April 2015

Federal Way Link Extension

Draft Environmental Impact Statement

SOUNDTRANSIT
Central Puget Sound
Regional Transit Authority

U.S. Department of Transportation
Federal Transit Administration

SOUNDTRANSIT

April 10, 2015

Dear Recipient:

The U.S. Department of Transportation Federal Transit Administration (FTA) and Sound Transit (the Central Puget Sound Regional Transit Authority) have prepared this Draft Environmental Impact Statement (Draft EIS) on the proposed Federal Way Link Extension. Sound Transit is the project proponent.

The Draft EIS has been prepared pursuant to the National Environmental Policy Act (42 U.S.C. 4321 to 4370e) and the State Environmental Policy Act (Ch. 43.21C RCW). It has been prepared to inform the public, agencies and decision makers about the environmental consequences of building and operating the Federal Way Link Extension in the cities of SeaTac, Kent, Des Moines, and Federal Way. The Draft EIS examines the project alternatives identified by the Sound Transit Board in September 2013.

The major choices for the project involve the route of the light rail line and station locations. The Sound Transit Board will consider the Draft EIS, public and agency comments, and other information before identifying a preferred route and station locations. FTA and Sound Transit will prepare a Final EIS which will respond to comments on the Draft EIS and include an evaluation of impacts and mitigation for the preferred alternative and other alternatives considered. After completion of the Final EIS the Sound Transit Board will select the project to be built. FTA will also issue a Record of Decision, which will state FTA's decision on the project and list Sound Transit's mitigation commitments to reduce or avoid impacts.

The Draft EIS includes appendices and technical reports on the enclosed CD. Please see the Fact Sheet of this Draft EIS regarding document availability and who to contact for further information about the Draft EIS.

Sincerely,

Kent Hale
Environmental Affairs and Sustainability

Central Puget Sound Regional Transit Authority • Union Station
401 S. Jackson St., Seattle, WA 98104-2826 • Reception: (206) 398-5000 • FAX: (206) 398-5499
www.soundtransit.org

This page intentionally left blank

FEDERAL WAY LINK EXTENSION
KING COUNTY, WASHINGTON
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Submitted pursuant to
the National Environmental Policy Act (NEPA) (42 USC 4322(2)(c))
and the State Environmental Policy Act (SEPA) (Ch. 43.21C RCW)
by the
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION
and
CENTRAL PUGET SOUND REGIONAL TRANSIT AUTHORITY
(Sound Transit)
in cooperation with
FEDERAL HIGHWAY ADMINISTRATION
U.S. ARMY CORPS OF ENGINEERS
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
KING COUNTY METRO
CITY OF SEATAC
CITY OF DES MOINES
CITY OF KENT
CITY OF FEDERAL WAY

3/23/15
Date of Approval

Regional Administrator
For Federal Transit Administration, Region 10

3/23/15
Date of Approval

SEPA Responsible Official
For Central Puget Sound Regional Transit Authority

This page intentionally left blank.

Fact Sheet

Proposed Action

The Central Puget Sound Regional Transit Authority (Sound Transit) is proposing to expand the regional light rail system south from the city of SeaTac to Federal Way, Washington. The proposed light rail extension, called the Federal Way Link Extension (FWLE, and formerly known as the Federal Way Transit Extension), would be within the cities of SeaTac, Des Moines, Kent, and Federal Way in King County. The proposed project is part of the Sound Transit 2 (ST2) Plan, funding for which was approved by voters in 2008 (Sound Transit, July 2008). Currently, there is projected funding to construct to Kent/Des Moines in the vicinity of Highline College.

The proposed project, which is part of the larger regional network of light rail proposed under the ST2 Plan, would begin at the future Angle Lake Station in SeaTac and end in the Federal Way Transit Center area. The 7.6-mile-long project corridor generally parallels State Route (SR) 99 and Interstate 5 (I-5), which are the major north-south routes through the FWLE corridor. It generally follows a topographic ridge between Puget Sound and the Green River Valley where the city limits of SeaTac, Des Moines, Kent, and Federal Way meet.

This Draft Environmental Impact Statement (EIS) evaluates several build (light rail) alternatives and a No Build Alternative, which considers how the transportation system would operate if the proposed project were not built. The No Build Alternative also provides a baseline against which to measure the impacts of the build alternatives. The light rail alternatives include at-grade, trench, and elevated light rail alignments with different station configurations. Four alternatives are evaluated, each with between four and nine station or alignment options.

Project Proponent and State Environmental Policy Act (SEPA) Lead Agency

Central Puget Sound Regional Transit Authority (Sound Transit)
401 South Jackson Street
Seattle, Washington 98104-2826
www.soundtransit.org

Dates of Construction and Opening

Sound Transit proposes to begin construction of the FWLE by 2019, and the light rail line is expected to open to Kent/Des Moines in 2023.

National Environmental Policy Act (NEPA) Lead Agency

Federal Transit Administration
915 Second Avenue, Suite 3142
Seattle, Washington 98174-1002
www.fta.dot.gov/about/region10

NEPA Responsible Official

Richard Krochalis, Regional Administrator for Region 10
Federal Transit Administration
915 Second Avenue, Suite 3142
Seattle, Washington 98174-1002

SEPA Responsible Official

Perry Weinberg, Director, Office of Environmental Affairs and Sustainability
Sound Transit
401 South Jackson Street
Seattle, WA 98104-2826

Contacts for Additional Information

Sound Transit
Kent Hale, Senior Environmental Planner (206) 398-5103
Erin Green, Environmental Planner (206) 398-5464
Tralayne Myers, Community Outreach Specialist (206) 398-5014
Mailing Address:
Sound Transit
401 South Jackson Street
Seattle, WA 98104-2826

Federal Transit Administration
Steve Saxton, Transportation Program Specialist
Federal Transit Administration Region 10
915 2nd Avenue, Suite 3142
Seattle, WA 98174-1002
(206) 220-4311

Potential Permits and Approvals

Federal Agencies	
Federal Highway Administration (FHWA)	• The following would be needed if the project to be built involved use of I-5 right-of-way: • Air Space Lease for Use of Interstate Right-of-Way • Limited Access Break • Operations and Maintenance Agreement • NEPA Record of Decision • Design Deviation Approval • I-5 Compatibility Report
Federal Transit Administration (FTA)	• NEPA Final Environmental Impact Statement and Record of Decision • Section 106 • Section 4(f)
U.S. Army Corps of Engineers	• Clean Water Act • Section 404 Wetlands Approval
U.S. Department of the Interior	• National Historic Preservation Act Section 106 • U.S. Department of Transportation Section 4(f)
U.S. Fish and Wildlife Service	• Federal Endangered Species Act Review
National Parks Service	• Section 4(f)
National Oceanic and Atmospheric Administration Fisheries Service	• Federal Endangered Species Act Review
State, County, and Regional Agencies	
Sound Transit	• SEPA Project Approval
Washington Department of Fish and Wildlife	• Hydraulic Project Approval
Washington State Department of Archaeology and Historic Preservation	• National Historic Preservation Act Section 106 Review
Washington State Department of Ecology	• Coastal Zone Management Consistency Certification • National Pollutant Discharge Elimination System Stormwater Discharge Permit, Clean Water Act Section 402 • Underground Storage Tank (UST) 30-Day Notice • Wastewater Discharge Permit • Water Quality Certification: Clean Water Act Section 401
Washington State Department of Ecology and Puget Sound Clean Air Agency	• Notice of Construction (Air Quality)
Washington State Department of Transportation	• Air Space Lease: State Transportation Routes and Interstate Right-of-Way (with FHWA) • Construction Oversight Agreement • Utility Franchise • Design Documentation Package • General Permits • Limited Access Break (with FHWA) • Operations and Maintenance Agreement (with FHWA) • Survey Permits • I-5 Compatibility Report (with FHWA)
Cities	
SeaTac, Des Moines, Kent and/or Federal Way	• Administrative Conditional Use and/or Design Review Approvals, Binding Lot Adjustments, and Site Plan Approvals

	• Building Permits: Mechanical, Plumbing, Electrical, Signs, Fences, and Awnings • Comprehensive Plan or Development Code Consistency Review, Special Use Permits, and/or Zoning Revision Applications • Construction Permits: Clearing and Grading, Demolition, Drainage, Driveways, Haul Routes, Landscape and Irrigation, Parking, Sanitary Sewers, Side Sewers, Street Use, Tree Protection, Use of City Right-of-Way, and Walls • Conveyance (elevators and/or escalators) • Environmental Critical Areas/Sensitive Areas Review including Wetlands, Streams, Steep Slopes, Flood Zones, Critical Habitat, and Buffers • Fire Protection and Hydrant Use Permits • Inspection Record Approval and Occupancy Permits • Noise Variances • Reviews and Approvals: Planning, Design, and Arts Commissions • Right-of-Way Permit or Franchise (utilities) • Street and Alley Vacations • Permanent, Interim, or Temporary Street Use Permits • Access or Use Easements for City-owned Properties • Removal/Abandonment of Residential USTs or Underground Heating Oil Tanks • Traffic, Transportation, and Parking Approvals • Use of City Right-of-Way (for construction) • Water Meter and Water Main Permits and Approvals • Floodplain Development License • Master Use Permit • Master Development Plan Approval
Other	
Utility Providers	• Pipeline and Utility Crossing Permits • Easements and Use Agreements

Principal Contributors

This EIS was prepared by consultants at the following firms: CH2M HILL, HDR Inc., ATS, Entech Consulting Group, Michael Minor and Associates, BERK Associates, and PRR. See Appendix A2 for a detailed list of preparers and the nature of their contributions.

Date of Issue of Draft Environmental Impact Statement

April 10, 2015

Commenting on the Draft EIS

The Draft EIS will be available for a comment period of 45 days. Comments on the Draft EIS can be made in writing, by e-mail, or at the public hearings. All comments are due by close of business on May 26, 2015. Send written comments to the following address:

Attention: Federal Way Link Extension Draft EIS Comments
Sound Transit
401 South Jackson Street
Seattle, Washington 98104

E-mail comments should be sent to FWLE@soundtransit.org. Written or e-mailed comments should include an addressee and return address. You may also offer comments at a public hearing/open house:

May 6, 2015 - Federal Way
4:00 p.m. to 7:00 p.m. (public hearing begins at 5:30 p.m.)
Federal Way Community Center
876 S 333rd Street
Federal Way, WA 98003

May 7, 2015 - Des Moines
4:00 p.m. to 7:00 p.m. (public hearing begins at 5:30 p.m.)
Highline College Student Union Building
2400 S 240 Street
Des Moines, WA 98198

Next Actions

Following publication of this Draft EIS and the close of the public comment period, the Sound Transit Board of Directors is expected to consider the comments received and identify a Preferred Alternative for evaluation in the Final EIS. The Final EIS will analyze the Preferred Alternative along with the other proposed light rail alternatives and the No Build Alternative. The Final EIS will also respond to the public and agency comments on the Draft EIS. Following issuance of the Final EIS, the Sound Transit Board of Directors will make a final decision on the FWLE alignment and station locations to be built.

The Federal Transit Administration will then issue a Record of Decision (ROD) describing the project Sound Transit will build and how it will avoid, minimize, and mitigate environmental impacts.

Related Documents

- Final Supplemental Environmental Impact Statement, Long-Range Plan Update (Sound Transit, 2014)
- Federal Way Transit Extension Alternatives Analysis Level 1 Evaluation (Sound Transit, 2013a)
- Federal Way Transit Extension Alternatives Analysis Level 2 Evaluation (Sound Transit, 2013b)

- Final Environmental Impact Statement, Transportation 2040: Metropolitan Transportation Plan for the Central Puget Sound Region (Puget Sound Regional Council [PSRC], 2010a)
- Sound Transit 2: A Mass Transit Guide, The Regional Transit System Plan for Central Puget Sound (Sound Transit, 2008)
- Regional Transit Long-Range Plan Final Supplemental Environmental Impact Statement (Sound Transit, 2005a)

All the above Sound Transit documents are available on the Sound Transit Web site, www.soundtransit.org.

Cost of Document and Availability for Review and/or Purchase

This Draft EIS is available for public review in a variety of formats and locations. It is available on the Sound Transit website (http://www.soundtransit.org/Projects-and-Plans/Federal-Way-Link-Extension) and on compact disk (CD) at no cost. Paper copies are available for the cost listed below, which does not exceed the cost of reproduction:

- Executive Summary – free
- Draft EIS – $25.00
- Technical Reports – $15.00 each
- Conceptual Design Drawings (Appendix F) – $25.00

Paper copies of these documents are available for review or purchase at the offices of Sound Transit, Union Station, 401 South Jackson Street, Seattle, Washington 98104. To request any of the documents, please contact Erin Green at (206) 398-5464. To review them, please call the Sound Transit librarian at (206) 398-5344 weekdays from 8:00 a.m. to 5:00 p.m. to arrange an appointment.

Paper and CD copies of the Draft EIS documents are also available for review at the following public places:

- King County Library System:
  - Des Moines Library, 21620 11th Ave S, Des Moines
  - Kent Library, 212 2nd Ave N, Kent
  - Woodmont Library, 26809 Pacific Highway S, Des Moines
  - Federal Way 320th Library, 848 S 320th Street, Federal Way
  - Federal Way Library, 34200 1st Way S, Federal Way
- Washington State Library: Point Plaza East, 6880 Capitol Boulevard SE, Tumwater

Table of Contents

List of Tables

List of Exhibits

Appendices

*Provided on CD with the Draft EIS and available on the project website at http://www.soundtransit.org/Projects-and-Plans/Federal-Way-Link-Extension. Printed versions are available on request.

This page intentionally left blank.

EXECUTIVE SUMMARY

ES.1 Introduction

The Central Puget Sound Regional Transit Authority (Sound Transit) is proposing to build and operate the Federal Way Link Extension (FWLE), which would expand the regional light rail system from SeaTac to Federal Way, Washington. The proposed project would be in the cities of SeaTac, Des Moines, Kent, and Federal Way in King County (Exhibit ES-1). The FWLE is an element of Sound Transit 2: a Mass Transit Guide, The Regional Transit System Plan for Central Puget Sound (ST2), financing for which was approved by the voters in November 2008. ST2 funded construction and operation of the portion of the FWLE from SeaTac to Kent/Des Moines. The length and configuration of the constructed project will depend on project funding and project costs. However, this Draft Environmental Impact Statement (EIS) evaluates alternatives for the whole FWLE corridor from SeaTac to Federal Way.

FWLE WOULD EXPAND THE REGIONAL LIGHT RAIL SYSTEM FROM SEATAC TO FEDERAL WAY.

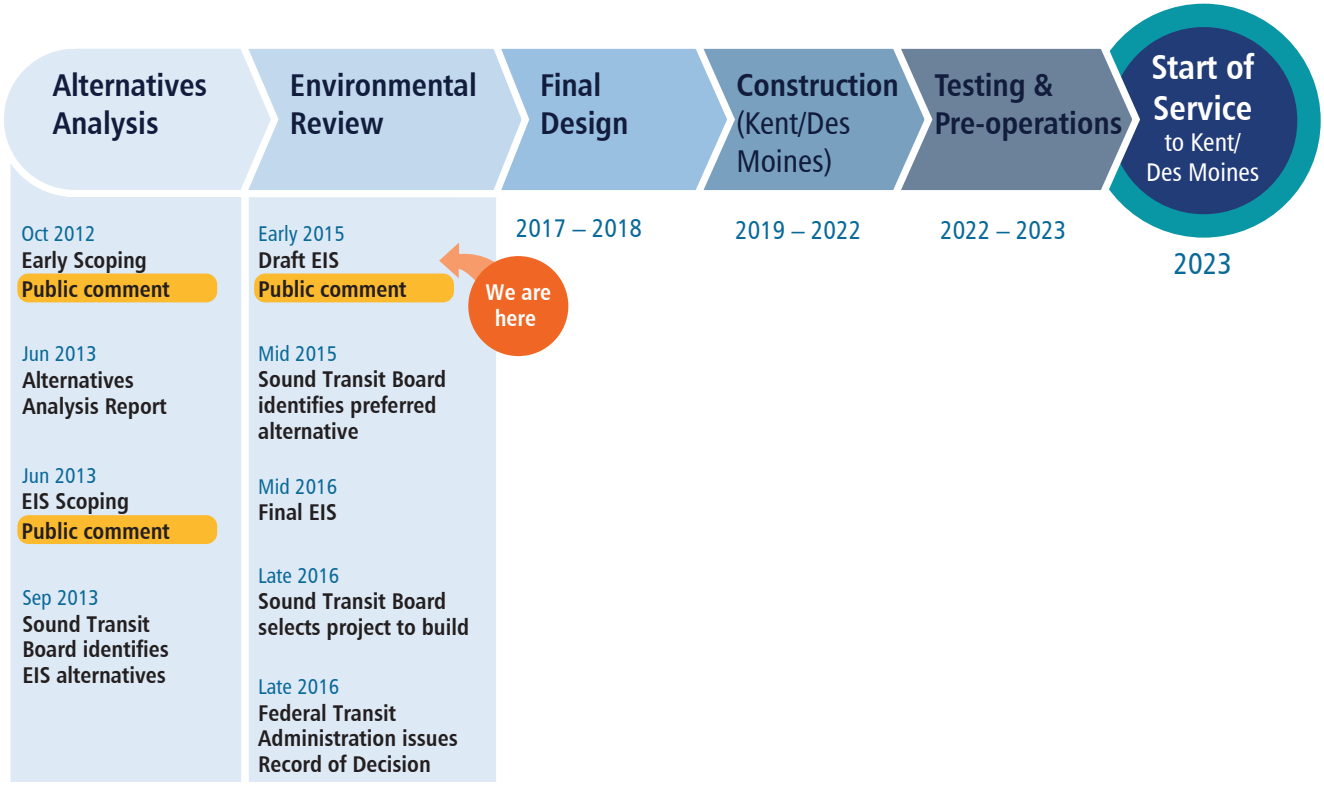
The FWLE will help implement the Puget Sound Regional Council's (PSRC) VISION 2040 (PSRC, 2009) and the updated Sound Transit 2014 Regional Transit Long-Range Plan (Long-Range Plan) (Sound Transit, 2014). Both of these plans call for the eventual extension of high-capacity transit service between SeaTac and Tacoma, known as the South Corridor.

This Draft Environmental Impact Statement (EIS) evaluates several build (light rail) alternatives and a No Build Alternative, which considers how the transportation system would operate if the proposed project were not built. The No Build Alternative also provides a baseline against which to measure the impacts of the build alternatives. The light rail alternatives include at-grade, elevated, and trench light rail profiles with different station configurations. Four alternatives are evaluated, each with between four and nine station or alignment options.

Exhibit ES-2 shows anticipated project milestones for the FWLE. The schedule for final design, construction, and operation will be refined as the project nears the end of environmental review and preliminary design.

EXHIBIT ES-1
SOUND TRANSIT REGIONAL LIGHT RAIL SYSTEM

EXHIBIT ES-2
PROJECT MILESTONES



ES.2 Purpose & Need

ES.2.1 PURPOSE

The purpose of the FWLE is to expand the Sound Transit Link light rail system from the city of SeaTac to the cities of Des Moines, Kent, and Federal Way in King County in order to:

- Provide a rapid, reliable, accessible, and efficient alternative for travel to and from the corridor and other urban growth and activity centers in the region, with sufficient capacity to meet projected demand.
- Expand mobility by improving connections to the regional multimodal transportation system with peak and off-peak service.
- Provide the high-capacity transit (HCT) infrastructure and service to support the adopted regional and local land use, transportation, and economic development plans. Plans such as PSRC's VISION 2040 call for growth to be concentrated in designated urban centers connected to each other by HCT. Several individual cities have adopted land use plans to support this regional vision.
- Advance the Sound Transit's Long-Range Plan vision, goals, and objectives for high-quality regional transit service connecting major activity centers in King, Pierce, and Snohomish counties.
- Implement a financially feasible HCT system to help preserve and promote a healthy environment.

FWLE WILL DELIVER HIGH-CAPACITY TRANSIT TO URBAN CENTERS LOCATED THROUGHOUT THE FEDERAL WAY CORRIDOR.

ES.2.2 NEED

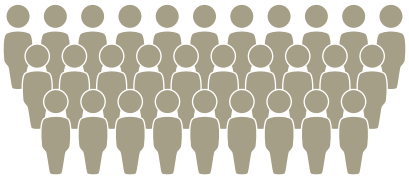
The following conditions within the project corridor demonstrate the need for the project:

- Increasing congestion on Interstate 5 and on the key arterials leading in and out of the study area will further degrade existing transit performance and reliability.
- North-south transit demand is expected to grow by about 40 to 75 percent by 2035 as a result of residential and employment growth in the FWLE corridor. This growth will require additional and more reliable transportation options than currently exist.
- Reliable and efficient peak and off-peak transit service is needed to connect people in the FWLE corridor with the region's growth centers.
- The corridor has a high concentration of transit-dependent populations who need efficient and reliable regional transit connectivity.
- Regional and local plans call for HCT in the corridor consistent with PSRC's VISION 2040 and Sound Transit's Long-Range Plan.
- Environmental and sustainability goals of the state and region include reducing vehicle miles traveled and auto-related greenhouse gas emissions.

ES.3 FWLE Meets the Need

Reliability of bus service in 2035 is expected to degrade compared to existing conditions in the project corridor. Under the No Build Alternative, which includes currently funded and committed road and transit improvements, key transit facilities, such as the I-5 HOV lanes, are expected to have speeds decrease by up to 30 percent in the peak direction of travel during the afternoon-evening rush hour. Without the FWLE, the 2035 transit hours of service to downtown Seattle would be more limited from the Federal Way Transit Center and the Redondo Heights/Star Lake service areas. With the FWLE operating in the corridor, light rail would be more reliable than bus transit because it would operate in an exclusive right-of-way and have no at-grade vehicle crossing conflicts. Adding the FWLE would improve service frequency and provide continuous two-way service for 21 hours a day between the FWLE and many Puget Sound regional destinations.

Bus service frequency in 2035 without the FWLE is expected to operate at the same level as existing conditions or better. However, service frequency to other regional destinations besides Downtown Seattle would be more limited and generally only provided in the peak direction of travel. Light rail to Federal Way would improve the service frequency for connections between Federal Way, Kent, Des Moines, SeaTac, and many other Puget Sound regional destinations, including Downtown Seattle, the University of Washington, Northgate, Lynnwood, Bellevue, Overlake and Redmond. Bus passenger loads would also increase beyond capacity without the FWLE as more pressure is put on the transit system. Several bus routes would exceed their seating capacity, while both bus and light rail would operate at acceptable levels of service with the FWLE, due to the transfer of some bus riders to light rail.



7,500-8,000 NEW RIDERS ARE EXPECTED

The FWLE would provide people who live and work in the FWLE corridor an alternative mode of transportation to get between the corridor and other regional centers, and would complement other local and regional transit services. Of the projected 24,000 to 27,500 riders who would board light rail in the FWLE corridor each day, approximately 7,500 to 8,000 are expected to be new transit riders. The projected ridership forecast for each alternative is based on the adopted regional land use forecasts provided by PSRC, as well as several other factors such as station locations, access to stations, and light rail travel times. Ridership forecasts for all alternatives are estimated to be similar as the alternative station locations and light rail travel times are relatively similar. With a Kent/Des Moines Station interim terminus, however, the daily ridership would vary due to the proximity of stations to SR 99 and transit connections at those stations. The SR 99 Alternative would have the highest ridership, with 9,000 riders, and the I-5 Alternative would have the lowest ridership, with 5,500 riders. The SR 99 to I-5 and I-5 to SR 99 Alternative would both have 8,500 riders. With a S 272nd Station interim terminus, the daily ridership would differ less, with a total project ridership of 12,500 for the SR 99, SR 99 to I-5, and I-5 to SR 99 alternatives, and a ridership of 10,000 for the I-5 Alternative. This would occur because of transit

connections at the S 272nd Star Lake Station, making it easier for riders to transfer to the FWLE at this location.

Providing reliable, frequent service for 21 hours a day to multiple regional destinations would provide greater transit connectivity for transit-dependent populations than is available today. This would have benefits for transit-dependent populations, including access to more employment opportunities and better access to services only provided in larger regional centers, such as Seattle or Bellevue. The FWLE would also reduce vehicle miles traveled by 40,000 miles and vehicle hours traveled by 2,000 hours each weekday. This would also result in reduced vehicle emissions in the corridor.

The FWLE would help fulfill plans for the South Corridor that have been envisioned since the 1990s. Providing HCT was called for in PSRC and Sound Transit plans, and financing for the extension to S 272nd Street in Federal Way was approved by voters in 2008 as part of the ST2 funding package. This package also funded environmental review of an extension from S 272nd Street to Tacoma, which the FWLE would also help implement as far as the Federal Way Transit Center.

ES.4 Alternatives Considered

This Draft EIS compares the environmental effects of a No Build Alternative and four light rail alternatives for the FWLE. The alternatives were defined by the Sound Transit Board of Directors (Board) after early scoping, an alternatives analysis, environmental scoping, and public and agency input, which considered a wide range of alternatives.

ES.4.1 ALTERNATIVES DEVELOPMENT

An early scoping period was held from October 18, 2012, to November 19, 2012, to encourage public and agency input on the project purpose and need and potential alternatives to study in the FWLE corridor. Following the early scoping period, an alternatives analysis process was completed to identify alternatives to study further in the Draft EIS. During this process, Sound Transit developed and reviewed 14 preliminary alternatives for the FWLE corridor between SeaTac and Federal Way. Several alternatives were eliminated because of ridership, cost, construction risk, and environmental impacts.

The NEPA/SEPA scoping period took place from June 17, 2013, to July 17, 2013. Sound Transit conducted the scoping process in consultation with city and county agencies; affected tribes; regional, state, and federal agencies; interest groups; businesses; affected communities; and the public.

RELATIONSHIP TO OTHER TRANSPORTATION AND TRANSIT PROJECTS

The FWLE would intersect with several existing and planned roadway and transit projects. Two that warrant special consideration are the RapidRide A Line operated by King County Metro and the SR 509 Extension Project planned by WSDOT. The RapidRide A Line would continue to serve along SR 99 with the project and would provide local service between the stations and access to the Link system. Riders using the RapidRide A Line would be able to transfer to light rail and the regional transportation system at the Kent/Des Moines Station or Federal Way Transit Center Station. If the SR 99 Alternative is selected, they would also be able to transfer at the S 272nd Redondo Station.

The SR 509 Extension Project would extend SR 509 from its current southern terminus at S 188th Street in SeaTac east to I-5. Appendix F, Conceptual Design Plans, shows the proposed SR 509 Extension in relation to the FWLE. Although no transportation plans include or identify funding to build this project, the FWLE alternatives have been designed to accommodate its full build-out.

Because of these uncertainties, the No Build Alternative does not include the SR 509 extension in the regional transportation network. However, this Draft EIS does include it in the cumulative impacts analysis (Chapter 6) as a reasonably foreseeable future action.

ES.4.2 NO BUILD ALTERNATIVE

The No Build Alternative would be the transportation system and environment as they would exist without the proposed project. The No Build Alternative includes a variety of projects, funding packages, and proposals in the central Puget Sound Region that are planned to occur with or without the FWLE. Improvements with the No Build Alternative primarily consist of funded or committed roadway and transit actions by state, regional, and local agencies combined with other projects that are considered likely to be implemented based on approved and committed funding. PSRC population and employment growth projections for 2035 are the same for the No Build and build alternatives. With the No Build Alternative, Sound Transit would still build the Northgate Link Extension, the Lynnwood Link Extension, the East Link Extension, and a new light rail operations and maintenance satellite facility. Sound Transit would also purchase additional light rail vehicles to serve the expanded system and would provide service enhancements to the Sound Transit Regional Express bus and Sounder commuter rail systems. Minor local bus service additions by King County Metro are also expected; however, the overall bus network and its service levels were generally assumed to remain similar to today.

ES.4.3 BUILD ALTERNATIVES

This section summarizes the four build alternatives evaluated, the impacts associated with each alternative, and the various station and alignment options. It also summarizes potential additional stations that could be added to the project if additional funding were available. These potential additional stations were not included in ST2 and further evaluation of their consistency with the ST2 Plan would be required before they could be added to the FWLE. Exhibits ES-3A to ES-3D and Table ES-1 provide an overview of these alternatives, options, and potential additional stations.

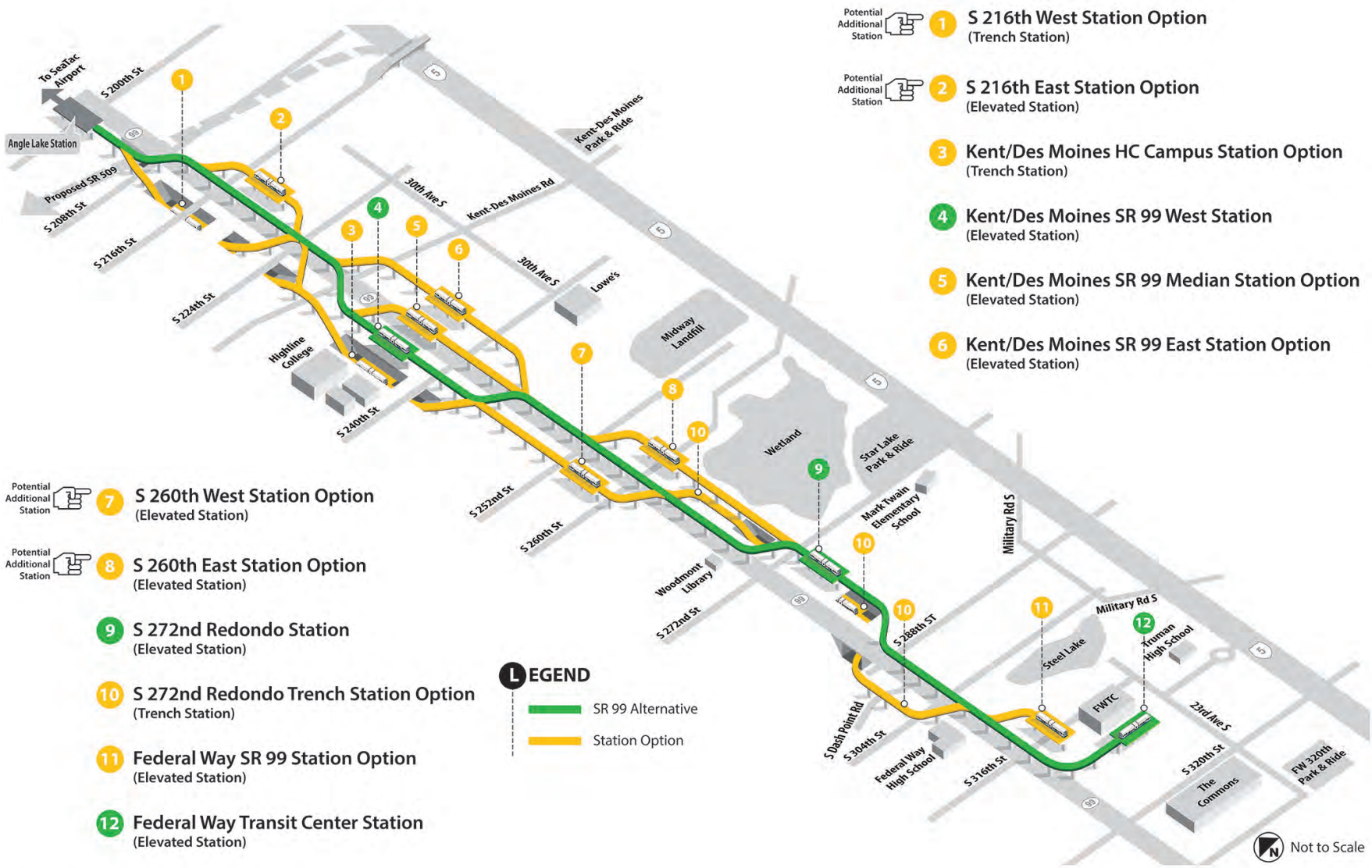
Parking would be provided at the Kent/Des Moines, S 272nd Street, and Federal Way City Center stations. All Kent/Des Moines stations would provide 1,000 spaces (500 structured, 500 surface) if the project is only initially built to Kent/Des Moines. The number of spaces could be reduced to 500 when the project is extended farther south. The S 272nd Redondo Station would have approximately 1,400 parking spaces that would be a combination of structured and surface. The S 272nd Star Lake Station would have approximately 1,240 parking spaces in structure. All Federal Way City Center stations would have approximately 400 parking spaces in structure.

TABLE ES-1
SUMMARY OF ALTERNATIVES EVALUATED IN THE DRAFT EIS

Alternative	Stations	Station Options	Potential Additional Stations	Alignment Options
No Build	▪ None	▪ None	▪ None	▪ None
SR 99	▪ Kent/Des Moines SR 99 West ▪ S 272nd Redondo ▪ Federal Way Transit Center	▪ Kent/Des Moines Highline Community College (HCC) Campus ▪ Kent/Des Moines SR 99 Median ▪ Kent/Des Moines SR 99 East ▪ S 272nd Redondo Trench ▪ Federal Way SR 99	▪ S 216th West ▪ S 216th East ▪ S 260th West ▪ S 260th East	▪ None
I-5	▪ Kent/Des Moines I-5 ▪ S 272nd Star Lake ▪ Federal Way Transit Center	▪ Kent/Des Moines At-Grade ▪ Kent/Des Moines SR 99 East ▪ Federal Way I-5 ▪ Federal Way S 320th Park-and-Ride	▪ None	▪ Landfill Median
SR 99 to I-5	▪ Kent/Des Moines 30th Avenue East ▪ S 272nd Star Lake ▪ Federal Way Transit Center	▪ Federal Way I-5 ▪ Federal Way S 320th Park-and-Ride	▪ S 216th West ▪ S 216th East	▪ Landfill Median
I-5 to SR 99	▪ Kent/Des Moines 30th Avenue West ▪ S 272nd Redondo ▪ Federal Way Transit Center	▪ S 272nd Redondo Trench ▪ Federal Way SR 99	▪ S 260th West ▪ S 260th East	▪ None

What are the Stations?	What are the Station Options?	What are the Potential Additional Station?	What is an Alignment Option?
There are three stations associated with each alternative: Kent/Des Moines, S 272nd (either Redondo or Star Lake) and Federal Way Transit Center.	Station Options are alternative locations for each station area: Kent/Des Moines, S 272nd Street, and Federal Way Transit Center. Options for a station generally have the same station characteristics and serve the same population.	The Alternative Analysis process for the FWLE identified additional station locations on SR 99. These stations could be added to the SR 99 alternatives but are not funded and would require additional approvals.	An alignment option is an alternative route along a portion of the alternative. An alignment option does not include station options.

EXHIBIT ES-3A
FWLE ALTERNATIVES



Potential Additional Station
1 S 216th West Station Option
(Trench Station)

Potential Additional Station
2 S 216th East Station Option
(Elevated Station)

3 Kent/Des Moines HC Campus Station Option
(Trench Station)

4 Kent/Des Moines SR 99 West Station
(Elevated Station)

5 Kent/Des Moines SR 99 Median Station Option
(Elevated Station)

6 Kent/Des Moines SR 99 East Station Option
(Elevated Station)

Potential Additional Station
7 S 260th West Station Option
(Elevated Station)

Potential Additional Station
8 S 260th East Station Option
(Elevated Station)

9 S 272nd Redondo Station
(Elevated Station)

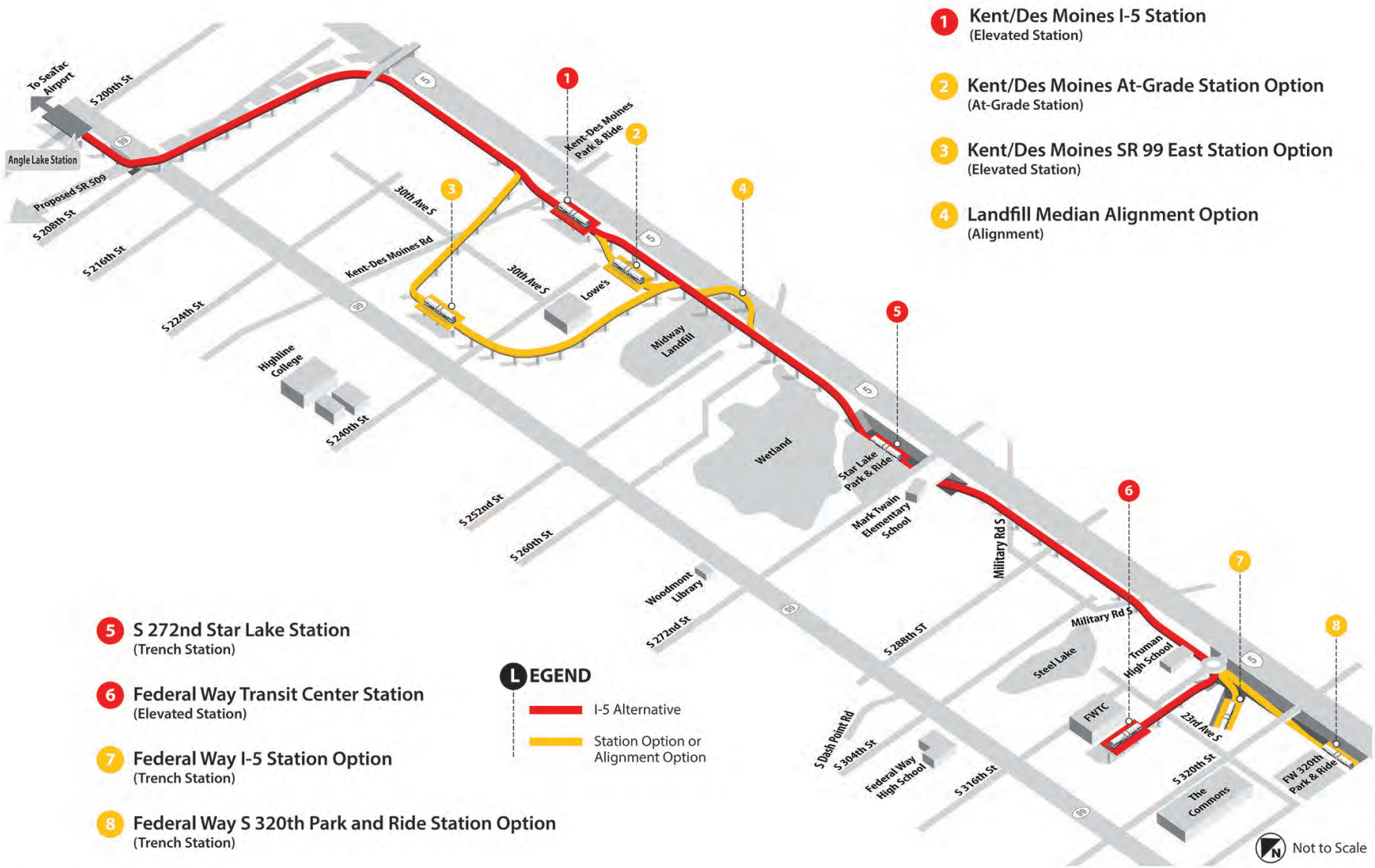
10 S 272nd Redondo Trench Station Option
(Trench Station)

11 Federal Way SR 99 Station Option
(Elevated Station)

12 Federal Way Transit Center Station
(Elevated Station)

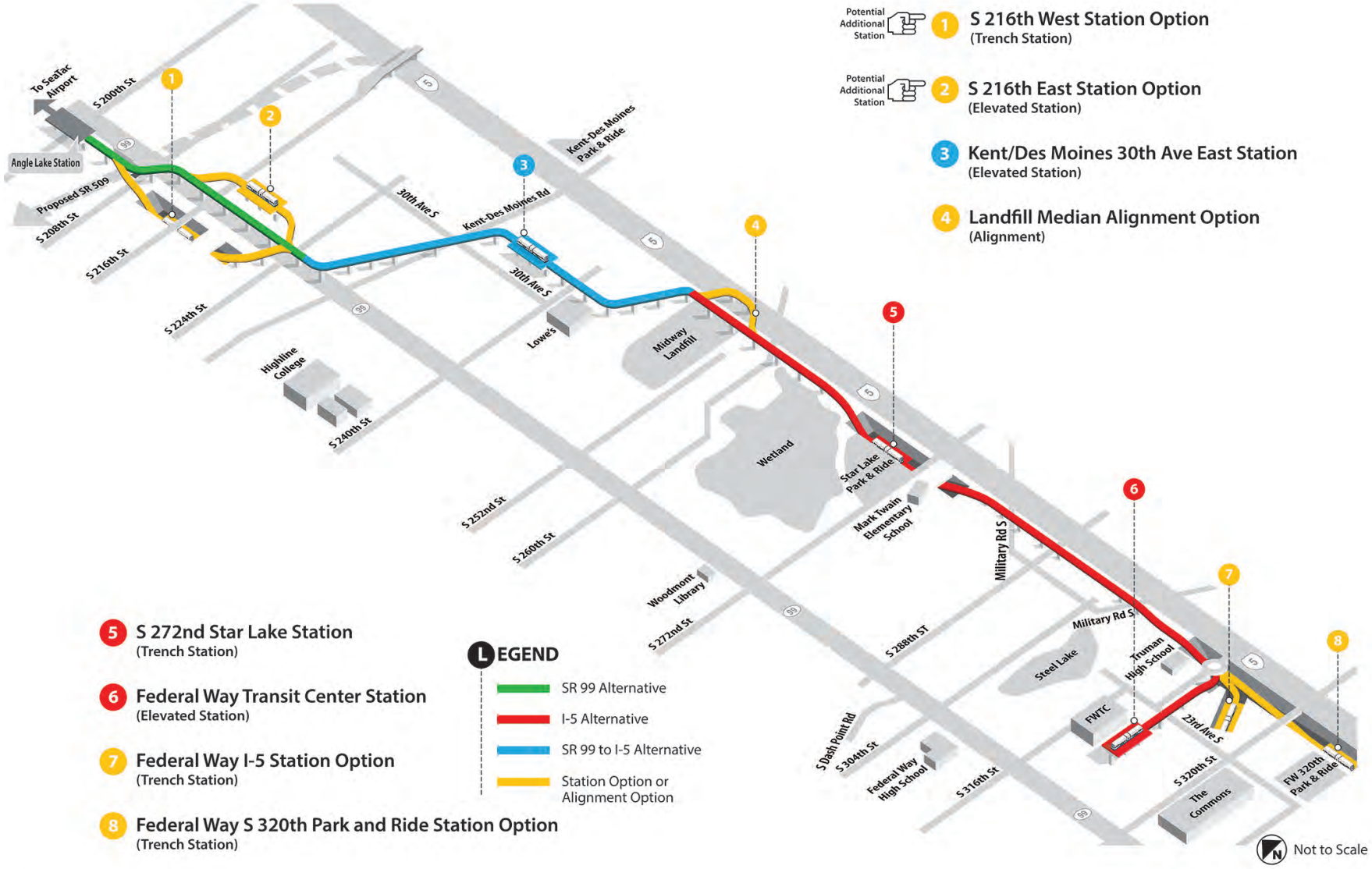
Diagrams are for illustration purposes only and are not to scale.

