SOUNDTRANSIT

HIGH CAPACITY TRANSIT CORRIDOR STUDY

LYNNWOOD TO EVERETT

JULY 2014
FINAL

FINAL REPORT

HIGH CAPACITY TRANSIT STUDY

LYNNWOOD TO EVERETT CORRIDOR

SOUNDTRANSIT
RIDE THE WAVE

Final

Lynnwood to Everett High Capacity Transit Study Final Report

SOUNDTRANSIT

July 2014

North Corridor Transit Partners
PARAMETRIX + PARSONS BRINCKERHOFF

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Acronyms and Abbreviations

BAT	business access and transit
BRT	bus rapid transit
FTA	Federal Transit Administration
HCT	high capacity transit
HOV	high-occupancy vehicle
I-5	Interstate 5
O&M	operation and maintenance
PSRC	Puget Sound Regional Council
Sound Transit	Central Puget Sound Regional Transit Authority
SR	State Route
ST2	Sound Transit 2
UGA	Urban Growth Area
WSDOT	Washington State Department of Transportation

SUMMARY

The Lynnwood to Everett High Capacity Transit (HCT) Study (the Study) is one of several HCT corridor planning studies Sound Transit has conducted to: 1) support the Sound Transit Board of Directors in decisions about the Sound Transit Long-Range Plan update, and 2) inform choices for the next phase of the regional HCT system plan's development. The study area for the Lynnwood to Everett corridor (Figure S-1) begins at the Lynnwood Transit Center, connects to Everett Station and the transit center near downtown Everett, and incorporates the area north to Everett Community College. This study area encompasses Interstate 5 (I-5) and State Route (SR) 99, which are the primary routes serving north and south travel between Everett and Lynnwood, as well as connecting south to Seattle. Some study options also connect to the Paine Field/Boeing Everett Manufacturing and Industrial Center (SW Everett Industrial Center), which the Puget Sound Regional Council has identified as a regional manufacturing and industrial jobs center in southwest Everett.

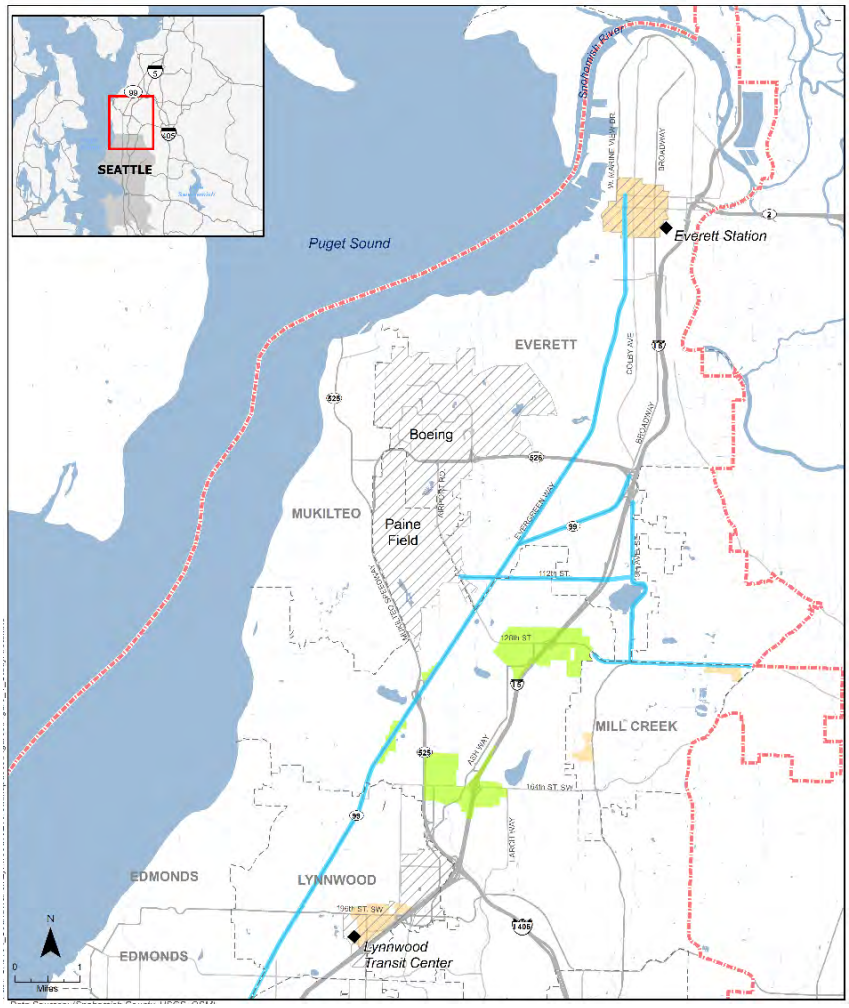


Figure S-1
The Lynnwood-Everett HCT Corridor Study Area

This Study identifies light rail and bus rapid transit (BRT) corridor options that have the potential to improve regional transit connections between Lynnwood and Everett. It evaluates at a conceptual level their performance in terms of ridership and mobility benefits, environmental effects and benefits, transit costs and cost-effectiveness, and consistency with regional and local plans. This is a conceptual-level study; therefore, the cost estimates included here are planning-level and are intended for the purpose of comparison among options, rather than a prediction of the costs of a specific project. A full environmental process with more detailed design would be required if and when any study corridors were to move forward into project development.

Study Approach

The Central Puget Sound Regional Transit Authority (Sound Transit) has developed a draft set of HCT guiding principles, goals, and objectives for its Long-Range Plan update and supporting HCT corridor studies. These goals and objectives, as well as a potential statement of the purpose and need for possible HCT improvements in the Lynnwood to Everett corridor, helped determine the evaluation criteria Sound Transit used to measure how effective potential improvements would be. Table S-1 lists the goals and objectives. This planning study is conceptual in nature, intended to outline a range of potential options to improve regional transit in the corridor.

Based on Sound Transit's current Long-Range Plan and previous studies, bus rapid transit (BRT) and light rail transit were the primary HCT modes considered for the Lynnwood to Everett HCT corridor. These two types of HCT have a fairly wide range of operating conditions.

Table S-1. Sound Transit's HCT Goals and Objectives

GOALS	OBJECTIVES
1. Provide a public transportation system that facilitates long-term mobility and connectivity	• Improve transit connections to key transit markets and regional growth centers • Must operate service principally in exclusive rights-of-way to be considered as high capacity transit • Improve the reliability of transit service
2. Enhance communities and protect the environment	• Conserve energy resources, control air pollution, and preserve the environment • Support communities' ability to develop sustainably, consistent with state and regional laws and growth management policies
3. Contribute to the region's economic vitality; increase access to jobs, housing, education, and other community resources; enhance the region's ability to move goods and services; and promote economic development	• Support economic growth by linking the region's designated growth centers • Support transit-oriented development in station areas
4. Strengthen communities' access to, and use of, the regional transit network	• Develop transit options that connect to existing and future bicycle, pedestrian, high-occupancy vehicle (HOV), and transit networks • Improve people's ability to access transit • Develop equitable transportation solutions
5. Develop a system that is financially feasible	• Develop cost-effective and efficient transportation solutions • Develop a system that is affordable to build, run, and use

In this study, Sound Transit developed and evaluated potential mass transit improvements by initially screening BRT and LRT modes and a large range of alignments, followed by a two-level process to refine the options for more detailed examination. Sound Transit consulted with local jurisdictions and the Washington State Department of Transportation (WSDOT) at key steps in this study, particularly as the potential concepts and options for the Lynnwood to Everett HCT corridor were being developed, evaluated, and refined.

Developing and Screening Corridor Options

The initial HCT concepts for the Lynnwood to Everett corridor were developed to help achieve overall system goals, and to help meet a preliminary statement of the purpose and need for further HCT system development in the corridor.

To define potential concepts, the study team drew upon existing condition information, previous studies and plans, and meetings with local jurisdictions. The focus was on connecting areas that were already robust transit communities, areas that were planned for future growth, and areas that had good access or major existing transit and transportation infrastructure. An initial "universe" of alignment concepts was refined into 13 end-to-end route concepts to undergo initial screening. Evaluation factors (see graphic at right) ranged from transit ridership to environmental effects.

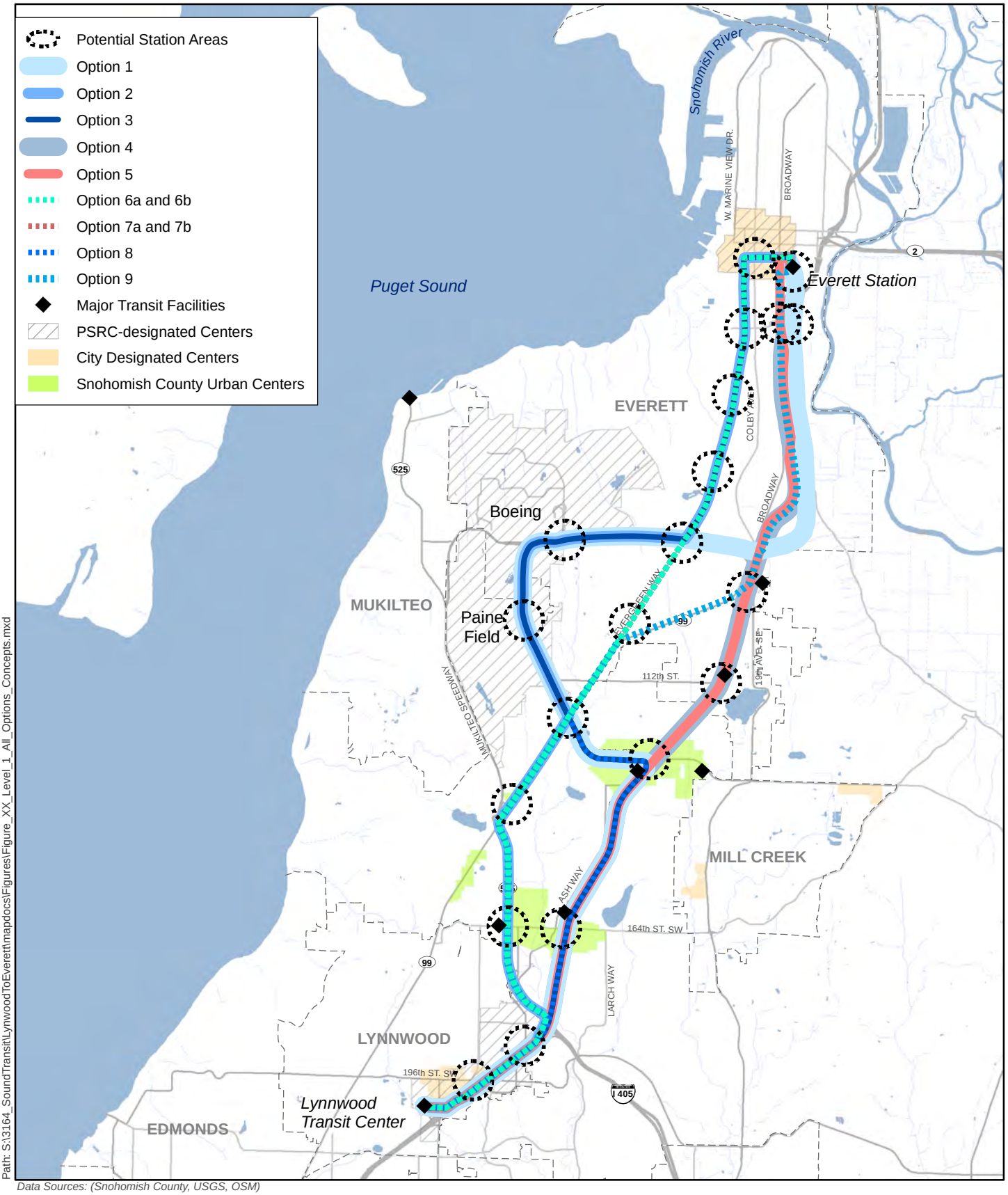
Evaluation Factors

Level 1 Options

The initial screening resulted in a set of nine Level 1 options (Figure S-2) covering different combinations of alignment and HCT technologies to connect Lynnwood to Everett and the intermediate activity centers in the corridor, including options to serve the Paine Field/Boeing Everett area.

The Level 1 options included six light rail options and three BRT options, and featured three primary Lynnwood to Everett alignment groups:

- Paine Field/Boeing Everett area (SW Everett Industrial Center) via Interstate 5 (I-5) and State Route (SR) 99
- SR 99
- I-5



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Data Sources: (Snohomish County, USGS, OSM)

N 0 0.5 1 2 Miles

Figure S-2
Level 1 Options

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All of the options had the same operating assumptions; the Level 1 analysis assumed trains or buses would run every 12 minutes, each way, all day.

