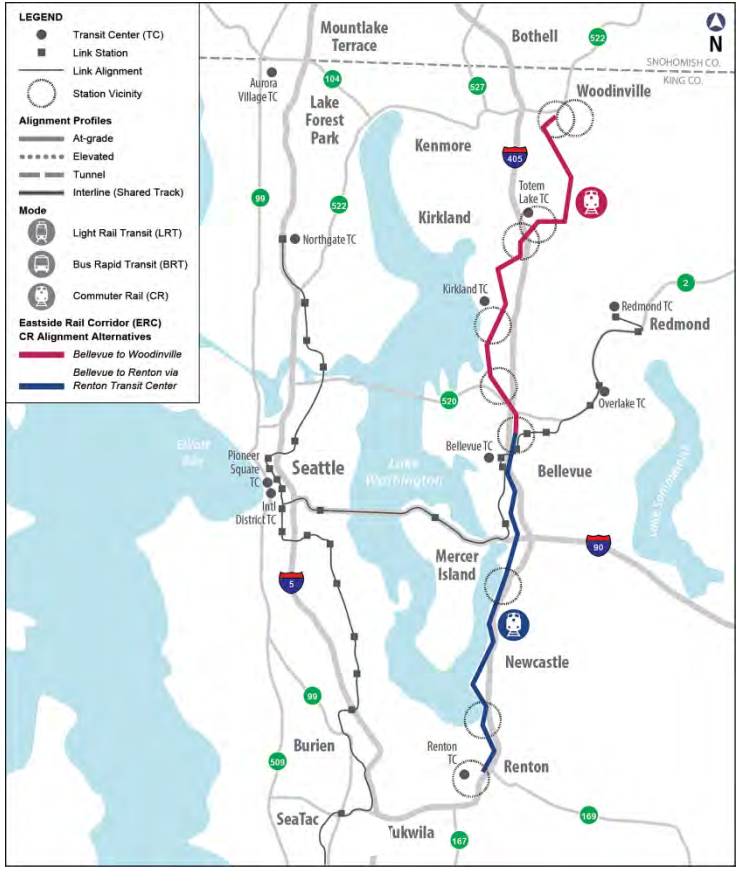
- ❑ 10 minute headways, all-day service, two-car trains
- ❑ Double tracked
- ❑ Connects to Kingsgate Park-and-Ride in Totem Lake area

	Bellevue to Totem Lake
Mileage	8
Ridership	4,000 to 5,000
Travel Time	18-22 min
Cost	$740M-970M

Key findings

- Terminus at Totem Lake (instead of Woodinville) serves 90% of market
- Shorter headways maximize travel market potential
- Moderate property impacts for trackways and stations, may increase if trail/utility relocation is required
- Power system and double tracked crossings/structures increase cost and complexity of LRT

Commuter Rail



Assumptions:

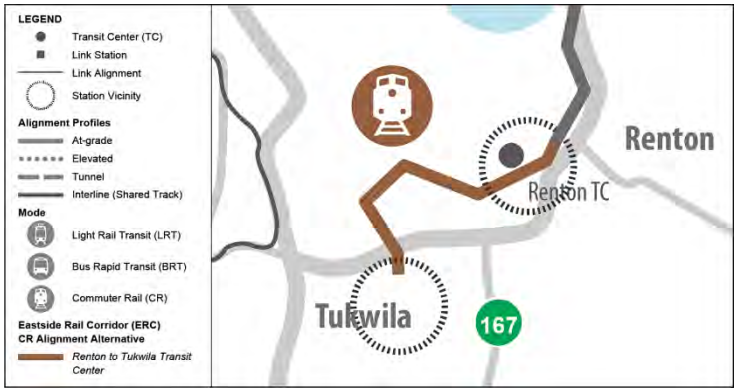
- ❑ Assumes 30 minute headways all day (20 min possible)
- ❑ Single tracked operations with sidings