EXHIBIT ES-3B
FWLE ALTERNATIVES



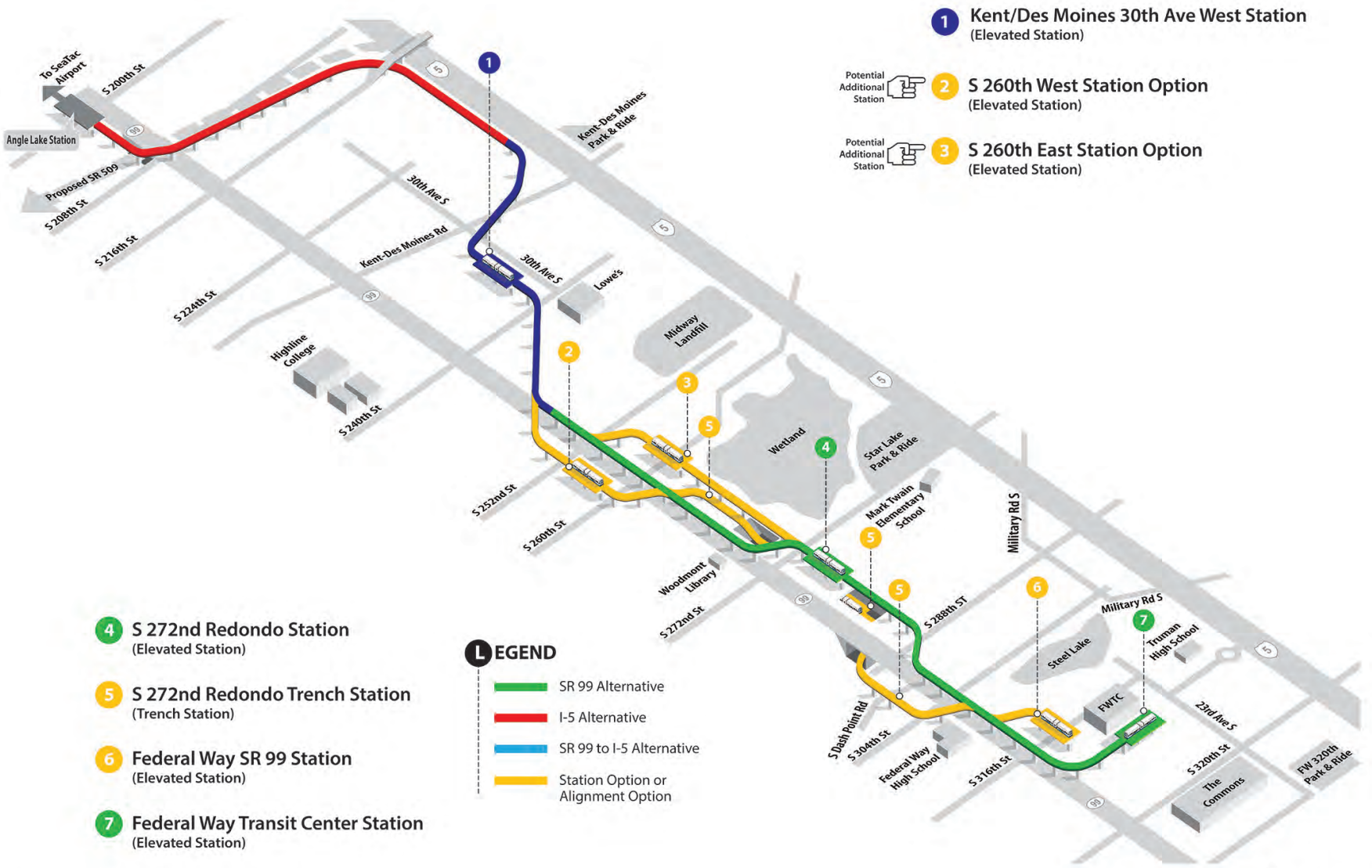
Diagrams are for illustration purposes only and are not to scale.

EXHIBIT ES-3C
FWLE ALTERNATIVES



Diagrams are for illustration purposes only and are not to scale.

EXHIBIT ES-3D
FWLE ALTERNATIVES



Diagrams are for illustration purposes only and are not to scale.

SR 99 Alternative

COST
1.77 Billion

TRAVEL TIME
13 Minutes

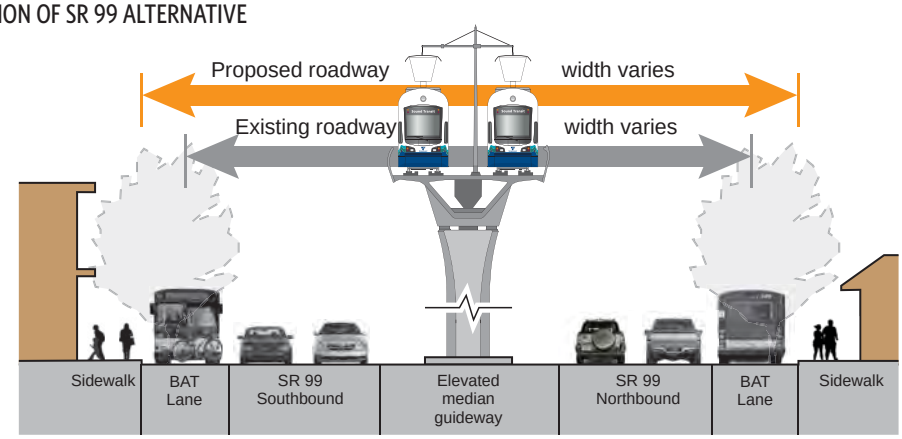
DAILY RIDERSHIP
26,500 Riders

TOD POTENTIAL
119 Acres

DAILY BOARDINGS

Kent/Des Moines Station **3,000** Riders
S 272nd Redondo Station **1,500** Riders
Federal Way Transit Center Station **9,000** Riders

EXHIBIT ES-4
CROSS SECTION OF SR 99 ALTERNATIVE



Proposed condition looking north (not to scale)

The SR 99 Alternative would generally follow SR 99, with stations at Kent/Des Moines, S 272nd Redondo, and the Federal Way Transit Center. It would remain in the median of SR 99 except at station areas and at crossings of Kent-Des Moines Road and S 272nd Street. The entire alignment and all stations would be elevated (Exhibit ES-4). This alternative has several station options and two potential additional stations not included in the ST2 plan. These stations are shown on Exhibit ES-5 and described on the following pages. Exhibit ES-4 shows a typical cross-section of the alignment located in the SR 99 median. Table ES-2 summarizes the impacts of the SR 99 Alternative.

The SR 99 Alternative is projected to have slightly higher ridership than the I-5 Alternative and the lowest residential displacements. It would have the greatest number of business and employee displacements, and would create more disruption to local traffic and business access during construction than other alternatives. It would have minimal impacts on ecosystems, and the least amount of new impervious area. The SR 99 Alternative would have the greatest number of noise impacts, but the lowest number of vibration impacts. This alternative would also have a potential groundborne noise impact at the new Federal Way High School Auditorium. All noise and vibration impacts could be mitigated. Traffic impacts near the Kent/Des Moines Station and S 272nd Redondo Station would be similar to other alternatives, and could be mitigated. This alternative would have visual impacts near S 216th Street and S 288th Street where residences along SR 99 could have views of Puget Sound and the Olympic Mountains partially blocked. The SR 99 Alternative would be the most supportive of transit oriented development (TOD).

EXHIBIT ES-5
SR 99 ALTERNATIVE

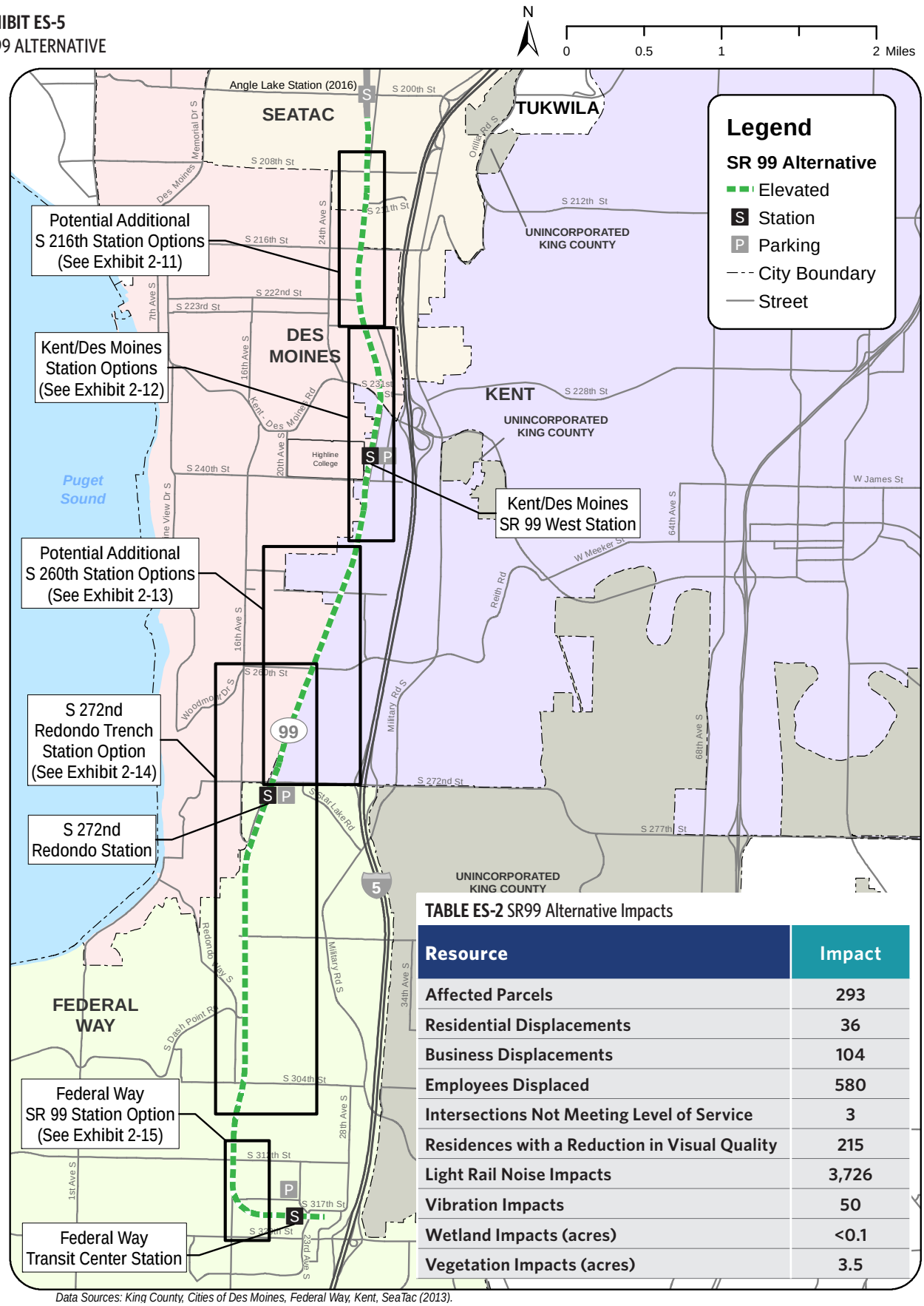


TABLE ES-2 SR99 Alternative Impacts

Resource	Impact
Affected Parcels	293
Residential Displacements	36
Business Displacements	104
Employees Displaced	580
Intersections Not Meeting Level of Service	3
Residences with a Reduction in Visual Quality	215
Light Rail Noise Impacts	3,726
Vibration Impacts	50
Wetland Impacts (acres)	<0.1
Vegetation Impacts (acres)	3.5

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).

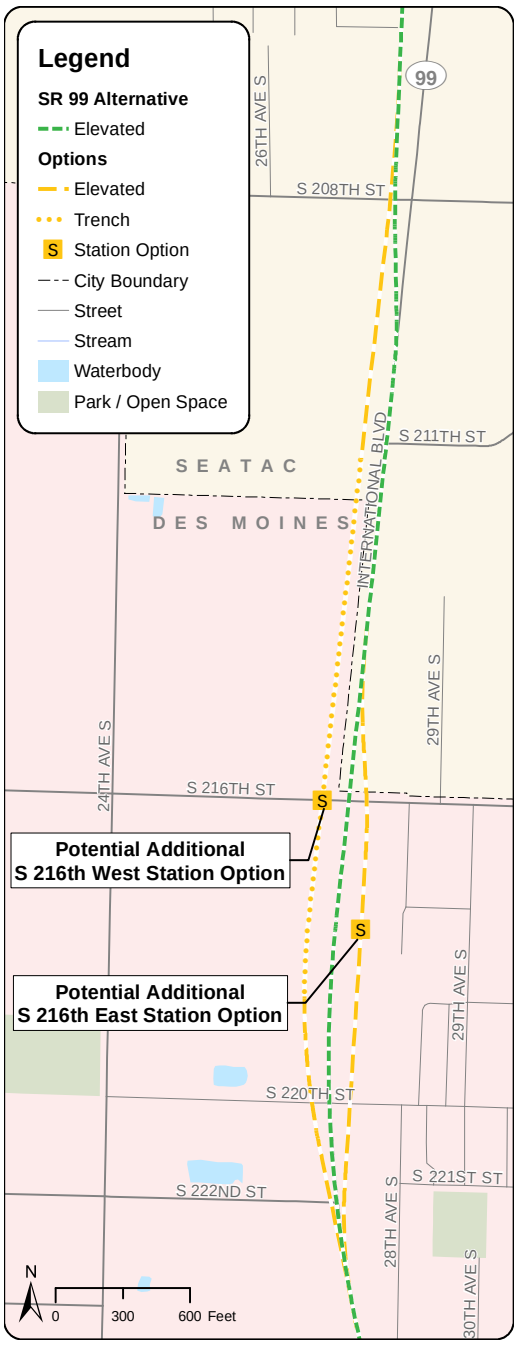
Potential Additional Station Options
S 216TH STREET

Two options are evaluated for the potential additional station at S 216th Street (Exhibit ES-6). The S 216th West Station Option would travel in a trench under S 216th Street west of SR 99 and would add $70M to the cost of the SR 99 Alternative. The S 216th East Station Option would be elevated on the east side of SR 99 and would add $70M. The east station option would result in more residential displacements than the west station option, but the west station option would result in more business and employee displacements (Table ES-3). Both would result in reduced noise impacts, and the west option would reduce vibration impacts while the east option would increase them. All noise and vibration impacts could be mitigated. There would be no additional traffic impacts or impacts on wetlands, wetland buffers, or streams with either option. The S 216th West Station Option would reduce visual impacts in this area by being in a trench on the west side of SR 99.

TABLE ES-3
PERFORMANCE MEASURES & IMPACTS COMPARED TO SR 99 ALTERNATIVE

LEGEND ↑ Increase ↓ Decrease	S 216th West Station Option	S 216th East Station Option
Performance Measures		
Cost Difference	↑ $70 million	↑ $70 million
Change in Daily Project Riders	↑ 500	↑ 500
Change in Travel Time (minutes)	No Change	No Change
TOD Potential within 1/4 mile (acres)	↑ 53	↑ 46
Resource Impacts		
Affected Parcels	↑ 6	↑ 5
Residential Displacements	No Change	↑ 26
Business Displacements	↑ 13	↑ 2
Employment Displaced	↑ 60	↑ 10
Intersections Not Meeting Level of Service	No Change	No Change
Residences with a Reduction in Visual Quality	↓ 45	No Change
Light Rail Noise Impacts	↓ 277	↓ 14
Vibration Impacts	↓ 50	↑ 16
Wetland Impacts (acres)	No Change	No Change
Vegetation Impacts(acres)	↑ 0.4	↓ 0.1

EXHIBIT ES-6
S 216TH STATION OPTIONS



Station Options

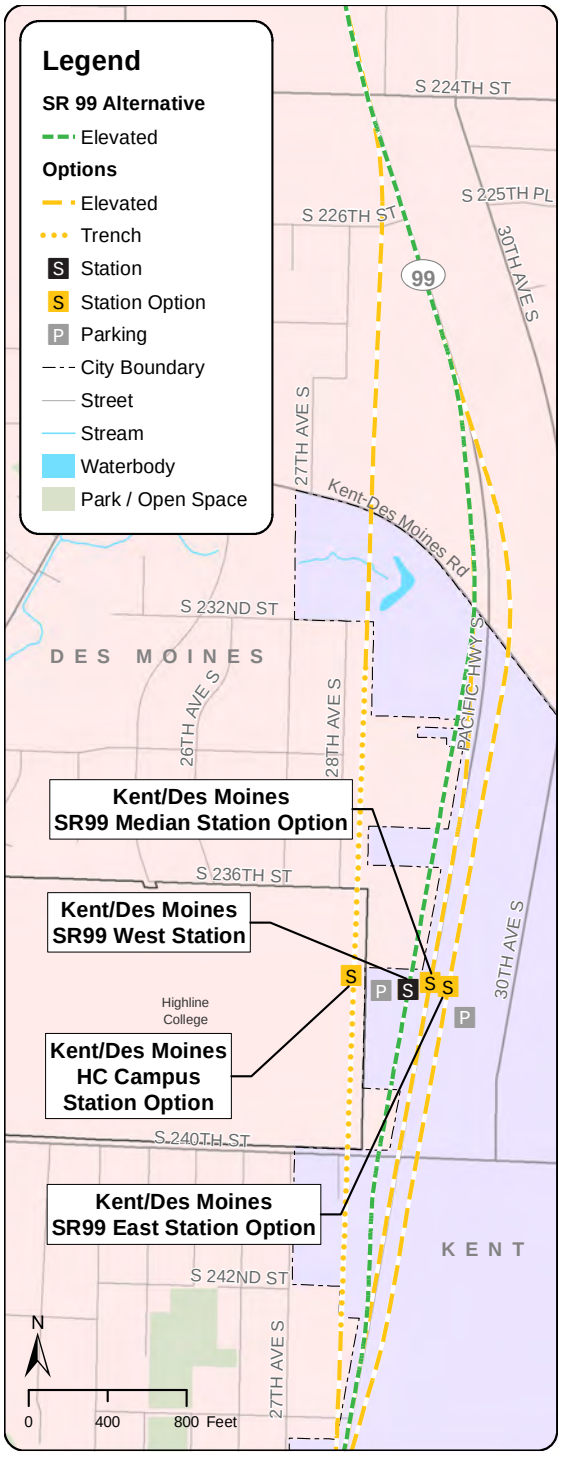
KENT/DES MOINES

The Kent/Des Moines SR 99 Median Station and East Station options (Exhibit ES-7) would increase the cost of this station, while the HC Campus Station Option would not change the project cost. All options would have increased residential displacements (Table ES-4). The SR 99 Median Station Option would have greater business displacements but fewer employees displaced while the HC Campus Station Option would impact fewer businesses but more employees. This would occur because different businesses would be impacted by each option. The Kent/Des Moines HC Campus Station Option would reduce noise impacts and increase vibration impacts, while the other options would increase noise impacts but would not change vibration impacts. All noise and vibration impacts could be mitigated. The HC Campus Station Option would also increase wetland impacts by crossing over Massey Creek.

TABLE ES-4
PERFORMANCE MEASURES & IMPACTS COMPARED TO SR 99 ALTERNATIVE

LEGEND ↑ Increase ↓ Decrease	HC Campus Station Option	SR 99 Median Station Option	SR 99 East Station Option
Performance Measures			
Cost Difference	No Change	↑ $20 million	↑ $10 million
Change in Daily Project Riders	No Change	No Change	No Change
Change in Travel Time (minutes)	No Change	No Change	No Change
TOD Potential within 1/4 mile (acres)	↓ 2	↑ 9	↑ 7
Resource Impacts			
Affected Parcels	↑ 19	↑ 1	↓ 9
Residential Displacements	↑ 39	↑ 14	↑ 34
Business Displacements	↓ 7	↑ 2	↓ 1
Employment Displaced	↑ 40	↓ 10	↓ 80
Intersections Not Meeting Level of Service	No Change	No Change	No Change
Residences with a Reduction in Visual Quality	↑ 15	No Change	No Change
Light Rail Noise Impacts	↓ 154	↑ 8	↑ 16
Vibration Impacts	↑ 12	No Change	No Change
Wetland Impacts (acres)	↑ 0.2	No Change	No Change
Vegetation Impacts(acres)	↓ 0.3	↓ 0.9	↓ 1.5

EXHIBIT ES-7
KENT/DES MOINES STATION OPTIONS



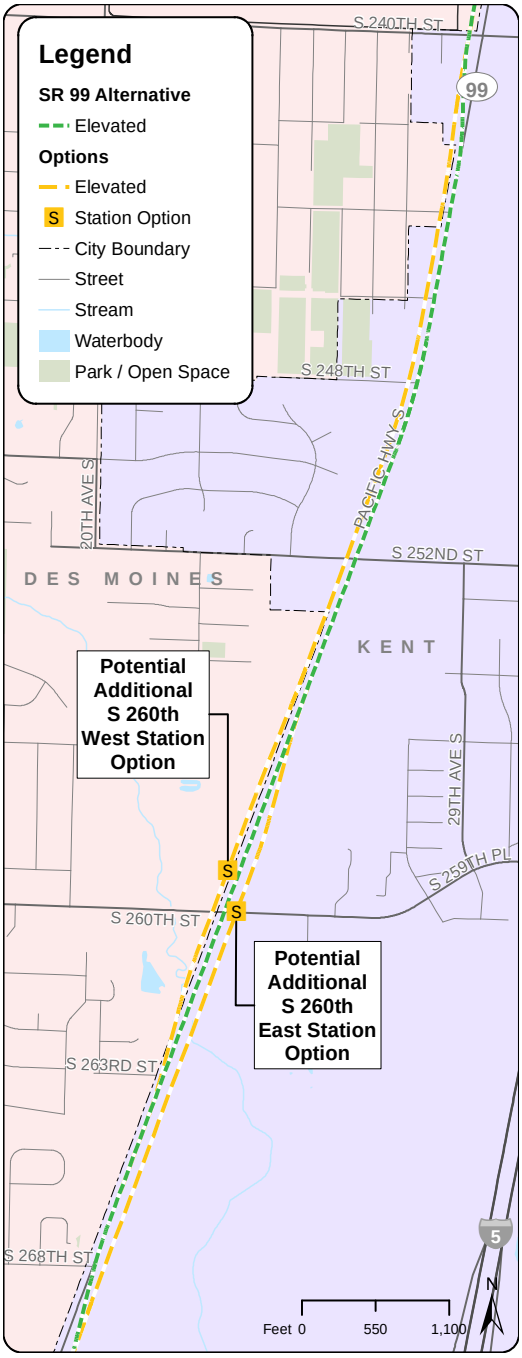
Potential Additional Station Options
S 260TH STREET

The potential additional station at S 260th Street (Exhibit ES-8) would add between $50M and $70M to the cost of the SR 99 Alternative. Both S 260th potential additional station options would increase business and employee displacements, while only the east station option would increase residential displacements (Table ES-5). Both options would increase vibration impacts but would decrease noise impacts. All noise and vibration impacts could be mitigated. Both station options would cross McSorley Creek and the S 260th East Station Option would result in additional impacts on the McSorley Creek Wetlands and forested areas.

TABLE ES-5
PERFORMANCE MEASURES & IMPACTS COMPARED TO SR 99 ALTERNATIVE

LEGEND ↑ Increase ↓ Decrease	S 260th West Station Option	S 260th East Station Option
Performance Measures		
Cost Difference	↑ $50 million	↑ $70 million
Change in Daily Project Riders	↑ 500	↑ 500
Change in Travel Time (minutes)	No Change	No Change
TOD Potential within 1/4 mile (acres)	↑ 36	↑ 43
Resource Impacts		
Affected Parcels	↓ 15	↓ 6
Residential Displacements	No Change	↑ 3
Business Displacements	↑ 18	↑ 21
Employment Displaced	↑ 140	↑ 80
Intersections Not Meeting Level of Service	No Change	No Change
Residences with a Reduction in Visual Quality	No Change	No Change
Light Rail Noise Impacts	↓ 150	↓ 6
Vibration Impacts	↑ 12	↑ 2
Wetland Impacts (acres)	↑ 0.1	↑ 0.4
Vegetation Impacts(acres)	↑ 0.4	↑ 0.3

EXHIBIT ES-8
S 260TH STATION OPTIONS



Station Option

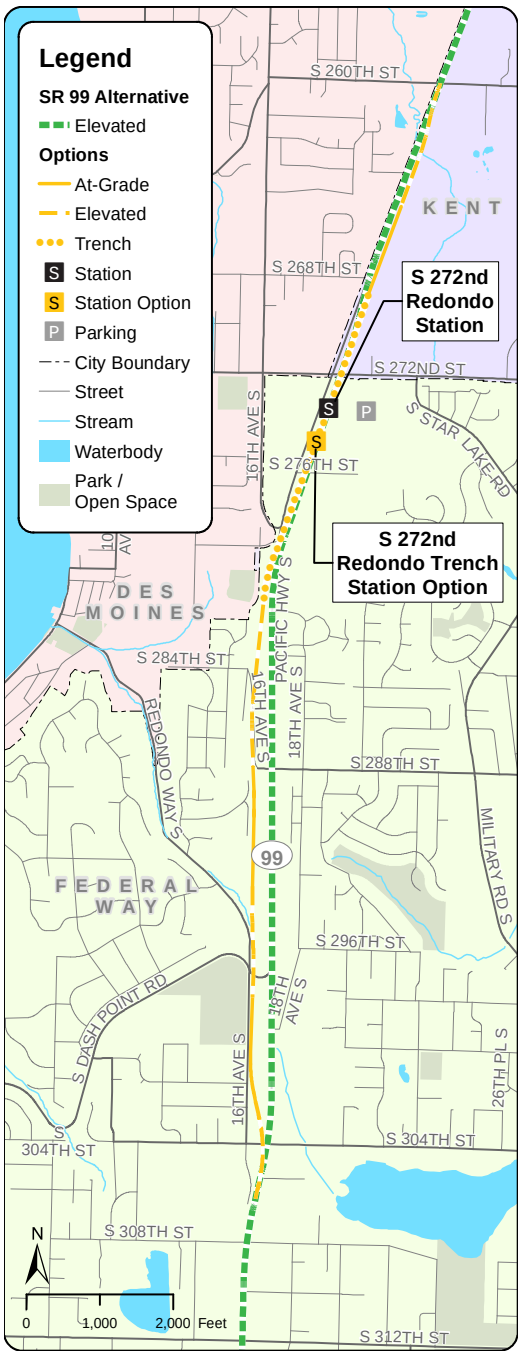
S 272ND REDONDO TRENCH

The S 272nd Redondo Trench Station Option (Exhibit ES-9) would cost $20M less than the SR 99 Alternative (Table ES-6). This option would increase residential displacements and would not change the number of business displacements, although the number of employees displaced would be greater due to different businesses being impacted. This option would cross McSorley Creek and Redondo Creek and would result in additional impacts on the McSorley Creek Wetlands. This option would not result in visual impacts on views of Puget Sound from SR 99 near S 288th Street, but it would still result in visual impacts on residences west of and below SR 99 where it would be elevated to the west of these properties. This option would have the greatest reduction in noise impacts of all options, but also the greatest increase in vibration impacts. All noise and vibration impacts could be mitigated.

TABLE ES-6
PERFORMANCE MEASURES & IMPACTS COMPARED TO SR 99 ALTERNATIVE

LEGEND ↑ Increase ↓ Decrease	S 272nd Redondo Trench Station Option
Performance Measures	
Cost Difference	↓ $20 million
Change in Daily Project Riders	No Change
Change in Travel Time (minutes)	No Change
TOD Potential within 1/4 mile (acres)	↓ 5
Resource Impacts	
Affected Parcels	↓ 21
Residential Displacements	↑ 4
Business Displacements	No Change
Employment Displaced	↑ 60
Intersections Not Meeting Level of Service	No Change
Residences with a Reduction in Visual Quality	↓ 10
Light Rail Noise Impacts	↓ 519
Vibration Impacts	↑ 181
Wetland Impacts (acres)	↑ 0.4
Vegetation Impacts(acres)	↑ 3.3

EXHIBIT ES-9
S 272ND REDONDO TRENCH STATION OPTION



Station Option

FEDERAL WAY SR 99

The Federal Way SR 99 Station Option (Exhibit ES-10) would be closer to SR 99, reducing the overall length of this alternative and reducing the cost by $70M and reducing business and employee displacements (Table ES-7). There would be greater noise impacts, but all noise impacts could be mitigated. This option would impact 0.7 acre of the Federal Way Town Square Park that is currently used for parking and landscaping. The loss of parking could be mitigated. There would be no additional ecosystem, traffic, or vibration impacts and no additional residential displacements.

EXHIBIT ES-10
FEDERAL WAY SR 99 STATION OPTION

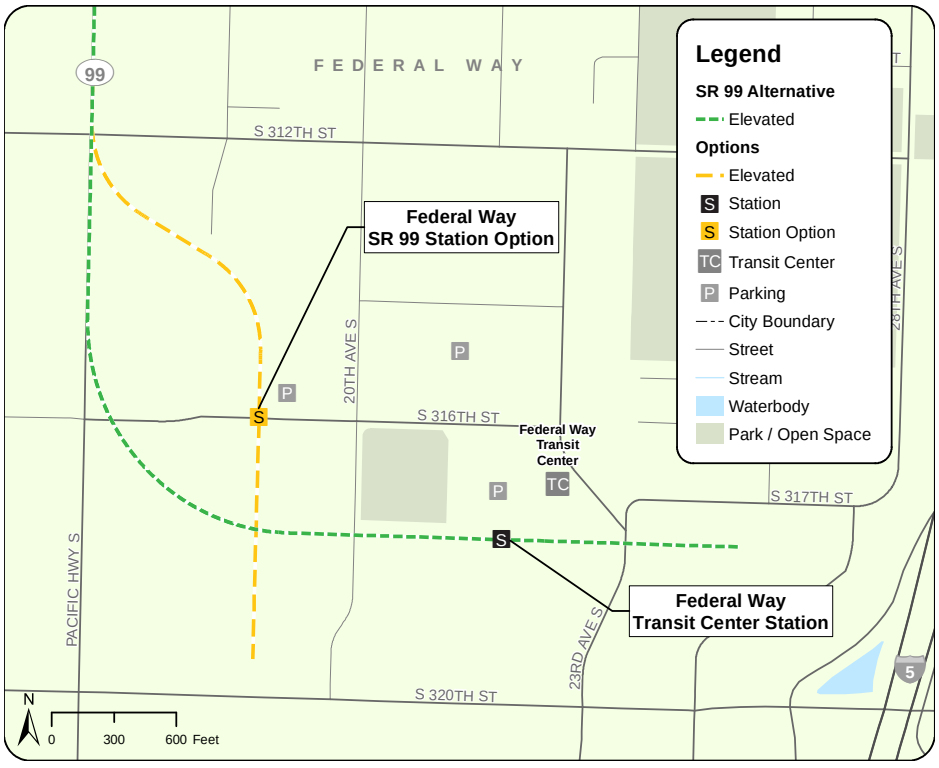


TABLE ES-7
PERFORMANCE MEASURES & IMPACTS COMPARED TO SR 99 ALTERNATIVE

LEGEND ▲ Increase ▽ Decrease	FW SR 99 Station Option
Performance Measures	
Cost Difference	▽ $70 million
Change in Daily Project Riders	▽ 500
Change in Travel Time (minutes)	▽ 1
TOD Potential within 1/4 mile (acres)	▲ 11
Resource Impacts	
Affected Parcels	▽ 8
Residential Displacements	No Change
Business Displacements	▽ 13
Employment Displaced	▽ 20
Intersections Not Meeting Level of Service	No Change
Residences with a Reduction in Visual Quality	No Change
Light Rail Noise Impacts	▲ 44
Vibration Impacts	No Change
Wetland Impacts (acres)	No Change
Vegetation Impacts(acres)	▽ 0.4

I-5 Alternative

COST
$1.42 Billion

TRAVEL TIME
13 Minutes

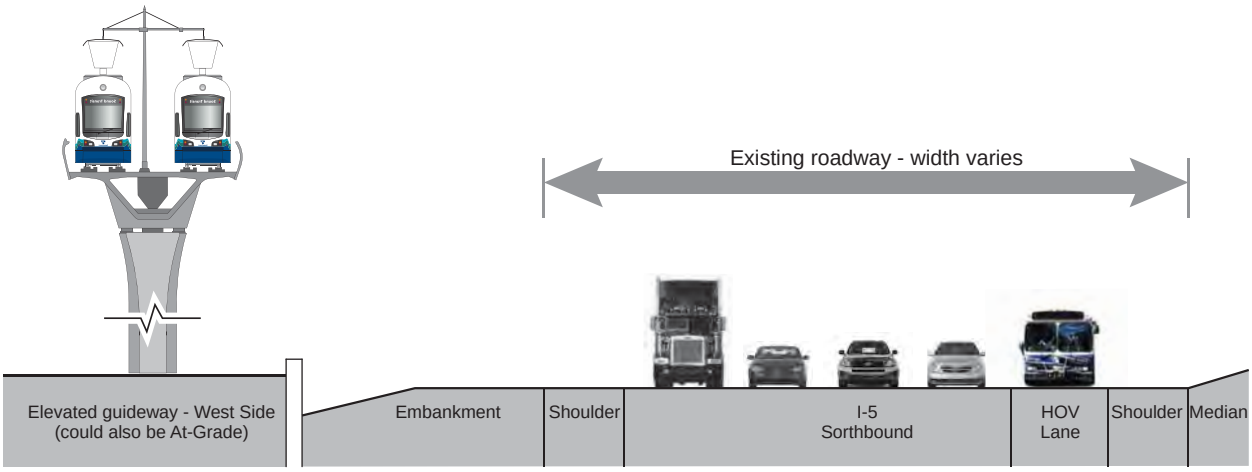
DAILY RIDERSHIP
25,500 Riders

TOD POTENTIAL
76 Acres

DAILY BOARDINGS

Kent/Des Moines Station 2,000 Riders
S 272nd Redondo Station 2,000 Riders
Federal Way Transit Center Station 9,000 Riders

EXHIBIT ES-11
TYPICAL CROSS SECTION OF I-5 ALTERNATIVE



Proposed condition looking north (not to scale)

The I-5 Alternative (Exhibits ES-11 and ES-12) would head south from the Angle Lake Station and cross to the east side of SR 99 in the vicinity of the proposed SR 509 extension (for description, see p. 6). It would be located in or adjacent to the future SR 509 Washington State Department of Transportation (WSDOT) right-of-way until S 231st Street, and would allow for the planned future build-out of I-5 in this area. Between S 231st Street and S 317th Street, the alignment would be mostly within the WSDOT right-of-way for I 5 except to access stations, which would be located outside of WSDOT right-of-way. The I-5 Alternative would be at-grade where existing topography allows and road crossings are not present.

Table ES-8 summarizes the impacts of the I-5 Alternative. The I-5 Alternative would have the highest number of residential displacements but the lowest number of business displacements. It would have the most impacts on wetlands, wetland buffers, and forested areas, and would require relocating Bingaman Creek north of S 288th Street and enclosing it in a pipe south of S 288th Street. Noise impacts would affect residences on the west side of I-5, and would require reconstructing an existing I-5 sound wall. The I-5 Alternative would have the lowest number of noise impacts but the greatest number of vibration impacts. All noise and vibration impacts could be mitigated. This alternative would have temporary construction impacts on the playfield at Mark Twain Elementary School, where a portion of the playfield would need to be closed for construction of a lidded trench for the light rail. The playfield would be restored to existing conditions following construction. Vegetation removal from the west side of I-5 would lower the visual quality from medium to low for many adjacent residences. The I-5 Alternative would be the least supportive of TOD.

EXHIBIT ES-12
I-5 ALTERNATIVE

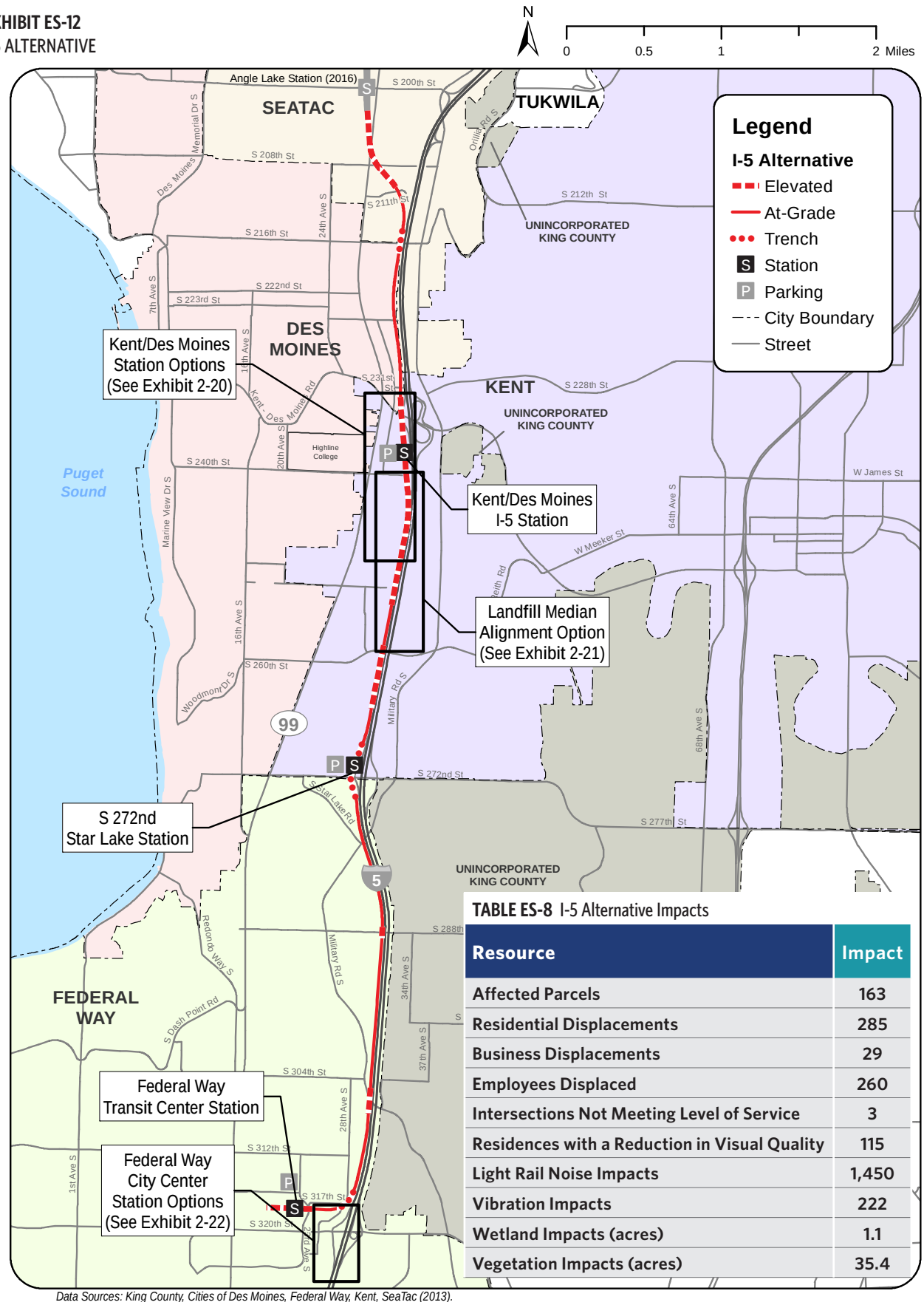


TABLE ES-8 I-5 Alternative Impacts

Resource	Impact
Affected Parcels	163
Residential Displacements	285
Business Displacements	29
Employees Displaced	260
Intersections Not Meeting Level of Service	3
Residences with a Reduction in Visual Quality	115
Light Rail Noise Impacts	1,450
Vibration Impacts	222
Wetland Impacts (acres)	1.1
Vegetation Impacts (acres)	35.4

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).

Station Options

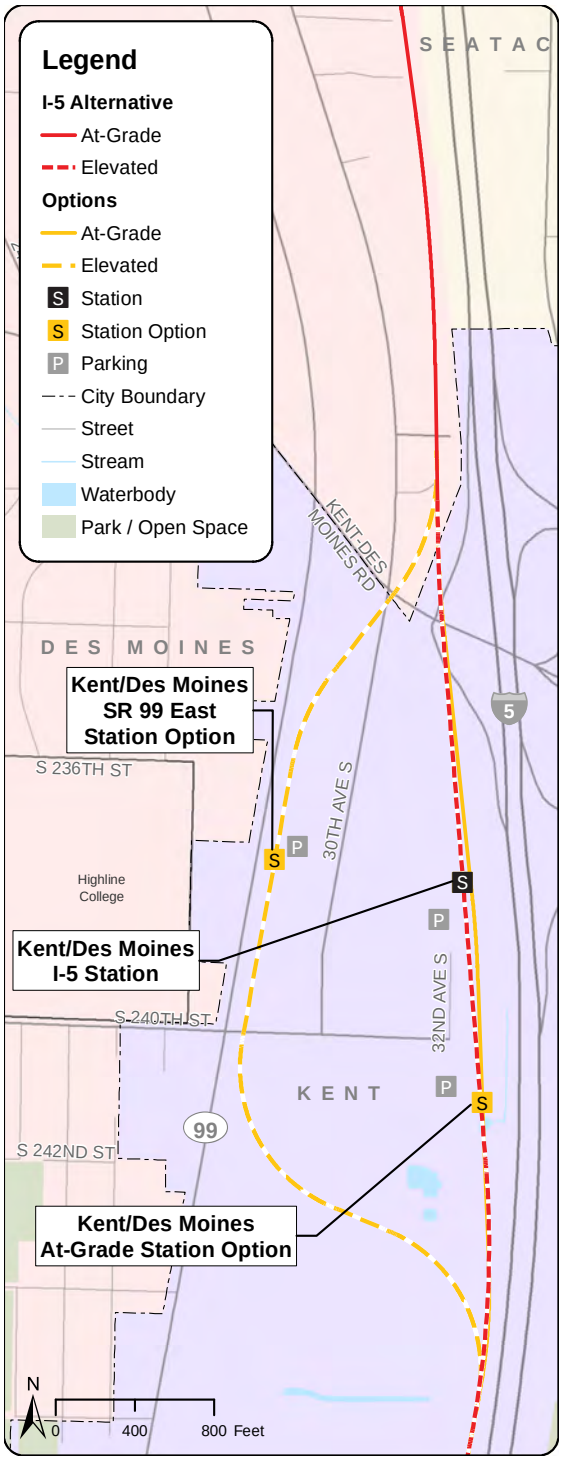
KENT/DES MOINES

The Kent/Des Moines At-Grade Station Option (Exhibit ES-13) would cost $100M less than the I-5 Alternative, while the SR 99 East Station Option would increase costs by $20M. Both options would reduce residential displacements, while only the SR 99 East Station Option would increase business and employee displacements (Table ES-9). Noise impacts would increase with both options, and vibration impacts would be reduced with the SR 99 East Station Option. All noise and vibration impacts could be mitigated. The At-Grade Station Option would result in traffic impacts at one additional intersection, which could be mitigated.