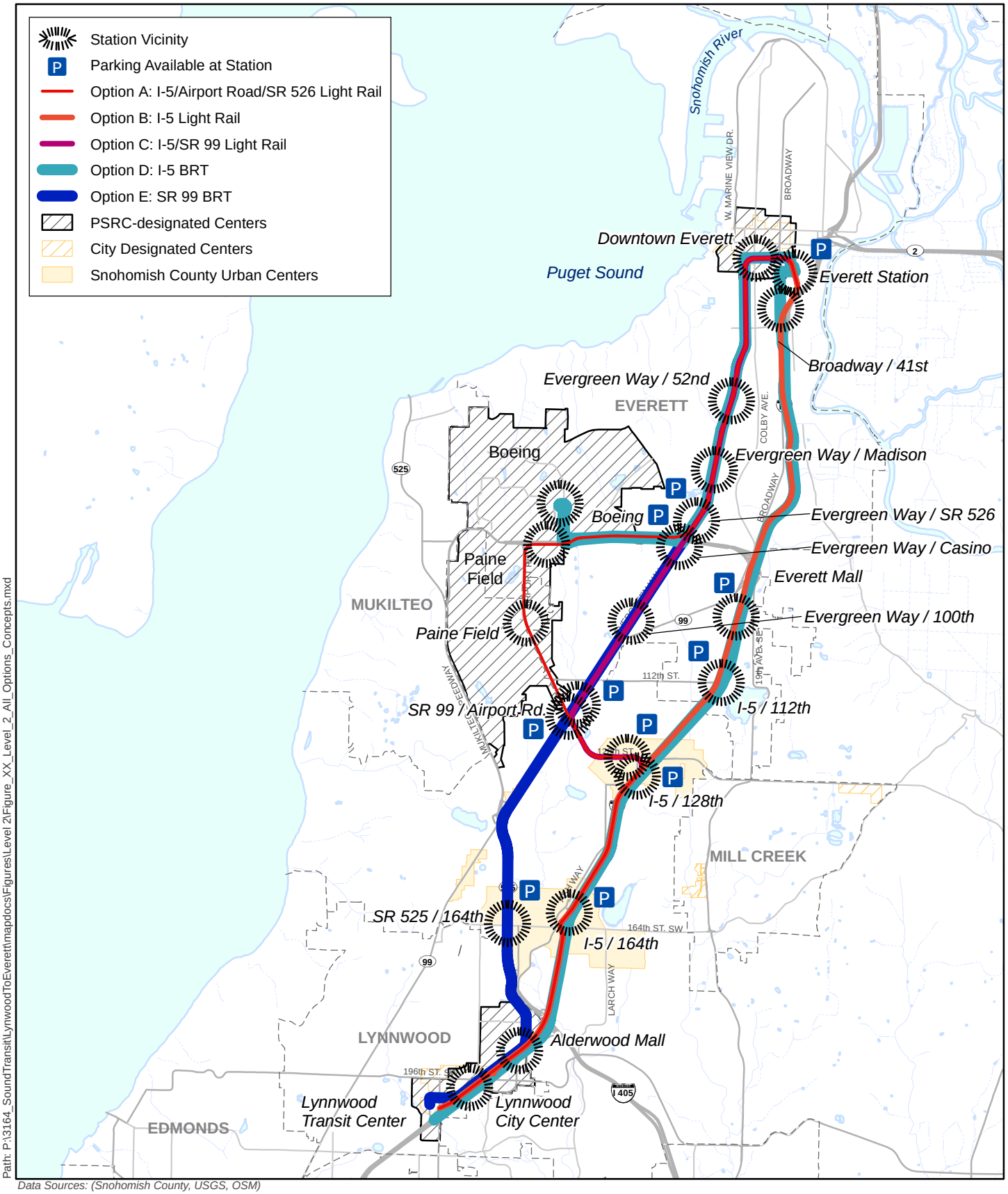
From the Level 1 evaluation, Sound Transit derived a set of five options for further study in Level 2. Some of the key findings from Level 1 that shaped the Level 2 options included the following:

- Overall, light rail options generally performed better than BRT, but were higher in cost. Light rail tended to be preferred over BRT by local agencies, in part because BRT investments with priority treatment for buses are already being made in the SR 99 corridor by Community Transit.
- The Paine Field/Boeing Everett area options performed well in serving a higher number of major regional connections, which gave them higher scores in areas such as land use and mobility. These options were higher in cost due to their longer distance, compared to I-5 or SR 99 options.
- The I-5 options performed well on transportation measures and comparative costs, but had lower ratings on land use and station area measures because I-5 itself reduces the amount of nearby land that could be developed with transit-oriented land uses. However, I-5 options tended to better leverage existing transportation infrastructure such as existing transit centers and park-and-rides.
- The SR 99 options performed well on most measures, particularly for station areas that had supportive land uses. However, right-of-way constraints and congestion affected the surface-running options for either BRT or light rail compared to an elevated light rail. In addition, there were concerns over conflicts or duplication with Community Transit's *Swift* BRT service. Finally, for light rail, siting a maintenance base along SR 99 would be a challenge.

Level 2 Evaluation Options and Results

The five Level 2 options are shown in Figure S-3 and evaluation results for key measures are summarized in Table S-2. Overall, the light rail options (A, B, and C) generally performed the highest in terms of ridership, reliability, travel time improvement, and the least disruption to other modes, but they are also the most expensive options. In contrast, the BRT options (D and E) are less than half the cost of light rail, but have less than half the ridership of light rail because their travel times are slower, and they overlap more with other existing transit services. Also, because they are at-grade and require changes to existing roadways, BRT options have mixed results for other measures such as cost effectiveness, complexity of design and construction, reliability, and environmental effects. The BRT routes would also have more challenges carrying the projected volumes of riders; currently, bus routes in the corridor already experience difficulty in meeting ridership demand.

The results also show that the corridor's transit ridership would be robust with any improvement that offers effective access and competitive travel times, especially with the light rail options. Within the major alignment choices (along I-5 or on SR 526 or SR 99/Evergreen Way), there are differences in right-of-way impacts, in the neighborhoods that could be served by potential stations, as well as how easily communities east of I-5 would be able to reach the regional system.



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Data Sources: (Snohomish County, USGS, OSM)

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Figure S-3
Level 2 Options

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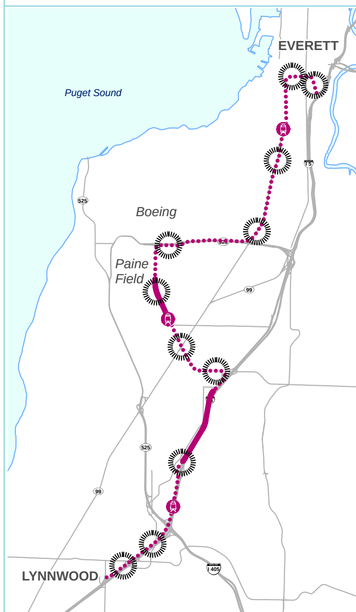
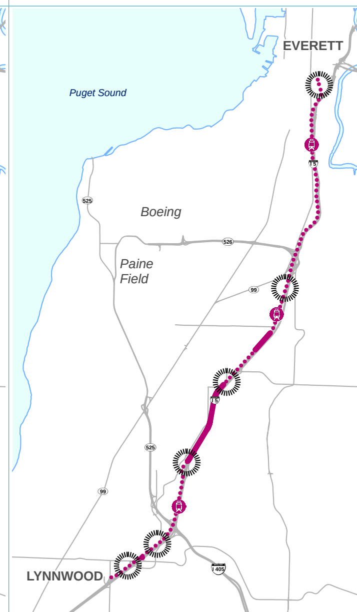
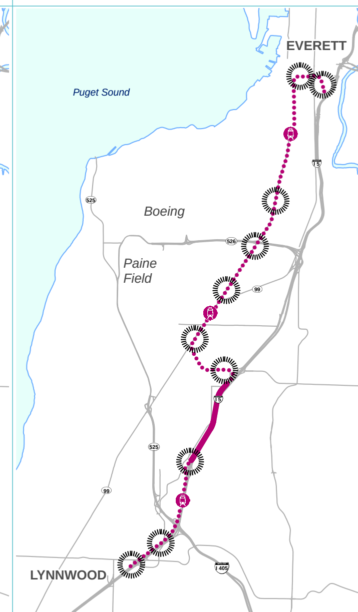
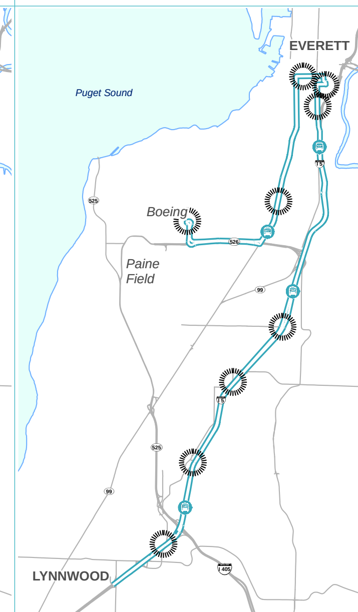
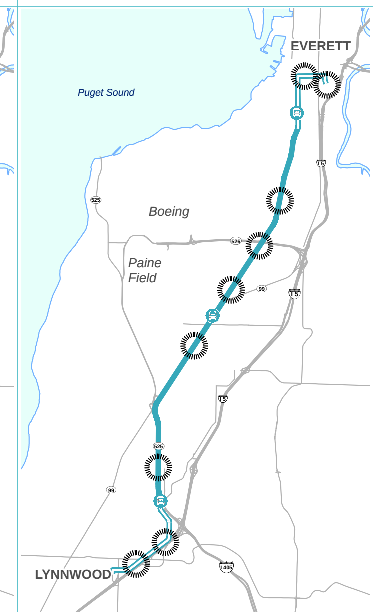
Lynnwood to Everett HCT
Corridor Study

Table S-2. Evaluation Results for Level 2 Options

	LEVEL 2 EVALUATION RESULTS SUMMARY				
	Option A	**Option B**	**Option C**	**Option D**	**Option E**
	I-5/Airport Road/SR 526 LRT	**I-5 LRT**	**I-5/SR 99/Evergreen Way LRT**	**I-5/Boeing Connector BRT**	**SR 99/Evergreen Way BRT**
					
Length	**15.7 miles** 17.3 miles*	**12.6 miles** 14.8 miles*	**14.0 miles** 15.6 miles*	**19.6 miles** 23.5 miles*	**13.6 miles** 18.1 miles*
Travel Time (Lynnwood-Everett)	**33 min** 37 min*	**22 min** 29 min*	**29 min** 34 min*	**30 min** 44 min*	**50 min** 64 min*
Ridership	**37,000 – 50,000 daily riders** 39,000 – 53,000 daily riders*	**32,000 – 43,000 daily riders** 35,000 – 48,000 daily riders*	**36,000 – 51,000 daily riders** 39,000 – 53,000 daily riders*	**14,000 – 21,000 daily riders** 15,000 – 23,000 daily riders*	**12,000 – 18,000 daily riders** 13,000 – 20,000 daily riders*
Cost	**$2,530 – $3,420 m** $2,760 – $3,720 m*	**$1,690 – $2,290 m** $2,070 – $2,810 m*	**$2,360 – $3,190 m** $2,590 – $3,490 m*	**$190 – $260 m** $200 – $270 m*	**$480 – $650 m** $490 – $660 m*

** with College Extension option*

As found with the Level 1 evaluation, options following an I-5 alignment on the southern portion of the corridor had the best results when they featured a station at 164th Street SW and the Ash Way Park-and-Ride, which is one of the few locations readily accessible from both the east and west, and it has supportive transit-oriented neighborhoods nearby. Heading north after 164th Street SW, the alignment choices have more nuanced trade-offs: I-5 with light rail offers the fastest travel times to Everett, but the SR 99/Evergreen Way or SR 526 alignments allow more stations than I-5, and have higher ratings on land use measures. While SR 99/Evergreen Way or SR 526 light rail had higher costs and travel times, they also had the most riders.

Table S-3 summarizes the ratings the Level 2 options received across the main evaluation categories. A summary of the Level 2 evaluation results by option follows.

Option A – I-5/Airport Road/SR 526 Light Rail

At nearly 16 miles, the Option A alignment includes a curve west to reach the Paine Field/Boeing Everett area and then heads back to follow SR 99/Evergreen Way into Everett. As the longest of the light rail options, it was also the most expensive, with a cost range of $2.5 to $3.4 billion. Its 33-minute travel time from Lynnwood to Everett was competitive with other alignments, and it would draw 37,000 to 50,000 daily riders by 2035, which was in the upper range for ridership. For much of its length, the option would run alongside freeways, but it would have arterial sections heading into Everett (SR 99/Evergreen Way and downtown Everett), where it would have more potential for impacts on property and local access. Option A had the most opportunities for station areas with supportive land uses nearby, with up to 11 stations covering 3 regional centers and local activity centers.

With an extension to Everett Community College, this option would add another 1.6 miles, gain up to another 3,000 trips, and add about $230 to $300 million in cost.

Option B – I-5 Light Rail

Option B is the shortest and fastest of the light rail options at 22 minutes, and would be notably faster than the BRT options. It had lower costs than the other two light rail options ($1.7 billion to $2.3 billion) and lower impacts. Daily ridership was the third best of the options, but still comparatively strong. After Everett Mall and SR 526 until the route approaches Everett Station, its northern sections along I-5 offered fewer opportunities for stations, particularly stations that could attract supportive land uses.

An extension to Everett Community College would add another 2.2 miles, gain up to 5,000 more trips, and add about $380 to $520 million in cost.

Table S-3. Level 2 Options Evaluation Ratings Summary

	LEVEL 2 EVALUATION RATINGS SUMMARY				
	Option A	Option B	Option C	Option D	Option E
	LRT on I-5/ Airport Way/SR 526	I-5 LRT	LRT on I-5/ SR 526/Evergreen Way	I-5 BRT	SR 99 BRT
Ridership	●	◕	●	◔	◔
Reliability	●	●	●	◔	◑
Travel Time	●	◕	◕	◑	◔
Disruption to Other Modes	◕	●	◕	◕	◔
Station Area Development Potential	●	◔	◕	◕	◑
Cost	○	◕	○	●	●
Cost Effectiveness	◔	◑	◔	●	○
Complexity	◑	◕	◔	◕	◑
Environmental Effects	◑	◕	◑	◕	◑

○ ◔ ◑ ◕ ●

Lower Performing → Higher Performing

Option C – I-5/SR 99/Evergreen Way Light Rail

Option C, at 29 minutes, had the second fastest travel time from Lynnwood to Everett, and attracted 36,000 to 51,000 daily riders, which is in the upper range of ridership. This option had limited impacts for its sections along I-5, but would have more impacts when following arterial sections such as SR 99/Evergreen Way. Its 10 assumed stations captured 2 regional centers, a downtown Everett station, and local activity centers. At its southern end, Option C allowed a connection with a planned *Swift* BRT route to the Paine Field/Boeing Everett area, but connections from the north to this regional job center would still require transfers to a local but limited service.

Adding an extension to Everett Community College would have the same results as Option A.

Option D – I-5 BRT (with Boeing Connector)

This BRT option follows I-5 between Lynnwood and Everett, much the same as the existing regional express service offers, but it would also add a BRT route between Everett Station and the Paine Field/Boeing Everett area. It could offer a 30-minute travel time from Lynnwood to Everett, but could still suffer from congestion because several segments would not have exclusive lanes for transit, making trips longer and less reliable. Trips from Everett to Boeing would be about the same speed as today, but would be more frequent, with all-day, two-way service. Although Option D had about half the ridership of the light rail options, this BRT option also would be a fraction of the costs for the light rail options.

An extension to Everett Community College would add up to 2,000 more riders without notably changing costs.

Option E – SR 99/Evergreen Way BRT

Option E would develop BRT in mostly exclusive lanes along SR 99 and Evergreen Way. While access and transit-supportive station opportunities were good, its 50-minute travel time from Lynnwood to Everett was comparatively slow. As a result, this option had the lowest range of riders (12,000 to 18,000). It also would have more impacts on traffic and access because it would need to rebuild most of SR 99, and its exclusive center lanes would restrict turn movements. Option E would also overlap with Community Transit's *Swift* BRT service, and the curb-lane Swift operations would likely need to be revised. This route would also not serve the Ash Way area.

An extension to Everett Community College would add about 2,000 more riders.