	Renton to Bellevue	Bellevue to Woodinville	Total
Mileage	11	11	22
Ridership			2,800-3,400
Travel Time	24-30 min	28-34 min	52-64 min
Cost*	$420-$560M	$540-$730M	$960-$1,290M

Key findings

- Longer headways limit ridership
- Fewer daily trips minimize noise, vibration and visual impacts
- Constrained ROW and possible encroachments may increase environmental effects
- Moderate property impacts in north segment, may increase throughout corridor if trail/utility relocation is required
- Primarily single-tracked operations reduce cost and complexity

Commuter Rail Connection to Tukwila Sounder Station



Assumptions:

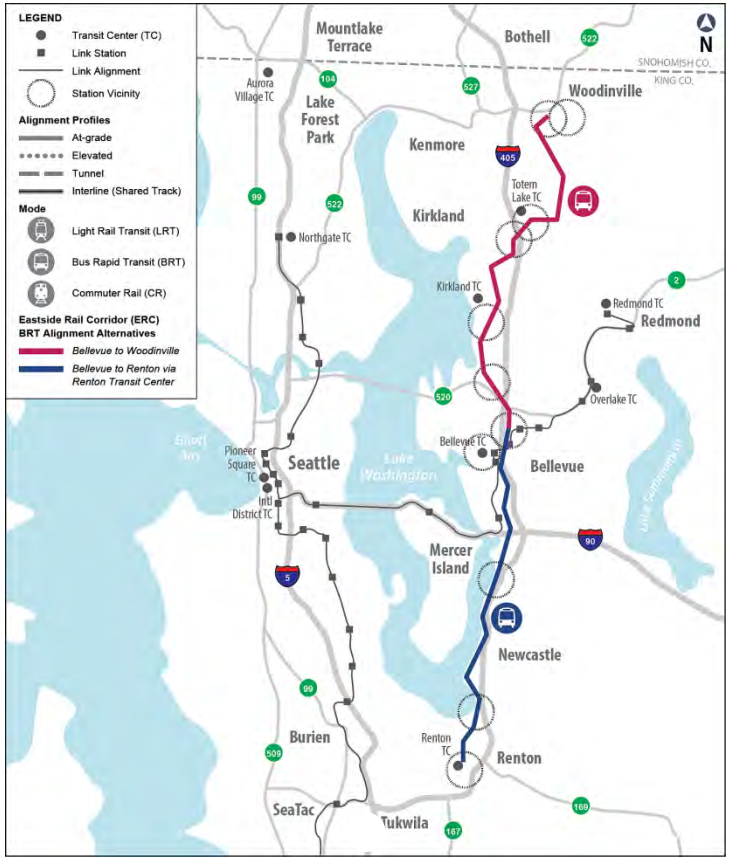
- ❑ 30 minute headways all day (20 minute headways possible) , single tracked operation
- ❑ Shared use of BNSF track between Renton's Boeing facility and BNSF mainline with construction of new track in BNSF ROW parallel to mainline near Tukwila Station
- ❑ Transfer opportunity (but no through-service) to existing south line Sounder service
- ❑ ***Cost does not include easements from BNSF***

	Tukwila to Renton	Renton to Bellevue	Bellevue to Woodinville	Total
Mileage	3	11	13	27
Ridership				3,500-5,000
Travel Time	7-8 min	24-30 min	28-34 min	60-72 min
Cost	$100-$130M	$420-$560M	$540-$730M	$1200-$1570M

Key findings

- Design option increases connectivity and ridership
- Black River crossing increases wetland impacts
- ***Negotiations with BNSF introduce complexity and cost***

Busway BRT



Assumptions:

- ❑ 10 minute headways all day
- ❑ Double lane operation throughout most of corridor
- ❑ A3 will have to be single-lane for approximately 1.5 miles and up to 4 miles
- ❑ ***Storm water management treatment and retention creates ROW impacts***