TABLE ES-9
PERFORMANCE MEASURES & IMPACTS COMPARED TO I-5 ALTERNATIVE

LEGEND ↑ Increase ↓ Decrease	At-Grade Station Option	SR 99 East Station Option
Performance Measures		
Cost Difference	↓ $100 million	↑ $20 million
Change in Daily Project Riders	No Change	↑ 500
Change in Travel Time (minutes)	No Change	↑ 1
TOD Potential within 1/4 mile (acres)	↓ 3	↑ 8
Resource Impacts		
Affected Parcels	↓ 5	↑ 7
Residential Displacements	↓ 99	↓ 27
Business Displacements	↓ 5	↑ 17
Employment Displaced	↓ 40	↑ 130
Intersections Not Meeting Level of Service	↑ 1	No Change
Residences with a Reduction in Visual Quality	No Change	No Change
Light Rail Noise Impacts	↑ 41	↑ 103
Vibration Impacts	↑ 1	↓ 20
Wetland Impacts (acres)	No Change	↓ 0.6
Vegetation Impacts(acres)	↓ 1.3	↓ 3.6

EXHIBIT ES-13
I-5 KENT / DES MOINES STATION OPTIONS



Alignment Option

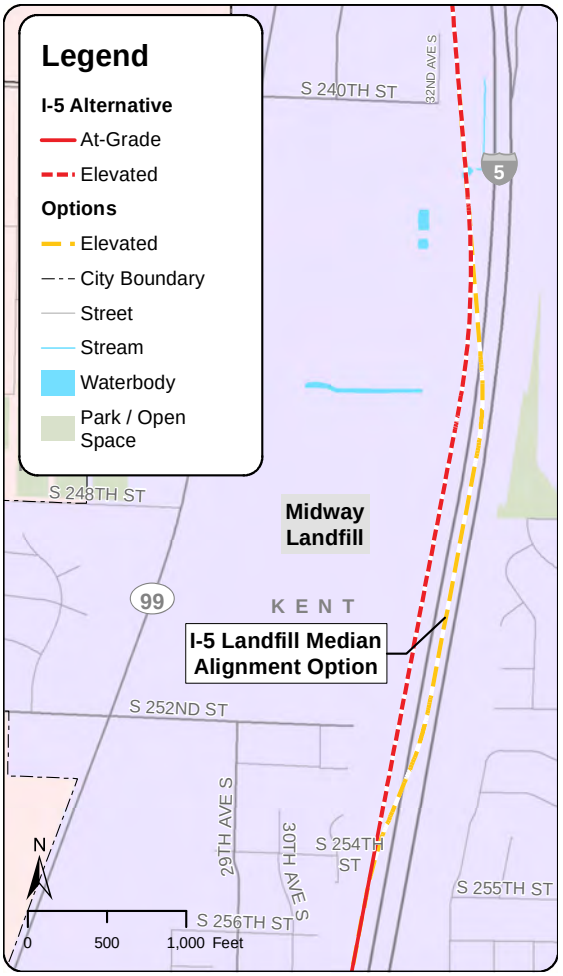
LANDFILL MEDIAN ALIGNMENT OPTION

There would be minimal changes in impacts associated with this alignment option (Exhibit ES 14 and Table ES-10). It could decrease costs by up to $10M when compared to the I-5 Alternative, by eliminating the removal of waste from the landfill. This option could also avoid the engineering and regulatory challenges associated with crossing the Midway Landfill. Use of the I-5 median for light rail in this area may conflict with WSDOT's long-term plans for use of the median. This option would have additional noise impacts but would reduce vegetation removal. Construction of the guideway in the median would require short-term, temporary narrowing of the inside shoulder between approximately S 240th Street and S 252nd Street for up to 6 months. This temporary shoulder closure could result in a short-term increase in crashes during construction.

TABLE ES-10
PERFORMANCE MEASURES & IMPACTS COMPARED TO I-5 ALTERNATIVE

LEGEND ↑ Increase ↓ Decrease	Landfill Median Alignment Option
Performance Measures	
Cost Difference	↓ $10 million
Change in Daily Project Riders	Not Applicable
Change in Travel Time (minutes)	Not Applicable
TOD Potential within 1/4 mile (acres)	Not Applicable
Resource Impacts	
Affected Parcels	No Change
Residential Displacements	↑ 1
Business Displacements	No Change
Employment Displaced	No Change
Intersections Not Meeting Level of Service	No Change
Residences with a Reduction in Visual Quality	No Change
Light Rail Noise Impacts	↑ 73
Vibration Impacts	No Change
Wetland Impacts (acres)	No Change
Vegetation Impacts(acres)	↓ 0.5

EXHIBIT ES-14
I-5 LANDFILL MEDIAN ALIGNMENT OPTION



Station Options

FEDERAL WAY CITY CENTER

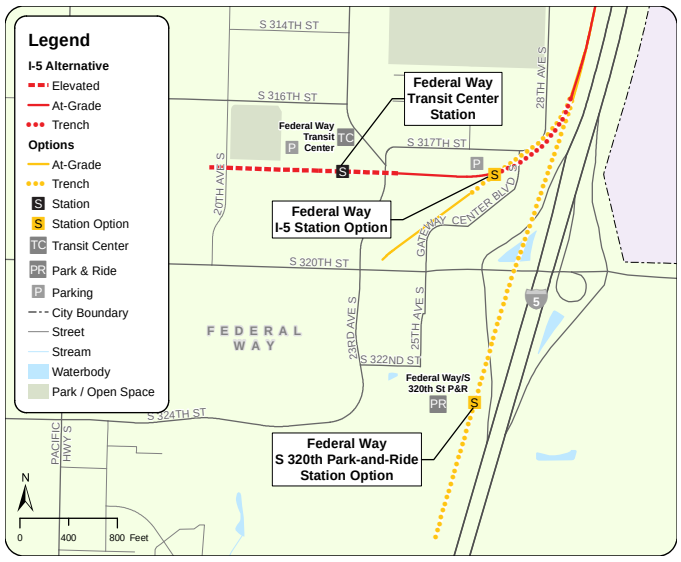
The Federal Way City Center station options (Exhibit ES-15) would be center-platform stations with a cross-over and tail track after the station platform.

The Federal Way I-5 Station Option would cost $40M less than the Federal Way Transit Center Station, while the Federal Way S 320th Park-and-Ride Station Option would cost $120M more. Both options would decrease business displacements, although the I-5 Station Option would increase the number of employee displacements because different businesses would be impacted. Only the S 320th Park-and-Ride Station Option would increase residential displacements (Table ES-11). The S 320th Park-and-Ride Station Option would have greater impacts to vegetation and vibration impacts but fewer noise impacts. The I-5 Station Option would have greater noise impacts but no change in vibration impacts. All noise and vibration impacts could be mitigated.

TABLE ES-11
PERFORMANCE MEASURES & IMPACTS COMPARED TO I-5 ALTERNATIVE

LEGEND ⇧ Increase ⇩ Decrease	FW I-5 Station Option	S 320th P&R Station Option
Performance Measures		
Cost Difference	⇩ $40 million	⇧ $120 million
Change in Daily Project Riders	⇩ 500	No Change
Change in Travel Time (minutes)	⇩ 1	⇩ 1
TOD Potential within 1/4 mile (acres)	⇩ 22	⇩ 11
Resource Impacts		
Affected Parcels	⇧ 2	⇩ 3
Residential Displacements	No Change	⇧ 19
Business Displacements	⇩ 5	⇩ 20
Employment Displaced	No Change	⇩ 210
Intersections Not Meeting Level of Service	No Change	No Change
Residences with a Reduction in Visual Quality	No Change	No Change
Light Rail Noise Impacts	⇧ 20	⇩ 120
Vibration Impacts	No Change	⇧ 2
Wetland Impacts (acres)	No Change	⇧ 0.1
Vegetation Impacts(acres)	⇩ 0.1	⇧ 1.7

EXHIBIT ES-15
FEDERAL WAY CITY CENTER STATION OPTIONS



SR 99 to I-5 Alternative

COST

1.48 Billion

TRAVEL TIME

14 Minutes

DAILY RIDERSHIP

26,000 Riders

TOD POTENTIAL

92 Acres

DAILY BOARDINGS

Kent/Des Moines Station **2,500** Riders

S 272nd Redondo Station **2,000** Riders

Federal Way Transit Center Station **9,000** Riders

OPTIONS FOR THE SR 99 TO I-5 ALTERNATIVE

This alternative could have the following station or alignment options that are associated with the SR 99 Alternative north of Kent-Des Moines Road and with the I-5 Alternative south of Kent-Des Moines Road:

- Potential additional station at S 216th (West and East options)
- Landfill Median Alignment Option
- Federal Way I-5 S 320th Station Option
- Federal Way I-5 Station Option

These options would have the same impacts as identified for these options on the previous pages.

The SR 99 to I-5 Alternative (Exhibit ES-16) would have the same alignment as the SR 99 Alternative from the Angle Lake Station to just north of Kent-Des Moines Road, where it would transition to 30th Avenue S with a station north of S 240th Street and then would transition to the I-5 right-of-way and be the same as the I-5 Alternative to the Federal Way Transit Center. Stations at S 272nd Street and the Federal Way Transit Center would be the same as the I-5 Alternative. Table ES-12 summarizes the impacts of the SR 99 to I-5 Alternative.

The ridership with the SR 99 to I-5 Alternative would be the same as the I-5 to SR 99 Alternative, slightly lower than the SR 99 Alternative, and slightly higher than the I-5 Alternative. The cost would be greater than the I-5 Alternative but less than the SR 99 or I-5 to SR 99 Alternatives. The travel time for this alternative would be approximately 1 minute longer than the other alternatives.

The SR 99 to I-5 Alternative would have the lowest number of parcels affected and would avoid many of the business displacements associated with the SR 99 Alternative, as well as many of the residential displacements associated with the I-5 Alternative. It would have most of the same impacts on ecosystems as the I-5 Alternative, including wetland impacts, impacts on Bingaman Creek, and impacts on forested areas along I-5. Also similar to the I-5 Alternative, this alternative would have temporary impacts on the playfield at Mark Twain Elementary, where the playfield would need to be closed while a lidded trenched guideway is constructed through it. The playfield would be restored to existing conditions following construction. Noise impacts would be less than the SR 99 Alternative and I-5 to SR 99 Alternative, but greater than the I-5 Alternative, while vibration impacts would be greater than the SR 99 and I-5 to SR 99 alternatives, but less than the I-5 Alternative. All noise and vibration impacts could be mitigated.

EXHIBIT ES-16
SR 99 TO I-5 ALTERNATIVE

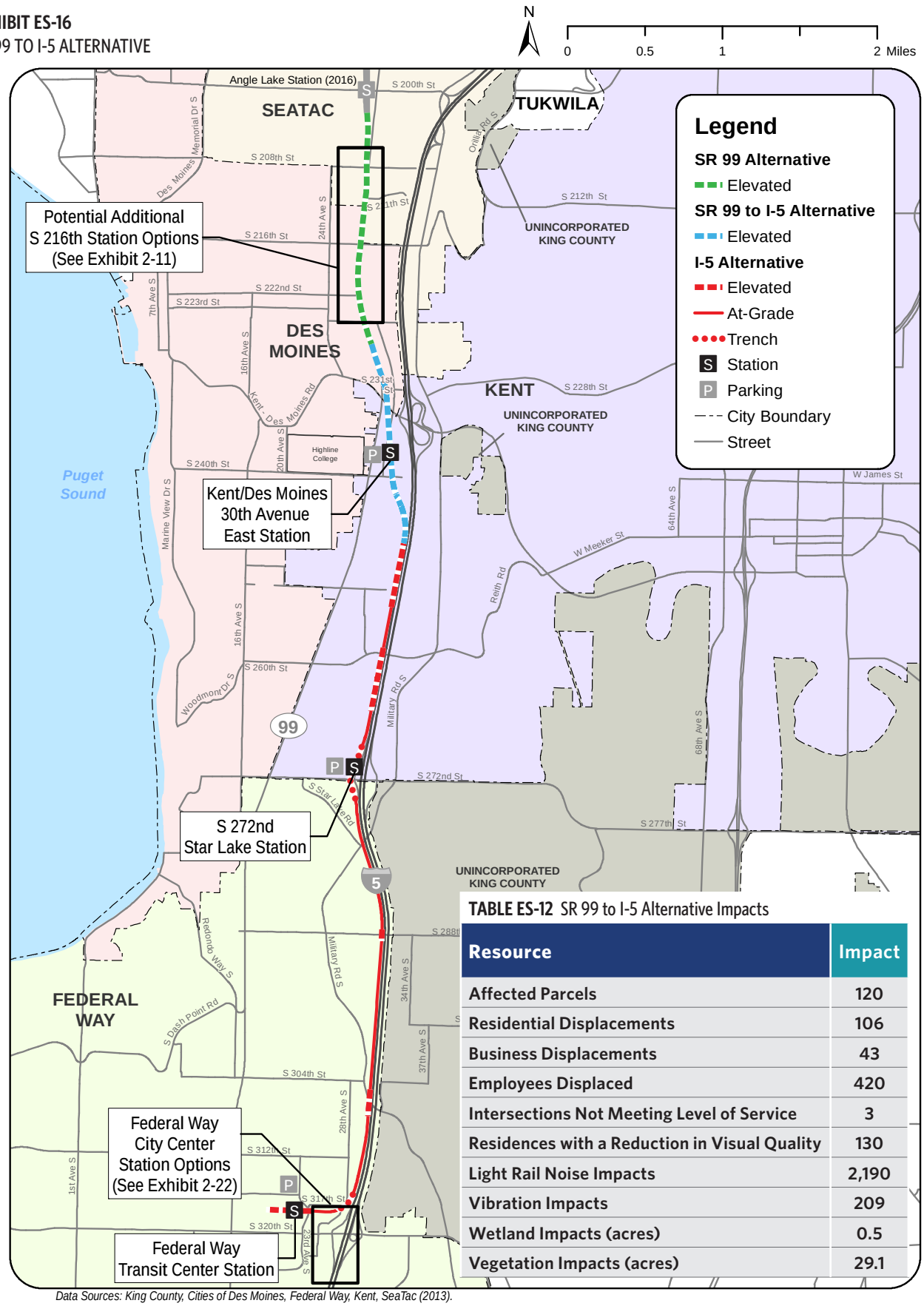


TABLE ES-12 SR 99 to I-5 Alternative Impacts

Resource	Impact
Affected Parcels	120
Residential Displacements	106
Business Displacements	43
Employees Displaced	420
Intersections Not Meeting Level of Service	3
Residences with a Reduction in Visual Quality	130
Light Rail Noise Impacts	2,190
Vibration Impacts	209
Wetland Impacts (acres)	0.5
Vegetation Impacts (acres)	29.1

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).

I-5 to SR 99 Alternative

COST
1.72 Billion

TRAVEL TIME
13 Minutes

DAILY RIDERSHIP
26,000 Riders

TOD POTENTIAL
126 Acres

DAILY BOARDINGS

Kent/Des Moines Station **2,500** Riders

S 272nd Redondo Station **1,500** Riders

Federal Way Transit Center Station **9,000** Riders

OPTIONS FOR THE I-5 TO SR 99 ALTERNATIVE

This alternative could have the following station or alignment options that are associated with the I-5 Alternative north of Kent-Des Moines Road and with the SR 99 Alternative south of Kent-Des Moines Road:

- Potential additional station at S 260th (West & East options)
- 272nd Redondo Trench Station Option
- Federal Way SR 99 Station Option

These options would have the same impacts as identified for these options on the previous pages.

The I-5 to SR 99 Alternative (Exhibit ES-17) would have the same alignment as the I-5 alternative from the Angle Lake Station to just north of Kent-Des Moines Road. The alignment would then transition to 30th Avenue S with a station north of S 240th Street. After leaving this station, the alignment would transition to the SR 99 median and be the same as the SR 99 Alternative to the Federal Way Transit Center. Stations at S 272nd Street and the Federal Way Transit Center would be the same as the SR 99 Alternative. This alternative would be elevated except from S 211th Street to S 216th Street, and from S 218th Street to S 231st Street, where it would be at-grade next to the I-5 right-of-way. Table ES-13 summarizes the impacts of the I-5 to SR 99 Alternative.

The ridership with the I-5 to SR 99 Alternative would be the same as the SR 99 to I-5 Alternative, slightly lower than the SR 99 Alternative, and slightly higher than the I-5 Alternative. The cost would be greater than the I-5 and the SR 99 to I-5 alternatives, but slightly less than the SR 99 Alternative. The I-5 to SR 99 Alternative would avoid some of the residential displacements associated with the I-5 Alternative but would have almost the same number of business displacements as the SR 99 Alternative. Similar to the SR 99 Alternative, it would have minimal impacts on ecosystems, with elevated crossings of all streams and minor wetland and vegetation impacts along SR 99. This alternative would have the second highest number of noise impacts after the SR 99 Alternative, but the least number of vibration impacts. Visual quality impacts would be slightly less than the SR 99 Alternative.

EXHIBIT ES-17
I-5 TO SR 99 ALTERNATIVE

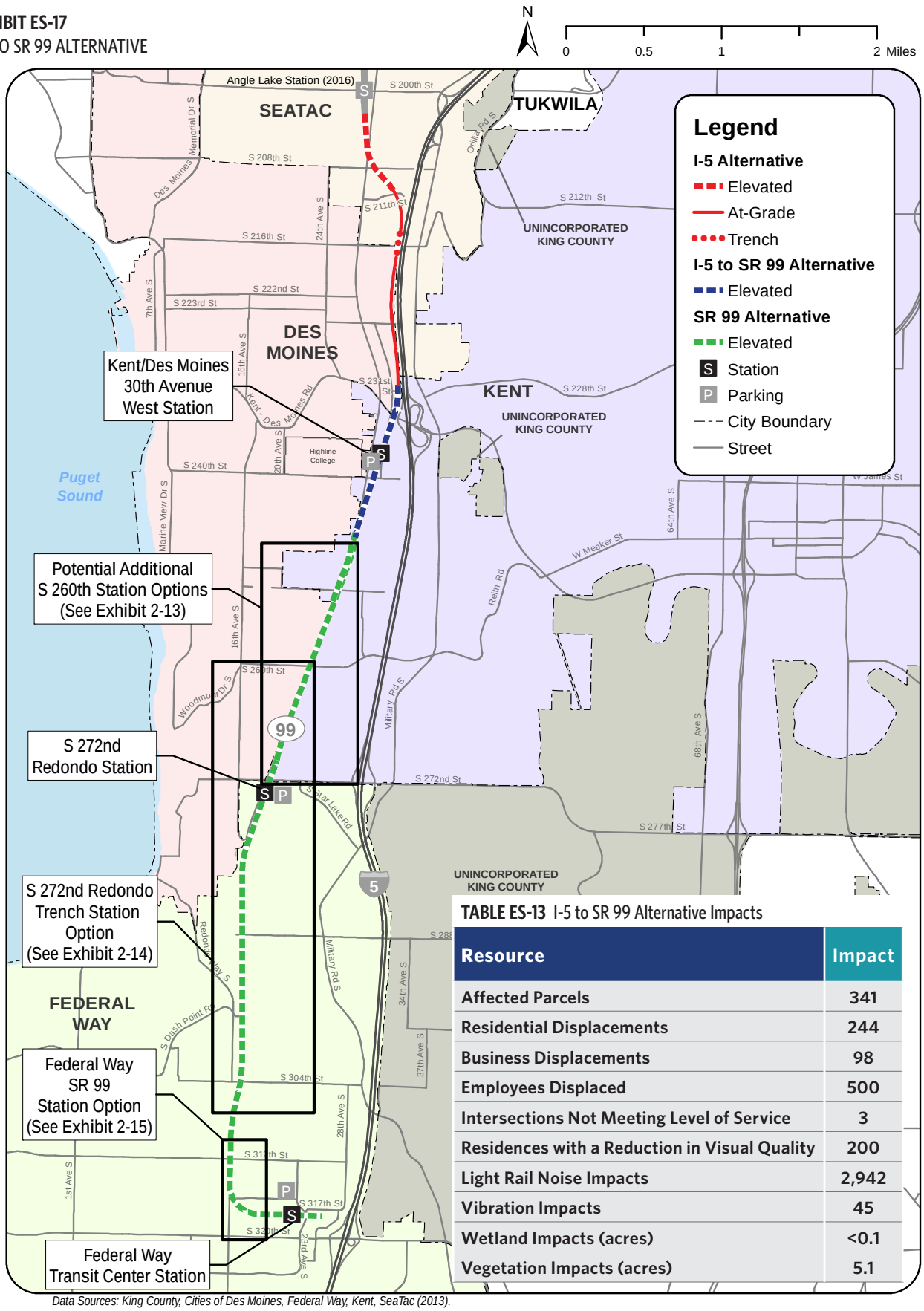


TABLE ES-13 I-5 to SR 99 Alternative Impacts

Resource	Impact
Affected Parcels	341
Residential Displacements	244
Business Displacements	98
Employees Displaced	500
Intersections Not Meeting Level of Service	3
Residences with a Reduction in Visual Quality	200
Light Rail Noise Impacts	2,942
Vibration Impacts	45
Wetland Impacts (acres)	<0.1
Vegetation Impacts (acres)	5.1

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).

ES.5 Comparison of Alternatives

This section summarizes key measures and impacts for all alternatives. Table ES-14 shows these measures and impacts for each alternative with the range of impacts for the options associated with each alternative in parentheses afterwards. As shown in Table ES-14, ridership and travel time would be similar for all alternatives, although alternatives with stations closer to SR 99 would have slightly higher ridership. Residential displacements would be higher for the I-5 alternatives, while business displacements would be higher for the SR 99 alternatives. The I-5 and SR 99 to I-5 alternatives would have the greatest impacts on wetlands, wetland buffers, streams, and forested areas, while the SR 99 Alternative would avoid impacts on most wetlands and streams.

TABLE ES-14
FWLE ALTERNATIVE CHARACTERISTICS AND IMPACTS

	Alternative (Range of Impacts with Options)			
	SR 99	I-5	SR 99 to I-5	I-5 to SR 99
Performance Measures				
Cost (2014 Dollars in billions)	**$1.77** ($1.68-$2.00)	**$1.42** ($1.27-$1.56)	**$1.48** ($1.43-$1.67)	**$1.72** ($1.63-$1.79)
Daily Project Riders	**26,500** (26,000-27,500)	**25,500** (24,000-25,500)	**26,000** (25,500-26,500)	**26,000** (25,500-27,000)
Travel Time in minutes	**13** (12-13)	**13** (12-14)	**14** (13-14)	**13** (12-13)
TOD Potential within 1/4 mile (acres)	**119** (118-235)	**76** (51-84)	**92** (70-145)	**126** (121-180)
Resource Impacts				
Parcels Affected	**293** (240-315)	**163** (155-172)	**120** (117-128)	**341** (298-341)
Residential Displacements	**36** (36-108)	**285** (186-305)	**106** (106-152)	**244** (244-251)
Business Displacements	**104** (84-140)	**29** (4-46)	**43** (23-56)	**98** (85-119)
Employees Displaced	**580** (480-980)	**260** (10-390)	**420** (210-480)	**500** (480-640)
Intersections Not Meeting Level of Service	**3** (3-3)	**3** (3-4)	**3** (3-3)	**3** (3-3)
Acres of Land Converted to Transportation Use	**51** (49-80)	**48** (47-55)	**42** (41-56)	**55** (55-71)
Residences with a Reduction in Visual Quality	**215** (160-230)	**115** (115-115)	**130** (85-130)	**200** (190-200)
Number of Light Rail Noise Impacts Before Mitigation *[All impacts can be mitigated]*	**3,726** (2,015-3,786)	**1,450** (1,330-1,646)	**2,190** (1,793-2,210)	**2,942** (2,340-2,986)
Number of Vibration/ Ground Borne Noise Impacts *[All impacts can be mitigated]*	**50** (0-271)/ **1** (1-1)	**222** (202-225)/ **0** (0-0)	**209** (209-227)/ **0** (0-0)	**45** (45-238)/ **1** (1-1)
Acres of Wetland/ Wetland Buffer Impacted	**< 0.1** (<0.1-0.7)/ **0.2** (0.2-0.8)	**1.1** (0.5-1.2)/ **1.1** (0.9-2.3)	**0.5** (0.5-0.6)/ **0.9** (0.9-1.1)	**< 0.1** (<0.1-0.5)/ **0.3** (0.3-0.7)
Length of Stream Impacts in Feet / Acres of Stream Buffers Impacted	**0** (0-0)/ **< 0.1** (<0.1-0.5)	**1,055** (1,055-1,055)/ **2.4** (2.4-2.4)	**1,055** (1,055-1,055)/ **2.4** (2.4-2.4)	**0** (0-0)/ **< 0.1** (<0.1-0.5)
Vegetation Impacts (acres)	**3.5** (1.6-7.6)	**35.4** (31.2-37.1)	**29.1** (28.5-31.2)	**5.1** (4.7-8.8)
Number of Historic Properties Impacted	**1** (1-2)	**0** (0-0)	**0** (0-0)	**1** (1-1)
Number of Parks Impacted	**0** (0-1)	**0** (0-0)	**0** (0-0)	**0** (0-1)

Construction for alternatives along SR 99 would be more disruptive to the community due to closure of lanes adjacent to the construction area. Construction on I-5 for alternatives along I-5 would not affect traffic on I-5 except for the Landfill Median Alignment Option. Partial closures of cross streets over or under I-5 would be required for construction over or under these streets. The I-5 and SR 99 to I-5 alternatives would result in temporary construction impacts on the playfield at Mark Twain Elementary, while the Federal Way SR 99 Station Option for the SR 99 and I-5 to SR 99 alternatives would have permanent and temporary construction impacts on the Federal Way Town Square Park.

An analysis of TOD at the station areas found that the Federal Way Transit Center Station and Federal Way SR 99 Station Option would have the most land available for TOD, followed by the Kent/Des Moines SR 99 West Station, Kent/Des Moines SR 99 Median Station Option, and the Kent/Des Moines SR 99 East Station Option (for both the SR 99 Alternative and the I-5 Alternative). Station locations closer to I-5 generally have lower TOD potential than those near SR 99 due to the barrier that I-5 creates for development within a ¼ mile distance of these stations.

Potential additional stations at S 216th Street and S 260th Street would increase the amount of land available for TOD for alternatives that could include these stations.

Existing sound wall along a portion of an elevated guideway.

ES.6 Avoidance, Minimization, and Mitigation Measures

Sound Transit is committed to complying with applicable federal, state, and local environmental regulations and applying reasonable mitigation measures to reduce significant adverse impacts. The Draft EIS identifies potential measures to mitigate adverse impacts of the project alternatives. Avoidance and minimization measures committed to as part of the project are identified along with other potential measures that would reduce or eliminate impacts. These measures would be refined through final design and permitting. The National Environmental Policy Act Record of Decision (ROD) would be issued after the Final EIS and would include a list of all committed mitigation measures for the project to be built.

The following is a summary of select potential mitigation measures for impacts that the project alternatives may not be able to fully minimize or avoid:

Wetlands and Streams: Sound Transit is committed to no net loss of wetland function and area on a project-wide basis. Sound Transit would work to avoid and minimize adverse effects on wetlands and streams through project design, where possible.

If impacts cannot be avoided or minimized, Sound Transit would provide compensatory mitigation to account for lost values in the same area. Mitigation would meet the requirements of local critical area ordinances.

Noise: Noise impacts would be mitigated by building sound walls, installing building insulation, and other measures.

Vibration: Sound Transit would install ballast mats, resilient rail fasteners, or other specialized track work to reduce groundborne vibration where necessary.

Visual impacts: Sound Transit would incorporate visual enhancement measures into the project and include the following measures to address adverse impacts where they would occur: landscaping or visual screening, aesthetic treatment of walls, pedestrian improvements, and elevated structures designed to minimize bulk.

Parks: Mitigation measures may include purchase of replacement land, enhancement or restoration of existing parks, or financial compensation.

Transportation: Mitigation of impacts on transportation such as longer delays and congestion at intersections could include restriping, adding right- or left-turn pockets, allowing U-turn movements at intersections, and adding or optimizing traffic signals.

ES.7 Significant and Unavoidable Adverse Impacts

With the avoidance, minimization, and potential mitigation measures described in Chapter 3 (Transportation Environment and Consequences), Chapter 4 (Affected Environment and Environmental Consequences), and Chapter 5 (Construction), significant adverse impacts would be avoided for most alternatives. Operational impacts that might not be fully mitigated include the following:

- The elevated guideway associated with the SR 99 Alternative and I-5 to SR 99 Alternative would have visual impacts on multi-family residences on the east side of SR 99 near S 288th Street, where many residences have views of Puget Sound and the Olympic Mountains. The S 272nd Redondo Trench Station Option would avoid the impacts on these residences, but would have visual impacts on residences on the west side of SR 99.
- Removal of vegetation along I-5, along with other project components such as retaining walls or an elevated guideway, would have visual impacts for some residences adjacent to the I-5 right-of-way with the I-5 Alternative, SR 99 to I-5 Alternative, and I-5 to SR 99 Alternative.
- The reach of Bingaman Creek south of S 288th Street would be placed in a pipe with the I-5 Alternative and the SR 99 to I-5 Alternative, requiring offsite or compensatory mitigation. Although mitigation would be provided, this reach of stream would be permanently enclosed.

Temporary impacts during construction may not be avoidable and could be significant and adverse in some locations. These impacts could include temporary but long-term lane or roadway closures, loss of parking, and noise and vibration along portions of any alternative. Detour routes, when available, would reduce the impact of roadway closures, although delays, congestion, and inconvenience would still occur. There could be adverse impacts on businesses adjacent to SR 99 from alternatives that travel on or adjacent to this corridor, especially for businesses that depend on drive-by traffic.

ES.8 Public and Agency Involvement

Sound Transit and the Federal Transit Administration (FTA) have been engaging the public and agencies since the start of early scoping in 2012. The 30-day early scoping period included two public meetings and one agency meeting, and comments were accepted at these meetings as well as via mail and online during this period. An online survey was also conducted during this period. Sound Transit initiated the Draft EIS process with formal public environmental scoping in June and July 2013, which included meetings with the public and agencies, a comment period, and public notices and advertisements. Sound Transit also hosted public events and meetings with agencies and interested groups as the Draft EIS was being prepared in 2013 and 2014. The release of the Draft EIS includes a formal public review and comment period, including public meetings with hearings, as described in Section ES.11, Next Steps. Appendix B of the Draft EIS has additional details about the project's public involvement and agency coordination plan, including how Sound Transit and FTA are reaching out to low-income and minority populations in the project vicinity.

163 PEOPLE ATTENDED THE SCOPING MEETINGS IN 2013 AND 19 WRITTEN COMMENTS WERE RECEIVED. 113 PEOPLE TOOK AN ONLINE SURVEY.

ES.9 Other Environmental Considerations

ES.9.1 SECTION 4(F) RESOURCES

Federal law protects historic properties and significant, publicly owned parks and recreation areas from being adversely affected by US Department of Transportation projects Under Section 4(f) of the Department of Transportation Act, the Department of Transportation generally cannot approve a transportation project that uses or adversely affects such properties unless (1) there is no feasible and prudent alternative, and (2) the project minimizes the impacts as much as possible. When the DOT determines that the transportation use of a Section 4(f) property has only a *de minimis* impact, the Section 4(f) restrictions are waived.

The Federal Way SR 99 Station Option for the SR 99 Alternative and the I-5 to SR 99 Alternative would directly impact 0.7 acre of the Federal Way Town Square Park that is used for parking and landscaping. The City of Federal Way believes Town Square Park is a recreational resource of local significance and thus a Section 4(f) property. FTA and the City are discussing ways to minimize the project's impacts to the park and whether such measures would reduce the impacts to a *de minimis* level. The FWLE would only impact parking stalls and landscaping and would not adversely affect the park's recreational activities, features and attributes. FTA is the lead federal agency for DOT on the FWLE and as such would make the final determination on *de minimis* for this resource following the public comment period.

The project's potential Section 4(f) use of historic properties is limited to partial acquisitions of two parcels on which eligible buildings are located. One such parcel contains most of Highline College, including several historic buildings as well as associated parking lots. The SR 99 Alternative HC Campus Station Option associated with the SR 99 Alternative would use one end of one of the parking lots. Similarly, the SR 99 Alternative, the I-5 to SR 99 Alternative and the Federal Way SR 99 Station Option would acquire a narrow strip of the parking lot serving the US Bank property on SR 99 in Federal Way. The acquisition and use of land under either of these scenarios would not affect the physical integrity of NRHP-eligible buildings and would have only a slight effect on the buildings' setting. FTA's preliminary determination is that these would be *de minimis* uses.

See Appendix E for more information about Section 4(f).

ES.9.2 ENVIRONMENTAL JUSTICE

This Draft EIS analyzes environmental justice consistent with federal authorities. The analysis assesses whether the FWLE alternatives would result in disproportionately high and adverse effects on minority and/or low-income populations. The analysis, described in Chapter 7, also describes the specific outreach efforts made during project development to involve minority and low-income populations and discusses the benefits of the FWLE to these populations.

After considering the project's potential effects, taking into account mitigation and avoidance measures as well as anticipated benefit to minority and low-income populations, FTA has made a preliminary determination that the FWLE would not have disproportionately high and adverse impacts on minority and low-income populations. In addition, the project would provide benefits to people served by the light rail project, including minority and low-income residents. Benefits from the project include improved access to all transit modes; a more reliable and more efficient transportation system; improved mobility through the project vicinity; transit travel time savings; improved accessibility to employment; and extended transit service hours. Although all populations would have access to these benefits to the same extent, they would accrue to a higher degree to minority and low-income populations because these groups are more likely to use transit.

ES.10 Areas of Controversy and Issues to Be Resolved

Areas of controversy and issues that remain to be resolved include the following:

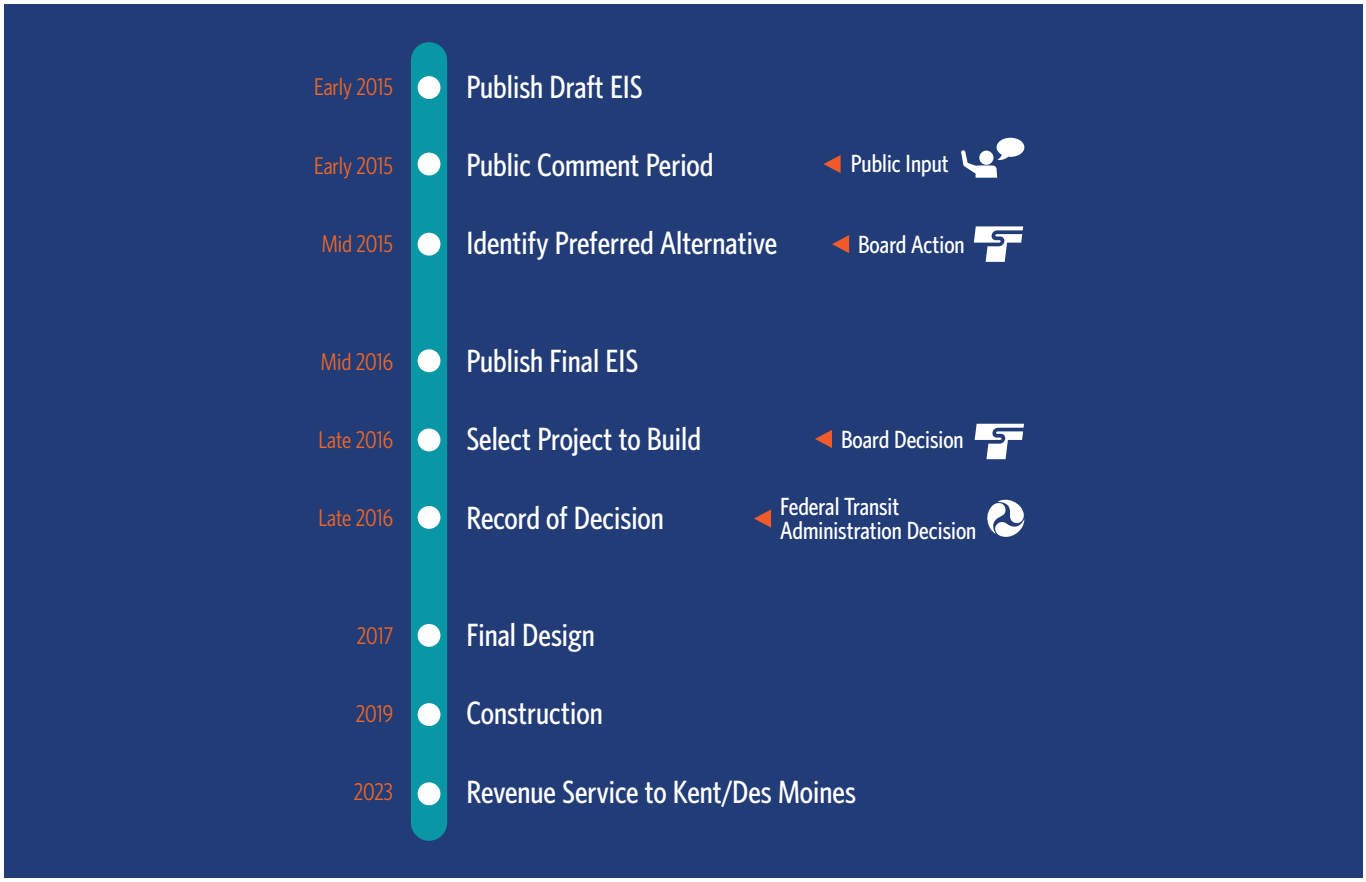
- **Funding plan for the project:** Current projections show that funding from ST2 tax revenue should be available to construct the FWLE from Angle Lake Station to the Kent/Des Moines Station. Funding sources for the extension to S 272nd Street and the Federal Way Transit Center have not been identified. While Sound Transit may apply for federal grants to help fund this portion of the project, funding from local tax revenue would be needed for much of this extension, and ST2 only authorized construction funding to S 272nd Street.
- **Potential additional stations:** Potential additional stations at S 216th Street and S 260th Street were not evaluated in the ST2 planning process, which analyzed ridership and cost for each station. They were not included in ST2, and further evaluation of consistency with the ST2 Plan would be required before any of them could be added to the FWLE.
- **Location of I-5 Alternative within WSDOT right-of-way:** If the Sound Transit board identifies a preferred alternative that would use portions of the I-5 right of way (ROW), Sound Transit must secure from WSDOT and FHWA agreements and approvals for such use and for other proposed modifications to other parts of the freeway (such as moving freeway noise walls). Sound Transit has coordinated with FHWA and WSDOT during conceptual design to identify where the alternatives evaluated in the Draft EIS could potentially use the I-5 ROW. If an alternative using I-5 right-of-way is identified as preferred, additional design coordination and analysis will occur during the development of the Final EIS. Ultimate approvals would not occur until final design of the FWLE. During final design, FHWA and WSDOT could require modifications or place other conditions on the project which could require environmental reviews.

Sound Transit would continue to coordinate with the appropriate federal, state, and local agencies and jurisdictions to address these issues. Additional areas of controversy and issues to be resolved will likely be identified during the Draft EIS comment period. These issues will be addressed in the Final EIS.

ES.11 Next Steps

Following publication of this Draft EIS, the following steps are anticipated (see Exhibit ES-2 for anticipated schedule milestones):

- **Draft EIS review and comment period:** The Draft EIS will be available for public and agency comment for 45 days. In addition, public hearings will be held during this comment period to receive oral testimony. Please see the Fact Sheet at the beginning of the Draft EIS for details.
- **Identification of Preferred Alternative:** Following the Draft EIS comment period, it is anticipated that the Sound Transit Board will identify a Preferred Alternative for evaluation in the Final EIS. The Preferred Alternative will be identified after considering the Draft EIS, public and agency feedback, and other relevant information. The final decision on the alternative to be built will not be made until after the Final EIS is issued.
- **Final EIS:** The Final EIS will document and respond to comments received on the Draft EIS, describe and evaluate the Preferred Alternative in combination with other alternatives, and describe proposed mitigation commitments associated with the project.
- **Project decision:** After completion of the Final EIS, the Sound Transit Board will consider the alternatives evaluated in the Final EIS and then select the project to be built.
- **Federal approval:** FTA will issue a decision document referred to as the federal ROD, which states FTA's decision on the project, identifies the alternatives considered, and itemizes mitigation commitments. Issuance of the ROD is required before any federal funding or approvals. If an alternative that uses the I-5 right-of-way is selected, FHWA would also issue a ROD.



This page intentionally left blank.

1.0 Purpose and Need for Federal Way Link Extension

For more than 30 years, the Central Puget Sound Region has been planning for high-capacity transit (HCT) to address the issues of population growth, transportation congestion, and maintaining a vibrant, competitive economy. Sound Transit (the Central Puget Sound Regional Transit Authority) was created to take on the challenge of regional mobility and develop and deliver an HCT system to the citizens of urban King, Pierce, and Snohomish counties as part of the region's overall long-range transportation plans (Sound Transit, 1996a, 2005, and 2014). These plans include HCT serving the communities of the Federal Way Link Extension (FWLE). The FWLE corridor was included in Sound Transit's 1996 *Regional Transit Long-Range Vision* (Sound Transit, 1996a), in the 2005 *Regional Transit Long-Range Plan* (Sound Transit, 2005), and in the 2014 *Regional Transit Long-Range Plan* (Sound Transit 2014). The *Sound Move* plan, adopted in 1996 (Sound Transit, 1996b), implemented the first phase of the Regional Transit Long-Range Vision. In 2008, the voters approved financing for the *Sound Transit 2 Plan* (Sound Transit, 2008; ST2), which prioritized the second round of regional transit system investments, including the FWLE. The planned regional light rail system to connect the northern, southern, and eastern reaches of the greater Seattle metropolitan area, including the FWLE corridor, is shown in Exhibit 1-1.

High-Capacity Transit (HCT)

High-capacity transit carries a larger volume of passengers using larger vehicles and/or more frequent service than a standard fixed-route bus system. High-capacity transit can operate on exclusive rights-of-way such as a rail track or dedicated busway, or on existing streets with mixed traffic. The main goal of high-capacity transit is to provide faster, more convenient, and more reliable service for a larger number of passengers.

The FWLE would expand the existing Sound Transit Link light rail system south to serve the cities of Des Moines, Kent, and Federal Way in south King County. This 7.6-mile extension would connect the Angle Lake Station under construction at S 200th Street in SeaTac with the Federal Way Transit Center in Federal Way. The FWLE corridor parallels State Route 99 (SR 99) and Interstate 5 (I-5), and generally follows a topographic ridge between Puget Sound and the Green River Valley.