1 INTRODUCTION

The Lynnwood to Everett High Capacity Transit (HCT) Study (the Study) is one of several HCT corridor planning studies Sound Transit has conducted to: 1) support the Sound Transit Board of Directors in decisions about the Sound Transit Long-Range Plan update, and 2) inform choices for the next phase of the regional HCT system plan's development. The study area for the Lynnwood to Everett corridor (Figure 1-1) begins at the Lynnwood Transit Center, connects to Everett Station and the transit center near downtown Everett, and incorporates the area north to Everett Community College. This study area encompasses Interstate 5 (I-5) and State Route (SR) 99, which are the primary routes serving north and south travel between Everett and Lynnwood, as well as connecting south to Seattle. Some study options also connect to the Paine Field/Boeing Everett Manufacturing and Industrial Center (SW Everett Industrial Center), which the Puget Sound Regional Council has identified as a regional manufacturing and industrial jobs center in southwest Everett.

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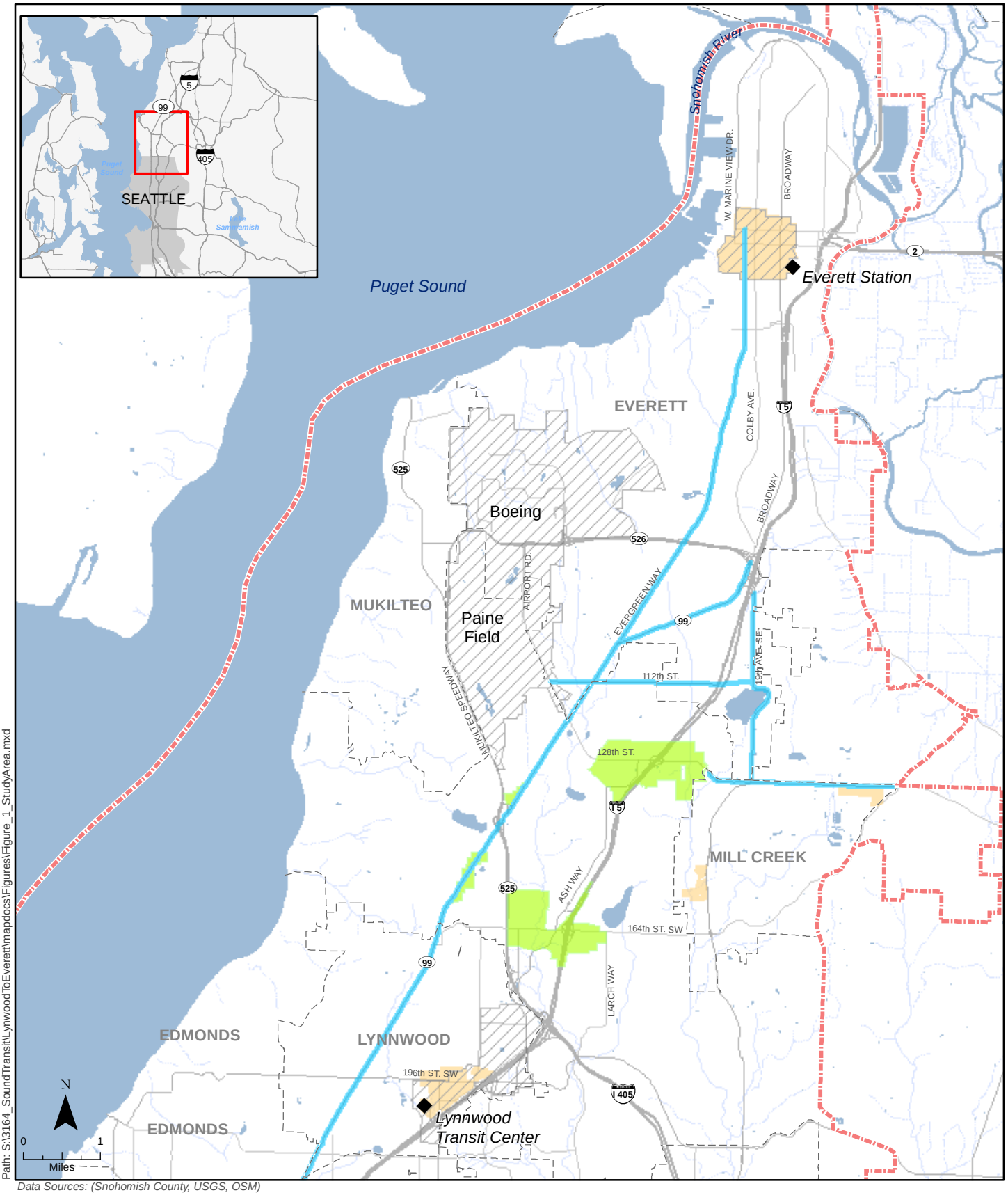
1.1 Project Background

The Lynnwood to Everett HCT corridor is part of a long-range plan for a regional transit system linking King, Pierce, and Snohomish counties. As defined in Sound Transit's currently adopted Long-Range Plan, the system plan features a continuous north-south spine that would ultimately connect Tacoma, Seattle, and Everett, as well as an east spine connecting Seattle with Bellevue and Redmond. Figure 1-2 shows the current plan and its corridors.



- Study Terminus Point
- Sound Transit Boundary
- PSRC-designated Centers
- City Designated Centers
- Snohomish County Urban Centers
- High and Medium Intensity Mixed Use Activity Corridors

Figure 1-1
Study Area

Lynnwood to Everett Corridor

The regional HCT system has been developing in phases, beginning with *Sound Move*, adopted in 1996, which created the initial regional transit network connecting all three counties with commuter rail, light rail, new transit centers, park-and-ride lots, and high-occupancy vehicle (HOV) access projects. One of the most important features of *Sound Move* is its corridor-based network with frequent, convenient, and dependable services connecting major regional centers. Currently, regional express bus and commuter rail are the primary regional transit services connecting Snohomish County with King and Pierce counties to the south.

On November 4, 2008, voters of the central Puget Sound region approved a ballot measure, Sound Transit 2 (ST2), to add more regional express bus and commuter rail service while building up to 36 additional miles of light rail, including projects that will extend light rail from Seattle to the Lynnwood Transit Center. The ST2 measure also included funds for studying additional potential HCT corridors, including the Lynnwood to Everett corridor.

Figure 1-2
Sound Transit Long-Range Plan

1.2 The Corridor Study Area

The general study area shown in Figure 1-1 is bounded by the Sound Transit district boundary to the west (Puget Sound), north (Everett city limits), and east (various north-south arterials located between SR 520 and SR 9), and by 200th Street SW to the south (where the Lynnwood Link Extension ends).

2 A PORTRAIT OF THE CORRIDOR

As the Study began, Sound Transit considered previous planning efforts, including the regional transit plan, other transportation and transit plans, and local comprehensive and land use plans. Existing transportation infrastructure, transportation patterns, environmental conditions, and land use were examined to see how they would influence the type and location of potential HCT improvements. Meetings were also held with local jurisdictions, the Washington State Department of Transportation (WSDOT), and transit agencies to discuss corridor conditions and the types of HCT improvements to be studied.

2.1 Land Use Patterns

The study area has five jurisdictions—Lynnwood, Mukilteo, Mill Creek, Everett, and unincorporated land in Snohomish County. Most of the study area land is developed. The north-south orientation of the corridor and its development patterns are generally constrained geographically by the presence of Puget Sound to the west, with the Snohomish River and more rural farmland valleys to the east until the southern portions of the corridor. I-5 and SR 99 are the only two continuous north-south highway routes into Seattle. I-405, in the southern part of the corridor, connects to east and south King County.

The Lynnwood Transit Center area and downtown Everett, both designated as regional growth centers by the Puget Sound Regional Council (PSRC), are targeted to have the highest intensity of land uses in the corridor. The Paine Field/Boeing Everett area is also a PSRC-designated regional growth center for employment, primarily in the manufacturing and industrial sectors. It is the largest commercial and industrial area within the study area. Two Snohomish County-designated urban centers are also located along I-5 at 164th Street SW and at 128th Street SW.

Along I-5, the study area is mostly residential, with mixed-use and commercial areas typically clustered along connecting east-west roadways. Along SR 99, there are mostly commercial and mixed-use land uses, although residential uses begin typically within a block of either side of SR 99. This includes some multi-family clusters, but most of the area is otherwise low-density and single-family neighborhoods.

2.2 Population and Employment

The areas of highest employment density within the corridor correspond to the two regional growth centers—Lynnwood and downtown Everett, and are generally between SR 99/Evergreen Way and I-5. The Paine Field/Boeing Everett area is also a major employment center and occupies a fairly large geographical area

Downtown Everett and the SR 99 corridor through Lynnwood also have greater household densities than surrounding areas. South of SR 526, residential areas include manufactured

housing as well as multi-family developments. The area around I-5 and 112th Street SE also contains a high concentration of multi-family developments and manufactured housing as well, compared to the corridor average.

2.3 Social/Demographics

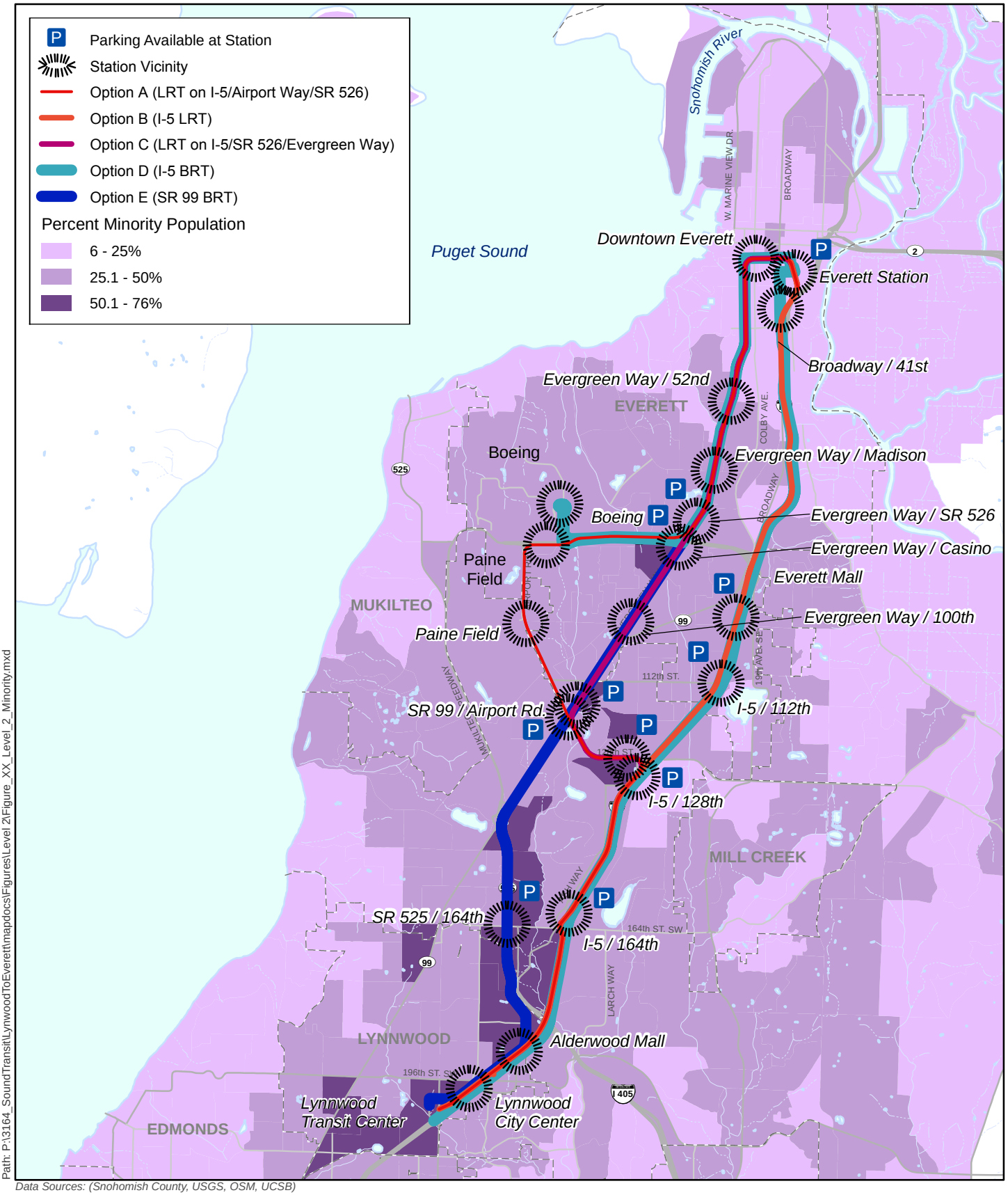
The Federal Transit Administration (FTA) encourages extra emphasis on serving populations that are typically considered to be "transit-dependent." The reasons for this emphasis are that these are the populations that require transit for mobility, and they are more likely to use transit compared to others that have other options readily available. Related research has also shown there is a correlation between transit use and transit-dependent riders. For this study, three types of data were used (primarily based on the 2010 U.S. Census)—minority rates, poverty rates, and automobile ownership to identify populations that may be more dependent on transit for mobility than others.

Minority rates are highest along the major transportation corridors of I-5 and SR 99 (see Figure 2-1). These corridors correspond to the areas with the highest density of multi-family housing. The area with the highest poverty rate is within the city of Everett. The SR 99 corridor also has higher poverty rates than the rest of the area, as shown in Figure 2-2.

Most of the households that did not own a vehicle are also located in areas with high poverty rates in the city of Everett and along parts of SR 99 (see Figure 2-3).

2.4 Transit Plans

In order to serve riders well, the combined local and regional network must be well integrated and maintain effective connections. In light of this, Sound Transit considered the existing local and sub-regional transit network as well as future planned services as it began drafting potential regional HCT improvements. Sound Transit, Community Transit, and Everett Transit have defined service areas and corridors that they emphasize with their current or future planned routes. Community Transit's Transit Development Plan, Long Range Transit Plan, and BRT Corridor Prioritization Study, as well as Everett Transit's Transit Development Plan were reviewed in development of this Study. Previous supporting studies for Sound Transit's Long-Range Plan, which included a review of BRT service concepts for the SR 99 corridor, light rail service in the I-5 corridor (including potential service to Paine Field/Boeing Everett), light rail service on SR 99, and an HCT mode analysis in the I-5 corridor, were also examined.