	Renton to Bellevue	Bellevue to Woodinville	Total
Mileage	11	12	23
Ridership			9,000-11,000
Travel Time	24-30 min	28-34 min	52-64 min
Cost	$570-$770	$500-$670M	$1,070-1,440

Key findings

- Shorter headways maximize ridership
- Double lane crossings/structures increase cost and complexity
- Busway width and storm water infrastructure increase property impacts

Sound Transit Investments in the I-405 Corridor

Sound Transit Projects completed in the I-405 Corridor

- Ash Way park and ride
- Ash Way transit access
- Lynnwood HOV direct access ramp
- Lynnwood Transit Center/Park and Ride
- Canyon Park freeway station
- Downtown Kirkland Transit Center
- Totem Lake Transit Station/direct access ramp
- Totem Lake Transit Center
- Bellevue NE 6th HOV direct access ramp
- Bellevue Transit Center
- Eastgate Park and Ride

Single Route BRT

Key findings (TBD)

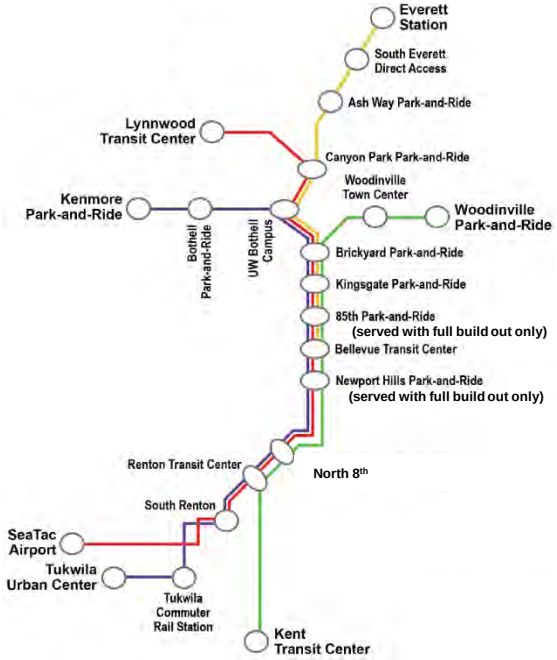
- Operation in Express Toll Lanes reduces cost and complexity, while achieving good reliability
- More reliable than Trunk and Branch, but serves fewer destinations

Assumptions: 10 minute headways all day

- ❑ Operates in Express Toll Lanes assuming 45MPH operation
- ❑ BRT does not serve 85th or Newport Hills with phased plan
- ❑ Note A2b continues to SeaTac Airport and does not terminate at Tukwila Sounder Station

	Full WSDOT Master Plan	WSDOT Phased Plan
Lynnwood to Bellevue		
Mileage	20	20
Travel time	40-50 min	45-55 min
Bellevue to Renton		
Mileage	9	9
Travel time	15-19 min	15-19 min
Renton to Tukwila Sounder Station		
Mileage	4	4
Travel time	18-22 min	20-24 min
Totals		
Mileage	33	33
Daily Boardings	17,000-21,000	14,000-17,000
Travel time	73-91 min	80-97 min
Cost	$1280-$1670M	$680-920M

Trunk and Branch BRT



Key findings (TBD)

- Improved travel times in the north and more stops in full build out moderately increased ridership
- Full build out is substantially more expensive
- Both options achieve good reliability, assuming 45MPH operation of Express Toll Lanes

Assumptions: 10 minute headways all day
- ❑ Operates in Express Toll Lanes assuming 45MPH operation
- ❑ BRT does not serve 85th or Newport Hills with phased plan
- ❑ Note A2b continues to SeaTac Airport and does not terminate at Tukwila Sounder Station