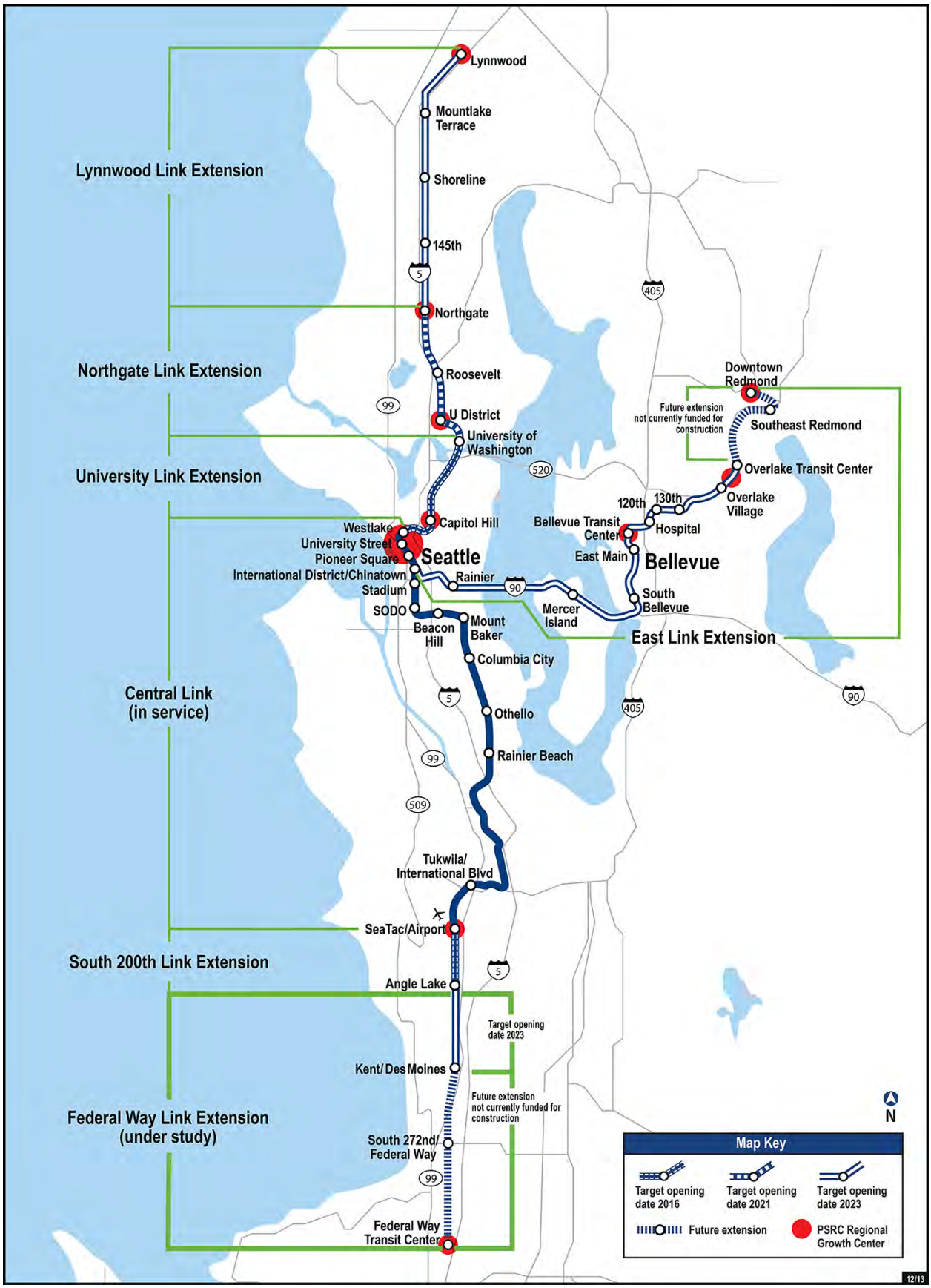


EXHIBIT 1-1
Sound Transit Link Light Rail System and FWLE Location

Major east-west arterials connecting I-5 and SR 99 include Kent-Des Moines Road (SR 516), S 272nd Street, and S 320th Street, which are served by major transit stops including the Kent/Des Moines Park-and-Ride, Redondo and Star Lake park-and-rides (S 272nd Street), Federal Way Transit Center (S 317th Street), and S 320th Street Federal Way Park-and-Ride. According to the 2010 U.S. Census, the combined population for the cities in the FWLE corridor was approximately 240,000, with SeaTac's population at 26,909, Des Moines' at 29,673, Kent's at 92,411, and Federal Way's at 89,306.

In addition to lacking reliable and efficient transit service in general, the corridor struggles particularly with growing (but unmet) north-south transit demand and the challenge of serving transit-dependent populations. These issues are described in more detail in Section 1.2, Need for the FWLE.

1.1 Purpose of the Project

The purpose of the FWLE is to expand the Sound Transit Link light rail system from the city of SeaTac to the cities of Des Moines, Kent, and Federal Way in King County in order to:

- Provide a rapid, reliable, accessible, and efficient alternative for travel to and from the corridor and other urban growth and activity centers in the region, with sufficient capacity to meet projected demand.
- Expand mobility by improving connections to the regional multimodal transportation system with peak and off-peak transit service.
- Provide the HCT infrastructure and service to support the adopted regional and local land use, transportation, and economic development plans. Plans such as Puget Sound Regional Council's (PSRC) VISION 2040 call for growth to be concentrated in designated urban centers connected to each other by HCT. Land use plans for individual cities support this regional vision.
- Advance the Sound Transit Long-Range Plan's vision, goals, and objectives for high-quality regional transit service connecting major activity centers in King, Pierce, and Snohomish counties.
- Implement a financially feasible HCT system to help preserve and promote a healthy environment.

Purpose and Need Statement

The purpose and need section establishes why the agency is proposing to invest taxpayer dollars in the project. It is intended to clarify what problems the project is addressing and to justify the expenditure needed. The project purpose and need also drives the process for alternatives consideration, in-depth analysis, and ultimate project selection.

1.2 Need for the FWLE

This section describes the need for the FWLE. For each need statement below, additional supporting information is provided along with references to sections of this Draft Environmental Impact Statement (Draft EIS) where more detailed information can be found.

Need #1: Increasing congestion on I-5 and on the key arterials leading in and out of the study area will further degrade existing transit performance and reliability.

- Transit options in the FWLE corridor depend on the existing roadway infrastructure. Congestion on I-5, SR 99, and the key corridor arterials are expected to increase and degrade transit performance and reliability. Section 3.4.2, Transit, provides additional information on transit in the FWLE area.
- Despite some substantial investments benefitting transit in the corridor (see text box), travel times are unreliable for many hours of the day because congestion extends well beyond typical commuting hours. I-5 between Federal Way and Seattle is typically congested for 8 hours each weekday. By 2035, without major investments, it is expected to worsen to 11 hours on weekdays.
- A traveler going between Federal Way and Downtown Seattle (approximately 22 miles) during peak periods, when congestion is high and delays are unpredictable, must allow 56 minutes in the morning and 46 minutes in the afternoon to ensure arriving on time 95 percent of the time. In 20 years, with the projected population and employment growth in the region, the trip will take at least 10 more minutes in the AM peak hour.
- Projected growth and increasing congestion will degrade bus service. Section 3.4.3, Arterial and Local Streets, describes the intersections in the FWLE study area that already barely meet, or do not meet, state and/or local standards, including 12 intersections along SR 99, Kent-Des Moines Road (SR 516), S 272nd Street, and Military Road S. By 2035, 14 intersections in the study area will experience this degree of congestion. This congestion will particularly affect the RapidRide A Line, which currently takes over 40 minutes during peak periods to travel 11 miles between the Federal Way Transit Center and Tukwila

Transportation Investments in the FWLE Corridor Benefitting Transit

Several locations within the FWLE corridor already feature investments to help improve transit speed and reliability. These include:

- Continuous high-occupancy vehicle (HOV) lanes on I-5 between Federal Way and the south Downtown Seattle area
- Contiguous business access and transit (BAT) lanes on both sides of SR 99 from S 216th Street to just south of S 320th Street, along with intersection signals that are programmed to give transit travel priority
- A “Texas T” HOV direct-access ramp connecting S 317th Street to the center HOV lanes on I-5, allowing buses to bypass the freeway interchange congestion
- Ramp metering and HOV bypass lanes on most I-5 interchange ramps to help control the flow of traffic onto the freeway

International Boulevard light rail station and, combined with Central Link light rail, takes up to 75 minutes to travel between Federal Way and Downtown Seattle. Accessing existing direct service (Metro and Sound Transit Express) between Federal Way Transit Center and Downtown Seattle can require out-of-direction travel for some riders located north of the transit center, increasing the total trip time. As congestion worsens, regional travel will take longer and be even less efficient.

Need #2: North-south transit demand is expected to grow by about 40 to 75 percent by 2035 as a result of residential and employment growth in the FWLE study area (Sound Transit Ridership Model, 2012). This growth will require additional and more reliable transportation options than currently exist.

- Between 2010 and 2035, population growth for the cities in the corridor is projected to be over 24 percent, and employment growth is anticipated to be over 66 percent (PSRC, 2013). Section 4.3, Economics, provides additional information on projected growth within the study area.
- PSRC's VISION 2040 (PSRC, 2009), the regional growth strategy, includes SeaTac, Kent, and Federal Way to be among the 14 core cities intended to accommodate 22 percent of the region's population growth and 29 percent of its employment growth by the year 2040. SeaTac and Federal Way also contain 2 of PSRC's 27 designated Regional Growth Centers, where population and employment growth should be focused. Exhibit 1-1 shows the Regional Growth Centers, including those in the FWLE corridor, with existing or planned Link access.
- PSRC's metropolitan transportation plan, Transportation 2040 (PSRC, 2014), prioritizes new transportation improvements in areas that accept an increased share of growth in order to concentrate growth in existing urbanized areas.
- The anticipated growth will substantially increase transit demand in the FWLE study area. Key King County Metro and Sound Transit routes between Federal Way and Seattle already operate at or above capacity in the peak periods and this condition is likely to worsen in the future. This is undesirable for passengers who must stand, and crowded vehicles slow down passenger loading and unloading.

Need #3: People in the FWLE corridor need reliable and efficient peak and off-peak transit service to connect with the region's growth centers. For corridor residents, inexpensive, reliable transit access to a variety of employment centers during peak and non-peak periods is vital. The FWLE corridor lacks such service, as described in Section 3.4.2.

Limits of Existing Transit Service:

- Most regional express transit service in the FWLE study area is Seattle-centric and operates at 30-minute headways in the peak periods, with limited or non-existent off-peak and weekend service. Generally, bus routes using I-5 make limited stops and connect the Federal Way Transit Center to Seattle-Tacoma International Airport (Sea-Tac Airport), Downtown Seattle, and the University of Washington.
- Along SR 99, there is very limited peak-period and off-peak period direct bus service to and from Downtown Seattle and other regional centers. RapidRide A Line provides frequent service along SR 99 but requires a transfer to other bus service or to Central Link Light Rail to travel to Downtown Seattle and/or other regional centers.
- Without major investments, the study area will continue to lack reliable and efficient transit service to other regional centers (such as Bellevue, Redmond, Northgate, and Lynnwood). This lack of reliable and efficient service limits opportunities for people in the FWLE corridor to work in these other employment centers, and also limits access for people in other areas of the region to jobs in the regional growth centers along and near the FWLE corridor, including the Kent manufacturing/industrial district, downtown Kent, and the Federal Way city center.

Reliable and Efficient Off-Peak Service is Important in the FWLE Corridor:

- Sixty percent of workers residing in the corridor worked in retail and in manufacturing, warehousing, transportation, communications, and utilities in 2010 (PSRC, 2010). Retail and manufacturing work schedules typically do not conform to peak-hour commute transit service. For instance, about 13 percent of

2010 Census respondents in the FWLE corridor began their commute between 4 PM and 5 AM.

- Having reliable transit service to other employment centers, including during non-peak hours, is important for households to take advantage of different employment opportunities.
- Highline College employs approximately 1,100 people and has approximately 16,500 students per year, 65 percent of whom come from the four cities within the FWLE corridor. Classes occur throughout the day and evening, and students and employees depend on reliable off-peak transit to get to and from the college.

Employment and Activity Centers in the FWLE Corridor

Large employers in the FWLE vicinity include Sea-Tac Airport and support industries such as hotels and restaurants in SeaTac, Highline College in Des Moines, and the Commons Mall and big-box retailers in Federal Way.

Need #4: The corridor has a high concentration of transit-dependent populations who need efficient and reliable regional transit connectivity. Improved transit increases access to expanding regional job markets by providing affordable and accessible commuting options for low-income households, and improves access to schools, jobs, family, and health care for transit-dependent youth and seniors.

- Transportation costs are still problematic and rising steadily. Tolls are being implemented on major freeways and additional tolls are expected on new and existing highways in the next several years. The price of fuel is generally increasing over time and PSRC forecasts a 40 percent increase in parking costs for major regional growth centers. All these expenses put a greater burden on low-income residents and impede access to important employment, educational, and health care opportunities.
- The corridor has a higher proportion of low-income residents than King County as a whole. The 2010 Census reported that nearly 16 percent of the population in the FWLE corridor had incomes at or below the federal poverty level, compared to less than 11 percent for King County. In some census tracts along SR 99, up to 61 percent of the residents had incomes below the poverty level. At 14 of the 15 elementary schools in the study area, the majority of students qualified for free or reduced lunches in the 2013-2014 school year. Chapter 7, Environmental Justice, provides additional information on low-income populations in the FWLE corridor.
- The corridor has higher percentages of populations under age 18 and over 65 years old than King County as a whole. These

populations tend to have higher percentages of residents who are transit-dependent.

Need #5: Regional and local plans call for HCT in the corridor consistent with PSRC's VISION 2040 and Sound Transit's Long-Range Plan. Planning for high-capacity transit in the FWLE corridor has been ongoing for over 30 years to address continuing population growth and the need for regional mobility to maintain a healthy economy. In anticipation of this project, cities in the corridor have updated their local comprehensive plans to encourage likely transit-oriented development in certain areas.

History of HCT/Light Rail Planning in the FWLE Corridor	
1981	Puget Sound Council of Governments completes light rail study
1986	Puget Sound Council of Governments publishes *Regional Multi-Corridor Project Summary Report*
1990	Puget Sound Regional Council (PSRC) adopts *Vision 2020*
1993	Regional Transit System Plan EIS Joint Regional Policy Committee adopts Regional Transit System Plan; Snohomish, King, and Pierce counties form the Central Puget Sound Regional Transit Authority (RTA)
1996	Sound Transit adopts Long-Range Vision, identifies potential rail extension in the corridor; voters approve funding for *Sound Move*, the initial package of high-capacity transit (HCT) investment
2000	Des Moines adopts Pacific Ridge Element of *Comprehensive Plan* that anticipates light rail
2001	PSRC adopts *Destination 2030*, identifies HCT expansion in corridor
2004	PSRC publishes *Central Puget Sound HCT Corridor Assessment*
2005	Regional Transit Long-Range Plan Supplemental EIS Sound Transit updates *Long-Range Plan*, identifies light rail extension in the corridor
2008	*Sound Transit 2* funds construction of light rail to S 272nd Street and environmental review of extensions farther south to Tacoma
2010	PSRC adopts *Vision 2040* and *Transportation 2040*, which includes light rail extension in the corridor; Des Moines updates Pacific Ridge Element of *Comprehensive Plan*; Federal Way updates City Center Chapter of *Comprehensive Plan* that anticipates light rail
2011	Kent publishes *Midway Subarea Plan* that anticipates light rail
2012	Sound Transit publishes *TOD Program Strategic Plan*
2012	PSRC approves *Central Puget Sound Regional 2010-2013 Transportation Improvement Program*, which includes light rail extension in the corridor
2013	Sound Transit completes Federal Way Transit Extension Alternatives Analysis, PSRC publishes *The Growing Transit Communities Strategy* report

TOD = transit-oriented development

Need #6: Environmental and sustainability goals of the state and region include reducing vehicle miles traveled and greenhouse gas emissions. State and regional policies strongly support actions to increase energy-efficiency and to reduce harmful greenhouse gas (GHG) emissions, especially from transportation sources. The FWLE would reduce dependency on single-occupancy vehicles, slow down growth in vehicle miles traveled, conserve energy, and lower air pollution.

Greenhouse Gases

Greenhouse gases (GHGs) are gaseous compounds (such as carbon dioxide) that absorb infrared radiation, trap heat in the atmosphere, and contribute to the greenhouse effect and climate change. Transportation generates about half of the GHGs in the state.

Washington law sets goals to decrease the annual per capita vehicle miles traveled by 30 percent by 2035 and 50 percent by 2050. Another state goal is to reduce overall emissions of greenhouse gases in Washington to 25 percent below 1990 levels by 2035 and to 50 percent below 1990 levels by 2050.

Washington State Executive Order 14-04, signed in April 2014, calls on state agencies to assist regional and local jurisdictions in "implementing measures to improve transportation efficiency, and to update their comprehensive plans to produce travel and land-use patterns that maximize efficiency in movement of goods and people, and reduce costs and greenhouse gases."

This page intentionally left blank.

2.0 Alternatives Considered

This chapter describes the alternatives defined and evaluated in this Draft Environmental Impact Statement (Draft EIS) and how they were developed. It also summarizes the alternatives eliminated from further consideration during the Alternatives Analysis process.

The project purpose and need described in Chapter 1 served as the basis for developing Federal Way Link Extension (FWLE) alternatives. Prior to the Draft EIS, an early scoping process and an Alternatives Analysis were conducted to define and evaluate a wide range of potential alternatives.

The FWLE would construct and operate an approximately 7.6-mile extension of light rail. It would connect the southern terminus of the Link light rail system at Angle Lake Station (now under construction) in the city of SeaTac with the Federal Way Transit Center in the city of Federal Way, traveling through and providing access to the cities of Des Moines and Kent. Exhibit 1-1 in Chapter 1 shows the project limits and the context of the project in the greater Sound Transit Link light rail system. The Draft EIS considers multiple alternative alignments and station options.

The Draft EIS also includes a No Build Alternative. This allows an analysis of the potential impacts of not building the FWLE, and provides a basis for comparing the build alternatives to a future baseline condition.

The remainder of this chapter is organized into the following subsections:

- 2.1 Overview
- 2.2 FWLE Project Alternatives
- 2.3 Alternatives Development and Early Scoping
- 2.4 Environmental Practices and Commitments
- 2.5 Estimated Project Costs and Funding
- 2.6 Minimum Operable Segments
- 2.7 Relationship to Other Transit and Transportation Projects
- 2.8 Next Steps and Schedule

2.1 Overview

The FWLE corridor is generally bounded by SR 99 to the west, I-5 to the east, S 200th Street to the north, and S 320th Street to the south. Alternatives outside this area or with different origins or destinations were not considered because they would not meet the project's purpose and need. Alternatives generally follow two corridors, SR 99 and I-5, between SeaTac and Federal Way. Sound Transit developed the alternatives through an early scoping and Alternatives Analysis process during 2012 and 2013 that included public and agency input. Additional detail on this process, the alternatives evaluated, and the alternatives not carried forward is provided in Section 2.3. As shown in Table 2-1 and Exhibits 2-1A to 2-1D, this Draft EIS evaluates a no build alternative and four build alternatives: one in each primary transportation corridor (SR 99 and I-5), and two that are different alignments using both the SR 99 and I-5 corridors.

Station Option

Station options are alternative locations for each station area: Kent/Des Moines, S 272nd Street, and Federal Way Transit Center. Options for a station generally have the same station characteristics and serve the same population.

Potential Additional Station

The Alternatives Analysis process for the FWLE identified additional station locations on SR 99. These stations could be added to the SR 99 alternatives but are not funded and would require additional approvals.

Alignment Option

An alignment option is an alternate route along a portion of the alternative. An alignment option does not include station options.

TABLE 2-1
Summary of Alternatives Evaluated in the Draft EIS

Alternative	Stations	Station Options	Potential Additional Stations (not funded in ST2)	Alignment Options
No Build	None	None	None	None
SR 99	• Kent/Des Moines SR 99 West • S 272nd Redondo • Federal Way Transit Center	• Kent/Des Moines Highline College (HC) Campus • Kent/Des Moines SR 99 Median • Kent/Des Moines SR 99 East • S 272nd Redondo Trench • Federal Way SR 99	• S 216th West • S 216th East • S 260th West • S 260th East	None
I-5	• Kent/Des Moines I-5 • S 272nd Star Lake • Federal Way Transit Center	• Kent/Des Moines At-Grade • Kent/Des Moines SR 99 East • Federal Way I-5 • Federal Way S 320th Park-and-Ride	None	Landfill Median
SR 99 to I-5	• Kent/Des Moines 30th Ave. East • S 272nd Star Lake • Federal Way Transit Center	• Federal Way I-5 • Federal Way S 320th Park-and-Ride	• S 216th West • S 216th East	Landfill Median
I-5 to SR 99	• Kent/Des Moines 30th Ave. West • S 272nd Redondo • Federal Way Transit Center	• S 272nd Redondo Trench • Federal Way SR 99	• S 260th West • S 260th East	None

EXHIBIT 2-1A
FWLE Alternatives – SR 99

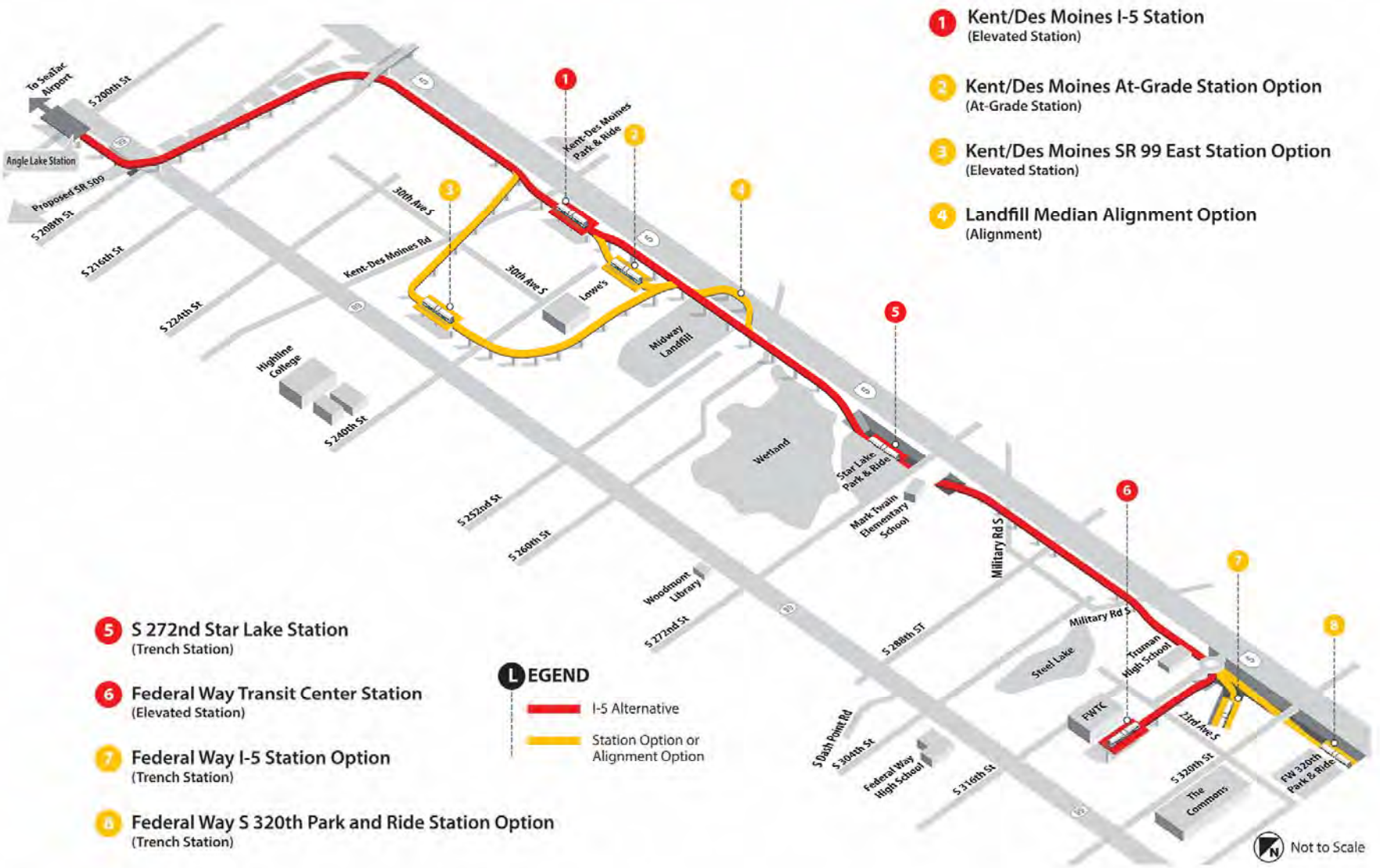
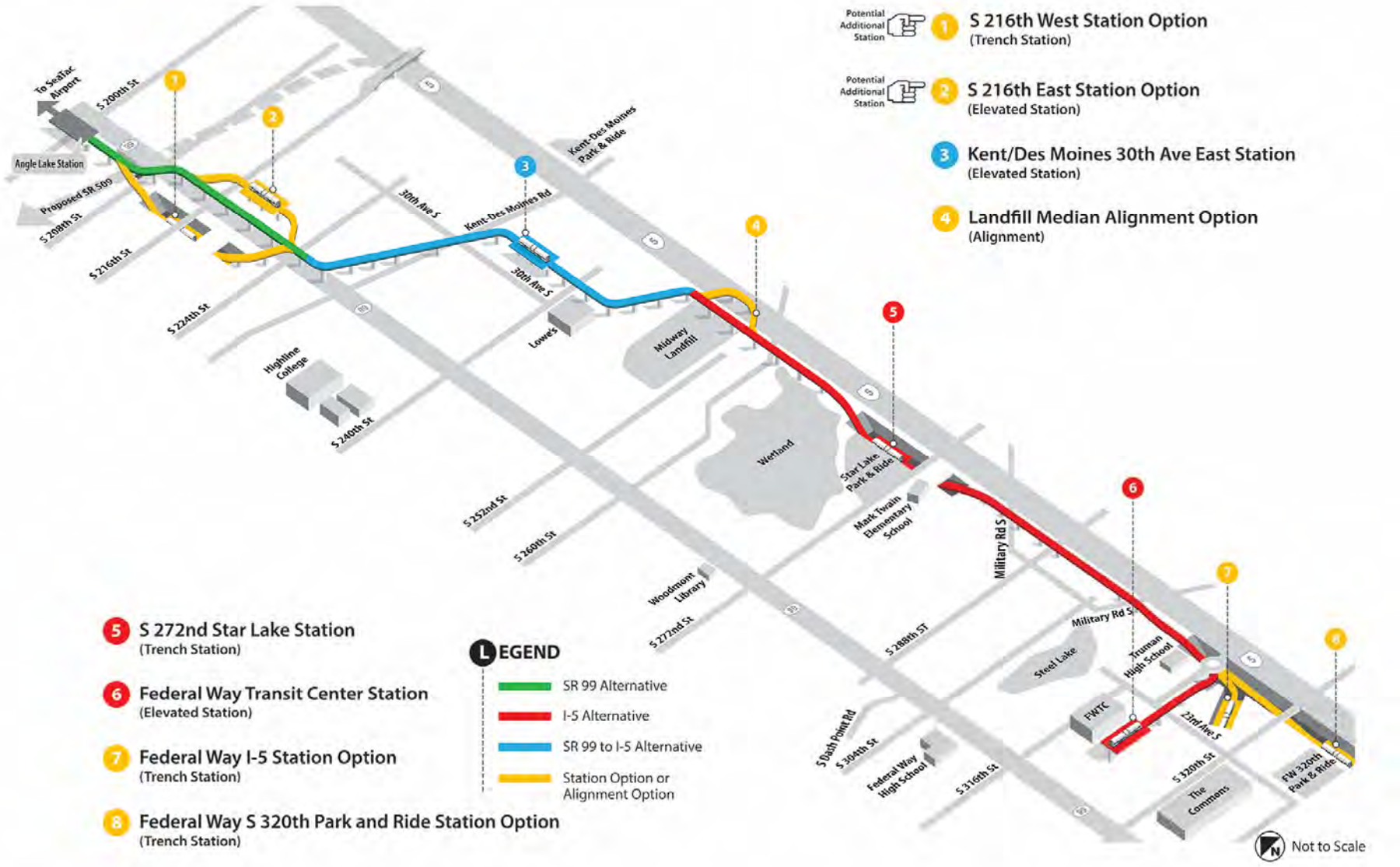


EXHIBIT 2-1B
FWLE Alternatives – I-5



Diagrams are for illustration purposes only and are not to scale.

EXHIBIT 2-1C
FWLE Alternatives – SR 99 to I-5

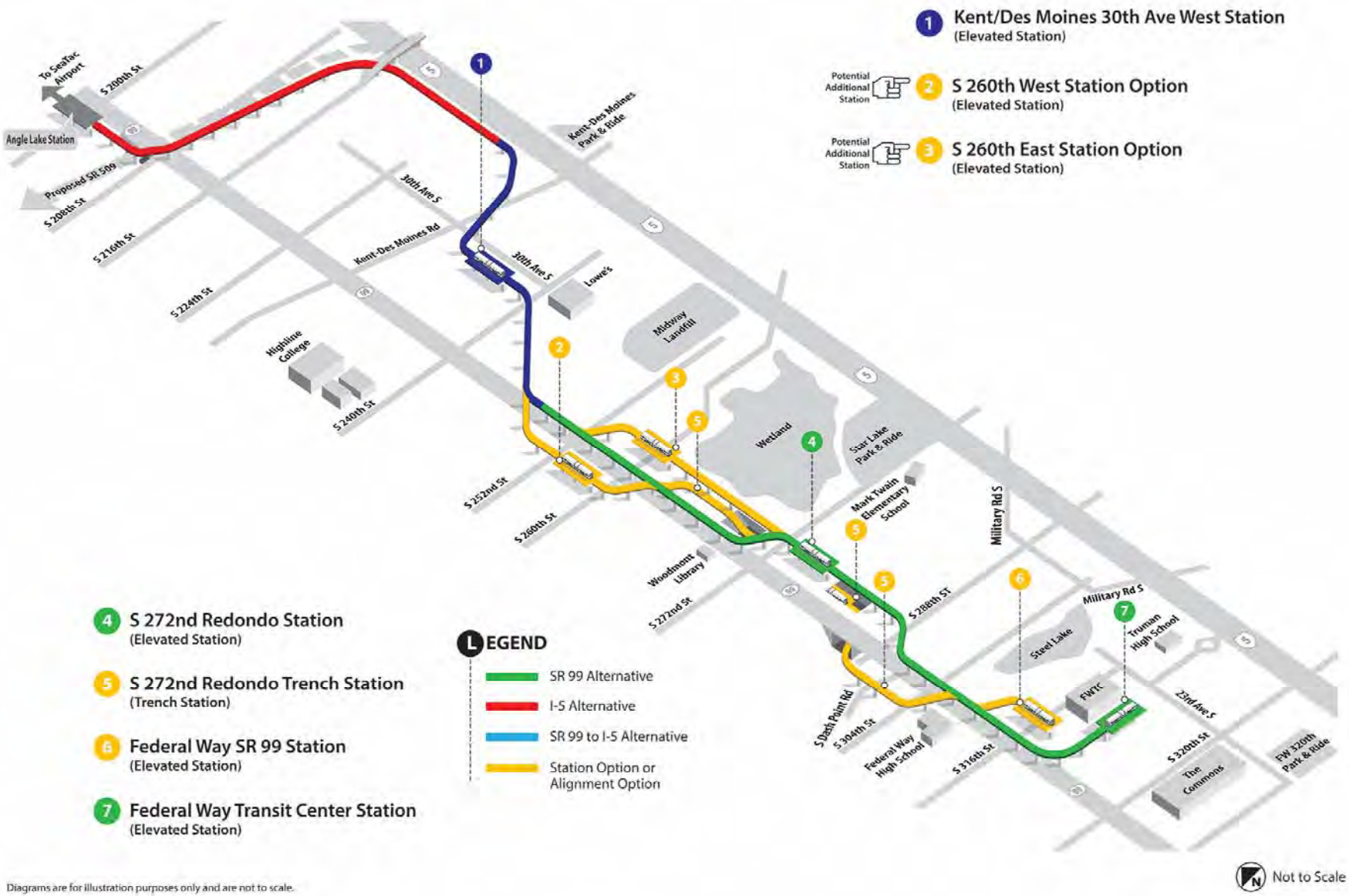


EXHIBIT 2-1D
FWLE Alternatives – I-5 to SR 99

1

Each alternative includes three stations: Kent/Des Moines, S 272nd Street, and the Federal Way Transit Center. For the Kent/Des Moines and Federal Way Transit Center stations, a station location has been identified for each alternative, along with one or more optional station locations. Voters authorized stations at Kent/Des Moines and S 272nd Street in the ST2 funding package. The Federal Way Transit Center is the terminus of this project for purposes of conceptual design and this Draft EIS. The station at the Federal Way Transit Center and its options would not restrict a southern extension of Link to a specific corridor; a future extension to Tacoma could follow the SR 99 or I-5 corridor.

The FWLE could be constructed in phases with an interim terminus station at either Kent/Des Moines or S 272nd Street. Therefore, this Draft EIS analyzes the impacts of two shorter segments, where appropriate: Angle Lake to Kent/Des Moines and Angle Lake to S 272nd Street.

There are also potential additional stations at two locations along SR 99: S 216th Street and S 260th Street. Both station locations include options on the east and west sides of SR 99. These stations were not part of the ST2 funding package, but could be added to the project if additional funding becomes available. Further evaluation of these stations' consistency with the ST2 plan would be required. There are no potential additional stations with the I-5 Alternative.

The I-5 Alternative also has an alignment option at the Midway Landfill that is designed to avoid or minimize impacts at this location. This option is described in greater detail later in this chapter.

The other two alternatives (SR 99 to I-5 and I-5 to SR 99) use portions of both the I-5 and SR 99 alternatives. The Draft EIS analyzes them with stations at three locations: Kent/Des Moines, S 272nd Street, and Federal Way Transit Center. Table 2-1 shows the station or alignment options that could be included with these alternatives.

2.2 FWLE Project Alternatives

This section describes in more detail the project alternatives shown in Exhibits 2-1A to 2-1D.

2.2.1 No Build Alternative

No Build Alternative

The No Build Alternative includes the transportation system and environment as they would exist without the proposed project.

The No Build Alternative includes a variety of projects, funding packages, and proposals in the central Puget Sound Region that are planned to occur with or without the FWLE. The No Build improvements consist of funded or committed roadway and transit actions by state, regional, and local agencies, and other projects that are considered likely to be implemented based on approved and committed funding. The same population and employment growth projections by Puget Sound Regional Council (PSRC) through 2035 are used for the No Build and Build alternatives.

The No Build Alternative includes the following major improvements by Sound Transit:

- Northgate Link Extension to Northgate Transit Center in Seattle
- Lynnwood Link Extension to Lynnwood Transit Center in Lynnwood
- East Link Extension to Overlake Transit Center in Redmond
- Service enhancements to Sound Transit Express bus and Sounder commuter rail systems
- A satellite light rail maintenance and operations facility

Minor local bus service additions by King County Metro are also expected; however, the overall bus network and its service levels were assumed to remain similar to today. Appendix G1, Transportation Technical Report, describes the major projects assumed in the No Build Alternative by jurisdiction, including regional highway improvements, new and expanded local roadways, and intersection improvements.

2.2.2 Components of Build Alternatives

This section summarizes the general components common to the four build alternatives and then describes in detail the alignments and the stations associated with each alternative, including park-and-rides and other station access.

All of the light rail alternatives would operate in exclusive right-of-way (referred to as light rail guideway), outside of traffic, to avoid operating and safety conflicts. This would assure the fast and frequent service needed to serve the FWLE corridor, with trains arriving as often as every 8 minutes and track speeds of up to 55

miles per hour (mph) (see Section 2.2.2.5 for the operating plan). The light rail guideway would be 30 to 40 feet wide, with two sets of tracks. This includes room for the poles and overhead catenary system (contact wire) needed to power the trains. Many sections would also contain space for emergency access as well as walls or barriers to restrict other access.

Elevated structures would require support columns or other bridging support structures. For at-grade guideway in areas with slopes, retaining walls might be needed where the alignment cuts into an adjacent hillside, or where needed to support fill material below the guideway. In some places, sound walls would be added to the guideway or to retaining walls to reduce noise impacts.

2.2.2.1 Profiles

For the FWLE, the developed nature of the corridor and large number of cross-streets require an elevated guideway along SR 99. There are fewer cross-streets along I-5, and therefore the profile can be based on topography and would vary between at-grade and elevated. A 15-foot zone is required next to all profiles, which would be free of trees that could overhang onto the guideway but would permit shrubs and ground-cover. The profiles of the alternatives and options are shown in Exhibits 2-7, 2-11 through 2-15, 2-17, 2-19, 2-20, and 2-22 through 2-24 later in this chapter.

Light Rail Profiles

Light rail can have several profile types: **at-grade**, **elevated**, **trench**, **retained fill**, or **tunnel**. "At-grade" means that the rail track is at the same grade (ground level) as the surrounding terrain. Tunnel profiles were ruled out for the FWLE during the alternatives analysis process (see Section 2.3).

At-Grade

Light rail at-grade operates best in areas where the grade is less than 6 percent and where there is adequate room within reserved street rights-of-way or off-street corridors. It works well with a moderate number of riders and with train frequencies as often as every 4 minutes. This project would have an at-grade profile only within the Washington State Department of Transportation (WSDOT) right-of-way for the I-5 Alternative. No at-grade crossings of roadways are proposed.

Elevated

Sound Transit uses light rail on elevated structures where the system must be grade-separated to cross over geographic or physical barriers and accommodate higher train frequencies, and where at-grade trackway might not be appropriate for surface corridors with high traffic levels. An elevated profile must have a minimum clearance of at least 16.5 feet near roadways, but topography and other

considerations might result in a profile as high as 50 feet or more. Pier supports holding up the guideway are typically about 10 feet by 10 feet square at the ground, although the underground support structure might be wider.

An elevated guideway can travel in the median of existing roadways, along the side of the roadway, or in off-street corridors.

Trench and Retained Fill

A variation of the at-grade profile is a trench or a retained fill. With a trench, the trackway is cut into the ground with a retaining wall on one side or both sides. With a retained fill, the trackway is built up above the ground surface with a retaining wall on one side or both sides, supporting the guideway. Portions of the guideway might involve trench or retained fill because of topography or to allow the guideway to travel under roadways.

2.2.2.2 Stations

The project would have three light rail stations plus two potential additional stations. The stations would be either elevated or at-grade depending upon the site conditions and the engineering requirements of the guideway.

The approximately 380-foot-long boarding platforms would serve four-car trains. They could be either in the center with tracks on both sides (center platform) (Exhibits 2-2 and 2-3) or on the outer side of the tracks (side platform). Escalators, elevators, and/or stairs would let riders access the elevated platforms. All stations would meet the Americans with Disabilities Act (ADA) requirements as well as public access, fire code, and life-safety requirements.

Interim terminus stations may also include parking for operators and security staff, and spaces for crew break rooms, storage, and light maintenance activities such as cleaning the interiors of vehicles.

2.2.2.3 Access

Link riders could get to each station by bus, automobile, bicycle, and walking. Sound Transit and King County Metro transit

Station Features

Stations would accommodate pedestrian, bicycle, and bus access. Each station would have a bicycle storage area with space for expansion. The station plans include connecting bus stops, paratransit stops, and handicapped-accessible drop-off areas. All station areas would accommodate a traction power substation and a signal bungalow. They would also include ticket vending machines, closed-circuit television cameras, a public address system, emergency phones, and variable message signage. Most of the stations would have parking for transit patrons in either a structure or a surface lot.

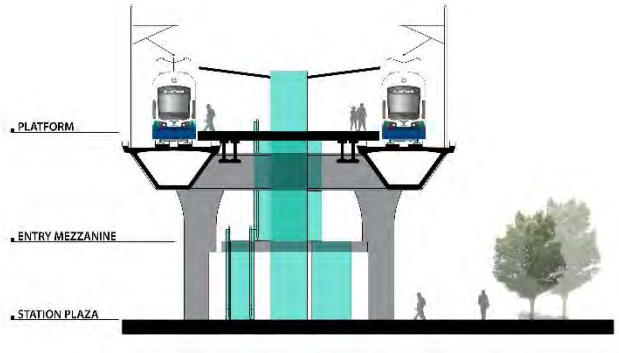


EXHIBIT 2-2
Elevated Center Platform Station

routes would provide service based on the FWLE Transit Integration Plan, which is described in more detail in Chapter 3. Each station would include an area for riders to transfer to or from buses. Depending on the projected level of future bus service, stations would have bus stops near the station on nearby streets and/or bus facilities within the station area.

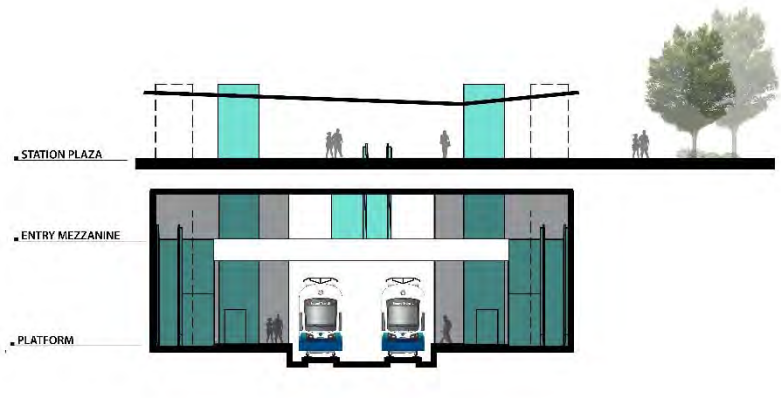


EXHIBIT 2-3
Trench Side Platform Station

Parking lots or garages would be built at the Kent/Des Moines, S 272nd Street, and Federal Way Transit Center stations, but not at the potential additional stations at S 216th Street and S 260th Street. The allocation of parking at each station is based on the existing parking supply and utilization, surrounding land use characteristics, multi-modal access expectations (pedestrian, bicycle, arterial and highway connections, and transit transfers), and data about local and national parking use at comparable facilities. More parking would be provided at the Kent/Des Moines Station when it is an interim terminus compared to the full project build-out. The demand for parking at Kent/Des Moines is expected to decrease as the project extends south and additional parking is provided at S 272nd Street and Federal Way Transit Center stations. Additional parking would not be needed at the S 272nd Street station if it is an interim terminus. All stations will have areas for rider drop-off/pick-up. Sound Transit would make road improvements or extensions at some stations. Road improvements could include sidewalks, bike lanes, or widening to accommodate projected traffic levels.

Interim Terminus

A terminus station to which the project would operate until the next portion of the project can be built. The interim terminus would typically include a station with tail tracks extending beyond the station for layover of trains.

2.2.2.4 Tail Tracks and Crossovers

Tail tracks are tracks that extend past a terminus station far enough to allow the temporary layover of one four-car train—typically 850 feet beyond the end of the station platform. They also enable trains to approach terminal stations at higher speeds because they extend the safe braking distances. They are necessary at all terminus stations, even interim ones.

Crossover tracks connect two parallel tracks and allow trains to change safely from one track to the other (Exhibit 2-4). They would be provided at various places to allow for maintenance that requires removing one track from service, to bypass a stalled train, to turn trains in the opposite direction, or to operate in the event of emergencies or blockages. Crossover trackwork requires special signaling control equipment under or adjacent to the guideway.

EXHIBIT 2-4
Crossover Tracks

2.2.2.5 Overhead Catenary System

An overhead catenary system (OCS) delivers electricity to light rail vehicles. The OCS requires two wires for each track served, supported on 15- to 23-foot-high steel poles about 200 feet apart (Exhibit 2-5). The poles are typically located between the two tracks. A zone clear of trees is maintained within about 15 feet of the poles.

EXHIBIT 2-5
Overhead Catenary System

2.2.2.6 Traction Power Substation

Traction power substations (TPSSs) boost the power to the OCS. The TPSSs are metal buildings about 20 feet wide by 60 feet long, with an additional 10 to 20 feet of clearance required around each unit (Exhibit 2-6), screened by a wall or fence.

TPSSs would be located at the Kent/Des Moines, S 272nd (Redondo or Star Lake), and Federal Way Transit Center stations, and near S 221st Street and S 288th Street. All TPSSs would likely be placed in the footprint of a light rail station or beneath the guideway.

EXHIBIT 2-6
Traction Power Substation

2.2.3 SR 99 Alternative

The SR 99 Alternative (Exhibit 2-7) would exit the Angle Lake Station along 28th Avenue S, cross over WSDOT's proposed SR 509 extension (see Section 2.7), and transition to the existing SR 99 median near S 208th Street. It would remain in the median of SR 99 except at station areas and at crossings of Kent-Des Moines Road and S 272nd Street as described below. The alignment and all stations would be elevated and would be in public right-of-way except in the station areas. The alternative would require additional right-of-way in some areas for intersection widening or station access improvements. The three stations described below would be center-platform configurations, but potential additional stations would have side-platform configurations. Typical cross-sections for median, west, and east alignments are shown on Exhibits 2-8, 2-9, and 2-10.