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Data Sources: (Snohomish County, USGS, OSM, UCSB)

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Figure 2-1
2010 Minority Rates within Study Area

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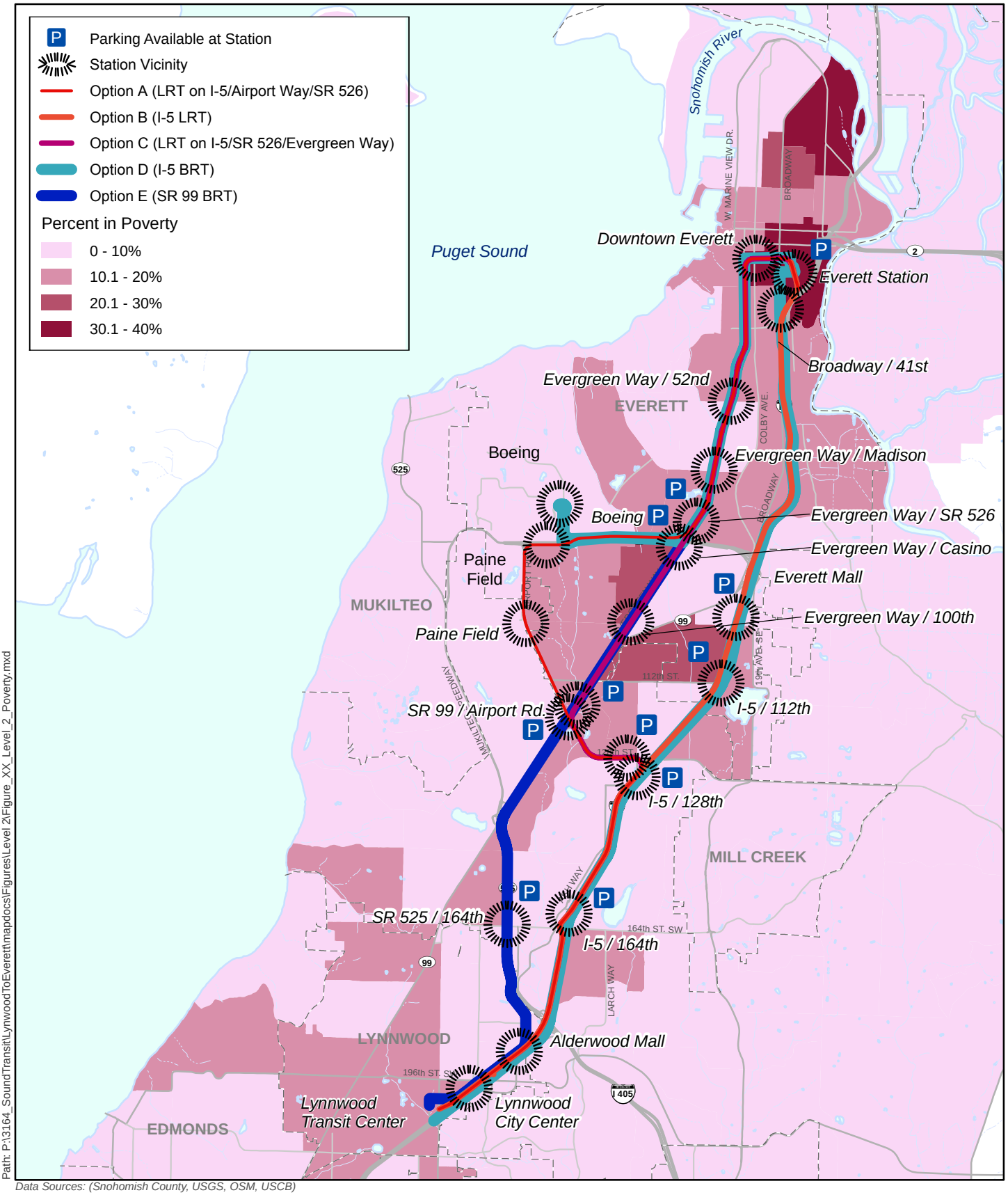
Corridor Study



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Data Sources: (Snohomish County, USGS, OSM, USCB)

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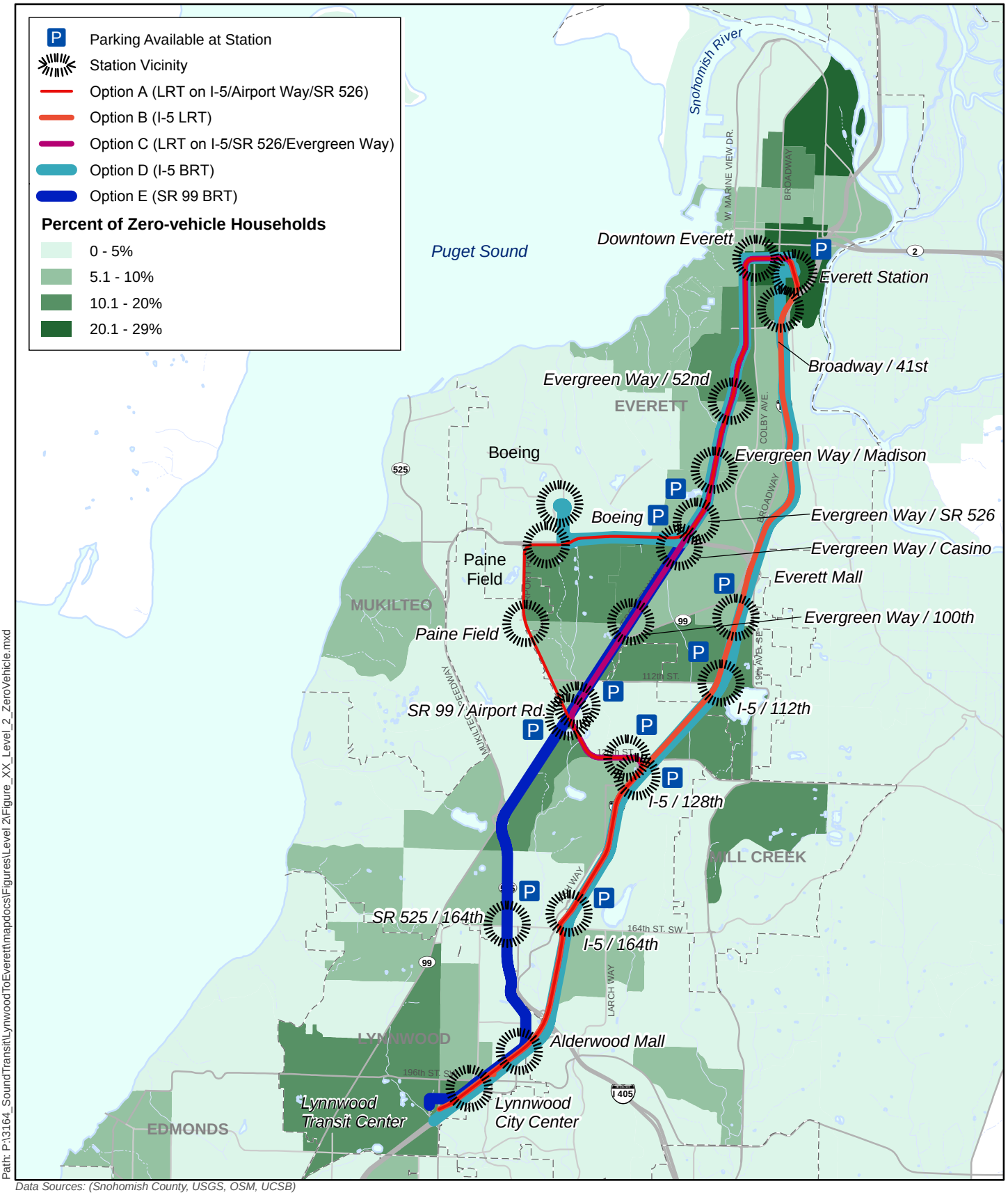
Figure 2-2
2010 Poverty Rates within Study Area

SOUNDTRANSIT RIDE THE WAVE

Lynnwood to Everett HCT
Corridor Study



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Data Sources: (Snohomish County, USGS, OSM, UCSB)

N 0 0.5 1 2 Miles

Figure 2-3
2010 Vehicle Ownership by Household within Study Area

SOUNDTRANSIT RIDE THE WAVE

Lynnwood to Everett HCT Corridor Study

2.5 Other Plans and Projects

WSDOT's plans and programs covering the study area include Moving Washington (WSDOT's plan for investments and priorities for operating efficiently, managing demand, and adding capacity strategically); pedestrian and signal improvements on SR 99 from Lincoln Way to Airport Road; a transportation study of US 2 between Everett and Snohomish to develop recommendations that address safety and mobility issues; the Mukilteo Multimodal Project; and BNSF rail corridor upgrades. Currently, there are no major plans to expand general highway capacity in the study area. Local jurisdictions, as well as Community Transit and Everett Transit, also have plans to improve the multimodal functions in sections of the corridor.

2.6 Environmental Conditions

To assist in developing concepts and evaluating potential environmental effects, possible environmentally sensitive areas were identified, including the following:

- Lakes, streams, and water bodies
- Wetlands
- Parks and recreational facilities
- Trails
- Schools, churches, and other community facilities
- Historic properties
- Archaeological properties
- Residential areas

2.7 Activity Centers and Transportation Facilities

Figure 2-4 shows a map of the major centers and transportation facilities identified in the study area. Local agencies and jurisdictions reviewed this information, which was subsequently used to assist in developing potential routes that could connect destinations between Lynnwood and Everett.

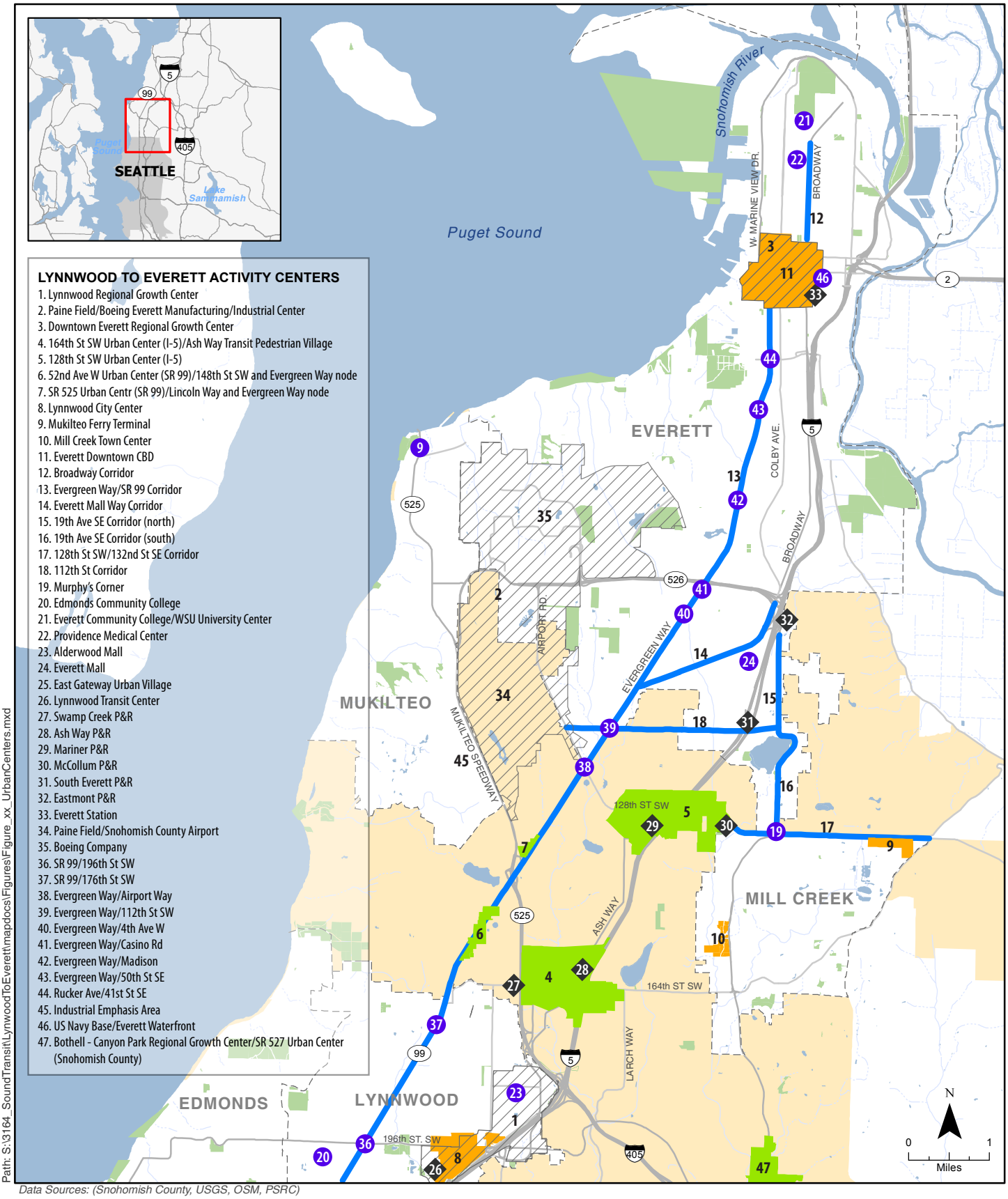


Figure 2-4
Study Area Activity Centers and Corridors

Lynnwood to Everett

2.7.1 Snohomish County

For areas within unincorporated Snohomish County Urban Growth Areas (UGAs), the County designated four types of centers. These are listed below along with the corresponding locations of centers designated within the Lynnwood to Everett Study area:

- Urban Centers (includes Transit Pedestrian Villages): mixed-use centers generally located along transit-emphasis corridors and high-capacity routes
  - I-5 and 164th Street SW
  - I-5 and 128th Street SW
  - SR 99 and 152nd Street SW
  - I-5 and 44th Avenue West
  - SR 99 and SR 525
  - Ash Way and 164th Street SW (Transit Pedestrian Village)
- Urban Villages: smaller scale than urban centers
  - SR 99 and Airport Road; nearby SR 99 and Center Road (Paine Field)
  - 112th Street SW and 4th Avenue West
  - 164th Street SW and 33rd Avenue West
- Manufacturing and Industrial Centers: major regional employment
  - Paine Field

At Ash Way and 164th Street SW, where direct access ramps, a transit center and park-and-ride are attracting transit-oriented development

SR 99 and Airport Way, near Paine Field

2.7.2 City of Lynnwood

The City of Lynnwood's Comprehensive Plan identifies its City Center area, which includes the existing transit center and future Lynnwood Link Extension station, as well as areas primarily north and east of the transit center. The Highway 99 Subarea Plan identifies a set of primary mixed-use nodes focused on BRT stops, with transit-oriented development along a linear corridor where there is larger retail and office development. Mixed-use nodes with BRT stops in the study area include:

- 196th Street SW
- 176th Street SW
- 148th Street SW

2.7.3 City of Everett

The City of Everett's Comprehensive Plan and the Everett Downtown Plan define strategies to transform Everett's downtown into a more active, diverse, and vibrant metropolitan center. The Everett Station Area Plan envisions transit-supportive development to complement the downtown area. The Evergreen Revitalization Plan for the principal arterial connecting downtown Everett to southwest Everett and the Paine Field/Boeing Everett area seeks to create a linear community with 5,300 additional residents and 2,000 additional jobs by 2025, with BRT stations at:

- 41st Street SE
- 50th Street SE
- Madison Street
- Pecks Drive
- Casino Road
- 4th Avenue West
- 112th Street
- Airport Road

Civic Buildings in Downtown Everett

Along Evergreen Way in Everett

2.7.4 Mukilteo and Mill Creek

Mukilteo's Comprehensive Plan anticipates lower levels of growth in the study area, in part because of the low inventory of undeveloped residential land in the city. With an established community of mostly single-family neighborhoods, the highest density in Mill Creek development is at the Mill Creek Town Center, located west of SR 527. The area to the northeast of the Town Center, near 132nd Street NE and Seattle Hill Road, also anticipates more mixed-use development.