	Full WSDOT Master Plan	WSDOT Phased Plan
Lynnwood to Bellevue		
Mileage	20	20
Travel time	40-50 min	45-55 min
Bellevue to Renton		
Mileage	9	9
Travel time	15-19 min	15-19 min
Renton to Tukwila Sounder Station		
Mileage	4	4
Travel time	18-22 min	20-24 min
Totals		
Mileage	33	33
Daily Boardings	2000-25000	17,000-20,000
Travel time	73-91 min	80-98 min
Cost	$1280-$1670	$680-920M

D R A F T

July 16, 2014

Sound Transit
Attention: Karen Ertl, Long Range Plan Draft SEIS Comments
Union Station
401 S. Jackson
Seattle, WA 98104

Dear Ms. Ertl:

Thank you for the opportunity to comment on the Draft Supplemental Environmental Impact Statement (DSEIS) for Sound Transit's Regional Transit Long-Range Plan (LRP) Update. We appreciate the amount of time and effort that goes into producing a document of this type. Our comments fall into two main categories: Connecting Totem Lake Urban Center and Downtown to HCT; and Restoring Consideration of Alternative Technologies to the DSEIS.

Connecting Totem Lake Urban Center and Downtown to HCT

The primary interest of the City of Kirkland is connection of the Totem Lake Urban Center to the rest of the region with High Capacity Transit. We therefore request the largest possible number of options for doing so be included in the DSEIS and the LRP update. The Eastside Rail Corridor (ERC) and I-405 Corridor Studies you recently completed were helpful in looking at choices to connect Totem Lake. The Bus Rapid Transit alternative on I-405 should include the ability to exit I-405, travel through the urban center and rejoin I-405. An example of such a connection might be at NE 128th Street and NE 116th Street. This may require new facilities to ensure travel speed and schedule reliability and an evaluation of these facilities should be included in the DSEIS.

We request that Street Car also be included as an alternative mode for the ERC in the LRP. The DSEIS indicates that Sound Transit envisions the use of Street Cars between transit centers. The corridor between Totem Lake and the East Link stop at Overlake Hospital is an ideal place for such a link.

A second critical Kirkland interest is to connect the Downtown Central Business District and Kirkland Transit Center (a Sound Transit investment from *Sound Move*) to any High Capacity Transit on I-405 or along the Eastside Rail Corridor. Under Kirkland's current zoning the downtown could add more than one million square feet of Class A office space, several hundred thousand square feet of retail and a significant number of multifamily dwelling units within the next ten years. This may require new transit access facilities connected to I-405 at NE 85th Street or NE 70th Street and we respectfully request that Sound Transit also include these or similar alternatives in the DSEIS so that they can be included in the revised Long Range Plan.

Restoring Consideration of Alternative Technologies to the DSEIS.

It is our understanding that the DSEIS clears a full spectrum of Bus Rapid Transit and Street Car technology, including vehicles that are autonomous and/or those that are powered by electricity or other alternative fuel technologies so that they may be included in the Long Range Plan. This should be made clear in the document.

Several transit modes were excluded from consideration in the Long Range Plan and we find this perplexing, especially considering the potential of these alternatives to provide cost-effective connections along the Eastside Rail Corridor and to communities or institutions that may never be served by existing or future light rail lines or BRT. We are certainly supportive of only considering modes that have sustainable operating and maintenance costs and we are respectful of Sound Transit's requirements to provide high capacity regional transit. It is *for* these reasons, and because the Long Range Plan is constrained neither by cost nor by time, that removing modes from further consideration is short-sighted for the region. It could be that, over the life of the plan, one of the modes being excluded from consideration could help improve operations, reduce capital expenditures and do so with a small environmental footprint.

The alternative technologies that are proposed to be removed from further consideration are entirely consistent with Sound Transit's Goals and Ojectives for the Long-Range Plan which have been copied directly from the DSEIS below.