2.2.3.1 Kent/Des Moines SR 99 West Station

This station would be on the west side of SR 99 between S 236th Lane and S 240th Street. After exiting the station, the alignment would transition back to the SR 99 median south of S 240th Street. This station would have approximately 1,000 parking spaces (500 surface, 500 structured) if the station were an interim terminus, and the number of parking spaces could be reduced to about 500 spaces when the system is extended south and additional system parking is made available at other stations.

Kent/Des Moines Station

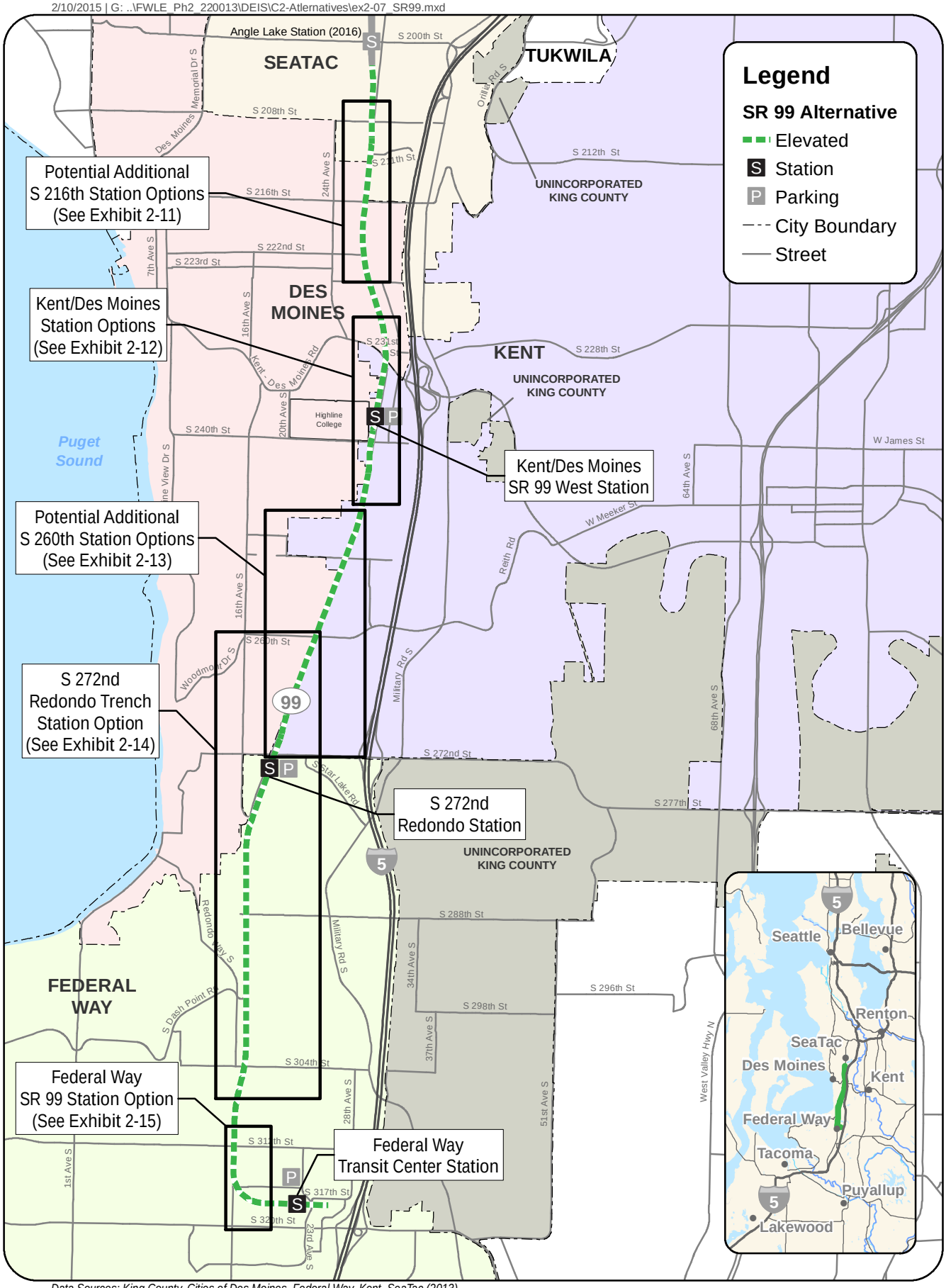
All Kent/Des Moines stations and station options for the SR 99 Alternative would include construction of a new S 236th Lane east of SR 99 to provide access to the station and parking area.

2.2.3.2 S 272nd Redondo Station

The guideway alignment would transition to the east side of SR 99 north of S 272nd Street before entering an elevated station at the existing Redondo Heights Park-and-Ride. This station would have access from SR 99 and S 272nd Street, and approximately 1,400 combined surface and structured parking spaces, an increase of approximately 700 from what is currently provided. It would not need additional parking if it were a terminus. After exiting the station, the alignment would transition back to the SR 99 median near S 279th Street.

2.2.3.3 Federal Way Transit Center Station

The alignment would exit the SR 99 median north of S 316th Street and head east to an elevated Federal Way Transit Center Station on the south side of the existing transit center. This station would add approximately 400 new surface parking spaces to the 1,200 existing parking spaces.



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).

N

0 0.5 1 2 Miles

EXHIBIT 2-7
SR 99 Alternative

Federal Way Link Extension

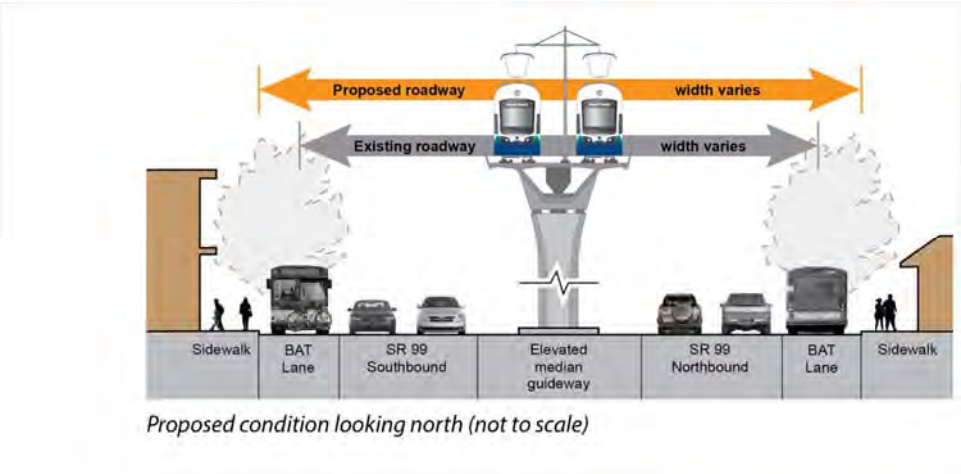


EXHIBIT 2-8
Typical Cross-Section - SR 99 Alternative - Median

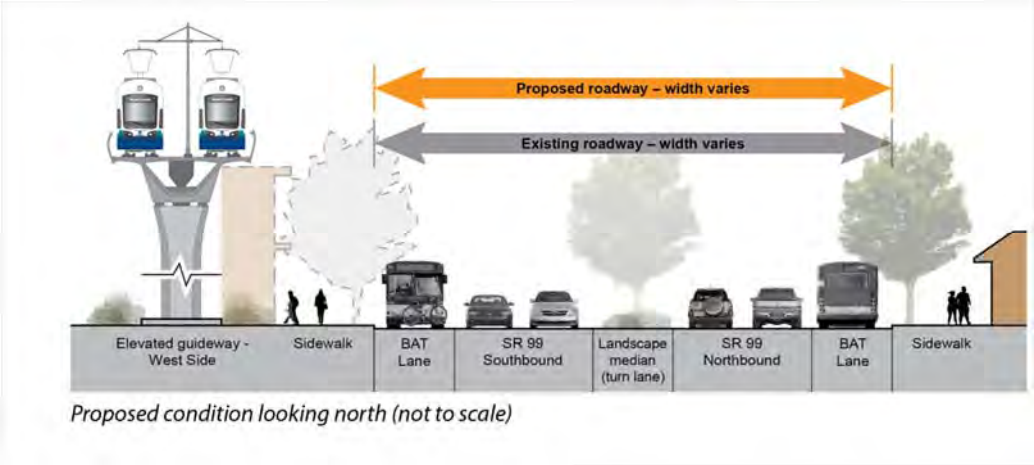


EXHIBIT 2-9
Typical Cross-Section - SR 99 Alternative and Station Options- West or East Side

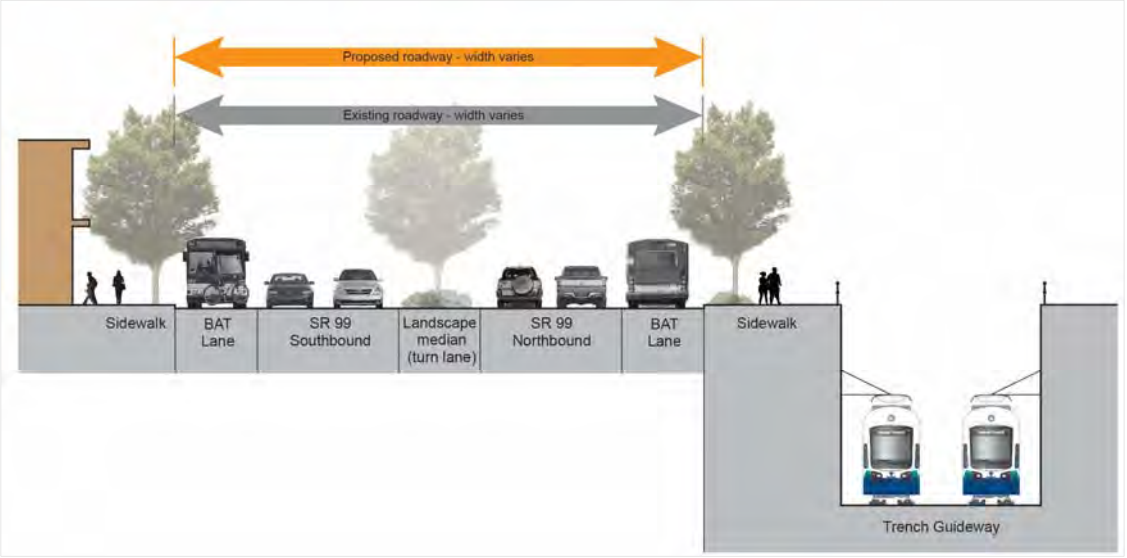


EXHIBIT 2-10
Typical Cross-Section for SR 99 Station Options with Trench-West or East Side

2.2.3.4 S 216th Potential Additional Station

The project could have a potential additional S 216th Station (Exhibit 2-11) on either side of SR-99. In either case, it would be designed with side platforms, preserving the ability to add the station at a later time. The station would not have parking. This station location is not funded under ST2.

S 216th West Station Option

The alignment for this potential additional station would stay on the west side of SR 99 from Angle Lake Station to S 216th Street instead of transitioning to the median. Similar to the SR 99 Alternative, the alignment would exit the Angle Lake Station and follow the SR 509 right-of-way to the west side of SR 99, and then would remain behind the sidewalk on the west side of SR 99 to S 216th Street, entering a trench near S 211th Street. It would remain in a trench, with the station under S 216th Street, until it approaches S 220th Street. Entrances to the station would be located on both the north and south sides of S 216th Street. After exiting the trench, the alignment would cross S 220th Street and transition to the SR 99 median.

S 216th East Station Option

The light rail alignment for this potential additional station would be the same as the SR 99 Alternative until approximately 300 feet north of S 216th Street, where it would transition to the east side of SR 99 and enter an elevated station south of S 216th Street. After exiting the station, it would transition back to the SR 99 median near S 222nd Street.

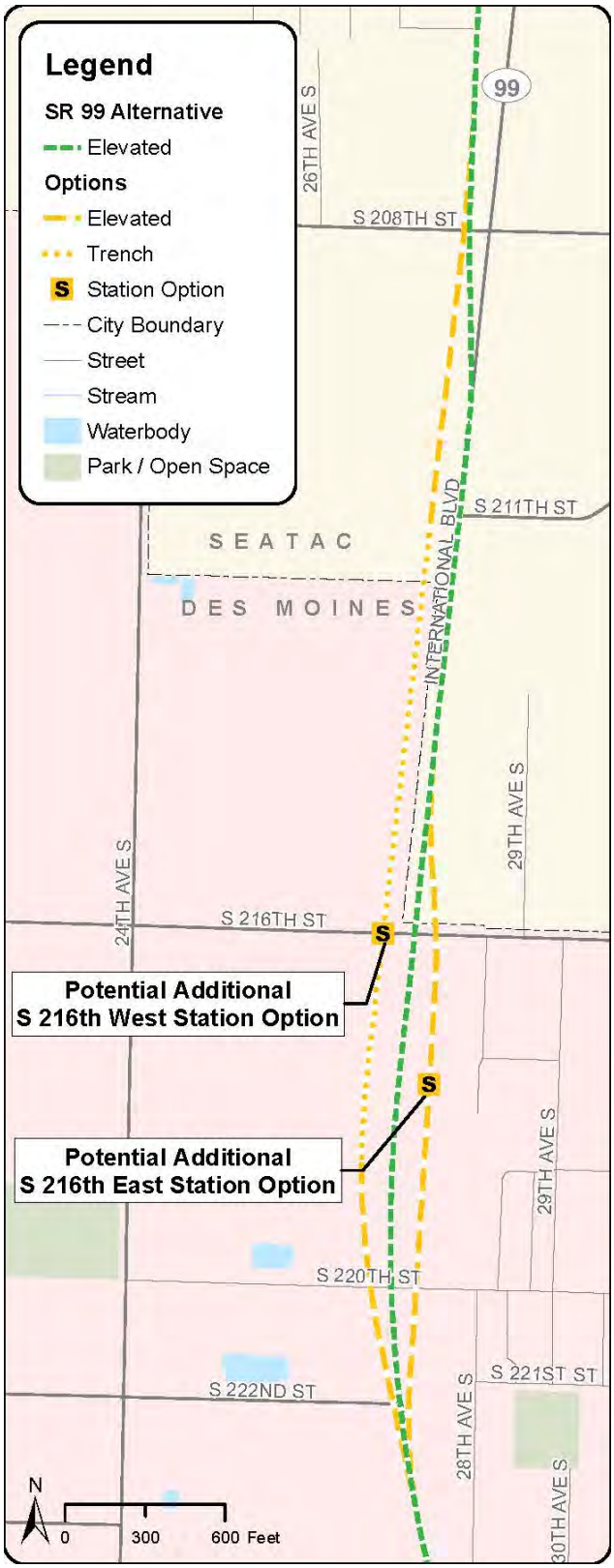


EXHIBIT 2-11
S 216th Station Options

2.2.3.5 Kent/Des Moines Station Options

All Kent/Des Moines Station options (Exhibit 2-12) would have center platforms and parking for approximately 1,000 vehicles (500 surface, 500 structured) if an interim terminus. The parking could be reduced to 500 spaces when the system is extended south and additional system parking is available at other stations.

Kent/Des Moines HC Campus Station Option

The alignment for this station option would transition to the west side of SR 99 north of S 226th Street and generally follow the east side of 28th Avenue S across Kent-Des Moines Road. It would then enter a trench south of S 232nd Street and continue in a trench to a station on the eastern edge of the Highline College (HC) campus east parking lot and then under S 240th Street. It would become elevated and return to the SR 99 median south of S 240th Street. If this station option were combined with the S 216th West Station Option, the alignment would remain on the west side of SR 99 between these two station options.

Kent/Des Moines SR 99 Median Station Option

The alignment for this station option would transition from the west side of SR 99 south of Kent-Des Moines Road to enter the median. The station would be in the SR 99 median at approximately S 236th Lane. The alignment would stay in the median after exiting this station.

Kent/Des Moines East Station Option

This station option would transition to the east side of SR 99 north of Kent-Des Moines Road and would span this intersection to enter an elevated station on the east side of SR 99, north of S 240th Street. The alignment would return to the SR 99 median south of S 240th Street.

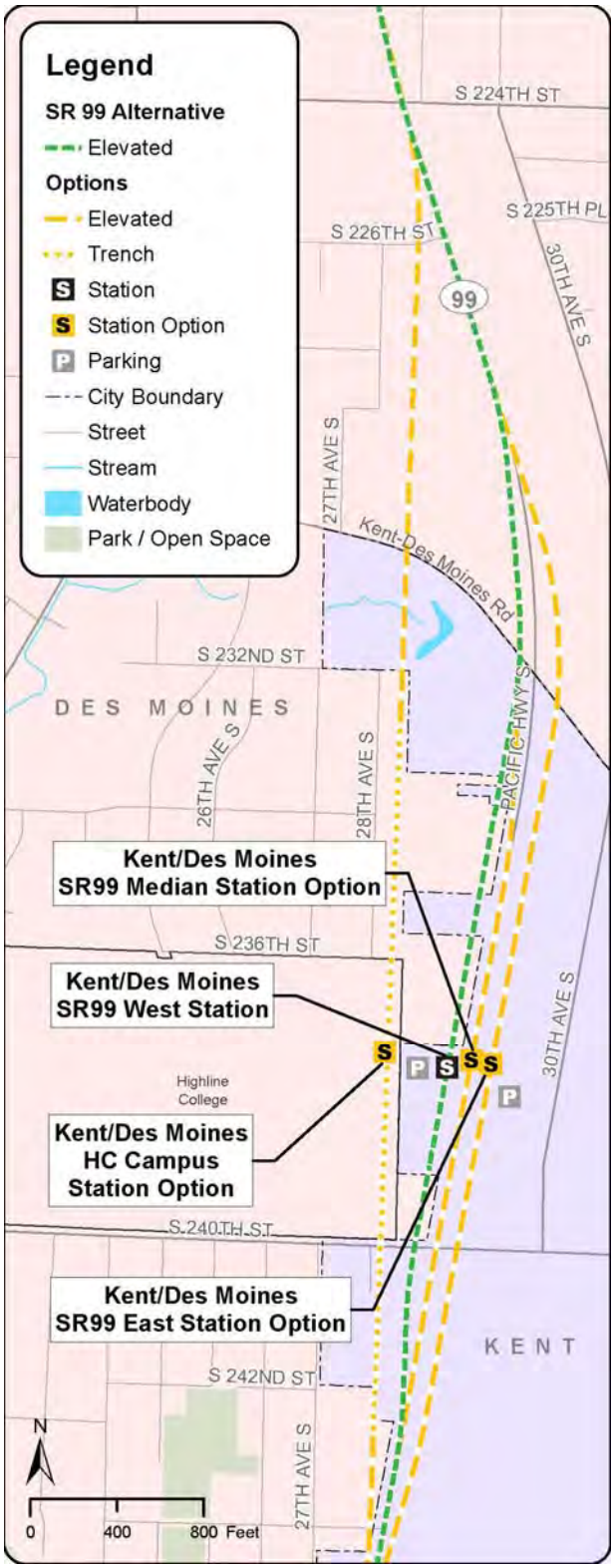


EXHIBIT 2-12
Kent/Des Moines Station Options

2.2.3.6 S 260th Potential Additional Station

The project could have a potential additional station (Exhibit 2-13) on either the east or west side of SR 99. In either case, it would be designed with side platforms, preserving the potential to be built at a later time if not included in and built as part of the Preferred Alternative. There would be no patron parking built with this station. This station location is not funded under ST2.

S 260th West Station Option

The alignment for the S 260th West potential additional station would transition to the west side of SR 99 south of S 240th Street and continue behind the sidewalk to an elevated station north of S 260th Street. It would transition back to the SR 99 Alternative just south of S 260th Street.

S 260th East Station Option

The alignment for the S 260th East potential additional station would transition to the east side of SR 99 north of S 260th Street and continue to a station straddling S 260th Street. Entrances to the station would be on both sides of S 260th Street. The alignment would then continue on the east side of SR 99 to the S 272nd Street Redondo Station and reconnect with the SR 99 Alternative.

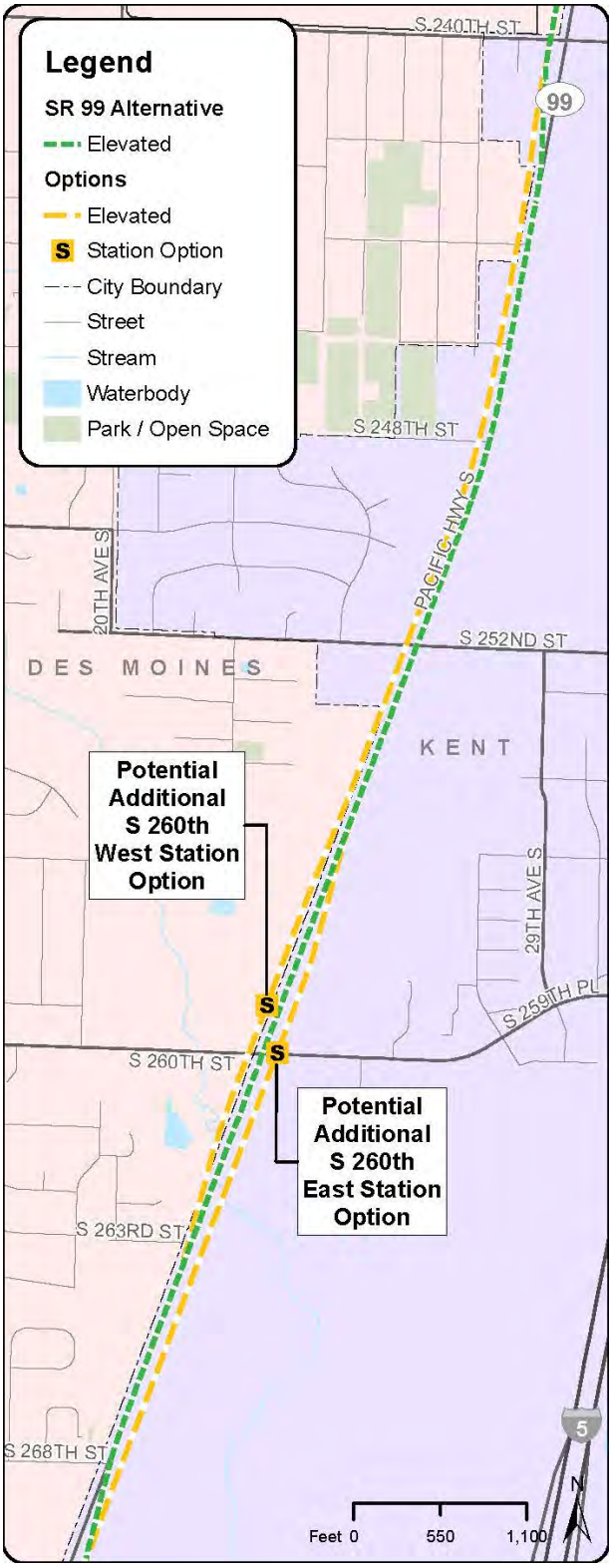


EXHIBIT 2-13
S 260th Station Options

2.2.3.7 S 272nd Redondo Trench Station Option

The alignment for the S 272nd Redondo Trench Station Option (Exhibit 2-14) would shift from the SR 99 median to the east side of SR 99 just south of S 260th Street and then transition to a trench by S 272nd Street. The guideway would cross under S 272nd Street to the S 272nd Redondo Trench Station at the existing Redondo Heights Park-and-Ride and then continue south, crossing under SR 99 near S 279th Street. On the west side of SR 99, it would travel behind properties fronting the west side of SR 99 and would be on a structure but below the elevation of SR 99, due to the terrain sloping down to the west. It would cross over 16th Avenue S, enter an existing utility corridor south of S 288th Street, and follow this corridor south and span over Dash Point Road. It would then travel on the east side of 16th Avenue S until SR 99 near S 308th Street, where it would transition back to the SR 99 median.

Parking for this station would be the same as described for the S 272nd Redondo Station.

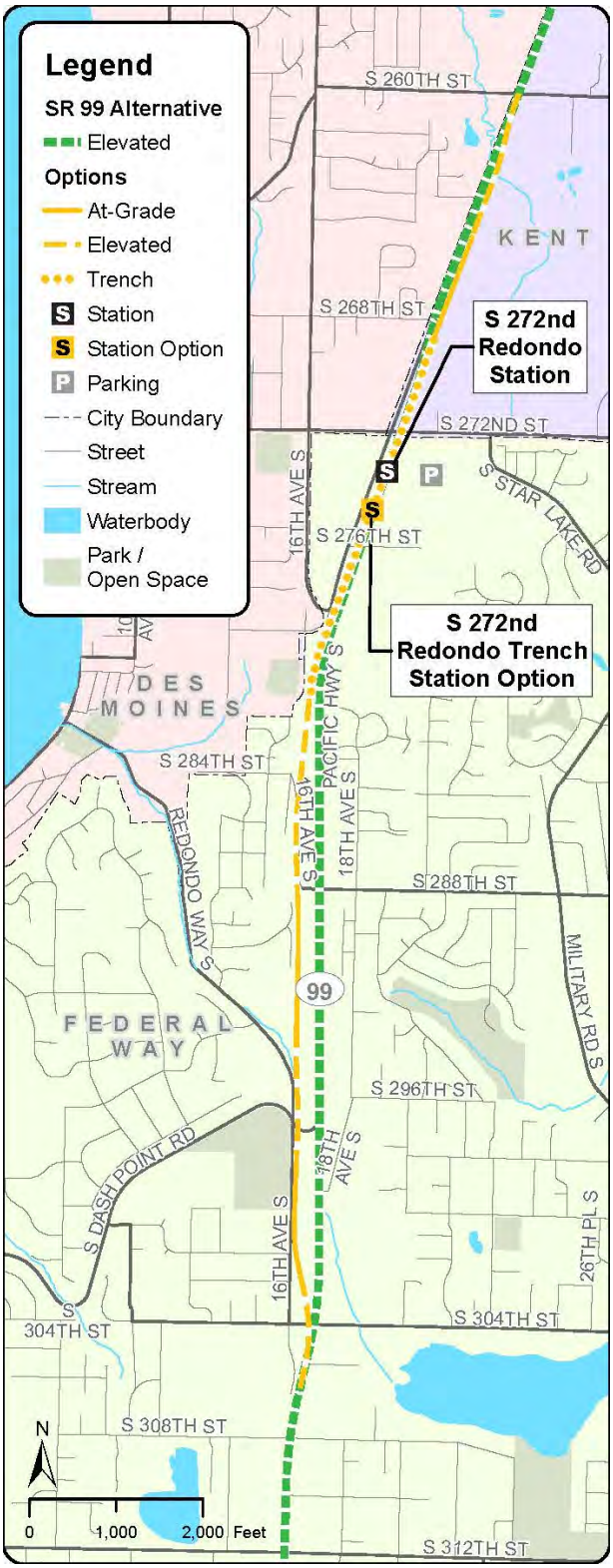


EXHIBIT 2-14
S 272nd Redondo Trench Station Option

2.2.3.8 Federal Way Transit Center SR 99 Station Option

The alignment for the Federal Way Transit Center SR 99 Station Option (Exhibit 2-15) would leave the SR 99 median between S 308th Street and S 312th Street, and would travel southeast outside of existing public right-of-way to an elevated center-platform station between SR 99 and 20th Avenue S, straddling S 316th Street. This station would add 400 new parking spaces to the 1,200 existing parking spaces at the Federal Way Transit Center.

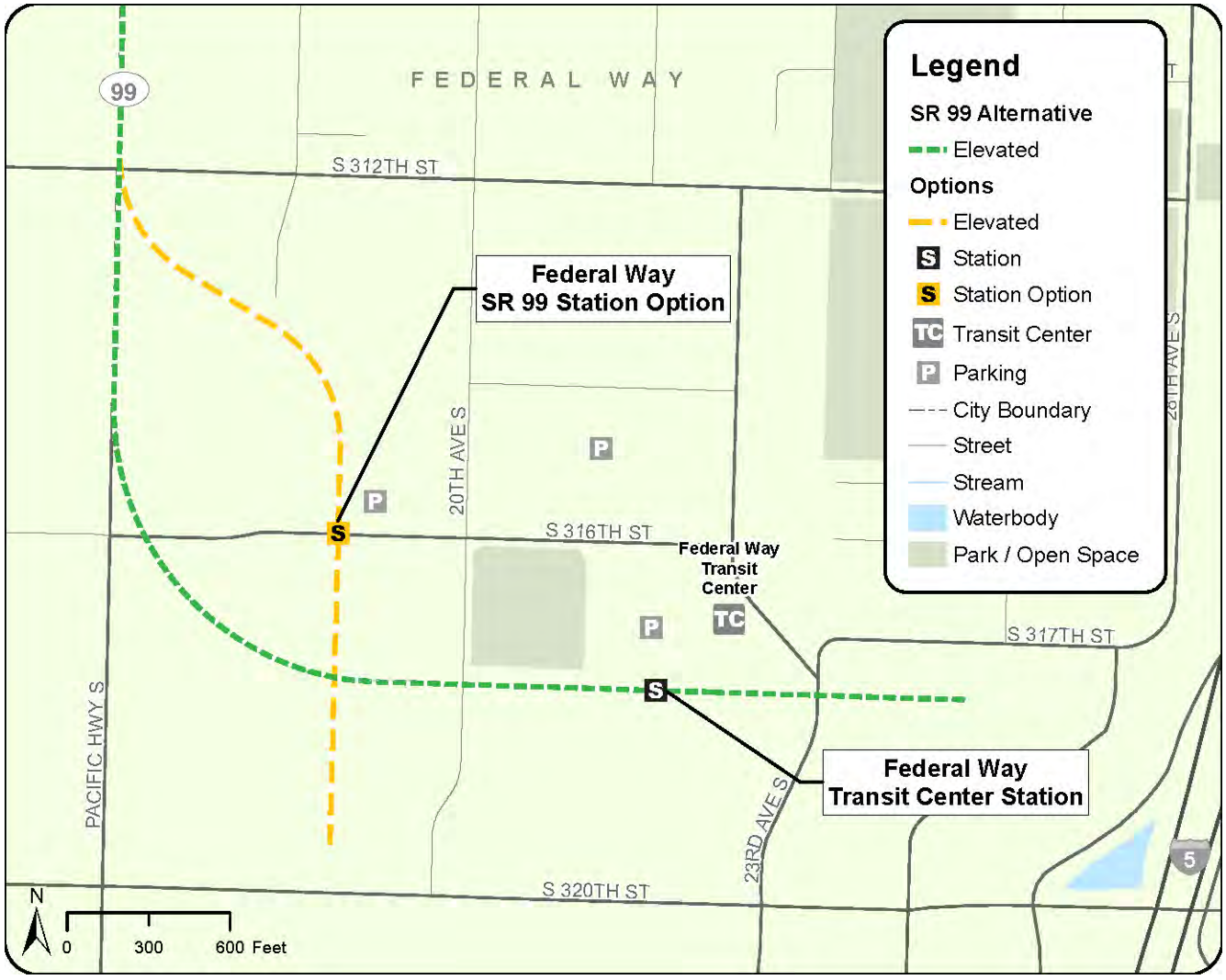


EXHIBIT 2-15
Federal Way Transit Center SR 99 Station Option

2.2.4 I-5 Alternative

The I-5 Alternative (Exhibits 2-16 and 2-17) would leave the Angle Lake Station and cross to the east side of SR 99 near the proposed SR 509 extension (see Section 2.7 for additional information on this project). It would be inside the future SR 509 WSDOT right-of-way until reaching I-5. From S 211th Street to S 231st Street, the light rail alignment would be outside of and west of the WSDOT right-of-way to allow for the planned future build-out of I-5 in this area. Appendix F, Conceptual Design Plans, shows the proposed SR 509 Extension in relation to the FWLE. Between S 231st Street and S 317th Street, the alignment would be mostly within the I-5 right-of-way except to access stations. Some areas of this alternative would be at-grade or in a trench where existing topography allows and road crossings are not present (see Exhibit 2-17). All road crossings would be grade-separated. All stations would have center platforms and transit connections.

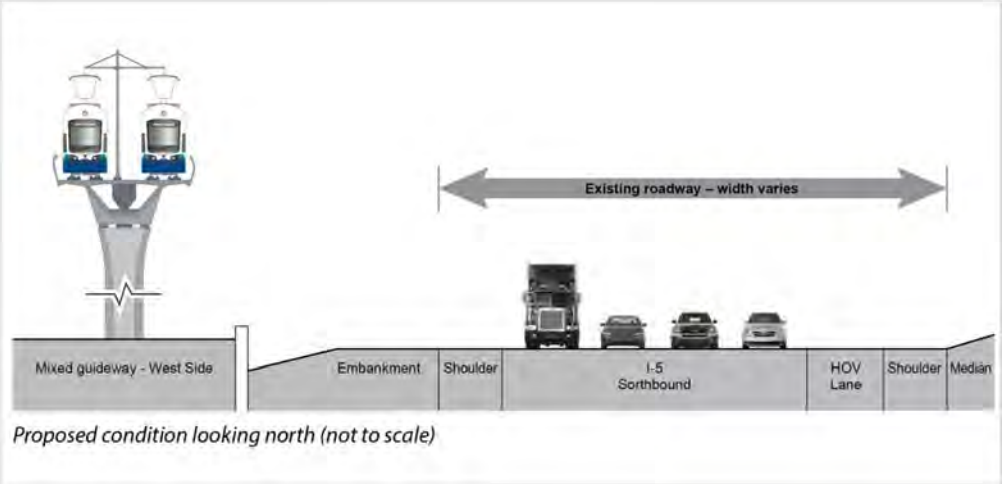


EXHIBIT 2-16
Typical Cross-Section, Elevated Profile - I-5 Alternative

2.2.4.1 Kent/Des Moines I-5 Station

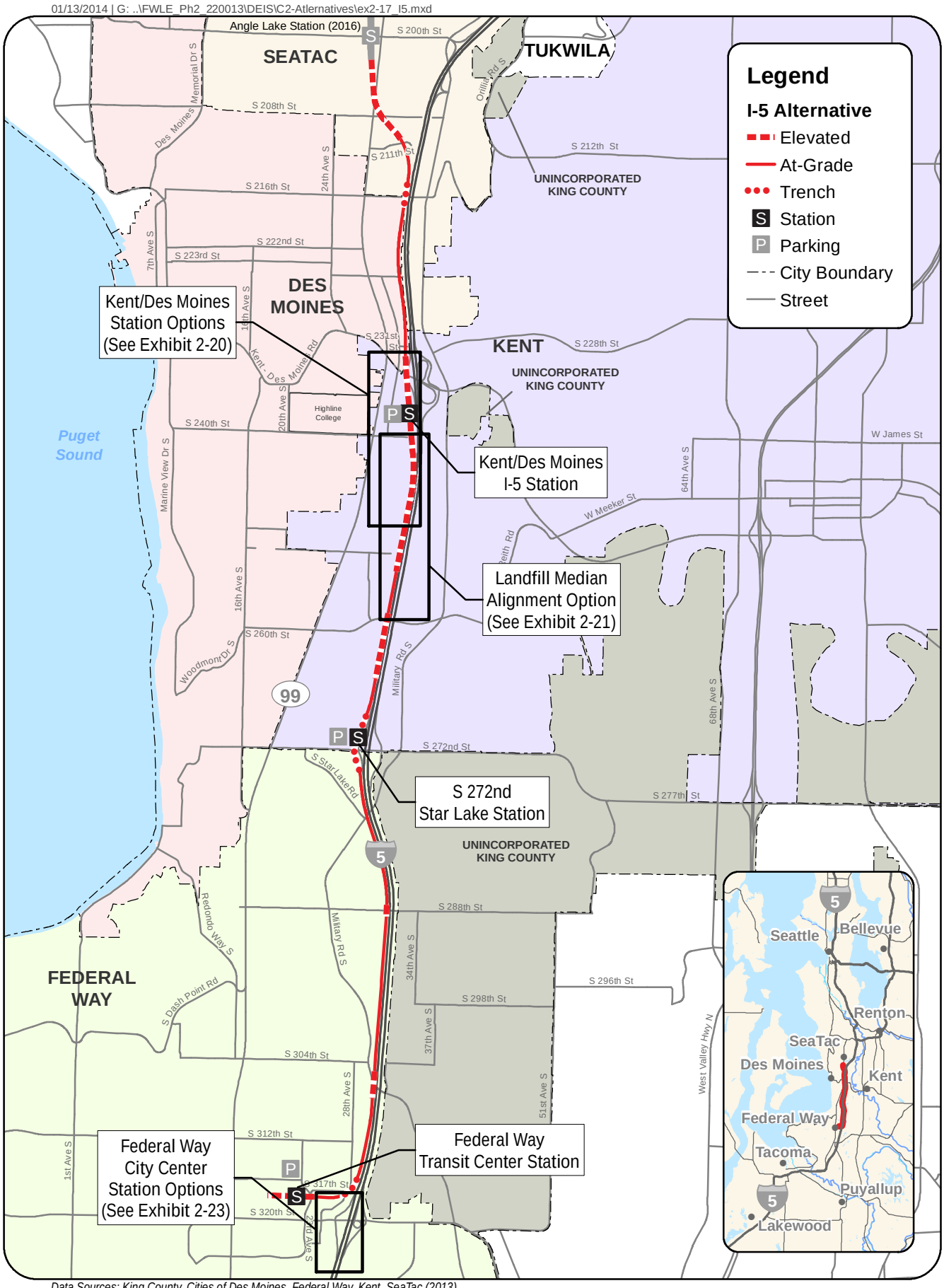
This elevated station would be adjacent to the west side of I-5, north of S 240th Street. It would have approximately 1,000 parking spaces (500 surface, 500 structured) if used as an interim terminus, which could be reduced to 500 spaces when the system is extended south and additional system parking is made available at other stations.

Kent/Des Moines Station

The Kent/Des Moines I-5 station and SR 99 East Station Option would include construction of a new S 236th Lane east of SR 99 to provide access to the station and parking area.

2.2.4.2 S 272nd Star Lake Station

This trenched station would be at the Star Lake Park-and-Ride and would have approximately 1,240 parking spaces in structured parking, about 700 more than the existing parking at this location.



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).

N

0 0.5 1 2 Miles

EXHIBIT 2-17
I-5 Alternative

Federal Way Link Extension

2.2.4.3 Federal Way Transit Center Station

This station would be elevated on the south side of the existing Federal Way Transit Center. It would add about 400 new parking spaces to the 1,200 existing spaces.

2.2.4.4 Location within I-5 Right-of-Way

The width of the undeveloped I-5 right-of-way under consideration for transit use varies from roughly 20 feet to 45 feet along the potential alignment. Given the project's current level of conceptual design, it is premature to define the precise location of the light rail guideway within this strip of undeveloped right-of-way. If for the Final EIS Sound Transit identifies a Preferred Alternative within the I-5 right-of-way additional analysis and more detailed design will help inform the specific siting of the guideway within the right-of-way.

To help decision-makers and the public understand potential impacts of an alignment within the undeveloped I-5 right-of-way, Sound Transit has assumed in this Draft EIS that the guideway will generally follow the western edge of the interstate right-of-way. This is to ensure that potential impacts to neighboring properties and land uses are disclosed as fully as possible given the current level of design. It also reflects the general practice of agencies with jurisdiction over interstate highways (in Washington state, the Federal Highway Administration and WSDOT) to locate non-highway uses as far as possible from an existing highway. There are several reasons for this approach, including the following:

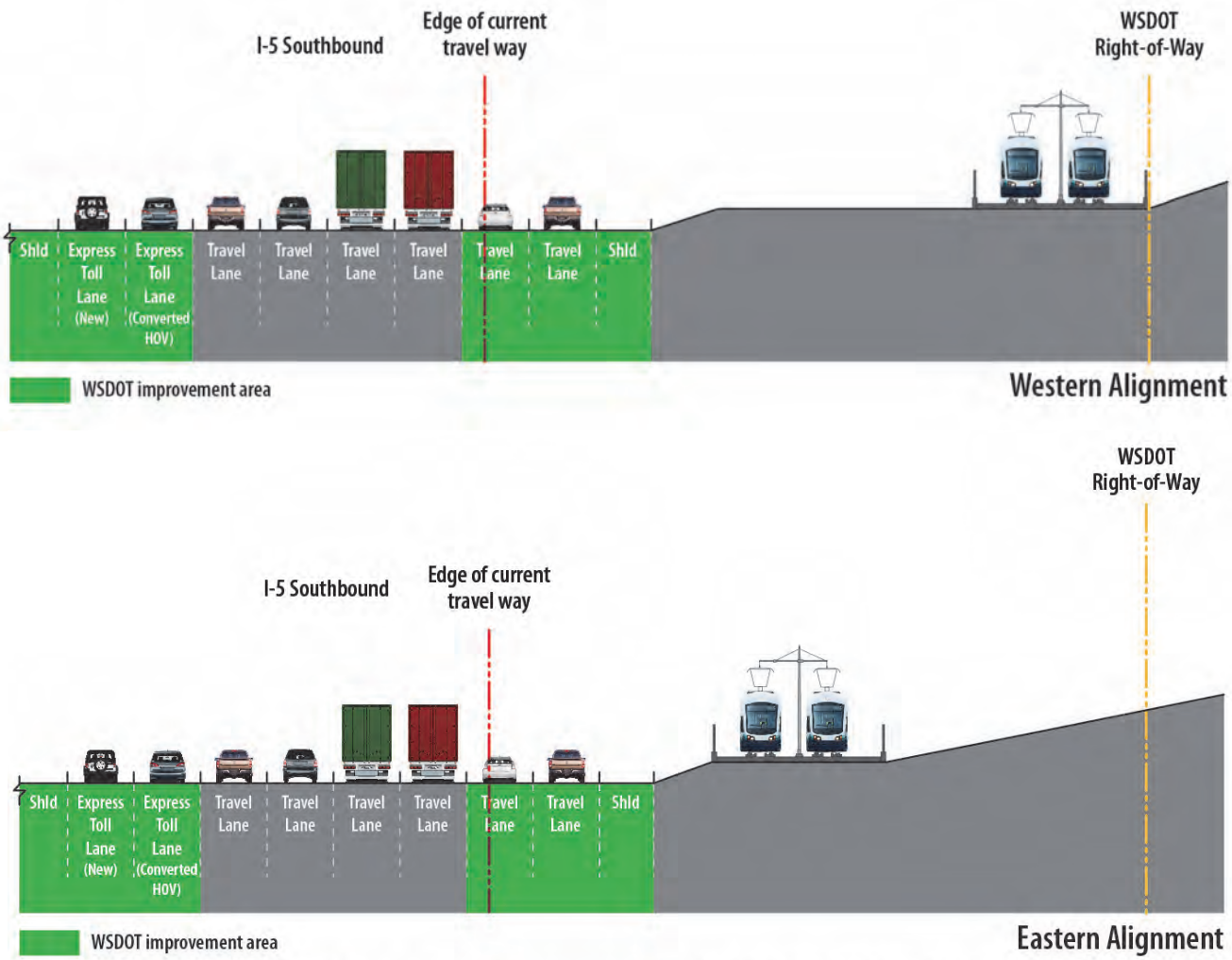
- **Safety:** As the distance diminishes between the proposed non-highway structure and the highway pavement, the risk to highway users increases. The amount of increased hazard at any location depends on factors like the specific highway configuration, location-specific highway volumes, average speeds, topography, and the distance from the edge of pavement to the structure/barrier. The effect could be a very slight increase in the accident rate, or a substantial increase, depending on the factors involved. Safety mitigation measures may help, but WSDOT and FHWA believe they will not fully mitigate safety concerns. For example, a guardrail in front of the structure may mitigate the increased hazard of a non-highway use's large concrete pier, but guardrails themselves are potential hazards.
- **Future highway-related needs for the right-of-way:** The highway agencies must also determine that any use of the right-of-way

leaves enough room to accommodate reasonably foreseeable highway expansion needs, considering the width of the right-of-way and the anticipated regional growth. Even if highway expansion is not precluded after the introduction of the non-highway use, such projects become more difficult and expensive if there is inadequate right-of-way in which to work.