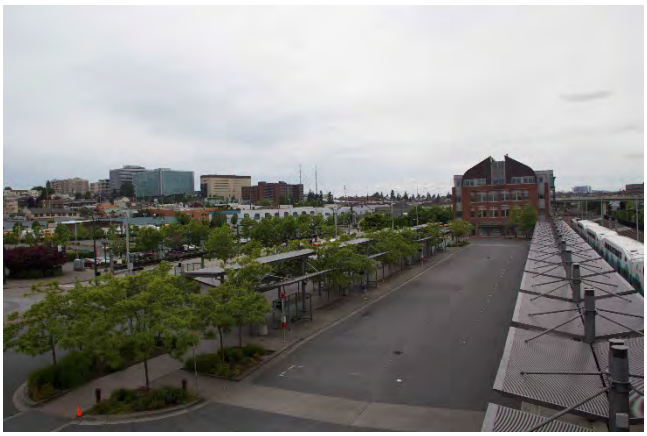
2.7.5 Roadway Facilities

As the only continuous freeway running through the study area, I-5 serves regional, interstate, and international traffic, which is at or near capacity during many hours of the day. Although I-5 has a robust and relatively new system of HOV facilities, including HOV direct access ramps, HOV lanes, and HOV bypass lanes at interstate on-ramps, heavy congestion in the general purpose lanes still affects the operation of the HOV lanes.

Seven state highways are located within the study area, but only SR 99 operates continuously through the corridor. SR 525 (Mukilteo Speedway) extends north from the I-5/I-405 interchange to Mukilteo on the west side of the Paine Field/Boeing Everett area. SR 526 (Boeing Freeway) runs east-west between SR 525 near Paine Field/Boeing Everett and I-5. SR 527 runs north-south between Bothell and south Everett east of I-5.

2.7.6 Transit Service

Sound Transit, Everett Transit, and Community Transit operate bus services in the study area. The primary transit corridors are I-5, SR 99, SR 104, SR 526/SR 528, and Everett Mall Way/Broadway. Major transit facilities include Ash Way Park-and-Ride, Swamp Creek Park-and-Ride, McCollum Park-and-Ride, Mariner Park-and-Ride, South Everett Freeway Station, Everett Mall Station, Eastmont Park-and-Ride, Mukilteo Ferry Terminal, Everett Station, and College Station. Community Transit, in partnership with Everett Transit, also operates *Swift*, a BRT service, along a 17-mile stretch of the Highway 99/Evergreen Way/Rucker Avenue corridor between Shoreline and Everett. Other *Swift* corridors within the study area have been identified in Community Transit's Long-Range Transit Plan. This includes a route connecting the Paine Field/Boeing Everett area with the Canyon Park-Bothell Regional Growth Center via Airport Road, 128th Street SW/SE, and SR 527. This route, currently under development by Community Transit, would provide high-frequency connections between the HCT options in this study and key south Snohomish County activity centers.



Everett Station

2.7.7 Travel Demand, Transit Markets, and Ridership

Travel Demand

To better understand overall travel patterns in the corridor, Sound Transit reviewed the PSRC Long Range Transportation Plan, the regional transportation forecasting model, the 2011 Sound Transit Model, and Commute Trip Reduction data. Commute trips continue to be the primary purpose of trips in the area. They are also the types of trips with the most potential to be served by fixed-route transit because a high proportion of them are focused on a limited number of employment centers (e.g., downtown Seattle, the University of Washington), which are most efficiently served by transit. The highest volume of commute trips that start within

the study area are destined for the Seattle central business district and East King County. For the commute trips that originate outside the study area, most are headed to job sites in downtown Everett and the Paine Field/Boeing Everett area.

Commute Trip Reduction data provided by the Boeing Company show that employees at the Everett plant travel from the north, south, east, and west of the Boeing facility. A little more than one-third come from the south, one-third from the north and east, and a little less than one-third from the immediate vicinity.

Transit Markets

A review of Sound Transit's ridership model (2011), as well as other ridership information, show strong demand for transit service in the corridor, particularly for the larger north-south corridor that extends into King County. Transit trips related to travel from Everett, Lynnwood, and other Snohomish County communities into King County represent about 15 percent of all transit trips in the entire Sound Transit service area.

Figure 2-5 shows the percentage of commuter trips within the corridor that are currently made by transit. The highest percentage of these transit trips are at the end points of the study area (Lynnwood and Everett). The areas along the SR 99 corridor also show a relatively high concentration of transit trips, followed by the Mill Creek area. Regarding roadway facilities serving transit, I-5 is currently the most used route, although SR 99 also accommodates a relatively high number of transit trips.

Park-and-Ride Users in the Study Area

Community Transit's data (2012) show park-and-ride users are typically individuals within the study area, but some also come from north, south, or east of the study area. The Ash Way Park-and-Ride is the most popular facility for users in the study area—recent counts have shown that its utilization rate is 100 percent or greater (due to illegal parking). The next most popular park-and-ride is at Everett Station, which has users from the nearby surrounding area including from north and south of downtown Everett. Recent counts at this facility show it at 100 percent utilization as well.

Transit Ridership

Weekday ridership for routes traveling generally along I-5 are highest in the southern portion of the corridor, and then become progressively lower moving north toward Everett Station. Transit ridership on I-5 drops significantly north of Everett. Along SR 99 and up through Evergreen Way, ridership is fairly constant and increases between larger activity centers such as Mountlake Terrace and Lynnwood, but is highest in Everett.

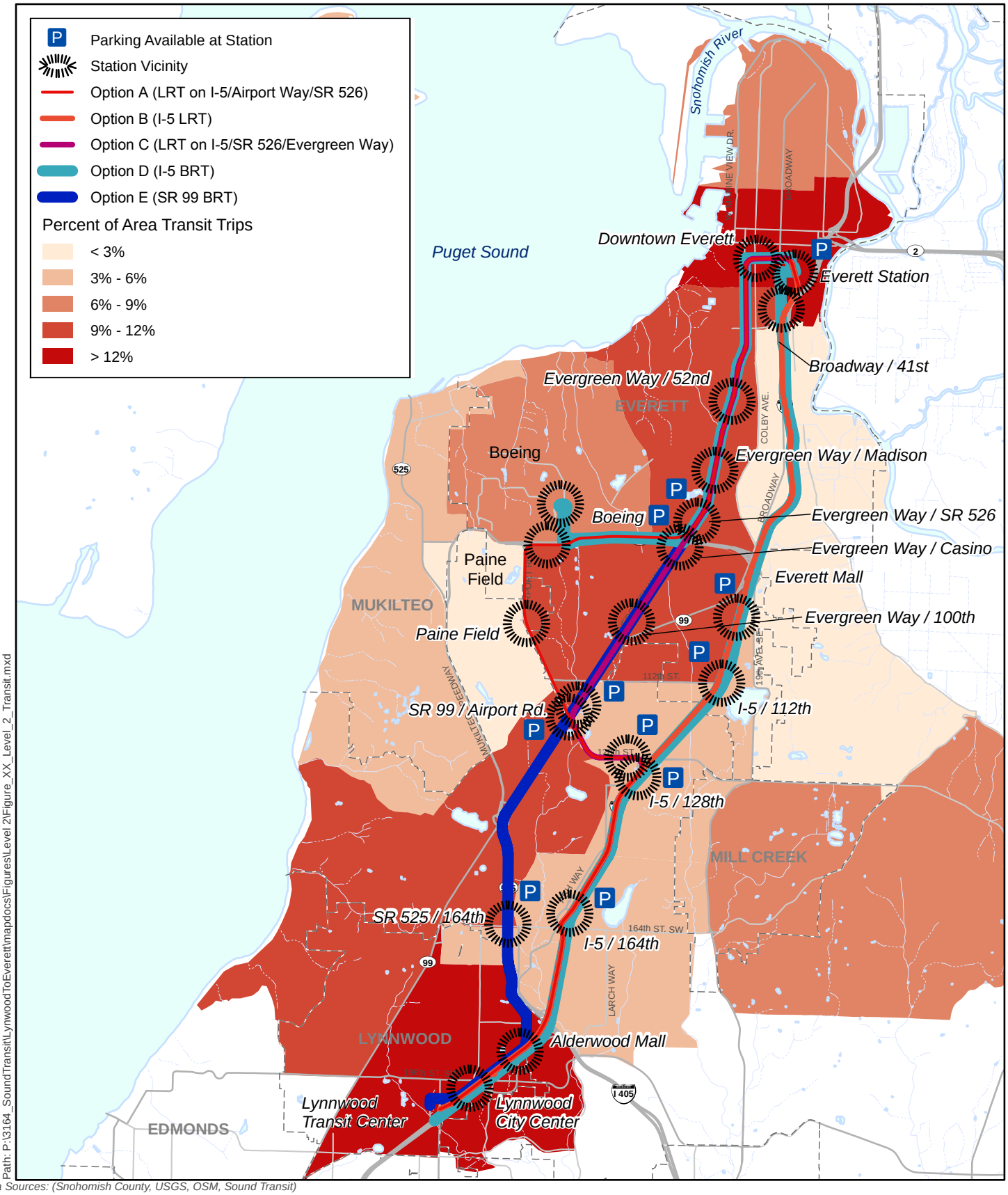


Figure 2-5
Transit Trips

SOUNDTRANSIT
RIDE THE WAVE

Lynnwood to Everett HCT
Corridor Study

Transit Operating Performance

Depending on the route, some routes are fairly reliable with running times that vary by only 1 or 2 minutes. Others, such as Sound Transit Route 510, vary by as much as 14 minutes for travel between the South Everett Freeway Station and downtown Seattle. The route's running time is particularly longer during the PM peak period/peak direction (northbound). The *Swift* BRT route on SR 99 varies by 6 minutes northbound and southbound. (Arterial routes are generally shorter than the freeway routes, and often show less variability due to coordinated signal systems, but are typically slower.)

Many buses in the I-5 corridor are full with standing room only as they leave Seattle. They drop off a significant volume of passengers at the Lynnwood Transit Center; however, many routes have relatively high loads in the study area.

3 GOALS, OBJECTIVES, AND THE NEED FOR HIGH CAPACITY TRANSIT

The following draft set of guiding principles, goals and objectives were developed for the HCT corridor studies (see Table 3-1 for goals and objectives). A potential purpose and need for improvements in the Lynnwood to Everett corridor (presented after this section) helped guide the evaluation of potential corridor options. The guiding principles are:

- Be consistent with the state Growth Management Act
- Be consistent with VISION 2040, the region's adopted growth strategy
- Be consistent with Transportation 2040, the region's Metropolitan Transportation Plan
- Be consistent with the state High Capacity Transportation Systems Act (81.104)
- Support City and County measures enacted to manage growth and reduce automobile use in major centers
- Support the regional economy and preserve a high quality of life
- Increase the value of *Sound Move* and ST2 investment in projects and services
- Examine effective HCT alternatives to automobile use, as identified in ST2 and/or as directed by the Sound Transit Board

Table 3-1. Sound Transit's HCT Goals and Objectives

GOALS	OBJECTIVES
1. Provide a public transportation system that facilitates long-term mobility and connectivity	• Improve transit connections to key transit markets and regional growth centers • Must operate service principally in exclusive rights-of-way to be considered as high capacity transit • Improve the reliability of transit service
2. Enhance communities and protect the environment	• Conserve energy resources, control air pollution, and preserve the environment • Support communities' ability to develop sustainably, consistent with state and regional laws and growth management policies
3. Contribute to the region's economic vitality; increase access to jobs, housing, education, and other community resources; enhance the region's ability to move goods and services; and promote economic development	• Support economic growth by linking the region's designated growth centers • Support transit-oriented development in station areas
4. Strengthen communities' access to, and use of, the regional transit network	• Develop transit options that connect to existing and future bicycle, pedestrian, HOV, and transit networks • Improve people's ability to access transit • Develop equitable transportation solutions
5. Develop a system that is financially feasible	• Develop cost-effective and efficient transportation solutions • Develop a system that is affordable to build, run, and use

3.1 The Purpose of High Capacity Transit in the Lynnwood to Everett Corridor

The purpose of potentially extending the regional HCT system in the Lynnwood to Everett corridor is to:

- Provide reliable, rapid, and efficient two-way, peak, and off-peak transit service to help meet the long-term demand for travel between the Lynnwood to Everett corridor communities and other communities in the central Puget Sound region
- Support regional and local growth management plan goals to focus growth in centers connected by a high-quality multimodal transportation system
- Enhance communities by improving access to jobs, housing, education, and community resources in the corridor and the region
- Improve the effectiveness of the regional multimodal transportation system by creating an alternative to travel on congested roadways and extending the value of previous regional transit system investments
- Protect the environment and promote healthy, equitable, and sustainable communities by improving transit service and encouraging other ways to travel than by car

3.2 The Need for High Capacity Transit

HCT improvements in the Lynnwood to Everett corridor could potentially address:

- Increasingly unreliable travel times for transit trips made on the corridor's congested roadways
- Insufficient transit capacity to meet the demands of future population and employment in the corridor
- High levels of future population and employment growth in designated regional centers in Everett and Lynnwood, as well as in other activity centers in the corridor
- Requirements of the state's Growth Management Act and the direction of PSRC's VISION 2040, Transportation 2040, and adopted comprehensive plans of Snohomish County and its cities calling for adequate transportation systems to meet the needs of future population and employment growth

4 STUDY PROCESS

The Lynnwood to Everett HCT Study developed and evaluated a wide range of potential HCT improvements using an initial screening of possible options, followed by a two-level planning and analysis process, as shown in Figure 4-1. At each step, the evaluations mirrored the goals and objectives for HCT investments that could address the corridor's purpose and need for improved service.