Goals and objectives for Sound Transit's Long-Range Plan

- Provide a public high-capacity transportation system that helps ensure long-term mobility, connectivity, and convenience for residents of the central Puget Sound region for generations to come
  - Enhance regional mobility through improved travel time, reliability, and customer experience
  - Provide reliable, convenient, and safe public transportation services to regional growth centers and create an integrated system of transit services
  - Increase the percentage of people using transit for all trips
  - Provide an effective and efficient alternative to travel on congested roadways
- Preserve and promote a healthy and sustainable environment
  - Conserve land and energy resources, and improve air quality while also reducing greenhouse gas emissions and other pollutants
  - Minimize potential adverse impacts on the natural and built environments
  - Help limit urban sprawl, maintain open space, and protect natural resources
- Strengthen communities' use of the regional transit network
  - Use HCT to create opportunities for transit-oriented development around transit stations and centers consistent with local land use plans
  - Support the ability of communities to develop in a manner consistent with state and regional laws and growth management policies
  - Create HCT stations that are easy to access by foot, bicycle, and local transit, as well as by people who are transit-dependent
- Improve the economic vitality of the region
  - Enhance the region's ability to move goods
  - Make it easier to use transit to reach jobs, education, community resources, and commercial centers throughout the region
- Create a financially feasible system
  - Improve financial sustainability
  - Maintain, operate, and expand regional HCT services in a cost-effective manner
  - Support and build upon the existing regional HCT system
  - Avoid competitive, duplicative transit services

These alternative modes are particularly relevant to the goals to *"Preserve and promote a healthy and sustainable environment"* and *"Create a financially feasible system."* Most of these modes are automated and use alternative fuels or electricity and thereby avoid the majority of operating costs of BRT. And as technology rapidly advances in all sectors, it seems inevitable that these transit technologies will only get better and more efficient over time. And they may also provide unique solutions to *"make it easier to use transit to reach jobs, education, community resources and commercial centers throughout the region."*

To be clear, Kirkland understands that alternative technologies such as monorail, skytrain, aerial trams and personal rapid transit are not replacements for the regional light rail and BRT system. But these modes could be supplemental connections or alternatives for short segments of HCT that may be cost-effective and environmentally sustainable ways to expand the reach of HCT.

The story of the Capitol Hill Street car operation described on page 2-7 of the DSEIS is a good example of how being flexible in choice of mode was helpful to finding the right solution to problems that were unforeseen when the Plan was drafted. If the Long Range Plan had explicitly removed street cars from a choice of modes, perhaps because they don't serve regional destinations or because they have limited capacity or because they often operate at low speeds in mixed traffic, a potential solution would have been foreclosed. Recognizing that some high speed modes have operating characteristics suitable only for inter-regional travel, we request that same flexibility remain in the revision of the Long Range Plan by not removing lower speed transit technologies (Table 2-9) from the Long Range Plan. Some mode variation might be ideal for all or portions of the ERC, or to link educational institutions such as UW Bothell, Cascadia Community College, Lake Washington Institute of Technology and Bellevue College to existing or future HCT lines.

In the end, the DSEIS itself makes the case for including these technologies for further evaluation. In section 2.7, Environmental Commitments and Sustainability, the DSEIS states:

"The key goal of Sound Transit's sustainability and environmental management program is to protect the environment and create a healthy community and economy. The agency's core mission of moving people on transit is the most important action the agency can take to improve the local environment, connect communities, reduce sprawl, and enable citizens to thrive within their means by saving dollars on transportation. As the agency delivers transit projects and services, it is also working to conserve resources and incorporate sustainability into everyday operations."

If the core mission is to "move people on transit" to "improve the environment and reduce sprawl", adding back alternative transit technologies that can help accomplish this mission in a Plan unconstrained by finances or time seems both practical and prudent. We hope Sound Transit will restore these alternative modes to the DSEIS.

Sound Transit's plans for improving regional mobility provide an important avenue for Kirkland to enhance its links within Kirkland and with the region. Again, thank you for the opportunity to comment on Sound Transit's Long Range Plan.

Sincerely,

Kirkland City Council

Amy Walen, Mayor