In addition to potentially needing right-of-way for new lanes, highway agencies may also need it for requirements including new or improved drainage/stormwater facilities, signage, new or existing technologies to improve traffic management, environmental mitigation, upgrading storm water facilities, and innovative interchange designs. For example, grassy swales within a right-of-way provide an effective stormwater/drainage treatment. They can be replaced with concrete vaults, but vaults are more costly and require more maintenance.

- **Operations and maintenance:** The highway agencies must also maintain their roadways. As the amount of right-of-way decreases, the likelihood that maintenance will disrupt traffic increases. If maintenance vehicles have to use the highway shoulders, that also increases risk to motorists. And just as insufficient right-of-way can make new construction more costly, it can increase maintenance costs.

FHWA and WSDOT also recognize that site-specific constraints along the undeveloped right-of-way exist and may require flexibility to adjust the location of the transit guideway to avoid impacts or problems. For example, moving a guideway closer to the pavement from the edge of the right-of-way in some locations could reduce visual and noise impacts; it may avoid or reduce impacts to streams or wetlands or other natural features at a specific location; it may resolve constructability conflicts or serious cost problems due to working in or around existing infrastructure in the area; or it may mitigate or avoid other problems that would exist if the guideway were on the edge of the right-of-way. Appendix H illustrates some of the specific tradeoffs to be weighed at different locations along the I-5 alignment (Exhibit 2-18). Sound Transit, FTA, and the highway agencies acknowledge that if an alternative that uses I-5 right-of-way is identified as the Preferred Alternative, they will work collectively to perform this balancing of cost, complexity, and benefits with impacts



WSDOT improvement area includes additional lanes on the outside of the roadway as proposed in the *I-5 -SR 509 Corridor Completion an Freight Improvement Project* (not funded) as well as toll lanes in the shoulder and current HOV lane as proposed in the *SR 509, I-5 and SR 167 Puget Sound Gateway Project* (not funded).

EXHIBIT 2-18
Potential Locations of I-5 Alternative within WSDOT Right-of-Way (looking south)

to safety, future highway needs, and interstate maintenance and operations.

Exhibit 2-18 shows a representative cross section of the I-5 southbound lanes in the FWLE corridor, including the western limits of the I-5 right-of-way as well as the western limit of the current travel way. The WSDOT improvement area shown in green represents planned and potential improvements. The outside two additional lanes and shoulder represent I-5 widening proposed as part of the I-5 – SR 509 Corridor Completion and Freight Improvement Project as designed and documented in FHWA's Record of Decision for that project (2003). The inside improvement area reflects the potential for converting an existing HOV lane to an express toll lane and adding a

second express toll lane and shoulder in the I-5 median. These latter potential improvements have not been studied in an environmental impact statement but have been considered as part of the WSDOT Gateway Program. These potential improvements are not in the funded regional transportation plan.

Sound Transit, FTA, and the highway agencies have already identified two places in the I-5 alignment where, if the Sound Transit Board identifies an I-5 alternative as the Preferred Alternative, they would balance cost, complexity, and benefits with impacts to safety, future highway needs, and interstate maintenance and operations. One such location is where the light rail alignment approaches the Camelot Mobile Home Park south of S 288th Street, where shifting the alignment east may be necessary to adequately mitigate impacts to residents and, perhaps, Bingaman Creek.

The other location is where the alignment crosses the Midway Landfill. A more eastern alignment may be proposed if it is determined that there are constructability risks with the western alignment in the vicinity of the Midway Landfill. In both of these locations, and perhaps others, more information will be developed, and FHWA and WSDOT will be consulted to determine the guideway location that best accommodates all of the concerns described in this section.

After the Sound Transit board identifies a Preferred Alternative, Sound Transit will prepare a Final EIS with more precise and detailed information and more refined designs for that alternative. This will occur whether the Preferred Alternative uses I-5 or SR 99 or both, as the project team performs more detailed analysis and refines the design to reduce the project's impacts and maximize its benefits. Still more design refinements will continue after the Record of Decision (ROD) during final design and permitting. Consultation with the highway agencies, other interested agencies, and the public will also continue in tandem with the design advancement. All post-ROD design refinements will be subject to additional environmental review, consistent with the National Environmental Policy Act (NEPA) and the State Environmental Policy Act (SEPA).

2.2.4.5 Kent/Des Moines Station Options

All Kent/Des Moines Station options (Exhibit 2-19) would have center platforms and surface parking for approximately 1,000 vehicles if used as an interim terminus, which could be reduced to 500 when the system is extended south and additional system parking is available at other stations.

Kent/Des Moines At-Grade Station Option

The at-grade station option would be next to the I-5 right-of-way just south of S 240th Street. It would not change the alignment of the I-5 Alternative.

Kent/Des Moines SR 99 East Station Option

This station option would be elevated on the east side of SR 99. The alignment would begin transitioning from the west side of I-5 to the east side of SR 99 north of Kent-Des Moines Road, and would span Kent-Des Moines Road near 30th Avenue S. It would transition back to I-5 south of S 240th Street and re-enter the I-5 right-of-way.

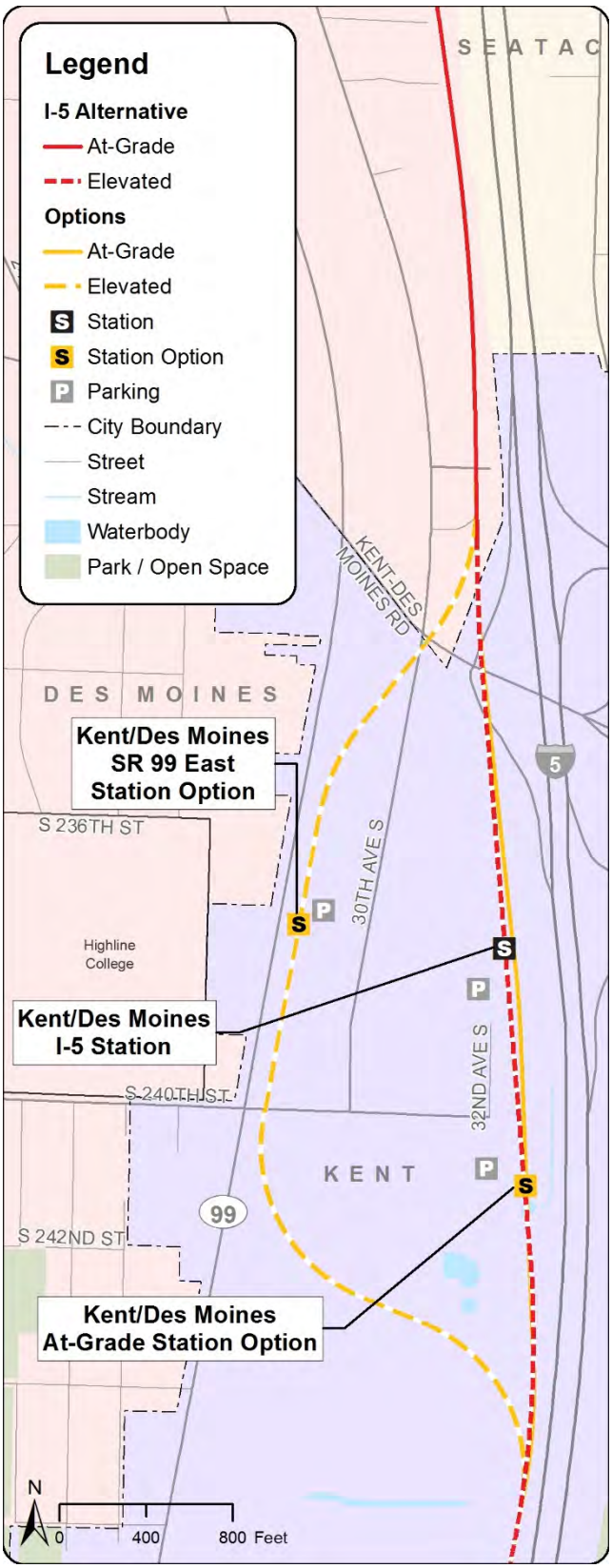


EXHIBIT 2-19
Kent/Des Moines Station Options

2.2.4.6 Landfill Median Alignment Option

To avoid crossing the Midway Landfill, which has unique engineering challenges associated with it, this alignment option (Exhibits 2-20 and 2-21) would transition to the I-5 median south of S 240th Street and would transition back to the west side of I-5 at approximately S 252nd Street. It would require spanning over the southbound lanes of I-5 to enter and exit the median.

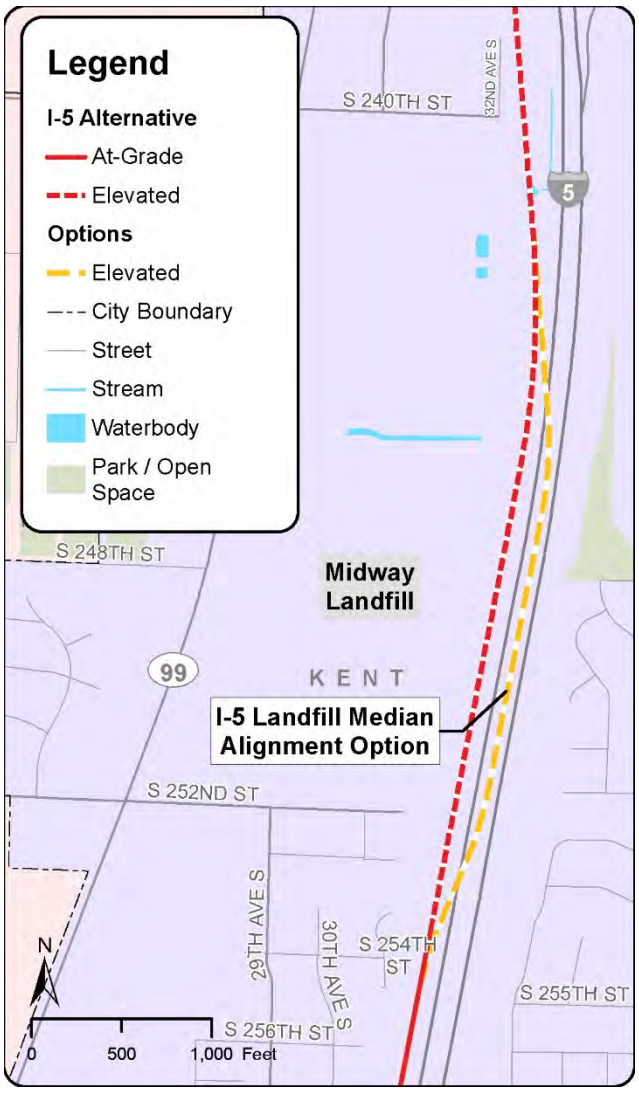


EXHIBIT 2-20
I-5 Landfill Median Alignment Option

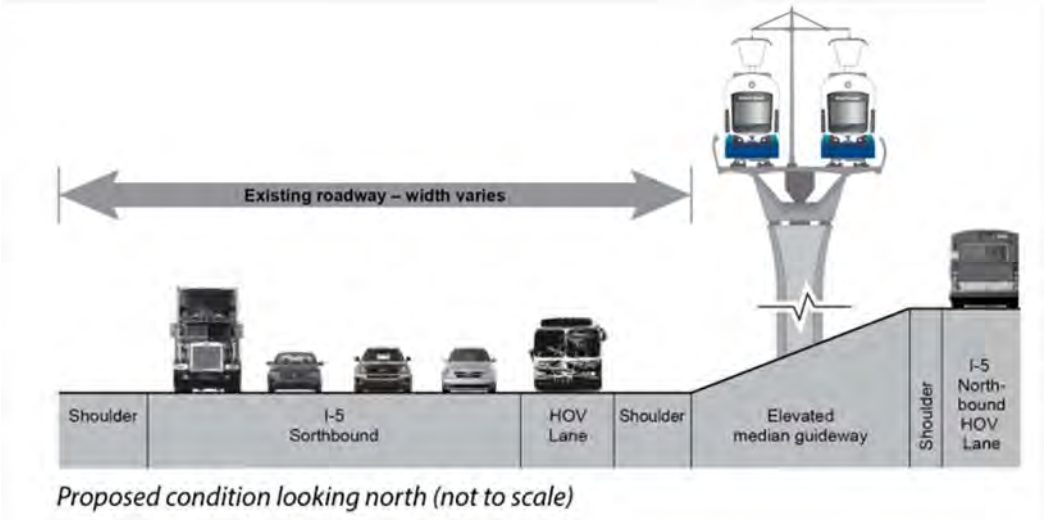


EXHIBIT 2-21
Typical Cross-Section – I-5 Landfill Median Alignment Option

2.2.4.7 Federal Way City Center Station Options

The Federal Way City Center Station options (Exhibit 2-22) are center platform stations and would have a crossover and tail track after the station.

Federal Way I-5 Station Option

This station option would be partially in a trench and partially at-grade and located close to I-5, between S 317th Street and S 320th Street, parallel to Gateway Center Boulevard. It would add 400 surface parking spaces to the existing 1,200 spaces at the transit center.

Federal Way S 320th Park-and-Ride Station Option

This station option would be at-grade near the west side of I-5 at the S 320th Street Park-and-Ride. It would have 1,600 parking spaces in structured parking, which would include the 877 spaces already at this location and over 700 new spaces. Transit service would be provided, including connections to the Federal Way Transit Center.

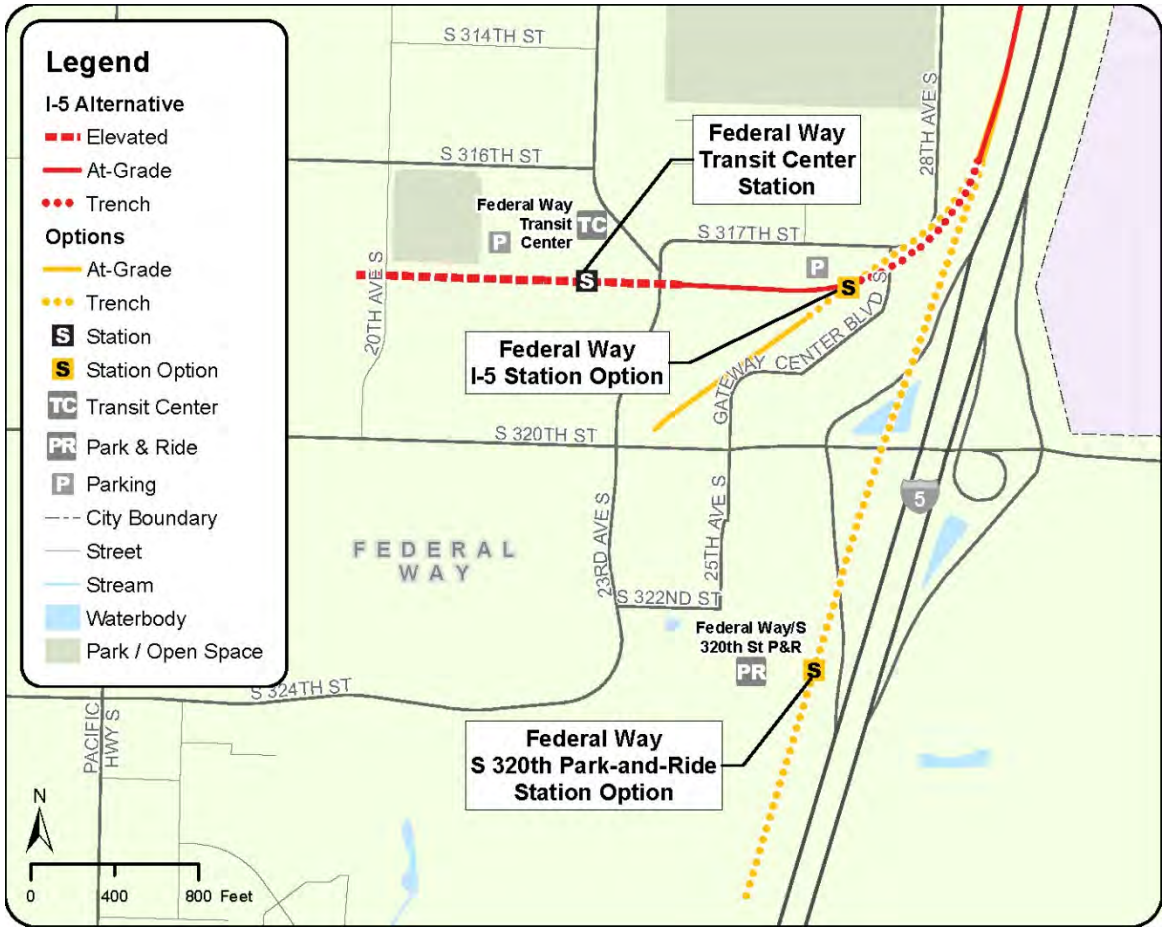


EXHIBIT 2-22
Federal Way City Center Station Options

2.2.5 SR 99 to I-5 Alternative

The SR 99 to I-5 Alternative (Exhibit 2-23) would have the same alignment as the SR 99 Alternative from the Angle Lake Station to just north of Kent-Des Moines Road (Exhibit 2-1C). The alignment would then transition to 30th Avenue S with a station north of S 240th Street (shown in blue). After leaving the station, the alignment would transition to the I-5 right-of-way and be the same as the I-5 Alternative to the Federal Way Transit Center (shown in red). Stations at S 272nd Street and the Federal Way Transit Center would be the same as the I-5 Alternative. This alternative would be elevated except for areas shown as at-grade in Exhibit 2-23.

Station Options

This alternative could have the following station options associated with the I-5 Alternative south of Kent-Des Moines Road:

- Federal Way I-5 Station Option
- Federal Way I-5 S 320th Station Option

Potential Additional Stations

This alternative could have the following potential additional station options associated with the SR 99 Alternative north of Kent-Des Moines Road:

- S 216th West Station Option
- S 216th East Station Option

2.2.5.1 Kent/Des Moines 30th Avenue East Station

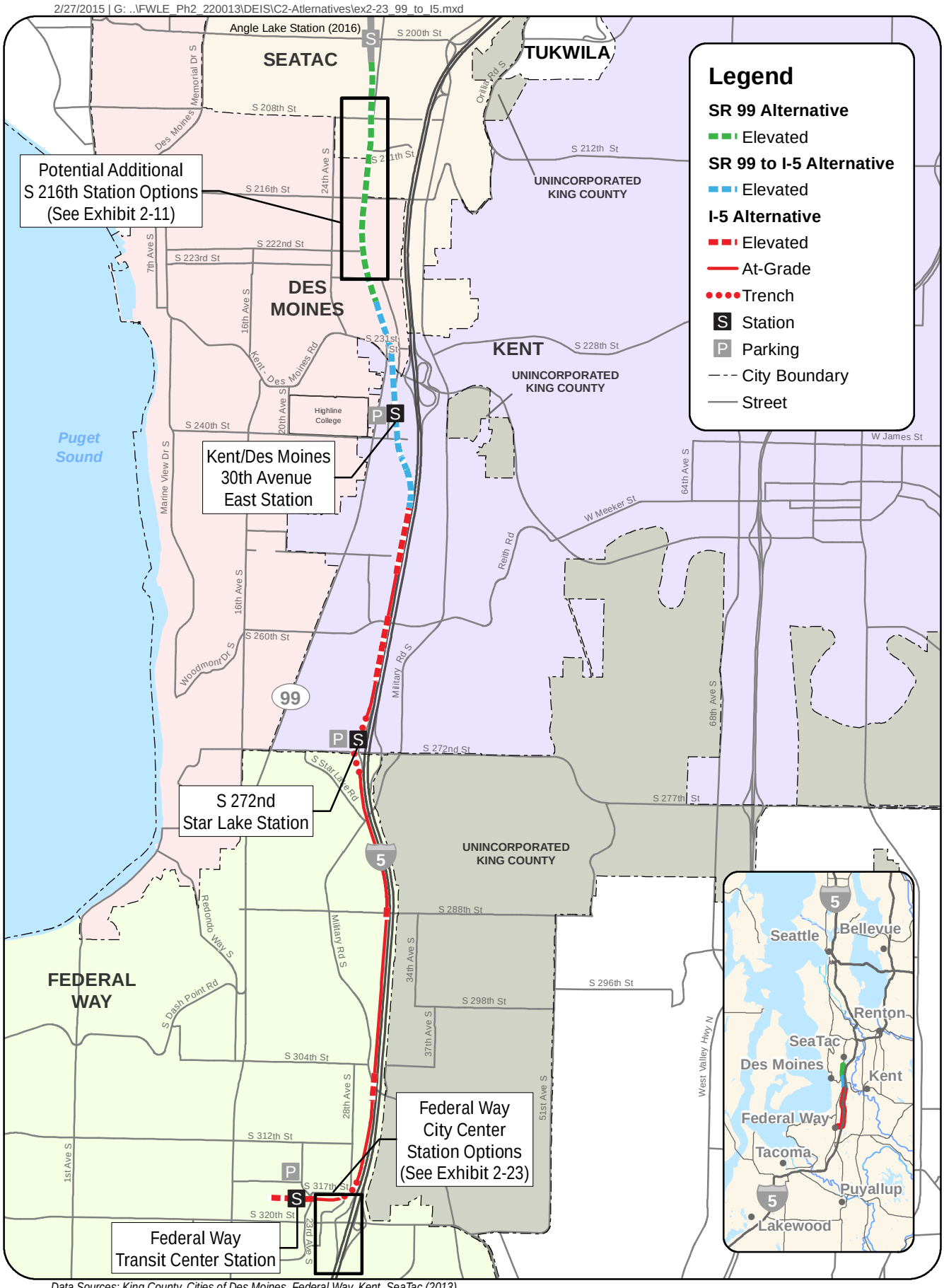
This elevated station would be just east of 30th Avenue S between Kent-Des Moines Road and S 240th Street. It would have approximately 1,000 parking spaces (500 surface, 500 structured) if used as an interim terminus, reduced to 500 spaces when the system is extended south and additional system parking is made available at other stations.

2.2.5.2 S 272nd Star Lake Station

This trenched station would be at the Star Lake Park-and-Ride and have approximately 1,240 parking spaces in structured parking, about 700 more than the existing parking.

2.2.5.3 Federal Way Transit Center Station

This station would be elevated on the south side of the existing Federal Way Transit Center. It would add about 400 new parking spaces to the 1,200 existing ones.



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).

EXHIBIT 2-23
SR 99 to I-5 Alternative

Federal Way Link Extension

2.2.6 I-5 to SR 99 Alternative

The I-5 to SR 99 Alternative (Exhibit 2-24) would have the same alignment as the I-5 alternative from the Angle Lake Station to just north of Kent-Des Moines Road (Exhibit 2-1D). The alignment would then transition to 30th Avenue S with a station north of S 240th Street (shown in blue). After leaving this station, the alignment would transition to the SR 99 median and be the same as the SR 99 Alternative to the Federal Way Transit Center (shown in green). Stations at S 272nd Street and the Federal Way Transit Center would be the same as the SR 99 Alternative. This alternative would be elevated except for from S 211th Street to S 216th Street, and from S 218th Street to S 231st Street, where it would be at-grade.

Station Options

This alternative could have the following station options associated with the SR 99 Alternative south of Kent-Des Moines Road:

- S 272nd Redondo Trench Station Option
- Federal Way SR 99 Station Option

Potential Additional Stations

This alternative could have the following potential additional station options associated with the SR 99 Alternative south of Kent-Des Moines Road:

- S 260th West Station Option
- S 260th East Station Option

2.2.6.1 Kent/Des Moines 30th Avenue West Station

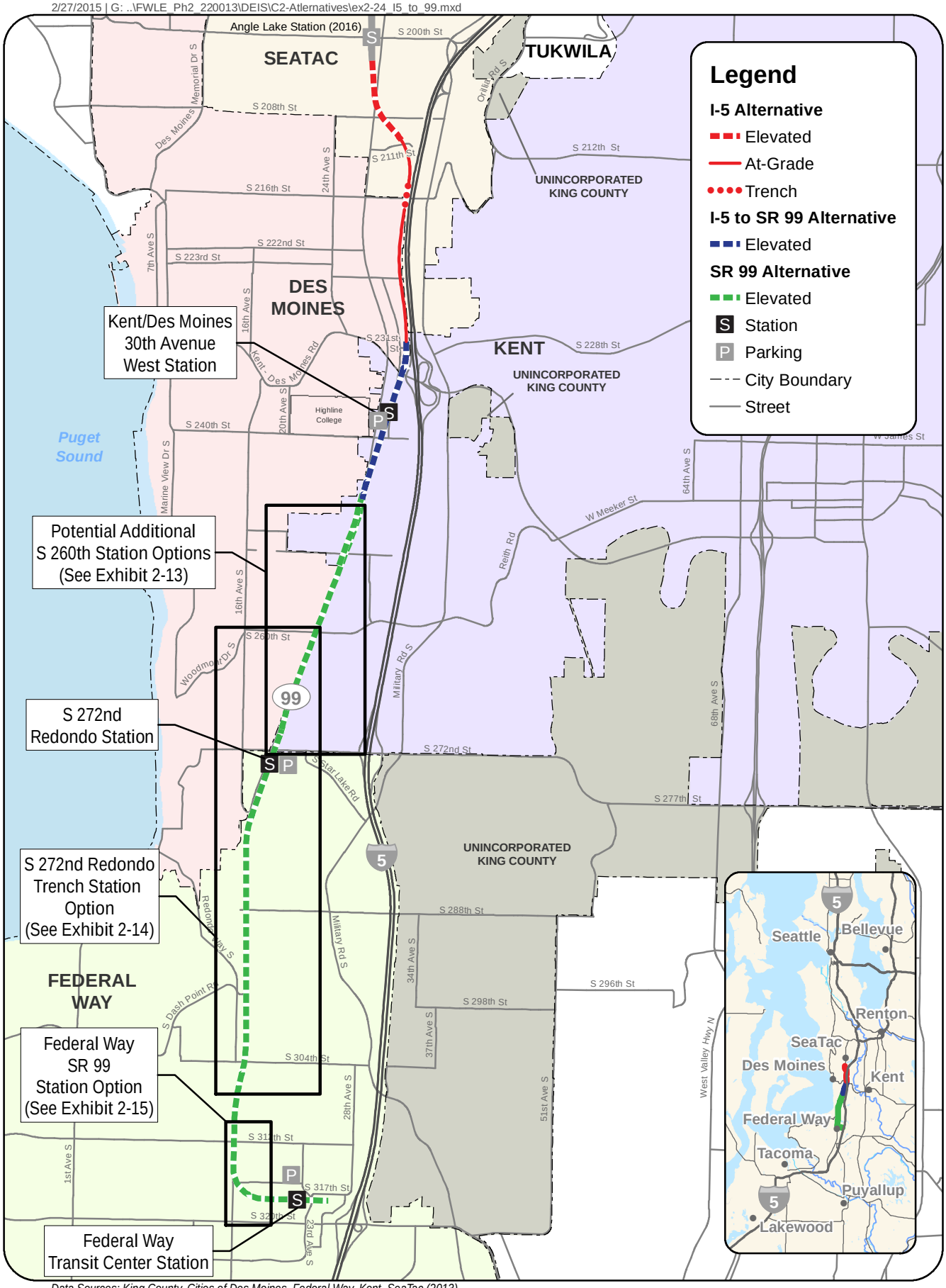
This elevated station would be just west of 30th Avenue S between Kent-Des Moines Road and S 240th Street. It would have approximately 1,000 parking spaces (500 surface, 500 structured) if used as an interim terminus, reduced to 500 spaces when the system is extended south and additional system parking is made available at other stations.

2.2.6.2 S 272nd Redondo Station

The alignment would transition to the east side of SR 99 north of S 272nd Street before entering an elevated station at the existing Redondo Heights Park-and-Ride. This station would have approximately 1,400 combined surface and structured parking spaces, about 700 more than are currently provided. The alignment would transition back to the SR 99 median near S 279th Street.

2.2.6.3 Federal Way Transit Center Station

The alignment would exit the SR 99 median north of S 316th Street and head east to an elevated station on the south side of the existing transit center. This station would add approximately 400 new surface parking spaces to the 1,200 existing ones.



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).

N

0 0.5 1 2 Miles

EXHIBIT 2-24
I-5 to SR 99 Alternative

Federal Way Link Extension

2.2.7 Operation and Vehicle Maintenance

The FWLE would operate 20 hours per day Monday through Saturday and 18 hours on Sunday. Service levels (train frequency) would vary during the day based on ridership demand or other service standards. Table 2-2 shows the proposed service schedule for weekdays. Trains would operate with up to four cars during peak and off-peak periods. Sound Transit currently has one Link operations and maintenance facility (OMF) in Seattle that was constructed as part of Central Link and opened in 2009. Sound Transit is evaluating alternatives for a satellite operations and maintenance facility for the Link system outside of the FWLE corridor. The construction of this satellite facility, which voters approved as part of ST2, is expected to be complete by 2023 when Sound Transit begins operating extensions to Lynnwood, Redmond, and Kent/Des Moines. These two facilities will meet the operation, storage, and maintenance needs for the fleet of light rail vehicles that will serve the expanded regional light rail system under ST2 (i.e., service north to Lynnwood, east to Overlake Transit Center, and south to Kent/Des Moines). Storage, maintenance, inspection, and repair of light rail vehicles serving the FWLE would occur at the OMF in Seattle. Trains serving the FWLE would be deployed primarily from the OMF in Seattle, although any terminus station (either interim or the Federal Way Transit Center) could provide overnight storage of up to four four-car trains. Two trains could be stored on the tail tracks and two at the station platform areas at the close of service each night. These stations may provide parking for light rail operators and office space for operator check-in facilities. They may also have space for maintenance personnel and materials to allow daily vehicle inspections and interior cleaning of vehicles. Overnight storage at a terminus station would allow deployment of northbound trains at the beginning of service each day.

TABLE 2-2
Weekday Service Periods

Service Period	Time Period	Service Type	Train Frequency (minutes)
Early morning	5:00 a.m. to 6:00 a.m.	Early/late	15
Morning peak	6:00 a.m. to 8:30 a.m.	Peak	8
Midday	8:30 a.m. to 3:00 p.m.	Base	10
Afternoon peak	3:00 p.m. to 6:30 p.m.	Peak	8
Evening	6:30 p.m. to 10:00 p.m.	Base	10
Evening late night	10:00 p.m. to 1:00 a.m.	Early/late	15

Vehicle, track, and systems maintenance occurs between 1:00 a.m. and 5:00 a.m. daily, outside of normal hours of light rail service.

Based on preliminary operating plans, about two trains may be deployed between approximately 4:30 and 5:00 a.m. to be staged for

the beginning of morning service at FWLE stations. Similarly, about two trains may operate between approximately 1:00 and 1:30 a.m. along the FWLE as they return to the OMFs at the close of service each day.

If Sound Transit identifies funding to extend light rail south of the Federal Way Transit Center, it would evaluate the need for an additional operation and vehicle maintenance facility for south King County. This Draft EIS does not evaluate locating an OMF in the FWLE corridor.

2.3 Alternatives Development and Scoping

In 2004, Sound Transit began planning for the next phase of investment to follow Sound Move. This included updating Sound Transit's Long-Range Plan and associated environmental review. Following several years of system planning work to define, evaluate, and prioritize the next round of regional transit system expansion, voters in 2008 authorized funding to extend the regional light rail system south to Federal Way as part of the ST2 Plan. The ST2 Plan also called for Sound Transit to extend light rail from downtown Seattle to Bellevue and Redmond to the east, and to Northgate and Lynnwood to the north. Additional history of planning in the FWLE corridor is provided in Chapter 1, Purpose and Need for Federal Way Link Extension. (Until September 2013, the project was referred to as the Federal Way Transit Extension.)

Screening Details

The Level 1 and Level 2 alternatives screening reports in Appendix C detail the specific measures used and the results of the evaluation.

The FWLE underwent an early scoping and Alternatives Analysis process in 2012 and 2013 to identify reasonable alternatives to be evaluated further in the Draft EIS.

The Alternatives Analysis process began with early scoping, an opportunity for the public and agencies to provide input on the preliminary Purpose and Need statement and on the potential alternatives to be evaluated during the Alternatives Analysis. The 30-day early scoping period was held in October and November 2012, and included two public open houses, an agency meeting, and an online survey. Opportunities to provide written comments were provided at the open houses, online, or via postal mail. The public open houses had interactive opportunities for attendees to provide input, including a large map of the project corridor where attendees could draw alignment and station suggestions. Overall, feedback received during the early scoping period was positive and generally

supported improved transit service in the project corridor, with noticeable support for light rail (see Appendix B). Based on input received during this period and on information in previous regional and local planning studies, Sound Transit established an initial range of alternatives to be evaluated in the alternatives evaluation process. The alternatives included different travel modes, such as bus rapid transit (BRT) and light rail; different profiles, such as elevated, tunneled, and at-grade; and alternative alignments on SR 99, I-5, 30th Avenue S, and 24th Avenue S (Exhibit 2-25). A Transportation System Management (TSM) alternative, which would have included lower-cost improvements to the transportation infrastructure to improve efficiency, was also considered.

The Alternatives Analysis included Level 1 and Level 2 evaluations. Seven of the initially identified alternatives did not make it to Level 1 because they did not meet the project purpose and need or clearly had impacts and/or costs that outweighed any benefits. These included BRT, tunnel profiles on either SR 99 or I-5, and specific alignments in the SR 99 and I-5 corridors that would have high environmental impacts, costs, or design challenges without providing measurable benefits when compared to other potential alignments. TSM was shown unlikely to improve conditions, as the most effective TSM components have already been implemented in the corridor, such as high-occupancy vehicle (HOV) lanes on SR 99 and I-5, direct-access ramps from I-5 to the Federal Way Transit Center at S 317th Street, and ramp metering and HOV bypass lanes on most I-5 interchange ramps to help control the flow of traffic onto the freeway. Bus and BRT alternatives were not advanced because they would have a slower travel time and less ridership capacity than light rail, and would not accommodate future population growth and transit demand in the corridor as effectively. Sound Transit evaluated the remaining 14 alternatives in Level 1.

The Level 1 and Level 2 evaluations measured each alternative against the criteria described below. The criteria and measures were derived from project objectives and purpose and need.

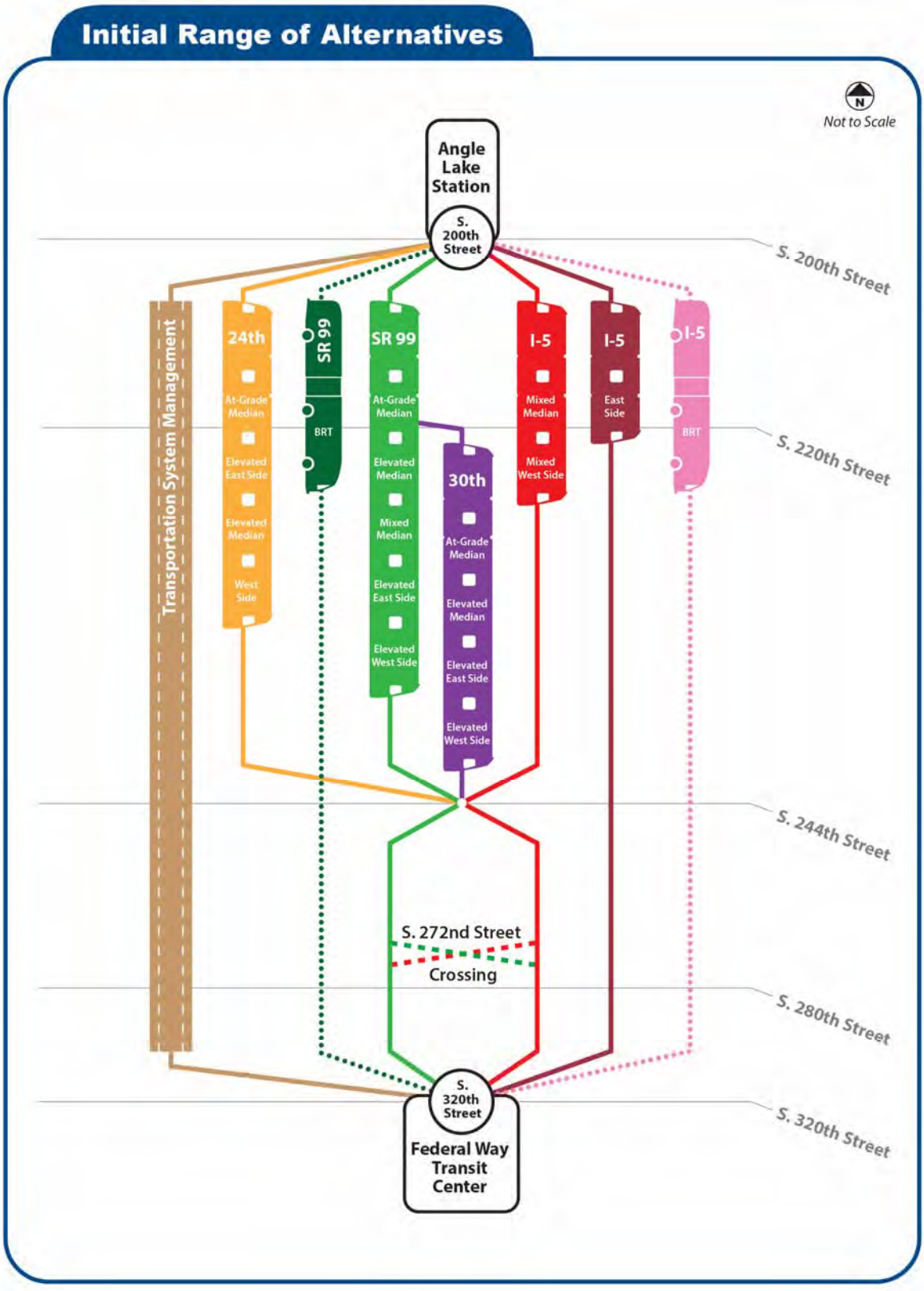


EXHIBIT 2-25
Initial Range of Alternatives

2.3.1 Criteria for Evaluation and Screening Results

Table 2-3 lists the criteria used for Level 1 and Level 2 alternatives evaluations. For each criterion, specific measures were defined, with 25 separate measures in Level 1 and 33 measures in Level 2. Measures increased in level of detail from Level 1 to Level 2. Level 2 screening omitted criteria that did not differentiate between alternatives in Level 1.

TABLE 2-3
FWLE Alternatives Analysis Evaluation Criteria

Purpose and Need Objective	Evaluation Criterion	Level 1 Measures	Level 2 Measures
Provide Effective Transportation Solution to Meet Mobility Needs	Ridership potential (year 2035)	M1: 2035 daily project riders and 2035 annual project riders	Daily and annual project ridership
			Station boardings
		M2: Travel time in study area	Travel time
	Connections to regional multimodal transportation systems	M3: Transit integration with Link system	Integration with Link system
		M4: Transit integration with facilities in the study area	Integration with bus facilities and services
Support Equitable Mobility	Transit-dependent and environmental justice populations	EM5: Low-income population within ½ mile of station	Does not differentiate between alternatives; not considered in Level 2
		EM6: Elderly population (age 65 or older) within ½ mile of station	Does not differentiate between alternatives; not considered in Level 2
		EM7: Youth population (age 16 or younger) within ½ mile of station	Does not differentiate between alternatives; not considered in Level 2
		EM8: 0-car households within ½ mile of stations	Does not differentiate between alternatives; not considered in Level 2
			Student poverty
			Subsidized housing
			Cost of commuting
			Access to express transit
			Minority populations
Support Land Use Plans and Economic Development	Transit-supportive land use and economic development policies	LU9: How well an alternative provides enhanced mobility to existing high-density land use centers	Existing land use
			Planned land use
			High density/TOD zoning
			Underutilized parcels
			Population
			Employment
			Households
			Parking opportunities
			Non-motorized access
		EN10: Impacts on wetlands	Wetlands

TABLE 2-3
FWLE Alternatives Analysis Evaluation Criteria

Purpose and Need Objective	Evaluation Criterion	Level 1 Measures	Level 2 Measures
Preserve a Healthy Environment	Effect on natural environment	EN11: Potential to affect streams (crossings)	Streams
	Effect on built environment	EN12: Visual and aesthetic impacts of alternative	Visual effects
		EN13: Potential property acquisition	Potential displacements
		EN14: Impacts to known parks	Does not differentiate between alternatives; not considered in Level 2
		EN15: Number of community facilities affected	Community facilities
		EN16: Impacts on known or eligible historic or other sensitive properties access	Does not differentiate between alternatives; not considered in Level 2
		EN17: Number of potentially impacted noise receptors	Noise
			Vibration
		EN18: Level of service (LOS) at intersections; evaluation of capacity/flow (existing conditions)	Traffic
		EN19: Traffic circulation and access; number of mid-block turning opportunities	
			Construction effects
Design an Affordable and Constructible Project	Design considerations	DC20: Potential utility effects	Utilities
		DC21: High-risk hazardous materials within ¼ mile of alternative	Hazardous materials
		DC22: Geologic hazards	Geologic issues
		DC23: Park-and-ride lot locations	Combined with parking measure under "Transit-supportive land use and economic development policies"
	System costs	DC24: Estimated capital cost ($2013)	Estimated capital cost
		DC25: Estimated annual operation and maintenance cost ($2013)	Estimated operation and maintenance cost

The following light rail alternatives were screened out based on how they performed against the Level 1 criteria; in general, they had less ridership, a longer travel time, or greater right-of-way impacts:

- SR 99 At-Grade Median
- SR 99 Mixed Median
- SR 99 Elevated West Side
- SR 99 Elevated East Side

- 30th Avenue S At-Grade Median
- 30th Avenue S Elevated Median
- 30th Avenue S Elevated East Side
- 24th Avenue S At-Grade Median
- 24th Avenue S Elevated Median
- 24th Avenue S Elevated East Side

The Level 2 analysis further refined the remaining alternatives to determine which ones should be studied in the Draft EIS. The evaluation studied the following alternatives:

- SR 99 Median
- SR 99 Hybrid
- 30th Avenue S Elevated West Side
- I-5 Mixed West Side
- I-5 Mixed West Side/Median

All of these alternatives would have similar ridership and travel times. The SR 99 Hybrid Alternative was a new alternative that was developed based on information learned during the Level 1 evaluation and designed to avoid impacts to key intersections and community facilities. Its alignment was informed by considerations such as topography and good access to park-and-ride lots.

The Level 2 evaluation included more than 30 different measures to help distinguish the pros and cons of the remaining alternatives. A number of the measures yielded results that were similar among all the alternatives, including daily ridership and travel time, and the number of people, jobs, and households currently located within a half mile of each alignment. Measures that differentiated alternatives included residential and business displacements, traffic impacts, potential for transit-oriented development (TOD), utility conflicts, proximity to hazardous material sites, and cost.