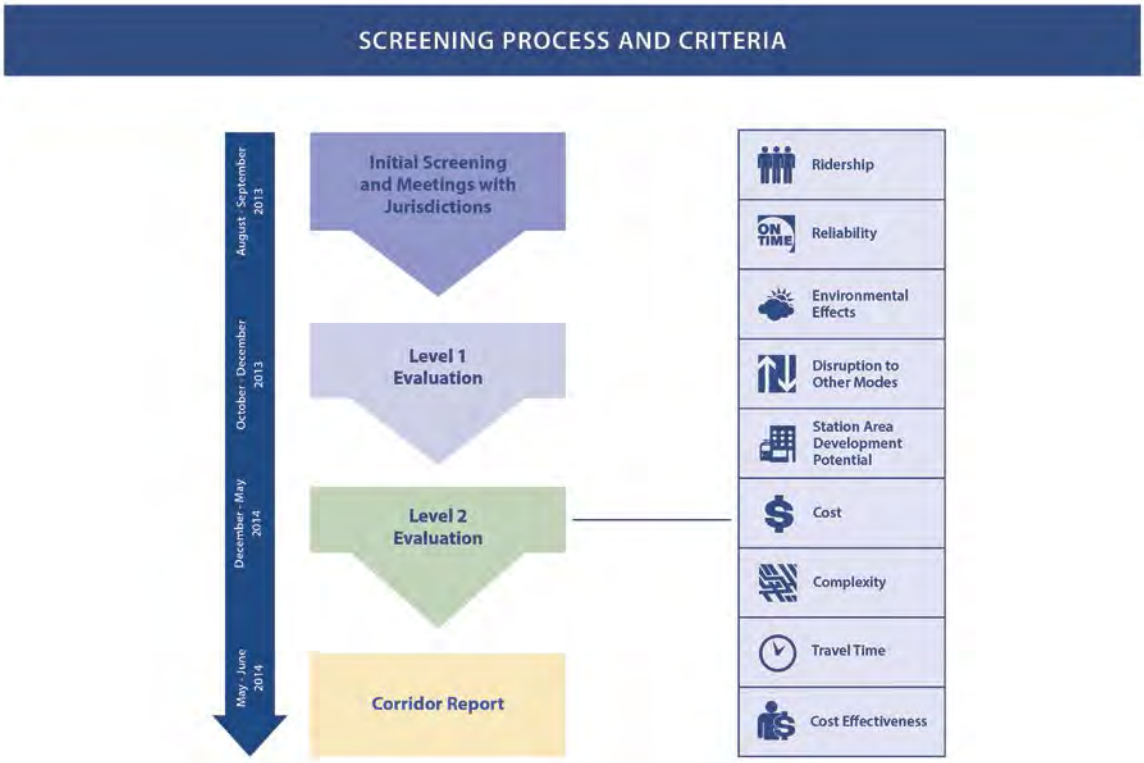


Figure 4-1
Initial Screening Process

In Level 1, Sound Transit laid out and reviewed a range of physical routes to connect activity centers and major transit and transportation infrastructure nodes in the corridor, with a focus on creating complete Lynnwood to Everett connections. The type of HCT technology, design assumptions, operating characteristics, and station areas were also described. Generally, routes fell into two groups: (1) routes that connected Lynnwood, Paine Field/Boeing Everett Manufacturing and Industrial Center, and Everett, and (2) routes that connected Lynnwood and Everett directly. These initial concepts were evaluated for their performance in meeting overall HCT goals and objectives for the corridor.

In Level 2, the team conducted further design and analysis for a set of corridor options that performed the best, which included a wider range of measures of performance for meeting overall HCT goals and objectives.

4.1 Developing Initial Concepts

Sound Transit drafted a large set of initial concepts to explore ways to connect activity centers and nodes between Lynnwood and Everett. The following factors were considered in the process:

- Designated regional growth centers, activity centers, activity corridors, and land use patterns
- Existing and future transportation demand
- Existing transit routes
- Major transportation corridors, particularly those that had direct connections and north-south continuity
- Existing transit facilities, particularly major facilities
- Planned transit investments
- Routes previously identified in issue papers as part of the 2005 Sound Transit Long-Range Plan update
- Comparative length of a resulting alignment compared to existing routes (potential to improve travel times and access)
- Potential alignments described in studies by others, or suggested in initial study meetings with the City of Everett, City of Lynnwood, City of Mukilteo, City of Mill Creek, Community Transit, and Snohomish County

Although the first set of concepts were generally mode neutral (they could be either BRT or light rail), the following were included in the base assumptions that any concept would:

- Operate as an all-day, two-way operation in a mostly exclusive guideway or transitway
- Be adaptable to a variety of transitway profiles (at-grade, exclusive, fully or partly grade separated)
- Reasonably represent the range of benefits, costs, and impacts of more detailed corridor alignment or station choices that could occur with more detailed planning and design

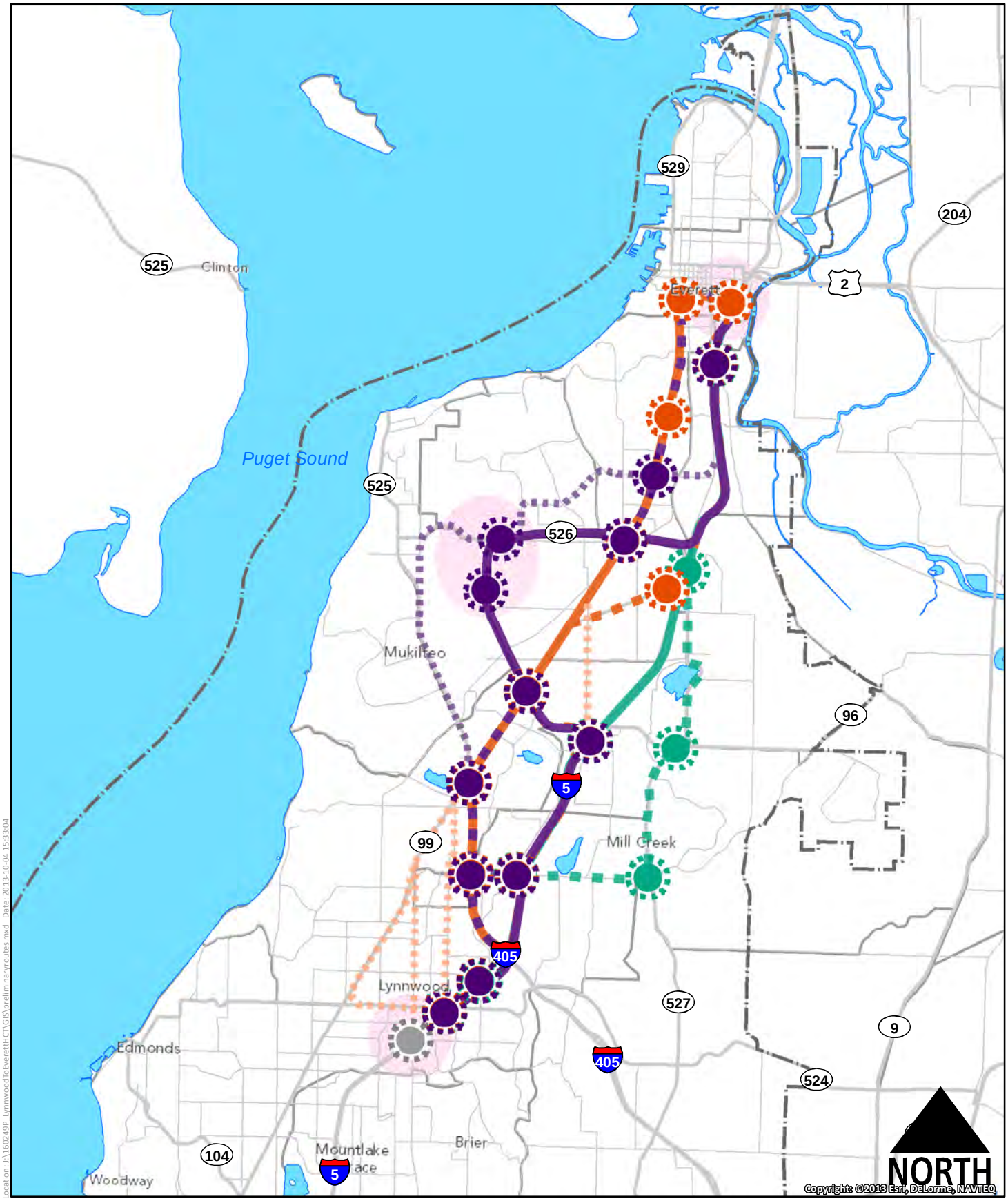
A workshop approach was used to define the first broad range of possible routes with the potential to connect regional growth centers, local activity centers, and existing or planned transit facilities and systems. All concepts were defined as beginning in Lynnwood and ending at the Everett Station.

The resulting set of concepts, shown in Figure 4-2, represents the initial “universe” of potential corridor HCT options. The solid lines represent the concepts considered to be the more primary routes connecting Lynnwood and Everett using either the I-5 (light blue line) or SR 99 (orange

line) corridor options, as well as a representative route (purple line) that would connect into the Paine Field/Boeing Everett area. The dashed or dotted lines represent other potential route variations that could be used, many of which would connect different intermediate activity centers between Lynnwood and Everett. Potential station areas were also considered; these areas are generally based on existing or planned activity centers or corridors.

Using this early list of potential concepts, the concepts were arranged into basic groups reflecting the number of regional centers they would connect and the general route or alignment followed—I-5 or SR 99.

- Group A concepts: "I-5 Two-Center" connecting Lynnwood City Center and downtown Everett via I-5
- Group B concepts: "SR 99 Two-Center" connecting Lynnwood City Center and downtown Everett via SR 99 and Evergreen Way
- Group C concepts: "Three-Center" connecting Lynnwood City Center, Paine Field/Boeing Everett area, and downtown Everett via either I-5 or SR 99



Preliminary Routes

All

Miles

0 1 2 4

Figure 4-2
Universe of Preliminary Corridor Concepts Connecting Lynnwood and Everett

5 LEVEL 1 OPTIONS

The options carried forward into Level 1, as shown in Figures 5-1 through 5-6, included BRT or light rail in various combinations of corridor segments between Lynnwood and Everett. The potential routes generally followed I-5, SR 99, and SR 526, as well as other options serving the Paine Field/Boeing Everett area via Airport Way and SR 526. They reflected a variety of design and operating choices, such as full elevated or at-grade for light rail, or BRT in semi-exclusive to more fully exclusive lanes. They also illustrated different station areas and sub-corridor choices. All options, whether light rail or BRT, were assumed to operate at 12-minute headways all day. Other notable characteristics are summarized below.

Option 1 – I-5/Airport Road/SR 526 Light Rail

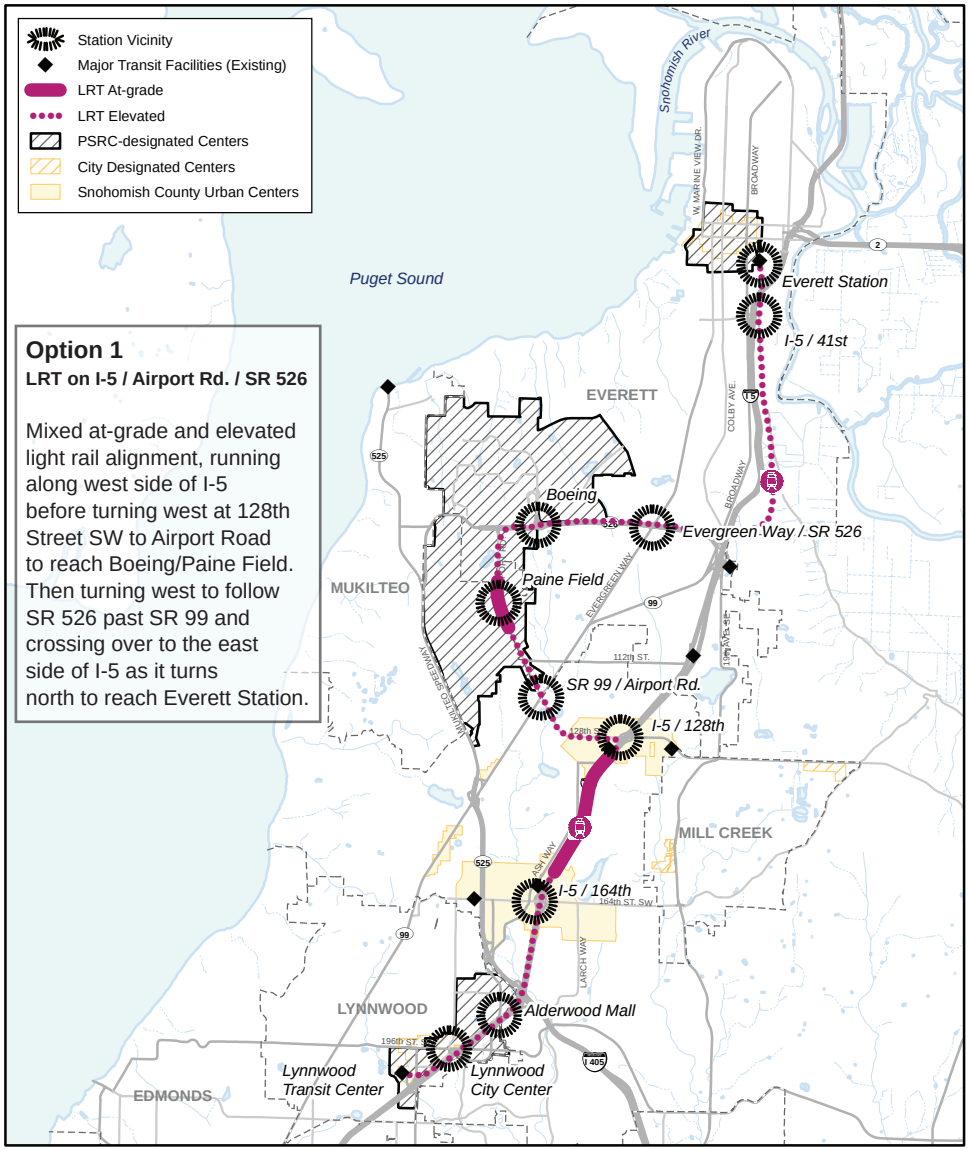
This option consists of light rail transit on I-5, Airport Road, SR 526, and I-5 (Figure 5-1). Notable characteristics include:

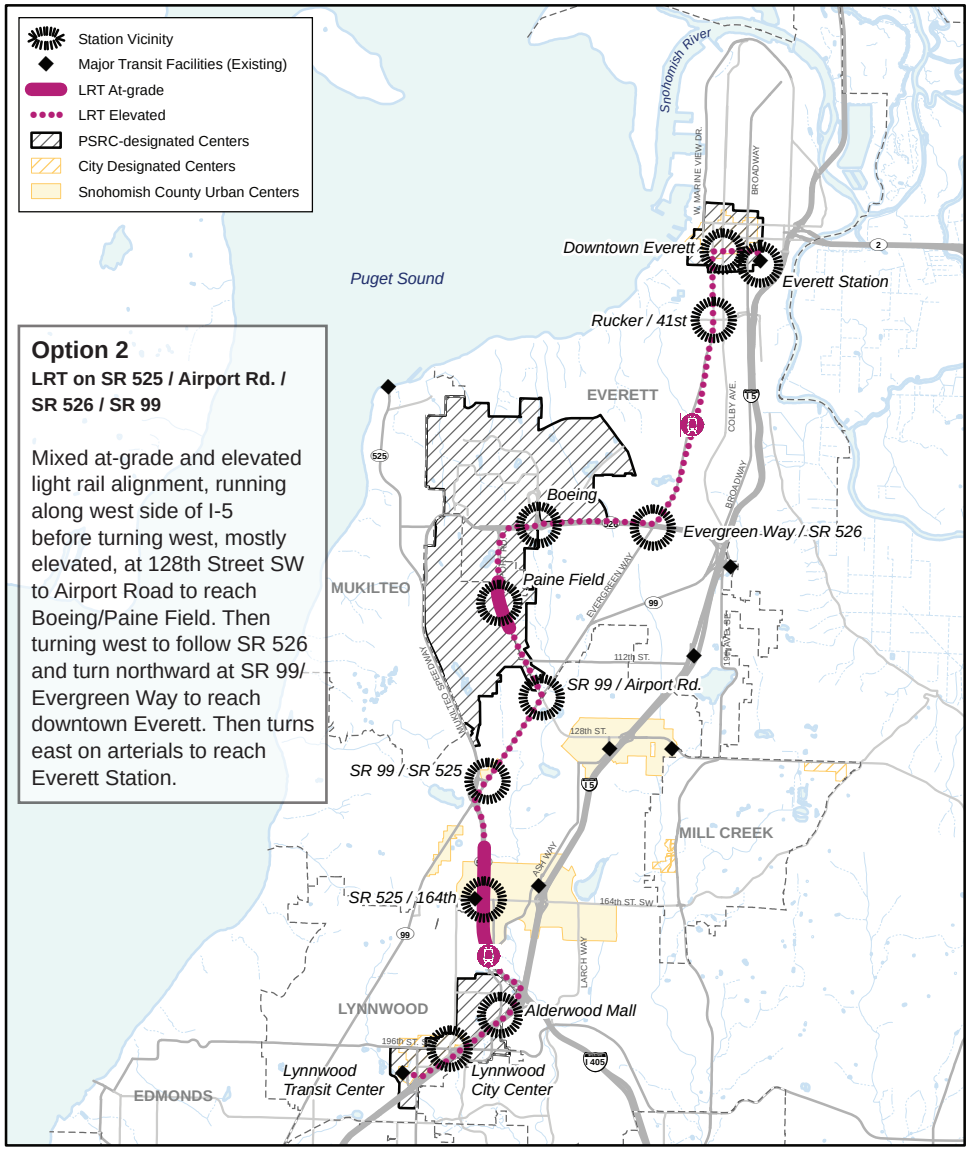
- From Lynnwood Transit Center to 128th Street SE (Mariner Park-and-Ride), the route would travel along the west side of I-5. At Mariner Park-and-Ride, it would travel along 128th Street SE/Airport Road to Boeing and then east along SR 526. At I-5, the alignment would cross to the east side of I-5, then travel north and transition to an existing freight rail corridor right-of-way along the Snohomish River, and continue to the Everett Station.
- This option would be mostly elevated but at-grade opportunities will be explored.
- Potential light rail stations would be near Lynnwood City Center, Alderwood Mall, Ash Way Park-and-Ride, Mariner Park-and-Ride, Airport Road/SR 99, Paine Field, Boeing, SR 526/Evergreen Way/41st Street (east of I-5), and Everett Station.

Option 2 – SR 525/Airport Road/SR 526/SR 99 Light Rail

This option includes light rail transit on SR 525, SR 99, Airport Road, SR 526, and Evergreen Way (Figure 5-1). Notable characteristics include:

- From Lynnwood Transit Center to SR 525 the route would travel along the west side of I-5 and then north along the east or west sides of SR 525 and SR 99 to Airport Road. At Airport Road, it would travel to Boeing and then east back to Evergreen Way. From there, the route would proceed north along the east or west side of Evergreen Way/Rucker Avenue/Pacific Avenue, and then east to Everett Station.
- This option would be mostly elevated but at-grade opportunities will be explored, particularly along SR 525.
- Potential light rail stations would be near Lynnwood City Center, Alderwood Mall, Swamp Creek Park-and-Ride, SR 525/SR 99, Airport Road/SR 99, Paine Field, Boeing, SR 526/Evergreen Way, 41st Street/Rucker Avenue, downtown Everett, and Everett Station.





N

0 0.5 1 2 Miles

SOUNDTRANSIT RIDE THE WAVE

Figure 5-1
Level 1
Options 1 and 2

Lynnwood to Everett HCT
Corridor Study

Option 3 – I-5/Airport Road/SR 99 BRT

This is a BRT option (more than 50 percent in exclusive transitway) on I-5, Airport Road, SR 526, and Evergreen Way (Figure 5-2). Notable characteristics include:

- This option is considered to be an HCT BRT option in that over half of its length would be in exclusive transitway.
- From the Lynnwood Transit Center, the route would travel along the existing I-5 HOV lanes using direct access facilities to access stations until reaching 128th Street SE (Mariner Park-and-Ride). Then it would continue along Airport Road in exclusive transit lanes up to Boeing property. From Boeing, it would travel along either Casino Road or SR 526 in exclusive transit lanes (likely to be elevated) to Evergreen Way where it would continue north in exclusive center transit lanes until Pacific Avenue. BRT would operate in shared lanes on Pacific Avenue to the Everett Station.
- Potential stations would be near Alderwood Mall, Ash Way Park-and-Ride, Mariner Park-and-Ride, Airport Road/SR 99, Paine Field, Boeing, Casino Road or SR 526/Evergreen Way, 41st Street/Rucker Avenue, downtown Everett, and Everett Station.
- Roadway improvements would include an I-5 median flyer stop station for Alderwood Mall, including pedestrian access facilities connecting the flyer stop and the mall area; new direct access transit ramps between I-5 HOV lanes and Ash Way to/from the north, and between I-5 HOV lanes and Mariner Park-and-Ride to/from the south. Direct access transit ramps should be considered between SR 526/Casino Road (to/from the west) and Evergreen Way center transit lanes (to/from the north), as well as reconfiguration of Evergreen Way with center BRT lanes from SR 526 to Pacific Avenue.

Option 4 – I-5 Light Rail

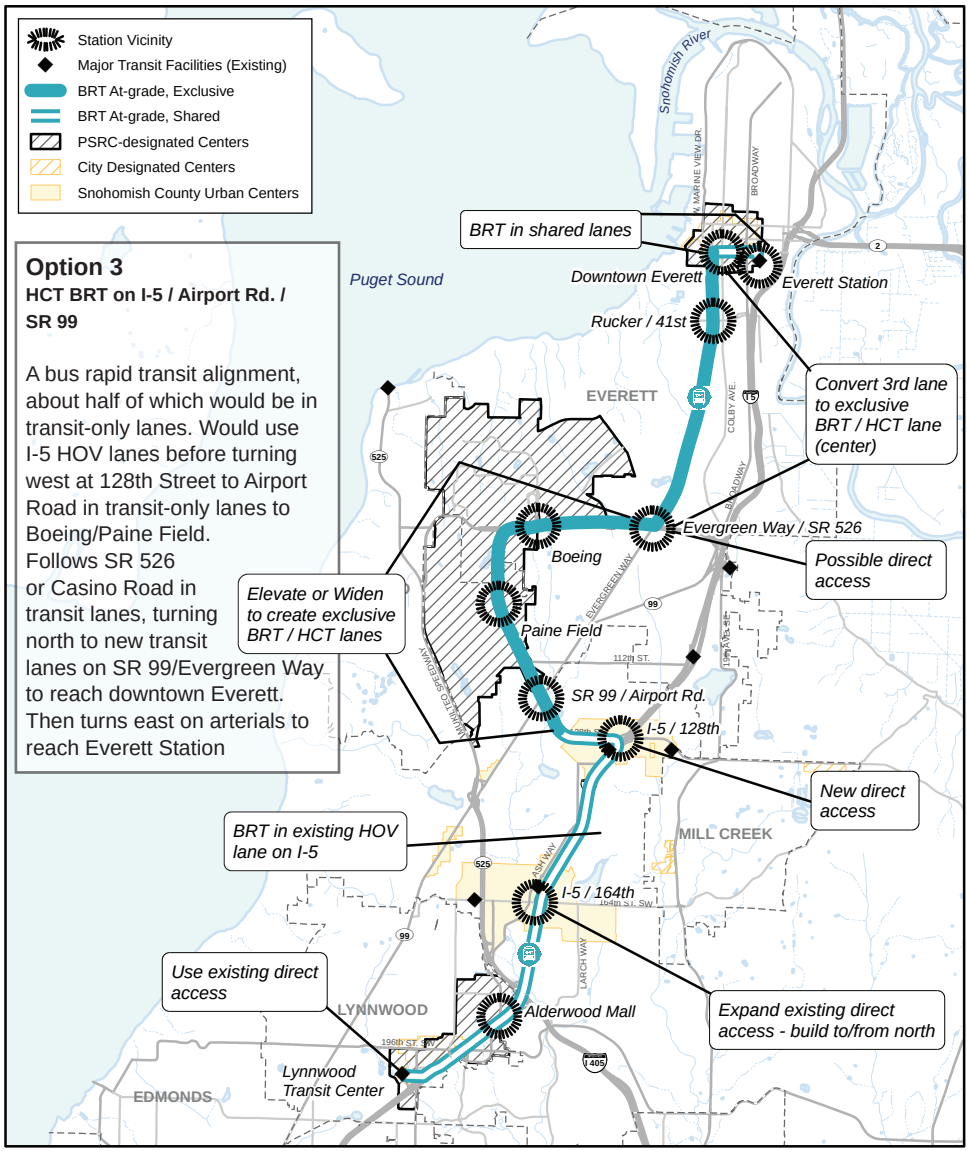
This option consists of light rail transit on I-5 (Figure 5-2). Notable characteristics include:

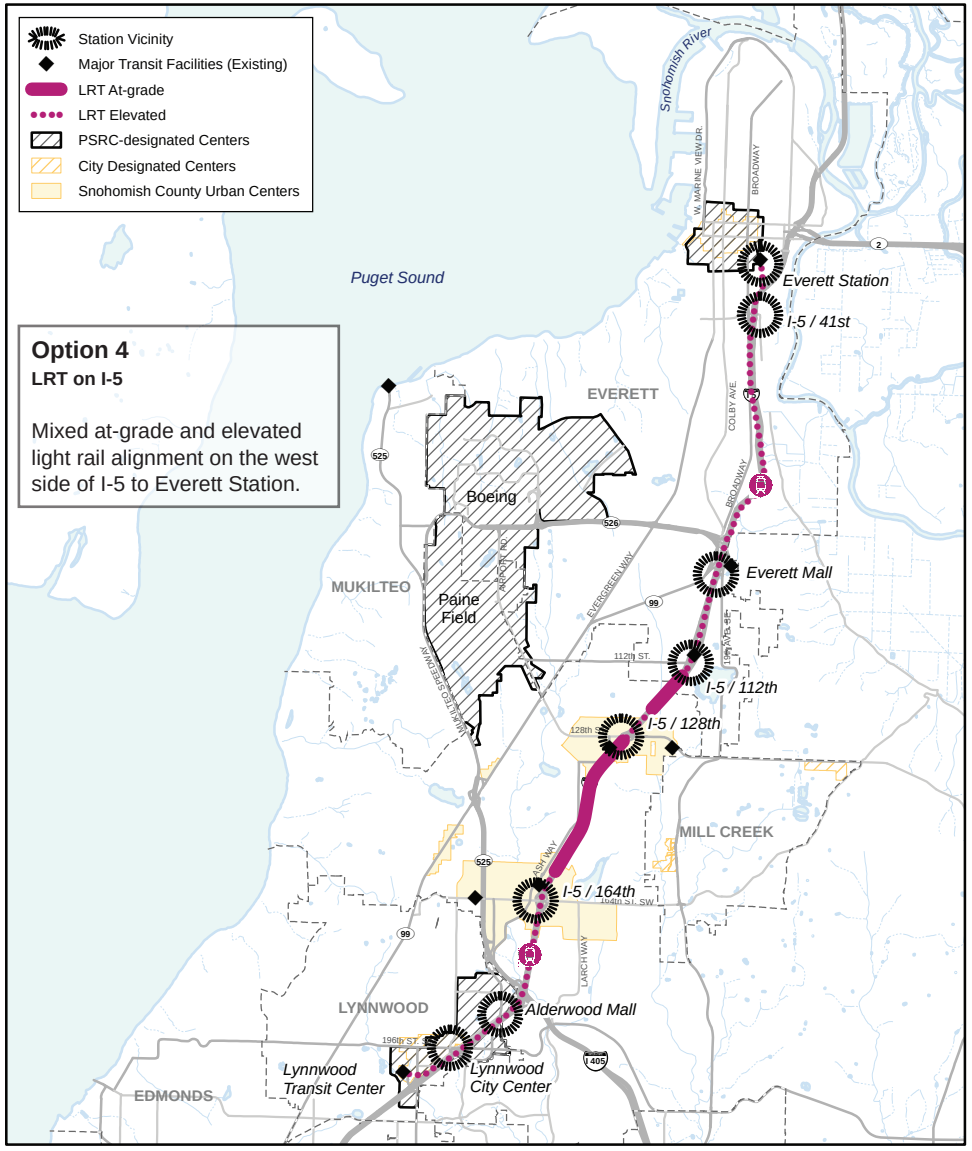
- The majority of the alignment runs along the west side of I-5 within the WSDOT right-of-way, with the exception of the northern terminus in Everett.
- This option would be mostly elevated but at-grade opportunities will be explored.
- Potential light rail stations would be near Lynnwood City Center, Alderwood Mall, Ash Way Park-and-Ride, Mariner Park-and-Ride, South Everett Park-and-Ride, Everett Mall, 41st Street (west of I-5), and Everett Station.