Using the same criteria as for the alternative alignments, Level 2 evaluated potential additional station locations in the following areas: S 216th Street, S 260th Street, S 288th Street, and Dash Point Road (SR 99 only). The stations included in ST2 (Kent/Des Moines, S 272nd Street, and Federal Way Transit Center) ranked the highest, followed by stations on SR 99 at S 216th Street and S 260th Street. Stations at SR 99 and S 288th Street and Dash Point Road ranked lower, along with all potential additional station locations on I-5. All Level 2 alignment and station alternatives were carried forward into the scoping process for the EIS, as shown on Exhibit 2-26.

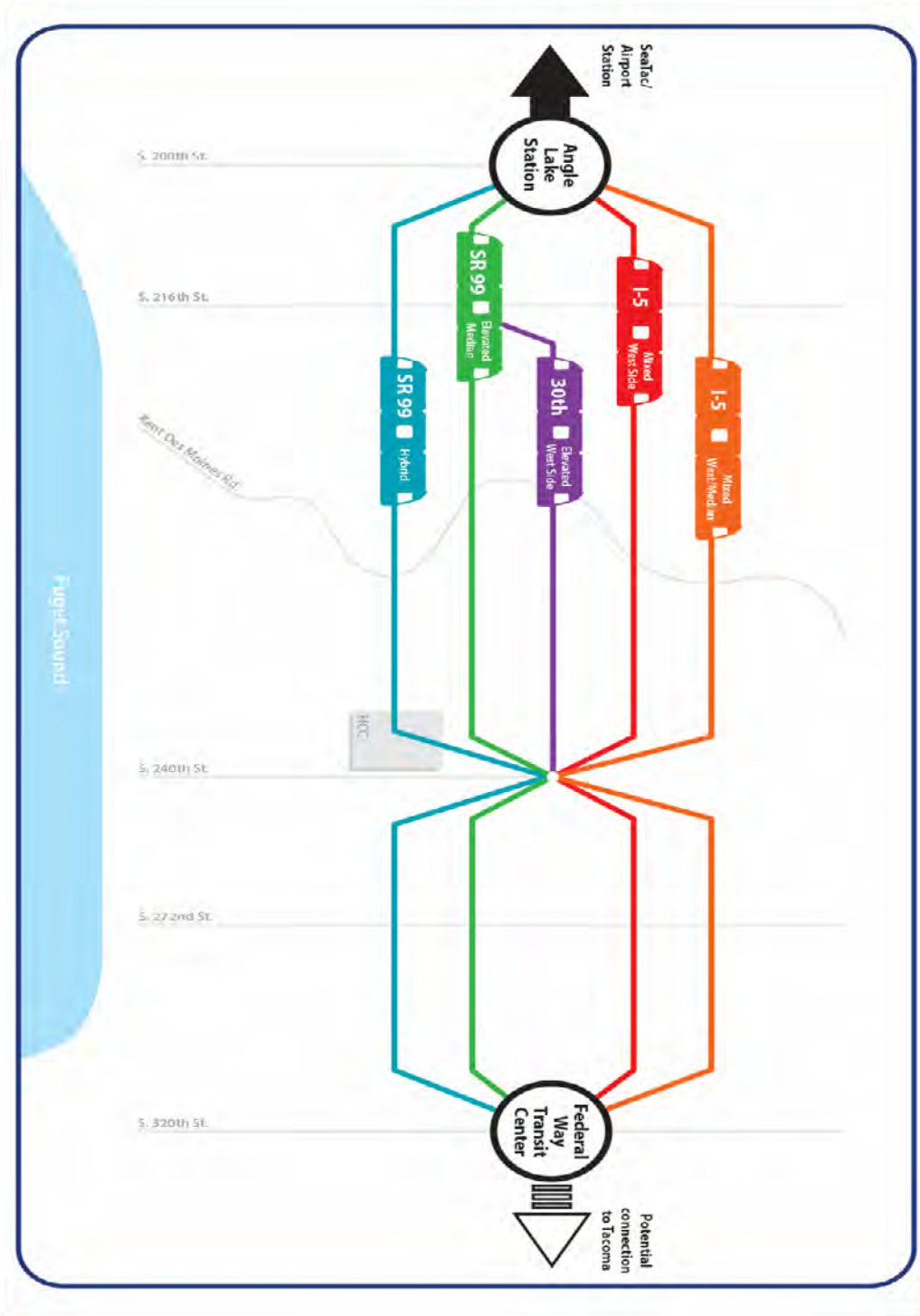


EXHIBIT 2-26
Alternatives Presented During Scoping

2.3.2 NEPA and SEPA Scoping Process

After the Alternatives Analysis, Sound Transit conducted another scoping process under NEPA and SEPA to solicit further input on the

project Purpose and Need statement and on the alternatives and elements of the environment for study in the Draft EIS.

Scoping included a 30-day public comment period from June 17 through July 17, 2013. Sound Transit gathered public comments about the project via an online survey, at two public meetings, by email, and by postal mail. Sound Transit also hosted an agency scoping meeting for federal, state, regional, and tribal governments.

The scoping process generated some new alternative suggestions that were considered but not carried forward in the Draft EIS for the reasons shown in Table 2-4.

TABLE 2-4
Alternatives Suggested During Scoping and Not Carried Forward

Alternative Suggested	Reason not Evaluated in Draft EIS
24th Avenue South corridor.	The 24th Avenue S Alternative was evaluated in the Level 1 evaluation but was not selected for further evaluation in Level 2 due to high environmental impacts and few benefits over SR 99 alternatives.
A line down SR 167 that could join the southbound eastside line before a South Center station that continued to Vashon and Gig Harbor.	This alignment would not meet the purpose and need for the project and would be outside the project study area.
329th Place South in the neighborhood where Waterbury Park Apartments are.	The southern limit of the project is the Federal Way Transit Center at approximately S 317th Street. S 329th Street is outside the study area for the project.
Run the rail down SR 99 to 25th and run it down that street just to the east of Highline College.	This alternative is similar to the HC Campus Station Option, which is evaluated in the Draft EIS. 25th Avenue S would be farther west than the HC Campus Station Option and would result in a longer route with greater neighborhood impacts.
A bridge at 240th over the freeway.	Roadway improvements, such as extending S 240th Street over I-5, are not currently proposed as part of the project. The City of Kent's *Midway Subarea Plan* (City of Kent, 2011) does call for this extension in the future.
Station at S 288th and Pacific Highway.	S 288th Street was a potential station location evaluated during the Alternatives Analysis, but it was not chosen to be studied in the Draft EIS because of the lower population and employment within ½ mile as well as limited access.

2.3.3 Alternatives Carried Forward

Following the public scoping period, the Sound Transit Board of Directors reviewed the comments received and the Alternative Analysis findings. In September 2013, the Board approved Motion 2013-77, which directed Sound Transit staff to study the following alternatives in the Draft EIS:

- SR 99 Alternative
- I-5 Alternative
- SR 99 to I-5 Alternative
- I-5 to SR 99 Alternative

It also called for potential design options on SR 99 and I-5, and established the stations at Kent/Des Moines, S 272nd Street, and Federal Way Transit Center as baseline stations and stations at S 216th Street and S 260th Street as potential additional stations for the SR 99 Alternative.

Since that time, Sound Transit has continued to coordinate with agencies and local jurisdictions to refine the conceptual design of these alternatives for evaluation in the Draft EIS. This resulted in the refined alignment option (the S 272nd Redondo Trench Station Option on SR 99) and station options at Kent/Des Moines, S 272nd Street, and the Federal Way Transit Center. It also resulted in potential additional stations at S 216th Street and S 260th Street.

2.4 Environmental Practices and Commitments

As an agency that has now 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 incorporated in the FWLE. These include the agency's environmental and sustainability program and a commitment to satisfying all applicable laws and regulations and mitigating significant adverse environmental impacts responsibly and reasonably. In addition to meeting environmental commitments, Sound Transit will avoid and minimize impacts where possible. Where adverse impacts cannot be avoided, this Draft EIS identifies potential measures to mitigate the adverse impacts of the FWLE.

The key goals of Sound Transit's sustainability and environmental management program are 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:

- Be in full compliance with all environmental laws and regulations and strive to exceed compliance by continually improving environmental performance through cost-effective innovation and self-assessment.
- Restore the environment by providing mitigation and corrective action, and monitor to ensure that environmental commitments are implemented.
- Improve the ability to manage and account for environmental risk.
- 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.
- 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.

Sound Transit's Board adopted a Sustainability Plan in 2011. Its targets and performance measures include 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.

Sound Transit's design and operation standards incorporate guidelines from the United States Green Building Council's Leadership in Energy and Environmental Design (LEED) certification system. The agency design criteria include 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. The system holds the agency accountable for identifying and controlling environmental impacts, setting and achieving objectives and targets, and demonstrating continual improvements in performance.

2.5 Estimated Project Costs and Funding

2.5.1 Project Funding

In 2008, voters approved funding for ST2. The ST2 plan identified funding to construct the portion of the FWLE from the Angle Lake Station in SeaTac to S 272nd Street. Since then, the recession has lowered Sound Transit's revenue forecast through 2023 by 30 percent. Sound Transit has responded by taking steps to control costs and realign the ST2 program to ensure that it can deliver the majority of the ST2 program, including portions of FWLE, by 2023. However, financial challenges remain. The current projection of ST2 tax revenue only allows for construction to Kent/Des Moines. Additional funding sources to complete the project could include FTA grants and/or additional voter-approved tax revenue.

Sound Transit Funding

Sound Transit's regional transit programs and projects are typically funded through a combination of voter-approved taxes collected in a three-county district, Federal Transit Administration (FTA) grants, bonds, and fare box revenue.

2.5.2 Project Cost Estimates

The current conceptual design includes uncertainties regarding the project scope, engineering data, mitigation requirements, schedule, and project delivery methods. Therefore, cost estimates at this stage are conceptual. They focus on the project elements that are defined consistently across alternatives, that capture the essential physical features of alternatives, and that help distinguish alternatives from one another. They do not include cost of additional light rail fleet vehicles needed to operate the FWLE.

Estimated project costs are shown in Table 2-5. Table 2-6 reflects the potential costs to construct from the Angle Lake Station to each potential interim terminus. The estimated project cost includes construction costs, right-of-way acquisition costs, engineering costs, and contingency.

TABLE 2-5
Estimated Project Cost For Full Project (Angle Lake to Federal Way Transit Center)

Alternative	Estimated Cost (2014$)
SR 99 Alternative	$1.77 billion
S 216th Street Potential Additional Station (West Option)	+ $70 million
S 216th Street Potential Additional Station (East Option)	+ $70 million
Kent/Des Moines HC Campus Station Option	No change
Kent/Des Moines HC Campus Station Option from S 216th West Station Option	+ $160 million
Kent/Des Moines SR 99 Median Station Option	+ $20 million
Kent/Des Moines SR 99 East Station Option	+ $10 million
S 260th Street Potential Additional Station (West Option)	+ $50 million
S 260th Street Potential Additional Station (East Option)	+ $70 million
S 272nd Redondo Trench Station Option	- $20 million
Federal Way SR 99 Station Option	- $70 million
I-5 Alternative	$1.42 billion
Kent /Des Moines At-Grade Station Option	- $100 million
Kent /Des Moines SR 99 East Station Option	+ $20 million
Landfill Median Alignment Option	- $10 million
Federal Way I-5 Station Option	- $40 million
Federal Way S 320th Park-and-Ride Station Option	+ $120 million
SR 99 to I-5 Alternative	$1.48 billion
I-5 to SR 99 Alternative	$1.72 billion

TABLE 2-6
Interim Termini Estimated Cost (Cost from Angle Lake Station)

Terminus	SR 99 Alternative	I-5 Alternative	SR 99 to I-5 Alternative	I-5 to SR 99 Alternative
Kent/Des Moines Station	$530 million	$490 million	$540 million	$480 million
S 272nd Street Station	$1.07 billion	$950 million	$1.01 billion	$1.02 billion

Sound Transit estimated operating and maintenance costs for the FWLE during the Alternatives Analysis. This cost is expected to be approximately $11.4 to $12.2 million annually (in 2014 dollars) between Angle Lake and Federal Way Transit Center. Operating and maintenance costs would range from $4.7 to $5.2 million annually for the Kent/Des Moines interim terminus, and $6.9 to $7.4 million annually for the S 272nd Street interim terminus. The major determinants of maintenance and operating costs are service levels,

running time, and trackway profile. These estimates will be refined in preliminary design and final design.

2.6 Interim Terminus Stations

Interim Terminus Station

The southernmost station of the FWLE that could operate if the project were built in phases. It represents the "end of the line" for the project that could be successfully operated on an interim or long-term basis if necessary until the project were built to the Federal Way Transit Center.

The FWLE might be built in phases, depending on available funding. Sound Transit has therefore identified two interim terminus stations that could operate before it builds all the way to the terminus at the Federal Way Transit Center. They are:

- Kent/Des Moines Station
- S 272nd Station

Each interim terminus station would have a tail track beyond the station platform; parking for operators; and office and storage space for light maintenance activities, such as cleaning interiors of vehicles.

2.7 Relationship to Other Transportation and Transit Projects

The FWLE would intersect with several existing and planned roadway and transit projects. Two that warrant special consideration are the RapidRide A Line operated by King County Metro and the SR 509 Extension Project (Exhibit 2-27) planned by WSDOT.

FWLE operations would complement RapidRide's service. As part of the conceptual bus service plan, RapidRide A Line would continue to serve along SR 99 with the project and would provide local service between the stations and offer an opportunity for people to access the Link system. The RapidRide A line would continue to serve points between the FWLE stations, and would provide access to the stations for transit-dependent populations along SR 99. All riders using the RapidRide A Line would have more opportunities to transfer to light rail and the regional transportation system, either at the Kent/Des Moines Station or Federal Way Transit Center Station, than they do now. If the SR 99 Alternative is selected, they would also be able to transfer at the S 272nd Redondo Station. There would be at least one more opportunity for transfer connections at the S 272nd Redondo Station if an alternative on SR 99 is selected, and the Kent/Des Moines and the Federal Way Stations provide similar transfer potential for riders transferring to and from the RapidRide A Line.

EXHIBIT 2-27
WSDOT's Proposed SR 509 Extension
Source: WSDOT

The SR 509 Extension Project, proposed by WSDOT, received a federal ROD in 2003, but funding since that time has been limited

to right-of-way acquisition. If it secures funding, this project would extend SR 509 from its current southern terminus at S 188th Street in SeaTac east to I-5. It would connect to I-5 between S 208th and S 216th streets, and would include additional collector/distributor lanes from the new SR 509/I-5 interchange to the S 320th Street interchange. Appendix F, Conceptual Design Plans, shows the proposed SR 509 Extension in relation to the FWLE. Although no transportation plans include or identify funding to build this project, the FWLE alternatives have been designed to accommodate its full build-out. WSDOT plans to revisit the proposed design and NEPA documentation for this project this year. Options include phasing it or combining it with other freight improvements in the south Puget Sound area such as the SR 167 Project and I-5 Puget Sound Gateway Project, which could also include lane management options such as tolling.

SR 509 Extension

This project is sometimes known by other names: "State Route 509: Corridor Completion/I-5/South Access Road Project" (2003 Record of Decision), and "SR 509 Corridor Freight and Congestion Relief Project" (WSDOT website).

Because of these uncertainties regarding the SR 509 Extension project, the No Build Alternative does not include the SR 509 extension in the regional transportation network. By assuming that the FWLE is constructed before the SR 509 Extension Project, this Draft EIS captures the reasonable worst-case impacts that could occur. However, this Draft EIS does include this project in the cumulative impacts analysis (Chapter 6) as a reasonably foreseeable future action. Chapter 6 also discusses changes in impacts if the SR 509 extension were built first, or if the projects were constructed at the same time. If the SR 509 Extension Project is constructed first, it would reduce the FWLE's impacts on some resources.

2.8 Next Steps and Schedule

The next steps in the development of the FWLE are described below.

2.8.1 Draft EIS Review and Comment Period

Sound Transit and FTA are circulating the Draft EIS to affected local jurisdictions, state and federal agencies, tribes, community organizations, other interest groups, and interested individuals. The document is available at Sound Transit offices, public libraries, community centers, and online. A 45-day formal public comment period from the date of issuance of the document is being provided. Sound Transit will provide project information and take written comments and oral testimony at upcoming public hearings. Please see the Fact Sheet at the beginning of this Draft EIS for details.

2.8.2 Identification of Preferred Alternative

The Sound Transit Board will identify a Preferred Alternative after it considers the information in the Draft EIS, and public and agency comments. The Preferred Alternative will include one station in each station area and may include one or more station or alignment option. The board will not make a final decision on the project alternative to be implemented until after it considers the Final EIS.

2.8.3 Final EIS and Project Decision

Sound Transit and FTA will prepare a Final EIS that analyzes the Preferred Alternative along with the other alternatives evaluated in the Draft EIS. The Final EIS will include and respond to the comments received on the Draft EIS. It will also describe proposed commitments to mitigate project impacts. The Sound Transit Board will then make a final decision on the project alternative to be built. FTA is also expected to publish a ROD for the project, which will document its findings that the project has met the requirements of NEPA and related environmental regulations. The ROD will describe FTA's environmental determination on the project, the alternatives considered, the basis for the decision to approve the project, and the required mitigation measures. Issuance of the ROD completes FTA's NEPA process and is a prerequisite for federal funding or approvals.

FTA is directed to issue a combined Final EIS and ROD document pursuant to Public Law 112-141, 126 Stat. 405, Section 1319(b) unless it determines, for statutory criteria or practicability reasons, that separate documents are appropriate. For this project, the EIS is a joint NEPA and SEPA document that will support decision-making by Sound Transit, FTA, and other agencies. Because SEPA requires that the Sound Transit Board's final decision on the project be informed by the Final EIS, the Final EIS must be issued independent of the ROD, so that Sound Transit's decision can later be incorporated into the ROD. As a result of these regulatory requirements under SEPA and NEPA, it will not be practical to issue a combined Final EIS and ROD, and they will be issued as separate documents.

2.8.4 Project Schedule

Exhibit 2-28 shows the anticipated schedule milestones for construction to Kent/Des Moines and start-up. However, the duration would likely change somewhat depending on available funds and construction costs.

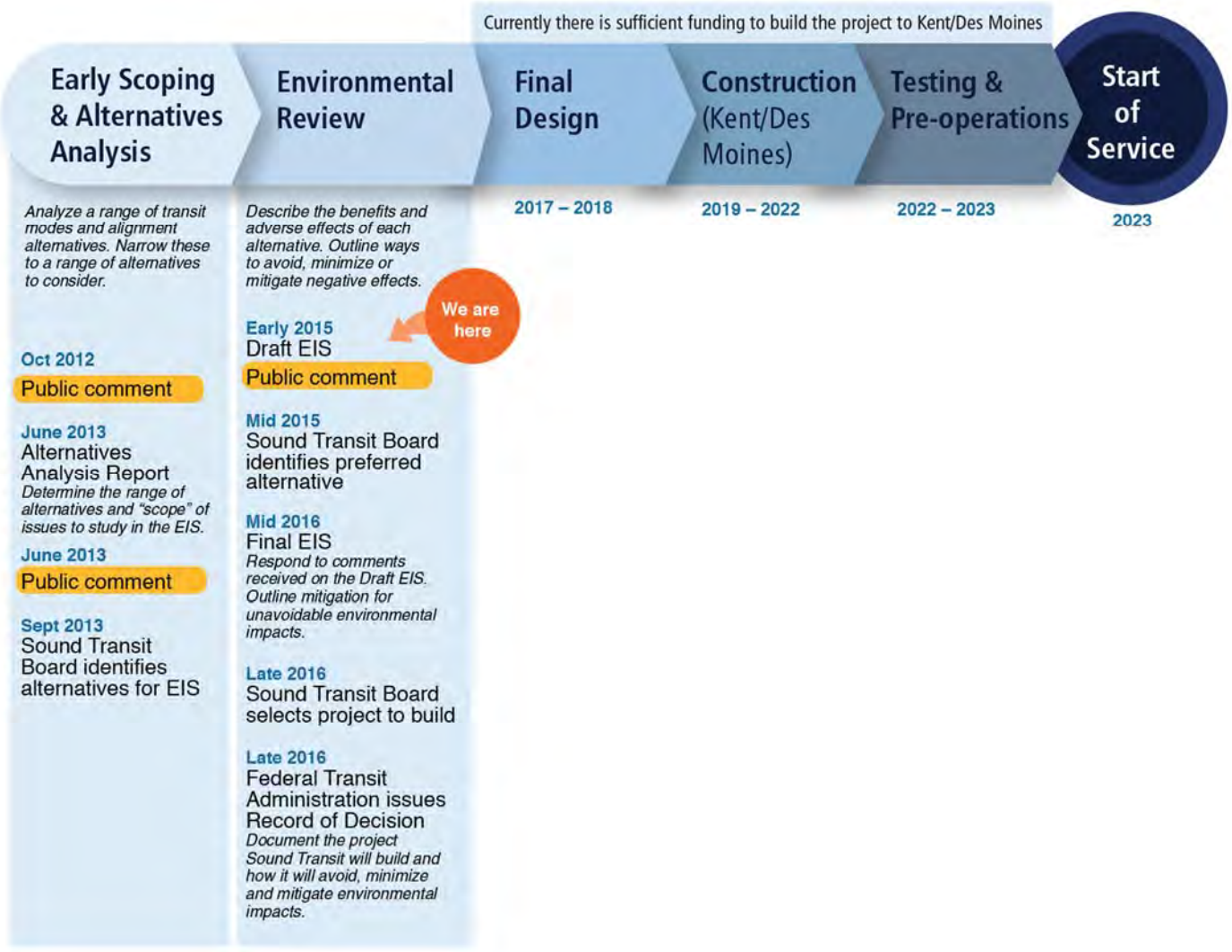


EXHIBIT 2-28
Project Milestones

2.8.5 Benefits and Disadvantages of Delaying Implementation

As required by SEPA, this section discusses the benefits and disadvantages of reserving for some future time the implementation of the proposed project, as compared with possible approval at this time.

The primary benefit to delaying the project would be to postpone impacts associated with project construction. The primary

disadvantage of delaying the project would be the inability to realize a major component of the region's long-range plans for managing growth and transportation. Delays would also limit economic development as influenced by the movement of people and goods and lost opportunity of linking neighborhoods and Puget Sound

regional employment centers. Delay could also allow projects to develop that would preclude or increase the cost of the FWLE.

A substantial delay in implementing FWLE would inhibit the region's ability to accommodate growth, as articulated repeatedly in local and regional plans. This would trigger a number of other consequences including changed development patterns and steadily increasing corridor congestion, with consequent air quality issues and higher energy usage.

Delaying the project due to funding limitations could cause further delays in project construction. This is because construction and right-of-way costs would rise due to inflation. If the project is built to an interim terminus, impacts at the terminus station could also increase. However, waiting until the entire project could be funded would delay the transportation improvements and other benefits that would be provided by the first interim segment.

Additional benefits and disadvantages related to delaying implementation of the FWLE may be identified during the Draft EIS comment period.

This page intentionally left blank.

3.0 Transportation Environment and Consequences

3.1 Summary

This chapter describes the characteristics of the transportation system in the Federal Way Link Extension (FWLE) vicinity and discusses potential impacts and mitigation measures associated with the project alternatives described in Chapter 2. This chapter first describes the existing transportation environment, and then presents the analysis and results showing potential impacts and mitigation. A summary of key findings is provided in Table 3-1. A more detailed discussion of the transportation analysis and results is provided in the Transportation Technical Report in Appendix G1.

TABLE 3-1
Transportation Key Findings

Transportation Element	Key Findings
Regional Facilities and Travel	• The build alternatives would decrease overall regional vehicle miles traveled (VMT) by approximately 150,000 miles per day (a 0.2% decrease) and vehicle hours traveled (VHT) by approximately 10,000 hours per day (a 0.3% decrease). • Traffic volumes and congestion across screenlines through the study area and along I-5 are expected to remain similar with the FWLE. • The number of persons traveling through the study area is expected to increase with the FWLE. A greater percentage of these persons would use transit compared to the No Build Alternative.
Transit Operations	• The FWLE would have up to 27,500 daily transit riders and up to 8,000 riders would be considered new daily transit riders. • Transit level of service (LOS) measures of effectiveness, including hours of operation, service frequency, reliability, and passenger load, would improve. • The build alternatives, compared with bus service, would provide a comparable travel time from Downtown Seattle to the Federal Way Transit Center. Between Federal Way Transit Center and other key Puget Sound destinations, travel times would be noticeably faster.
Arterials and Local Streets Operations	• The S 272nd Redondo Station and S 272nd Star Lake Station would provide the greatest increase in park-and-ride spaces with the full-length build alternatives. Under interim terminus conditions, the Kent/Des Moines Station would provide up to 1,000 parking spaces. • Vehicle trip generation at stations with park-and-rides would range from approximately 300 additional peak hour trips at the Kent/Des Moines Station up to approximately 800 additional peak hour trips with the Federal Way S 320th Park-and-Ride Station Option. • Property access and circulation impacts are expected to be minimal because the FWLE would be located in an exclusive guideway outside of roadway operations. Where needed, additional access roads and traffic control would enhance circulation. • Up to seven intersections could operate worse than the No Build Alternative with the FWLE and at levels below agency LOS standards. Proposed mitigation would improve operations at these locations to be similar or better than the No Build Alternative.

TABLE 3-1
Transportation Key Findings

Transportation Element	Key Findings
Safety	• Safety effects are expected to be minimal because the FWLE would be located in an exclusive guideway outside of roadway operations. • With all build alternatives and station options, there would be an increase in vehicle and nonmotorized activity around the station areas, which would increase the potential for conflicts between different travel modes; however, these are not expected to affect roadway accident rates. • The southbound I-5 clear zone would be maintained under all FWLE alternatives within the I-5 right-of-way. Only the I-5 Alternative's Landfill Median Alignment Option would increase the risk of accidents. The project could provide a barrier (such as guardrail) to protect vehicles on I-5 from light rail columns.
Parking	• The build alternatives would provide 1,600 additional parking stalls divided between the three stations: Kent/Des Moines (500 spaces), S 272nd Street (700 spaces), and the Federal Way Transit Center (400 spaces). • The build alternatives would remove between 250 and 830 parking stalls. The I-5 to SR 99 Alternative would remove the greatest amount of parking, and the SR 99 to I-5 alternative would remove the least amount of parking. • The potential additional station at S 216th Street (East option) would have the greatest potential for transit users to park in surrounding neighborhoods due to available on-street parking nearby. • At the Kent/Des Moines Station, Sound Transit could consider a parking management program to maximize the parking capacity and deter Highline College (HC) students from parking at the station parking areas. The parking management program could include restricted parking signage, permit parking only, or priced parking strategies.
Nonmotorized Facilities	• The pedestrian LOS would generally be acceptable for all alternatives and station options, with most crosswalks and sidewalks operating between LOS A and C.
Freight Mobility and Access	• No substantial changes to freight mobility and access would be expected with the No Build Alternative and build alternatives beyond the increased traffic volumes near the station areas.

3.2 Transportation Elements and Study Area

The transportation system analysis considered seven transportation elements (see box to the right) for the affected environment and 2035 No Build and FWLE build alternatives. Interstate 5 (I-5) highway operations and safety are addressed under Regional Facilities and Travel (screenline performance), Arterial and Local Street Operations (I-5 ramp terminal intersection operations and off-ramp queues), and Safety (crash history and I-5 clear zone). Navigable waterways are not evaluated in this analysis because there are not any such waterways in the FWLE transportation study area.

Transportation System Elements Analyzed

- Regional facilities and travel
- Transit operations
- Arterial and local street operations
- Safety
- Parking
- Nonmotorized facilities
- Freight mobility and access

The study area for this transportation analysis is generally bound by State Route (SR) 99 and I-5 from S 200th Street in the City of SeaTac to approximately S 324th Street in the City of Federal Way. Intersections studied for level-of-service (LOS) were identified along

major arterials and near station areas. For nonmotorized and parking facilities, a fixed buffer or radius was defined for analysis purposes. Specific study areas vary by transportation element and are described in the following sections. Exhibit 3-1 shows the study area and other key transportation study elements.

The affected environment sections for these elements describe existing conditions (in 2013), while impacts are analyzed for the design year 2035 (hereafter referred to as "year 2035"), which is consistent with the planning period of regional and local agencies. The impact analysis compares the No Build Alternative to the build alternatives, including potential mitigation that may be implemented with the project.

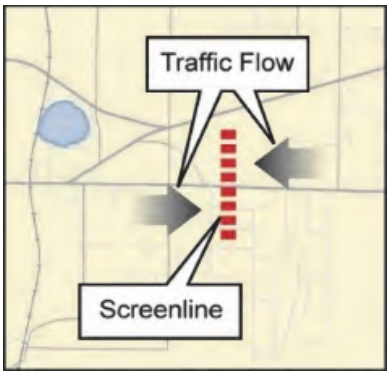
Design Year 2035

The year for which ridership forecasts and volumes are estimated to determine the design features required for the proposed FWLE improvements.

3.3 Methodology and Assumptions

The methodology and assumptions used to analyze the transportation impacts of the FWLE have been compiled in the *Federal Way Link Extension Technical Analysis Methodology*, which is provided in Appendix A of Appendix G1, Transportation Technical Report. That report presents the following information:

- Agency guidelines and regulations regarding the transportation analysis.
- Transportation analysis methodology, including relevant definitions, data collection, regional traffic analysis, intersection impact analysis, and safety assessments.
- Methods for traffic forecasting and transit ridership estimates.
- Methods for assessing impacts related to light rail stations and park-and-ride areas, parking, nonmotorized facilities and modes, property access and circulation, freight, transit, and construction.
- The transportation impacts of the FWLE were analyzed from three different perspectives: regional, screenline (corridor), and local operations. The regional and screenline assessments studied larger areas of the study area. The operational assessment identified and analyzed specific roadways, intersections, and transit facilities.



A screenline is an imaginary line across a section of freeways or arterials. These screenlines are used to provide a snapshot of how much volume is entering or exiting a particular area.

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).

N

0 0.5 1 2 Miles

EXHIBIT 3-1
FWLE Transportation Study Area

Federal Way Link Extension

3.4 Affected Environment

3.4.1 Regional Facilities and Travel

This section describes the regional travel conditions in the study area, which is served by two north-south highway facilities, SR 99 and I-5. East-west connections are mainly arterial roadways such as Kent-Des Moines Road (also known as SR 516), S 272nd Street, and S 320th Street. These arterials provide connections within the study area and to/from areas to the west and east. There are few regional facilities that directly connect the study area to the region's major population and employment areas, and travel is constrained on these roadways during the peak periods.

3.4.1.1 Vehicle Miles Traveled and Vehicle Hours Traveled

Today, over 85 million vehicle miles traveled (VMT) occur daily within the central Puget Sound Region (which includes King, Pierce, and Snohomish counties). This results in over 2.5 million vehicle hours traveled (VHT) daily and approximately 300,000 vehicle hours of delay (VHD) for all users of the transportation system.

3.4.1.2 Regional Roadways

Interstate freeways and state highways in the study area are identified in Table 3-2. A range of average daily traffic (ADT) volume is provided because travel characteristics are variable along these regional roadways. Local roadways in the study area are discussed in Section 3.3.3.

Transportation Analysis Terms

Vehicle miles traveled (VMT): The total number of vehicle miles traveled within a specific geographic area over a given period of time.

Vehicle hours of delay (VHD): The extra vehicle hours expended traveling on the roadway network below the posted speed limit in a specified area during a specified time period.

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

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

Vehicle volume to capacity (v/c): The ratio of the vehicle demand compared to the roadway capacity, used as the performance measure to assess travel conditions on the regional facilities in the study area.

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

Mode share: The percentage of people using a particular type of transportation (automobile, high-occupancy vehicle [HOV], or transit).

TABLE 3-2
Existing Regional Highway Facilities

Roadway	Roadway Classification	Number of Lanes	Speed Limit (mph)	ADT[a]	Bike Lanes	Sidewalk
SR 99	Principal Arterial	4 - 6	40 – 45	23,000 - 36,000	N	Y
I-5	Freeway	8 - 10	60	176,000 - 206,000[b]	N	N
Kent-Des Moines Road	Principal Arterial	4	45	30,000-35,000	N	Partial

[a] ADT is based on 2013 traffic count information where available; otherwise, 2012 counts with 1 year growth were used.
[b] Value based on Washington State Department of Transportation *Ramp and Roadway 2012* (WSDOT, 2012a).
mph = miles per hour; N = no; Y = yes

SR 99 provides a major north-south connection extending through Seattle south to Fife and is classified by the Washington State Department of Transportation (WSDOT) as a highway of state significance (HSS) and is part of the National Highway System (NHS). This road is a major north-south arterial west of I-5 within the study area. The facility is also called International Boulevard through the city of SeaTac and Pacific Highway S through the cities of Kent, Des Moines, and Federal Way.

I-5 is classified as an HSS, is a limited-access facility, and connects the transportation study area directly to key regional urban areas such as Downtown Seattle and Tacoma. I-5 is also part of the NHS.

Kent-Des Moines Road, which runs east-west and connects the Kent and Des Moines communities, is a highway of regional significance (non-HSS) and is part of the NHS. This road provides connections to Downtown Kent, the Kent Manufacturing/Industrial Center, and Downtown Des Moines. The road is classified as a principal arterial.

Major Roads and Highways

Arterial: A major thoroughfare used mainly for through traffic rather than access to residential neighborhoods. Arterials generally have greater traffic-carrying capacity than collector or local streets and are designed for continuously moving traffic.

Highway of state significance (HSS): Interstate highways and principal arterials that are needed to connect major communities in the state.

Highway of regional significance (non-HSS): State transportation facilities that are not designated as being of statewide significance.

National Highway System (NHS): A network of major highways important to the nation's economy, mobility, and defense.

3.4.1.3 Screenline Performance

Three screenlines, which cut across I-5 and SR 99, were established to assess the regional north-south travel within the study area. These screenlines provide a snapshot of traffic operations, such as volumes and travel mode share, along each corridor based on the travel demand estimated from the Puget Sound Regional Council (PSRC) and Sound Transit regional models. The screenlines are shown in Exhibit 3-1.

Vehicle volume-to-capacity (v/c) ratio is used as the performance measure to assess travel conditions on the regional facilities in the study area. Road deficiencies might exist when a v/c ratio exceeds 0.9. A v/c ratio over 1.0 suggests that the road cannot effectively accommodate all traffic and congestion is likely prohibiting efficient movement of people and goods. Mode share information provided from the PSRC and Sound Transit travel demand models allocates the vehicle demand on a roadway by vehicular type, which includes single-occupancy vehicles (SOVs), high-occupancy vehicles (HOVs), and transit.

The three screenlines cross areas with volumes close to capacity, indicating substantial congestion in the southbound direction, which is the peak direction in the PM peak hour. This level of congestion is

expected during the PM peak period as commuters are leaving large employment centers such as Downtown Seattle north of the study area. The northbound direction of travel does not currently have as much congestion.

3.4.2 Transit Operations

3.4.2.1 Transit Service and Facilities

Transit centers and park-and-ride facilities are the major transit facilities within the study area. King County Metro Transit (Metro), Sound Transit, and Pierce Transit provide bus service to these facilities. Metro provides most of the bus service in the area with express and local service routes throughout King County. Sound Transit's Regional Express buses provide regional service within the study area to King and Pierce counties. Pierce Transit buses provide service between Pierce County and south King County. Transit facilities in the study area include the following:

- Kent/Des Moines Park-and-Ride and Freeway Station
- Star Lake Park-and-Ride and Freeway Station
- Redondo Heights Park-and-Ride
- Federal Way Transit Center
- Federal Way/S 320th Street Park-and-Ride

Approximately 3,700 park-and-ride spaces are provided at these transit facilities in the study area. A list of transit routes that serve these facilities is provided in Appendix G1.

As of Spring 2012, thirty-three bus routes serve the study area. A mix of peak and all-day routes is provided, with peak service serving regional destinations north of the study area, including Downtown Seattle, First Hill, and the University of Washington. All day service provides more local feeder service from surrounding communities. Bus frequency and hours of service are discussed below in Section 3.4.2.2.

3.4.2.2 Transit Levels of Service

The following transit LOS performance measures were analyzed for the PM peak period (3:00 p.m. to 7:00 p.m.) to describe transit performance, unless otherwise noted:

- Service frequency
- Hours of service
- Passenger load
- On-time reliability

Transit Levels of Service

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

Appendix G1 describes transit levels of service definitions and the existing and future transit LOS values for each of the LOS measures.

Overall, the majority of the transit routes operate with a peak period level of service frequency of LOS E or worse, meaning average headways (how often transit will pass by a particular point along the route) are every 30 minutes or longer. Bus routes that provide service between Downtown Seattle and the FWLE study area currently operate at average headways of 15 minutes to 60 minutes, with most routes operating at a 30-minute headway. The RapidRide A Line, which provides service between Tukwila and Federal Way on SR 99, has the most frequent bus service in the study area. This route operates with 10-minute headways during the PM peak period and is the only route that operates at LOS B or better.

Little to no existing transit service is provided between the study area and key Puget Sound regional employment centers other than Downtown Seattle, such as Downtown Bellevue, Redmond, the University of Washington, Northgate, and Lynnwood. Within the study area, transit service is available along SR 99 throughout most of the day as RapidRide A Line travels between Federal Way Transit Center and the City of SeaTac, operating at LOS A or B.

The existing passenger load LOS is generally acceptable on most routes, although some routes do experience overcrowding. Detailed bus passenger load data are provided in Table C-1 in Appendix G1.

Service reliability, including on-time performance, was evaluated at regional transit facilities, and overall LOS results are shown in Table 3-3. Transit trips are considered on time if they depart at the scheduled departure time up to 5 minutes late. Trips are also considered unreliable if they depart earlier than their scheduled departure time.

TABLE 3-3
Transit On-Time Performance and Reliability at Transit Hubs

Transit Facility	On-Time Performance Percentage	Reliability LOS
International District/Chinatown	58%	F
Kent-Des Moines Park-and-Ride/Kent-Des Moines I-5 Freeway Stop	48%	F
Highline College	82%	D
Star Lake Park-and-Ride	45%	F
Federal Way Transit Center	66%	F

The International District/Chinatown Station was chosen for this analysis because transit service that occurs between the FWLE study area and Downtown Seattle travels through this station. The other four transit hubs selected are key transit facilities within the study area. The on-time performance and reliability metrics for the key bus routes in the study area are also shown in Appendix G1.

Most buses operate with poor on-time performance because of roadway congestion and wide variations in roadway travel times. In general, as buses travel along their route, the on-time performance percentage decreases. For example, Metro Route 177 is on time approximately 60 percent of the time at the International District/Chinatown Station, but by the time it reaches the Federal Way Transit Center in the PM peak, its on-time performance is less than 40 percent.

The RapidRide A Line reliability measure is not based on on-time performance but rather its headway adherence because it operates at 10-minute headways during the PM peak period. At the two station areas where RapidRide A Line reliability is measured (Federal Way Transit Center and Kent-Des Moines Road), the route operates with typical headway adherence at LOS C or better.

3.4.3 Arterials and Local Streets Operations

3.4.3.1 Arterial and Local Roadways

Exhibit 3-1 shows the local roadways in the study area, including the major facilities and roadway classification. Local north-south roads, including Military Road, have two travel lanes and speeds between 25 and 40 miles per hour (mph), while east-west cross-streets have between two and six lanes and speeds under 40 mph. Average daily traffic volumes range from a few thousand vehicles per day to up to 43,000 vehicles along S 320th Street. Most roadways in the study area have full or partial sidewalks but generally do not have bicycle lanes. Average daily traffic volumes, speed limits, and functional classification are described in more detail in Appendix G1.

Intersection Levels of Service

The quality of intersection operations is also described in LOS terms. LOS ratings range from LOS A to LOS F; LOS A represents the best operations, and LOS F represents the poorest operations. LOS was calculated for all study intersections. Intersections are considered to operate acceptably when they operate at or better than the agency's intersection LOS standard. Failing intersections mean that vehicles incur substantial delay, vehicle queuing is evident, and the intersection does not meet the agency's LOS standard.

3.4.3.2 Intersection Operations and Level of Service

Intersections were analyzed to understand the operating conditions on the local streets. Agency intersection LOS standards are shown in Table 3-4. Appendix G1 provides a detailed summary of the traffic analysis results for the existing AM and PM peak-hour conditions, signal control, and the applicable LOS standard.

TABLE 3-4
LOS Standards for Affected Agencies

Agency	LOS Standard
Washington State Department of Transportation	LOS D for highways of statewide significance (HSS) LOS E/mitigated for regionally significant state highways (non-HSS)
City of SeaTac	LOS E for principal and minor arterials LOS D for collector and lower classification streets LOS F exemptions are at the following SR 99 intersections: - S 188th Street - S 216th Street
City of Des Moines	LOS D for signalized intersections or v/c less than 1.0, with the following exceptions (with their LOS and v/c threshold) along SR 99: - S 216th Street (LOS F, v/c <1.0) - Kent-Des Moines Road (LOS F, v/c <1.2) - S 220th Street (LOS E, v/c <1.0) - S 224th Street (LOS E, v/c <1.0)
City of Kent	LOS E for non-SR 99 intersections LOS F for all SR 99 intersections
City of Federal Way	LOS E and a v/c ratio less than 1.0 for signalized intersections v/c ratio less than 1.0 for unsignalized intersection lane groups

Note: The LOS threshold for intersections that have approaches with multiple roadway classifications will be the higher classified roadway (e.g., at an intersection between a principal arterial and a collector, the LOS threshold of the principal arterial will apply).

An AM and PM peak hour intersection LOS analysis was conducted using the collected peak-hour traffic volumes. All of the intersections currently meet the respective jurisdiction's mobility standards except for Kent-Des Moines Road and I-5 southbound ramps intersection during the PM peak hour, and the Kent-Des Moines Road and SR 99 intersection during both the AM and PM peak hours. These intersections do not meet the WSDOT standard of LOS D for HSS facilities.

3.4.4 Safety

Crash data records were collected for a 5-year period between 2007 and 2011 for intersections, arterials, and I-5 (mainline and ramps) within the study area. Detailed crash frequencies and rates are provided in Appendix G1, Table 3-12 through Table 3-14. The majority of the crashes in the study area occurred at intersections. The intersection of SR 99 and Kent-Des Moines Road had the greatest number of crashes (197) and the highest intersection crash rate of 2.16 crashes per million entering vehicles (MEV) over the 5-year period. S 320th Street between SR 99 and I-5 had the greatest number of crashes (161) and the highest corridor crash rate of 2.99 crashes per million vehicle miles traveled (MVMT) over the 5-year

period. Appendix G1 provides additional information on the crash analysis results for the study area intersections arterials and the I-5 mainline and ramps.

WSDOT uses a system of collision analysis corridors (CAC) or collision analysis locations (CAL) to identify locations with high potential for safety improvements. The only arterial within the study area classified as a CAC is Kent-Des Moines Road; however, the crash rate on the segment of Kent-Des Moines Road within the study area is around 1.3 crashes per million vehicle miles traveled (MVMT), which is less than the statewide average for urban arterials (2.55 crashes per MVMT). Two SR 99 segments, S 216th Street to Kent-Des Moines Road (2.55 crashes per MVMT) and S 288th Street to S 320th Street (2.56 crashes per MVMT) have crash rates over the statewide average.

On the I-5 mainline through the study area, there were a total of 1,705 crashes between 2007 and 2011. The 2011 statewide collision average for interstates within WSDOT's jurisdiction in urban areas is 1.24 crashes per MVMT. All I-5 mainline segments in the study area have a crash rate less than the statewide average. The only CAC on I-5 in the study area is a 0.3-mile section at the S 272nd Street interchange. WSDOT concluded that no improvements are needed through this segment at this time.