Option 5 – I-5 BRT

This is a BRT option on I-5 which would operate primarily in existing I-5 HOV lanes (Figure 5-3). Notable characteristics include:

- The majority of the route would travel along the existing I-5 HOV lanes using direct access HOV lanes or transit facilities to access stations.





N

0 0.5 1 2 Miles

SOUNDTRANSIT RIDE THE WAVE

Figure 5-2
Level 1
Options 3 and 4

Lynnwood to Everett HCT Corridor Study

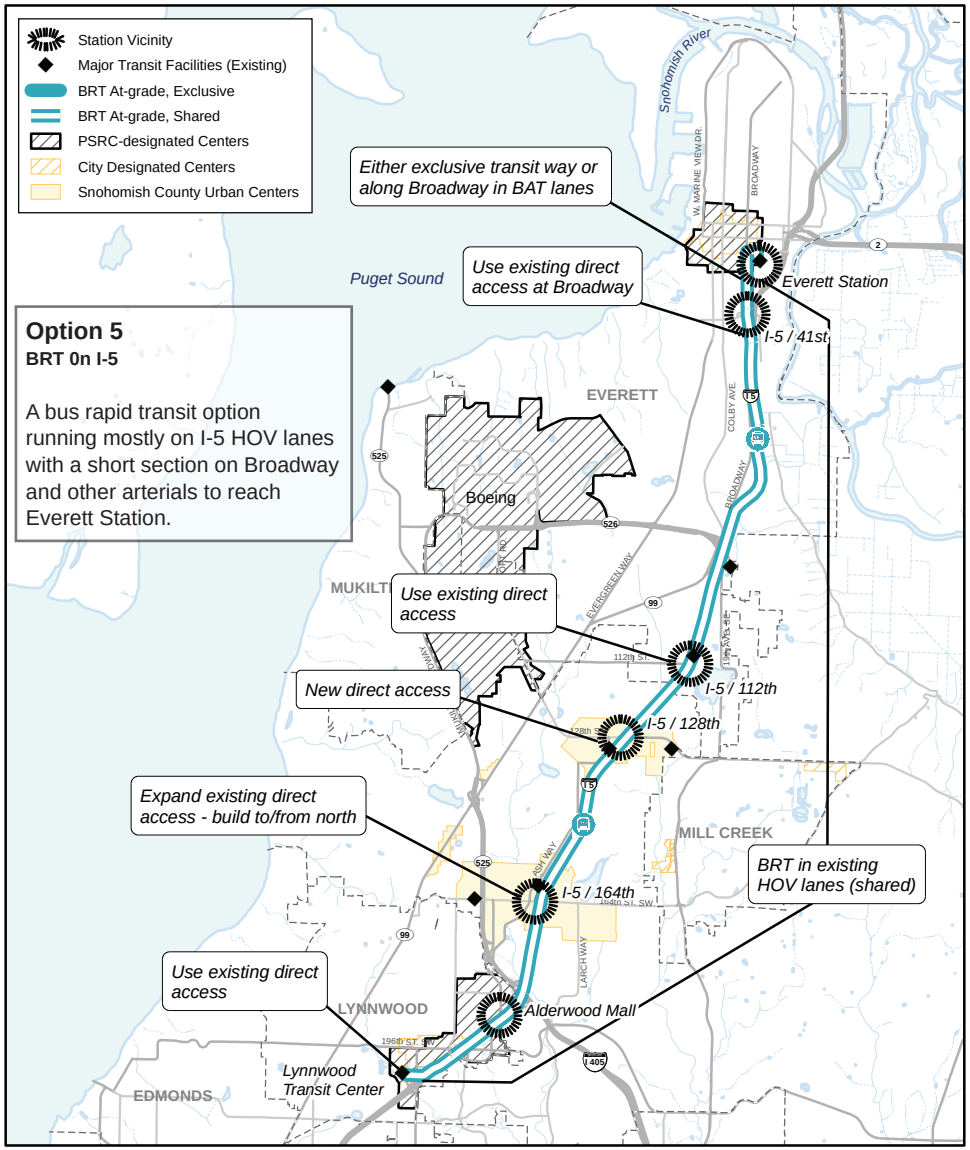


Figure 5-3
Level 1
Option 5

Lynnwood to Everett HCT
Corridor Study

- Between I-5 and the Everett Station, the route would use the direct access ramps to/from Broadway, and then either travel in an exclusive transitway connecting the Broadway ramps with Smith Avenue south of 36th Street, or along Broadway in business access and transit (BAT) lanes, and then along 33rd Street (to Everett Station) and 36th Street (from Everett Station) in shared lanes.
- Potential stations would be near Alderwood Mall, Ash Way Park-and-Ride, Mariner Park-and-Ride, South Everett Park-and-Ride, Broadway/41st Street, and Everett Station.
- Infrastructure improvements would include an I-5 median flyer stop station for Alderwood Mall, including pedestrian access facilities connecting the flyer stop and the mall area; new direct access transit ramps between I-5 HOV lanes and Ash Way Park-and-Ride to/from the north, and between I-5 HOV lanes and Mariner Park-and-Ride to/from the north and south.

Option 6a – SR 99 Light Rail (Elevated)

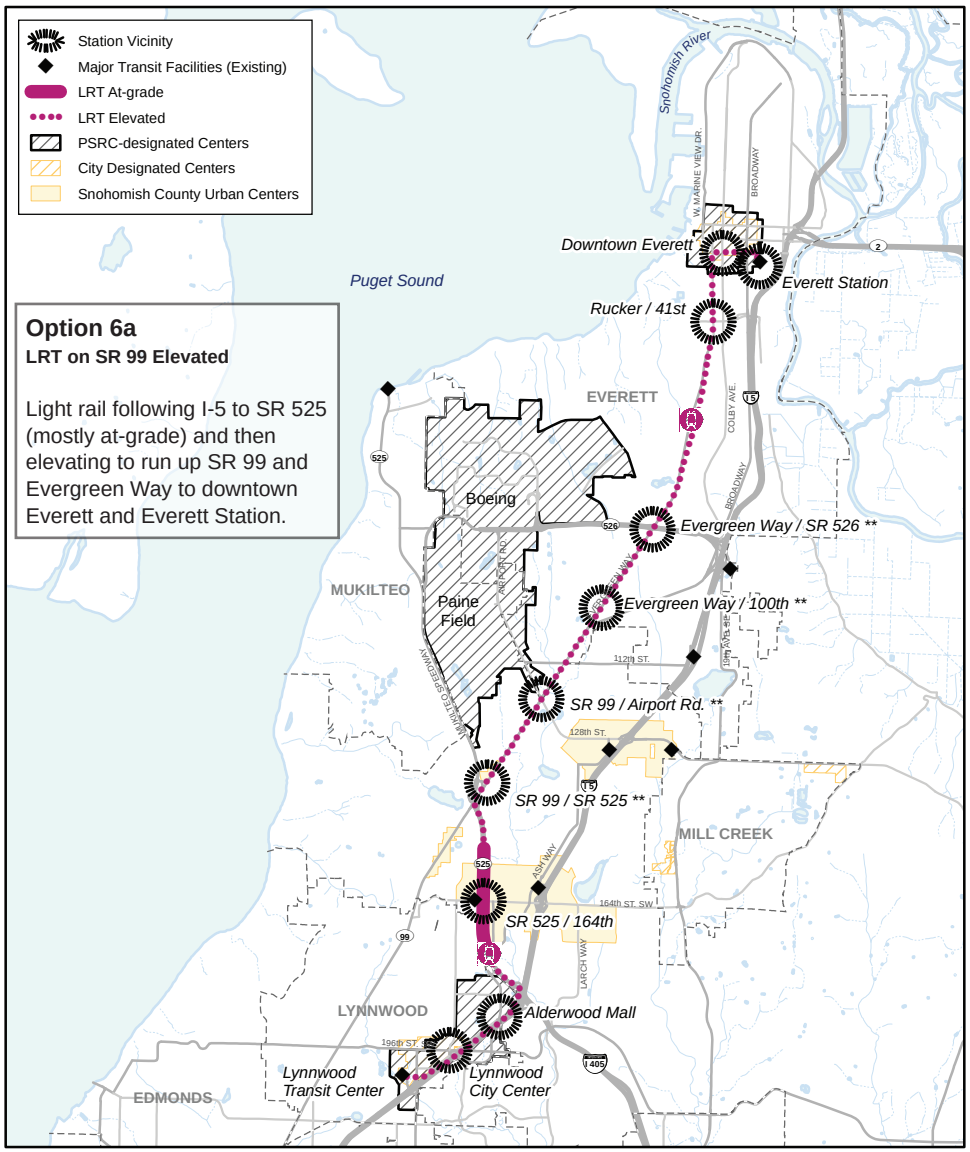
This light rail transit option would operate on SR 525, SR 99, and Evergreen Way. The section along Evergreen Way would be elevated (Figure 5-4). Notable characteristics include:

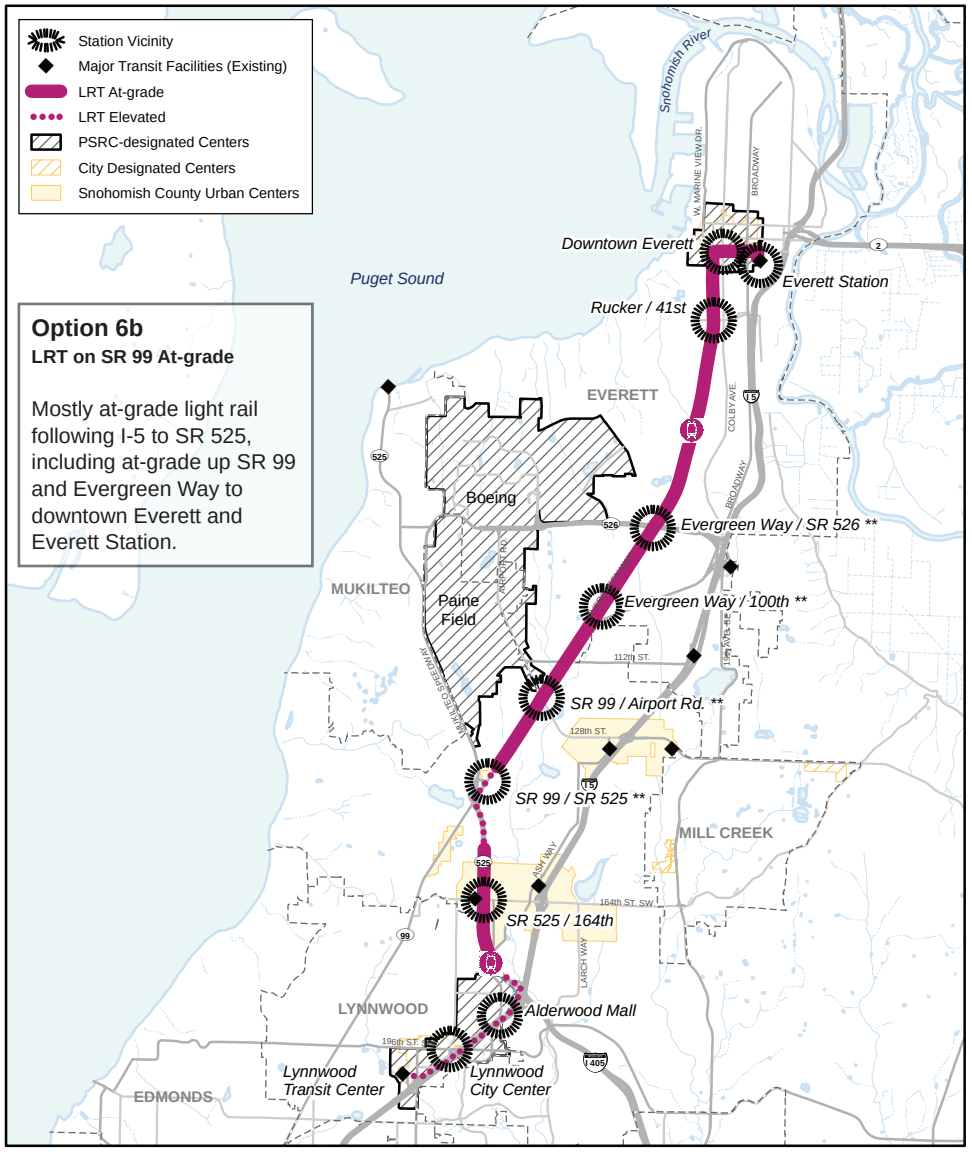
- The majority of the alignment, which would travel along SR 99/Evergreen Way, would be elevated for Option 6a. This elevated option would run along either the east or west side of SR 99 between SR 525 and Pacific Avenue.
- Between the Lynnwood Transit Center and SR 99, the alignment would travel along the west side of I-5 and then become at-grade either on the east or west side of SR 525.
- Potential light rail stations would be near Lynnwood City Center, Alderwood Mall, and Swamp Creek Park-and-Ride. Only two of the following four stations would be included: SR 525/SR 99, Airport Road/SR 99, 100th Street SW/Evergreen Way, and SR 526/Evergreen Way. Other stations would be at 41st Street/Rucker Avenue, downtown Everett, and Everett Station.

Option 6b – SR 99 Light Rail (At-Grade)

This is a light rail transit option also on SR 525, SR 99, and Evergreen Way; however, the section along Evergreen Way would operate at-grade (Figure 5-4). Notable characteristics include:

- The majority of the alignment, which runs along SR 99/Evergreen Way, would be at-grade for Option 6b. This at-grade option would travel in the center of Evergreen Way, keeping two travel lanes in each direction. Turn lanes would be provided at critical intersections.
- Between the Lynnwood Transit Center and SR 99, the alignment would travel along the west side of I-5 and then at-grade either on the east or west side of SR 525.
- Potential light rail stations would be near Lynnwood City Center, Alderwood Mall, and Swamp Creek Park-and-Ride. Only two of the following four stations would be included: SR 525/SR 99, Airport Road/SR 99, 100th Street SW/Evergreen Way, and SR 526/Evergreen Way. Other stations would be at 41st Street/Rucker Avenue, downtown Everett, and Everett Station.





N 0 0.5 1 2 Miles

SOUNDTRANSIT RIDE THE WAVE

Figure 5-4
Level 1
Options 6a and 6b

Lynnwood to Everett HCT
Corridor Study