There were a total of 378 crashes on the I-5 ramps in the study area between 2007 and 2011. The southbound off-ramp to S 320th Street has the highest crash frequency of about 17 crashes per year, but it also has the highest volume of any of the ramps in the study area.

A clear zone inventory for the I-5 mainline and ramps was completed for the western edge of I-5 between S 211th Street and S 317th Street and the I-5 median between S 244th Street and S 256th Street. Based on WSDOT Design Manual criteria for clear zone distances, a distance ranging between 20 and 45 feet, measured from the edge of traveled way, would allow for sufficient clear zone along the FWLE study area. Two conditions were assessed:

Clear Zone

The Roadside Design Guide defines a clear zone as an unobstructed, relatively flat area beyond the edge of the traveled way that allows a driver to stop safely or regain control of a vehicle that leaves the traveled way.

- Whether the clear zone width is currently met
- Whether a clear zone cannot be provided and barriers are required for safety (e.g., overcrossings)

Based on this inventory, approximately two-thirds of the southbound I-5 mainline currently has a clear zone, while the remaining sections have barriers, walls, or guardrails where the clear zone is not currently met or cannot be provided. The I-5 median between S 244th Street and S 256th Street is shielded by guardrail or barriers along northbound and southbound I-5, except for a small break for emergency vehicle access near S 248th Street.

3.4.5 Parking

Existing parking supply and utilization information was collected for the areas surrounding the potential FWLE stations and is provided in Table 3-16 in Appendix G1, Transportation Technical Report.

The areas surrounding the FWLE stations have an on-street parking utilization rate between 13 and 43 percent. These low utilization rates indicate that there is generally on-street parking available in the station areas. The park-and-rides in the study area have a utilization rate of 45 percent or more, except the Redondo Heights Park-and-Ride, which has an 8 percent utilization rate.

Currently, there are no privately operated parking facilities near the FWLE stations. Surrounding the Kent/Des Moines station area, most parking is located in residential neighborhoods and is generally restricted to residential uses only. While on-street parking is provided east of I-5, this parking was not considered because the total walking distance would be substantially greater than 1/4 mile from the station, the distance most pedestrians are willing to walk to access transit service. There is some on-street parking located north of the Star Lake Park-and-Ride adjacent to I-5. The parking at nearby multi-family housing is restricted to residents. The Federal Way Transit Center Station area has limited on-street parking.

3.4.6 Nonmotorized Facilities

Sidewalks are provided on both sides of SR 99 and are also along many arterial streets within the study area; however, some arterials are missing sidewalks on one or both sides of the road, such as Kent-Des Moines Road east of I-5 and S 240th Street. Many residential neighborhoods and local streets also lack sidewalks.

Pedestrian mobility between the station areas and east of I-5 occurs at the Kent-Des Moines Road, S 272nd Street, and S 320th Street

interchanges. Sidewalks around these interchange areas are intermittent, and combined with high traffic volumes and congestion at the interchanges, make nonmotorized travel through these areas difficult.

There are only a few existing bicycle facilities and multi-use trails in the study area. South 216th Street is the only roadway that currently provides a designated bicycle lane that runs the entire length between I-5 and Puget Sound. Kent-Des Moines Road, S 240th Street, and S 260th Street are all signed bicycle routes that have a wide shoulder to accommodate bicycles. These designated bicycle routes do not necessarily have marked lanes, although signage typically is present, which indicates to motorists that bicyclists are likely to share the roadway with vehicles. There are currently no bicycle facilities on SR 99, S 272nd Street, or S 320th Street.

The Des Moines Creek Trail and the Bonneville Power Administration Trail (BPA) are the closest regional trails to the study area. The Des Moines Creek Trail begins about 1/2 mile west of SR 99 at S 200th Street and extends southwesterly toward Puget Sound to just south of S 216th Street, and the BPA Trail begins at S 324th Street and 11th Place S in Federal Way.

3.4.7 Freight Mobility and Access

Truck mobility within the Puget Sound Region is largely supported by a system of designated freight routes (Exhibit 3-2) that connect major freight destinations. To prioritize truck routes, the WSDOT adopted the Freight Goods Transportation System (FGTS), which classifies roadways according to the amount of annual gross tonnage they carry (T1–T5). Within the study area, the transportation system is vital to moving freight and goods to and from major transportation hubs such as the Port of Seattle, Sea-Tac International Airport (Sea-Tac Airport), Kent Manufacturing/Industrial Center, Port of Tacoma, and other business and consumer destinations. Within the study area, there are no active freight rail lines.

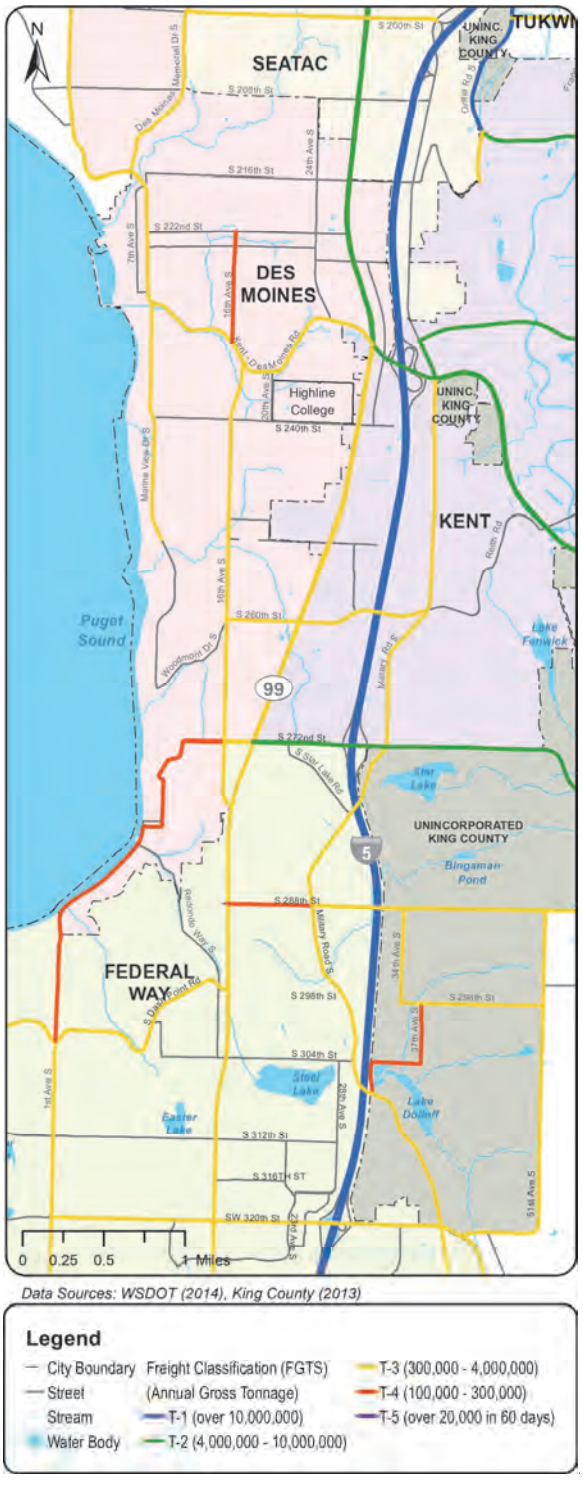


EXHIBIT 3-2
Existing Freight Routes

I-5 is the only FGTS Class T-1 roadway in the study area. Within the study area, all of the arterials are classified as either T-2 or T-3 routes. I-5 is a key freight corridor that serves not only the Puget Sound Region but also national and international markets. More than 72 million tons of freight are hauled over the course of a year on I-5. About 8 percent of the total vehicles that travel on I-5 are trucks. Between Sea-Tac Airport and Kent-Des Moines Road, SR 99 carried 3.6 million tons of freight in 2011. About 4 percent of the total vehicles on SR 99 are trucks. Many of these truck trips are destined for the Port of Seattle and the Kent Manufacturing/Industrial Center.

3.5 Environmental Impacts

The future long-term effects described in the following sections compare the No Build Alternative with the build alternatives for the year 2035. Agency and station long-range plans were reviewed and foreseeable projects were assumed. Modifications to the transportation system assumed to be in place under both the No Build Alternative and build alternatives (i.e., not associated with the project) are described in Appendix G1. Impacts from the No Build Alternative are quantified for Regional Facilities and Travel, Transit Operations, and Arterials and Local Street Operations. Impacts from the No Build Alternative are not quantified for Parking, Safety, Nonmotorized Facilities, and Freight Mobility because the conditions under the No Build would be similar to existing conditions. For all elements, the discussion of the No Build Alternative is integrated with the build alternatives and is not reported separately.

The effects of the build alternatives were analyzed assuming that light rail would extend to the Federal Way Transit Center, with potential interim terminus locations at the Kent/Des Moines Station and S 272nd Street Station. Potential mitigation to improve conditions was also identified for the build alternatives. The changes and effects described in this section are based on the conceptual light rail guideway and station area plans (Appendix F, Conceptual Design Drawings).

3.5.1 Regional Facilities and Travel

Regional travel patterns, including projected vehicle forecasts, traffic congestion, and mode share for the No Build and build alternatives are discussed in this subsection. Refer to Section 3.4.3 for I-5 ramp

terminal operational and queuing analysis and Section 3.4.4 for I-5 safety analysis.

The future arterial and local street system within the study area includes a variety of roadway and transit projects. These reasonably foreseeable projects and transit service changes were incorporated into the transportation analysis for the 2035 No Build and build alternatives. These future year projects are assumed because they already have substantial funding. As funding to construct the SR 509 Corridor Completion and Freight Improvement Project has not been identified by the State, this potential project was not assumed to be part of the No Build Alternative and is discussed in Chapter 6, Cumulative Impacts.

Traffic volumes are expected to increase from existing conditions because travel patterns are not forecasted to change appreciably and regional population growth is projected to continue. Overall, by 2035, traffic volumes are expected to increase within the study area by approximately 0.7 percent annually. Exhibit 3-3 shows the 2035 No Build Alternative v/c ratios for major regional facilities. Congestion would be evident on most major freeways and arterials in King County. The following sections further describe the No Build Alternative and how the build alternatives would affect overall traffic volumes and future congestion.

3.5.1.1 Vehicle Miles Traveled, Vehicles Hours of Delay, and Vehicle Hours Traveled

Table 3-5 shows the daily VMT, VHT, and VHD for the No Build Alternative and build alternatives for the year 2035. Changes in VMT, VHT, and VHD would be similar among build alternatives; therefore, a representative build alternative is highlighted in Table 3-5.

With the FWLE project, regional VMT is expected to decrease by approximately 150,000 miles on a typical weekday compared to the No Build Alternative because some auto drivers are expected to ride light rail with the FWLE.

EXHIBIT 3-3
2035 No Build PM Highway Volume-to-Capacity Ratios

TABLE 3-5
2035 Weekday Daily Vehicle Miles of Travel, Vehicle Hours of Travel, and Vehicle Hours of Delay

Alternative	VMT	VHT	VHD
No Build Alternative	103,910,000	3,370,000	499,000
Build Alternatives[a]	103,760,000	3,360,000	495,000
Change	-150,000	-10,000	-4,000

Source: PSRC, 2012
[a] The SR 99 Alternative is documented for comparison purposes. Other alternatives and station options would have the same regional impacts.

Forecasted VHT are expected to decrease by approximately 10,000 hours per day regionally with the FWLE. Forecasted VHD are expected to decrease by approximately 4,000 hours per day regionally.

3.5.1.2 Screenline Performance

The AM peak hour, PM peak hour, daily traffic volumes, and v/c ratios at the three selected screenline locations within the study area were analyzed. Exhibit 3-1 shows the project's three screenline locations. Screenline results are similar between all build alternatives; therefore, a representative value is provided in Table 3-6.

TABLE 3-6
2035 Screenline Volumes and Volume-to-Capacity Ratios

Screenline	Direction	AM Peak Hour				PM Peak Hour				Daily	
		No Build		Build Alternatives[a]		No Build		Build Alternatives[a]		No Build Volume (veh)	Build Alternatives Volume (veh)[a]
		Volume (veh)	V/C	Volume (veh)	V/C	Volume (veh)	V/C	Volume (veh)	V/C		
South of S 200th Street	NB	14,100	0.95	14,000	0.95	9,000	0.61	8,900	0.60	168,200	166,500
	SB	6,200	0.39	6,200	0.39	14,000	0.89	13,900	0.88	161,800	160,100
North of S 272nd Street	NB	15,400	1.00	15,300	0.99	9,300	0.60	9,200	0.59	174,000	172,100
	SB	6,200	0.40	6,100	0.40	15,200	0.98	15,000	0.97	168,700	166,900
South of S 312th Street	NB	12,600	0.78	12,500	0.77	8,500	0.52	8,500	0.52	149,900	148,600
	SB	6,100	0.37	6,000	0.37	12,800	0.79	12,700	0.79	147,600	146,200

Source: PSRC, 2012
[a] The SR 99 Alternative is documented for comparison purposes. Other alternatives and station options would have the same regional impacts.
NB = northbound; SB = southbound; veh = vehicle

The FWLE project would attract more persons to transit, thus resulting in minor decreases in traffic volumes and congestion across all screenline locations within the corridor. Modest decreases are

expected in both the peak and off-peak directions of travel. Most roads across the screenline would operate at or near capacity in the peak direction of travel with and without the FWLE.

3.5.1.3 Person Mode of Travel

Table 3-7 shows the total person demand and their mode of travel at the three screenline locations during the PM peak hour. A slight decrease in SOV and HOV person demand is expected with the build alternatives, as persons would shift from auto to light rail. The percent of the transit mode share in the total mode share for the PM peak period would increase, from 3 to 4 percent to 5 to 6 percent for northbound travel, and from 10 percent to 12 to 14 percent for southbound travel.

TABLE 3-7
2035 PM Peak Hour Mode Share

Screenline	Direction	No Build Alternative				Build Alternatives[a]			
		Total Persons	SOV	HOV	Transit	Total Persons	SOV	HOV	Transit
South of S 200th Street	NB	31,500	77%	19%	3%	32,000	75%	19%	6%
	SB	61,500	53%	37%	10%	63,200	51%	35%	14%
North of S 272nd Street	NB	32,900	75%	21%	3%	33,200	74%	20%	5%
	SB	65,400	55%	36%	10%	66,600	53%	35%	12%
South of S 312th Street	NB	30,700	73%	23%	4%	31,000	72%	23%	5%
	SB	55,900	54%	35%	10%	56,800	53%	35%	13%

Source: Sound Transit, 2012; PSRC, 2012
Note: Numbers may not add to 100% due to rounding.
[a] The SR 99 Alternative is documented for comparison purposes. Other alternatives and station options would have the same regional impacts.

3.5.2 Transit Service and Operations

Transit service and circulation, regional and local bus transit, ridership, station area mode of access, transit LOS measures, bus and light rail travel time, and transit transfer rates for the No Build and build alternatives are discussed in this subsection. Chapter 4.2, Transit Operations, in Appendix G1, provides additional discussion and data regarding the transit elements described in this section.

3.5.2.1 Transit Service and Circulation

A variety of transit facility improvements are planned for the FWLE, including new light rail stations with new or expanded park-and-ride capacity and improved transit connectivity through the construction of multimodal transit hubs. This would further integrate bus, transit, auto, and walk modes of access into one convenient location.

3.5.2.2 Regional and Local Bus Transit

Regional bus service could be restructured to operate collaboratively with light rail within the study area. Transit agencies have identified conceptual bus service plans that could be integrated with the implementation of light rail in the study area. The information provided by these agencies represents a potential condition where a change to the route may occur. This could include truncating, eliminating, rerouting, or increasing frequency to integrate with light rail service. As part of the conceptual bus service plan, RapidRide A Line would continue to operate along SR 99 with the FWLE, providing local service between the stations and offering an opportunity for people to access the light rail transit system.

3.5.2.3 Transit Travel Time

Light rail travel times are expected to range between 12 and 14 minutes between the Federal Way Transit Center and the Angle Lake Station, depending on the alternative and stations selected. In general, alignments that are shorter in length and have fewer curves (e.g., Federal Way SR 99 Station Option and Federal Way I-5 Station Option) would have slightly faster travel times. Travel times for each alternative and station option are provided in Appendix G1.

Table 3-8 shows the estimated PM peak-period transit travel times between the Federal Way Transit Center and key regional destinations for year 2035. The travel times for the build alternatives assume three FWLE stations (Kent/Des Moines, S 272nd Street, and Federal Way Transit Center) and do not include the potential additional S 216th or S 260th station options. Bus travel times are based on the 95th percentile travel times from Sea-Tac Airport and Downtown Seattle (International District) to Federal Way. For trips in the No Build alternative that originate from North Seattle/Lynnwood or the Eastside, a portion of the trip was assumed to be made on light rail (Lynnwood Link/Central Link and East Link), and a bus-to-light rail transit transfer would occur at the International District/Chinatown Station. Future travel times account for factors such as the time it takes to get on or off the bus and train, transit transfer wait times, light rail train acceleration and deceleration, and system operating speeds.

Key Ridership Definitions

- **Transit Boardings** – The entry of passengers onto a transit vehicle.
- **Transit Alightings** – The exit of passengers from a transit vehicle.
- **Transit Trips** – The transit route between a starting location and an ending location. A transit trip could have one or more transit boardings if a transfer occurs.
- **Project Riders** – Total transit boardings and alightings that occur in the FWLE study area
- **New Transit Riders** – Any person who shifted to transit from a non-transit mode.

TABLE 3-8
Year 2035 PM Peak Period Transit Travel Times (minutes) and Transfers between Federal Way and Regional Centers

Regional Centers	No Build Alternative		Build Alternatives	
	Travel Time (min)	# of Transfers	Travel Time (min)	# of Transfers
Downtown Seattle (International District/Chinatown Station)	49[a]	0	47	0
Sea-Tac Airport	42[a]	0	16	0
Downtown Bellevue	79[b]	1	72[c]	1
University of Washington	71[b]	1	61	0
Northgate	76[b]	1	66	0
Lynnwood	91[b]	1	80	0
Overlake	89[b]	1	83[c]	1

[a] Sources: No Build Alternatives – Existing 95th Percentile Travel Time for a representative bus route from the summer of 2012 (Sound Transit, Metro). Travel times were factored to 2035 by using future estimated roadway congestion based on regional growth (WSDOT, 2011).

Build alternatives and Central Link/East Link Travel Times – Sound Transit light rail travel time estimates (Sound Transit, 2012).

[b] Trip assumes light rail taken to the International District, and an 8-minute transfer time was assumed to access a surface bus.

[c] Trip assumes light rail taken to the International District, and a 4-minute transfer time was assumed to access light rail to Federal Way Transit Center.

The travel time from the regional centers to Federal Way would be 2 to 26 minutes faster with the build alternatives compared with the No Build Alternative. Express bus service between Federal Way and Downtown Seattle (International District) would have a 49-minute travel time under the No Build Alternative. These express routes have very limited stops and use I-5 exclusively to reach Downtown Seattle. The build alternatives would have a 47-minute travel time to Downtown Seattle. Light rail would also serve South Seattle neighborhoods, have more stops, and operate at-grade along portions of the alignment, resulting in similar travel times. While bus service is frequent and generally a one-seat ride from Federal Way Transit Center to Downtown Seattle, the reliability of the trip depends on freeway and local roadway conditions. With light rail operating in a grade-separated guideway, this trip would be more reliable even though the overall travel times would be similar.

The travel time from Federal Way to SeaTac Airport is forecasted to be 42 minutes in year 2035 under the No Build Alternative. Bus routes that provide service between these two destinations stop frequently and are delayed by congestion and traffic signals on arterials, which increases travel time. Light rail would operate with fewer stops and would not be delayed by vehicular traffic, resulting in a 16-minute travel time under the build alternatives.

While travel times between Federal Way and the International District/Chinatown Station are documented in Table 3-8, a greater travel time savings would be realized as light rail continues north, serving more of Downtown Seattle and other key Seattle destinations (e.g., Westlake Center), compared with the No Build Alternative. The Downtown Seattle Transit Tunnel would be used exclusively by light rail, whereas buses would use city surface streets. Buses would be slowed by traffic signals and congestion, which could result in higher travel times when compared with light rail.

For Seattle destinations north of downtown, such as the University of Washington and Northgate, light rail would provide at least a 10-minute travel time savings compared with the No Build alternative. In the No Build Alternative, a transfer from bus to light rail would be required, thus increasing travel time, and may result in the potential to miss a connection.

3.5.2.4 Ridership

The ridership forecasts produced for the FWLE were consistent with regional planning and used the most up-to-date information available. This included land use forecasts released by PSRC in September 2013 that reflected the most current release available. This land use set, referred to by PSRC as the "local targets" forecasts, was created by PSRC to reflect local agencies' adopted plans, including population and employment forecasts. It represents a regional development pattern consistent with what local jurisdictions are planning under the first set of VISION 2040-aligned local growth targets, such as the City of Kent's Midway Subarea Plan. Overall, these land uses assume a substantial growth pattern within the study area for year 2035 (close to a 50 percent increase in employment and households surrounding the Kent-Des Moines station area) and were used as the basis for ridership projections.

Table 3-9 shows the year 2035 daily transit ridership for the No Build Alternative and build alternatives. Table 3-9 also documents the expected daily ridership and number of new transit riders for the build alternatives. Total daily trips (ridership) includes all riders on the FWLE, regardless of where they board the train. The FWLE would serve 25,500 and 27,500 daily riders, and about 8,000 would be new transit riders. Under all the build alternatives, the number of regional (Sound Transit service area) daily transit boardings is expected to increase by about 2 percent.

TABLE 3-9
2035 FWLE Weekday Transit Trips and Project Riders

Measure	No Build Alternative	Build Alternatives					
		SR 99	I-5	SR 99 to I-5	I-5 to SR 99	SR 99 – Four Stations[a]	SR 99 – Five Stations[b]
Total Regional Daily Transit Trips[c]	602,000	609,500	609,500	609,500	609,500	609,500-610,000	610,000
Total Daily System-wide Link Boardings[d]	280,000	300,000	299,000	299,000	299,500	300,000-301,000	301,000
Total FWLE Light Rail Project Riders	N/A	26,500	25,500	26,000	26,000	27,000-27,500	27,500
New Transit Riders	N/A	7,500	7,500	7,500	7,500	7,500-8,000	8,000

Source: Sound Transit, 2012

[a] Range provided assumes a station at S 216th Street or S 260th Street.

[b] Assumes SR 99 Alternative with additional stations at S 216th Street and S 260th Street.

[c] Includes both light rail and bus riders in the Sound Transit service area.

[d] The increase in total daily system-wide boardings is greater than the number of FWLE station boardings shown in Exhibit 3-4 and Exhibit 3-5 because the total daily system-wide boardings includes new transfers that would occur between FWLE and East Link. Each transfer is counted as an additional boarding within the Link Light Rail system..

N/A = not applicable

Average 2035 weekday and PM peak period (3 p.m. to 6 p.m.) station boardings are shown in Exhibit 3-4 for the build alternatives and in Exhibit 3-5 for the build alternatives with station options. These boardings show only the trips starting at each FWLE station and the Angle Lake Station, while the total trips shown in Table 3-9 include all trips to or from any FWLE station.

In these exhibits, potential station areas are listed north to south, and the size of the circle represents the relative number of boardings at each station. The ridership at each station would vary depending on the combination of stations and various station options. For the four build alternatives, total daily boardings in the FWLE study area would range from 13,000 to 13,500 boardings per day. The total daily boardings for the build alternatives with the potential additional stations and station options would range from 12,500 with the I-5 Alternative with the Federal Way I-5 Station Option to 15,000 under the SR 99 alternative with five stations. Although the addition of stations would increase overall ridership, a portion of those additional station boardings would come from the other surrounding stations.

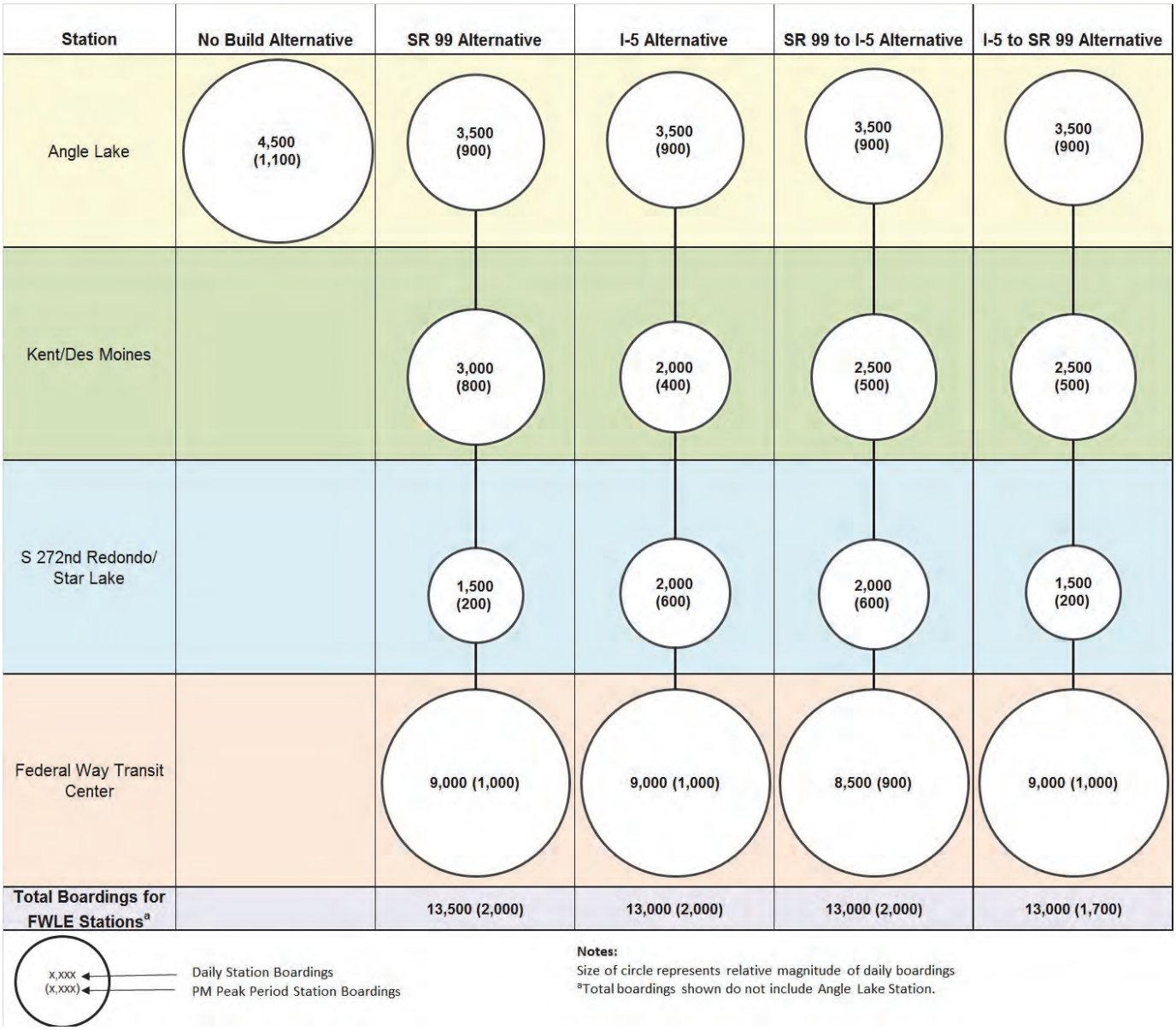


EXHIBIT 3-4
2035 FWLE Build Alternatives Weekday Station Boardings

In general, the ridership forecasts for the build alternatives are relatively similar. The primary factors influencing ridership are the number of people in the travelshed, the station locations, the transit service connections, and the Link light rail travel times. factors are similar among the alternatives, but vary between some station options. Minor ridership differences within station areas are expected because of differences in the density of population and employment close to the station, connections to local and regional transit (such as proximity to RapidRide stops), details of station access and walkability, and the amount of parking provided at the station.

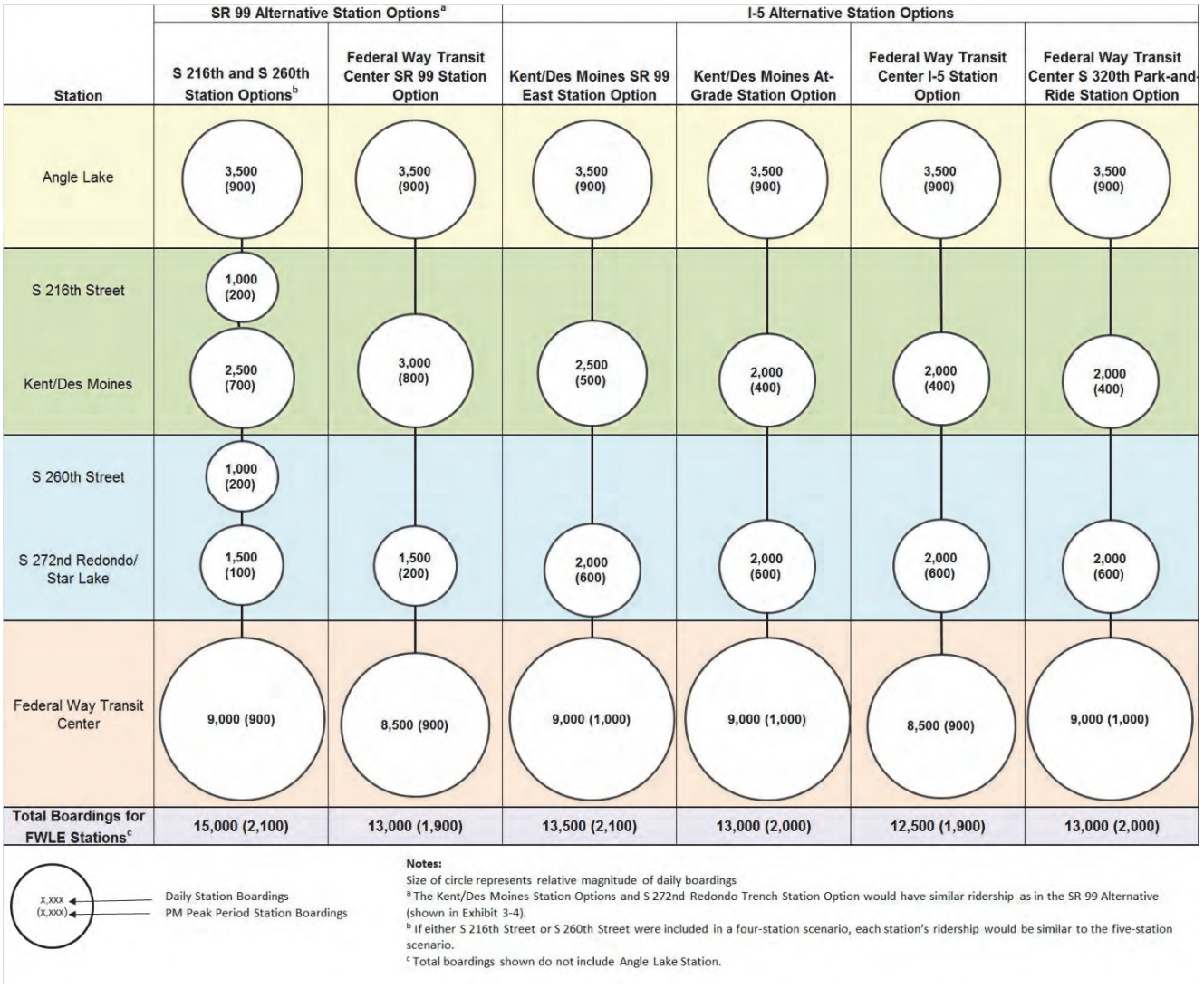


EXHIBIT 3-5
2035 FWLE Light Rail Station Options Weekday Station Boardings

For example, because the I-5 Alternative Kent/Des Moines station options are farther from SR 99 and Highline College and would not be directly served by the RapidRide A line, they would have about one-third fewer boardings than stations along SR 99. While RapidRide A Line riders may not access the Link system at the I-5 Kent/Des Moines Station, they are likely to continue using transit and access the Link system at another nearby station.

For the S 272nd Redondo and S 272nd Star Lake stations, more bus feeder service (i.e., routes to and from the Kent Valley area) has been assumed in the vicinity of the Star Lake Station than the Redondo Station, which contributes to the difference in station boardings between these two stations (Exhibit 3-4).

Tables 3-10 and 3-11 document the expected corridor ridership and change in new transit riders for the build alternatives under the Kent/Des Moines and S 272nd Street interim terminus conditions, respectively. Under all the build alternatives, the number of regional (Sound Transit service area) daily transit trips would increase slightly, to approximately 603,000 per day, with the FWLE to the Kent/Des Moines Station. Extending farther south to S 272nd Street, total transit trips would increase more, to approximately 604,000 per weekday.

TABLE 3-10
2035 Kent/Des Moines Station Interim Terminus Weekday Ridership and Project Riders

Measure	2035 No Build	2035 Light Rail Alternative			
		SR 99	I-5	SR 99 to I-5	I-5 to SR 99
Total Daily Transit Trips	602,000	603,000	603,000	603,000	603,000
Daily System-wide Link Boardings	280,000	284,000	283,000	284,000	284,000
Total Corridor Project Riders	N/A	9,000	5,500	8,500	8,500
2035 New Transit Riders	N/A	1,000	1,000	1,000	1,000

Source: Sound Transit, 2012
N/A = not applicable

TABLE 3-11
2035 S 272nd Station Interim Terminus Weekday Ridership and Project Riders

Measure	2035 No Build	2035 Build Alternative			
		SR 99	I-5	SR 99 to I-5	I-5 to SR 99
Total Daily Transit Trips	602,000	603,500	603,500	604,000	604,000
Daily System-wide Link Boardings	280,00	288,000	286,000	288,000	288,000
Total Corridor Project Riders	N/A	12,500	10,000	12,500	12,500
2035 New Transit Riders	N/A	1,500	1,500	2,000	2,000

Source: Sound Transit, 2012
N/A = not applicable

In the interim condition with the Kent/Des Moines Station, the SR 99 Alternative would have the highest total corridor project riders (9,000) and the I-5 Alternative the lowest boardings (5,500). As previously described, the station's location and proximity to RapidRide stops would affect the ridership between these stations.

For example, with the I-5 Alternative's SR 99 East Station option, the ridership would be similar to the SR 99 Alternative and station options. Under the S 272nd Street Station interim condition, the SR 99, SR 99 to I-5, and I-5 to SR 99 alternatives would have slightly more project riders than the I-5 Alternative.

Similar to the full-length project, the difference in project riders between the build alternatives would be influenced by a combination of factors, including the density of population and employment around the station area, local and regional transit service connectivity, proximity to RapidRide stops, station access and walkability, the amount of parking stalls at the stations, and expected light rail operating speeds.

3.5.2.5 Station Area Mode of Access

Station area mode of access was analyzed for each type of person trip at a station. Exhibit 3-6 shows the average expected mode of access to each station area for the four build alternatives and the station options for the PM peak hour. The pie chart size is indicative of the relative number of boardings at each station area.

At the Kent/Des Moines stations, any station located near SR 99 would have a higher transit transfer mode share than stations near I-5 because there would be more transfers between RapidRide A Line and light rail. These transfers would decrease with station options that are located farther from RapidRide A Line stops along SR 99.

At S 272nd Street, the Star Lake Station would have a higher transit transfer percentage than the Redondo Station as a result of the higher number of transit routes serving the Star Lake facility.

At the Federal Way Transit Center, the majority of trips would be transit transfer, while the remaining portion would be generally automobile-based. Although land uses in this station area are forecasted to change from the current commercial focus to more mixed use, the

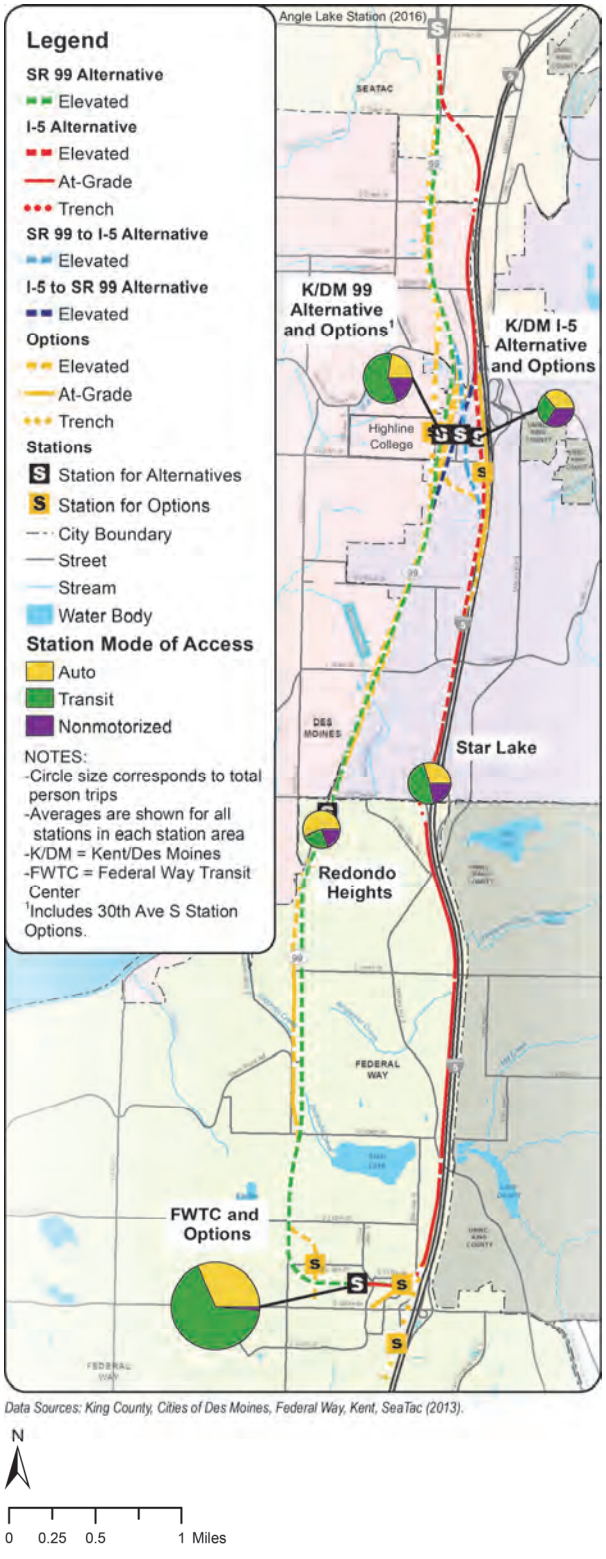


EXHIBIT 3-6
2035 Build Alternatives PM Peak Hour Station Mode of Access

mode of access at this station is forecasted to be focused on transit and automobile modes of access, with a smaller share of pedestrian- and bicycle-based trips. The Federal Way S 320th Park-and-Ride Station would generate a higher percentage of auto-based trips, because a larger proportion of parking spaces would be available for light rail users and fewer feeder transit routes would serve the station area.

For the potential additional stations at S 216th Street and S 260th Street, the mode of access is expected to be predominately nonmotorized because no parking is assumed to be provided and transit transfer potential is limited because only a few bus routes would serve these stations. A small portion of the trips at this station would be passenger drop-off/pick up trips, which represent the only type of auto access trips at these stations.

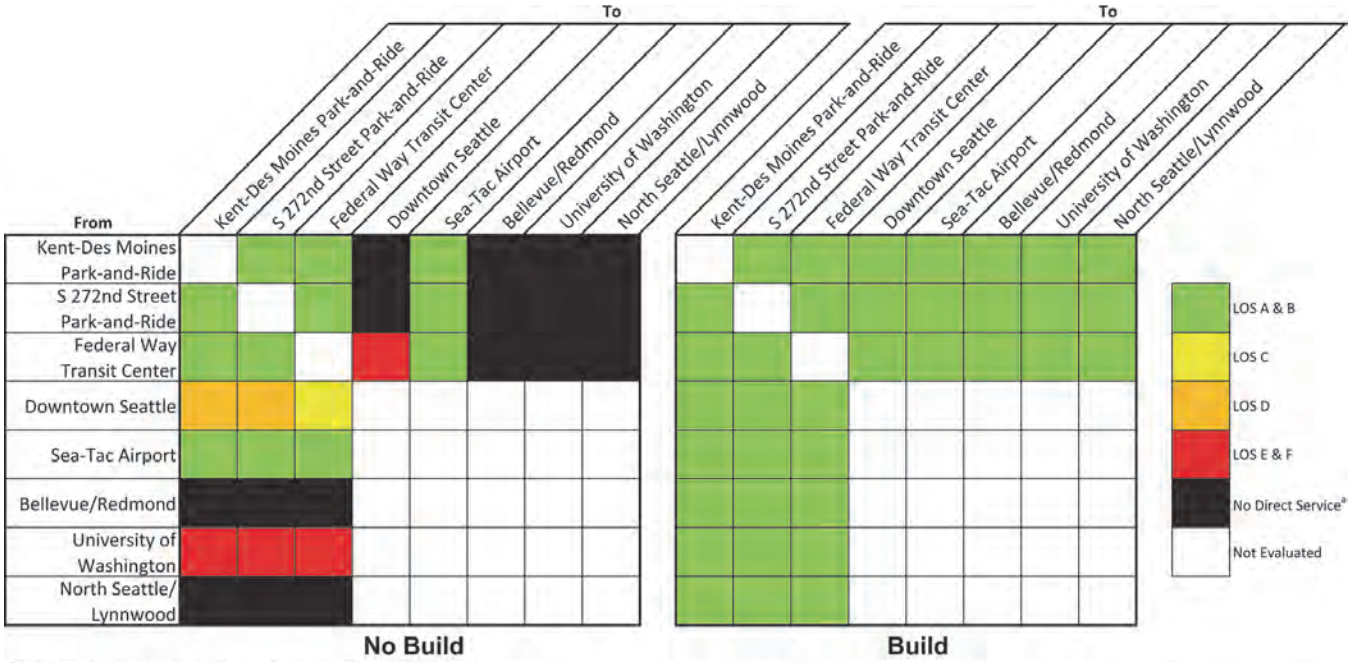
3.5.2.6 Transit LOS Measures

Transit LOS was analyzed for service frequency, hours of service, and passenger loads to describe transit performance in the No Build and build alternatives for the year 2035. The transit LOS methodology used the same procedures and metrics described earlier in Section 3.4.2.2.

Service Frequency

Exhibit 3-7 shows the LOS for service frequency for the 2035 No Build and build alternatives during the PM peak hour. The 2035 No Build service frequency is expected to be the same LOS as existing conditions. Direct transit service to regional destinations, such as Downtown Seattle and the University of Washington, would be limited and generally only provided in the southbound (peak) direction of travel. Direct northbound transit service (not requiring a transfer) to/from the study area to North Seattle and Bellevue/Eastside would not be available with the No Build Alternative.

With the build alternatives, access to regional destinations east of Lake Washington (Bellevue/Redmond) would still require a transfer; however, the frequency of the rail service and the ease of transfer between light rail lines would minimize the transfer time. The FWLE would overall improve the service frequency to LOS A for connections between Federal Way, Kent, Des Moines, SeaTac, and the many of the Puget Sound regional destinations.



[a]No direct service or requires one or more bus transfers.
At LOS A, passengers are assured a transit vehicle will arrive soon after they arrive at a stop (>6 bus/hr), while the threshold between LOS E and F is service once per hour.

EXHIBIT 3-7
2035 No Build Alternative and Build Alternatives Transit Level of Service for Service Frequency

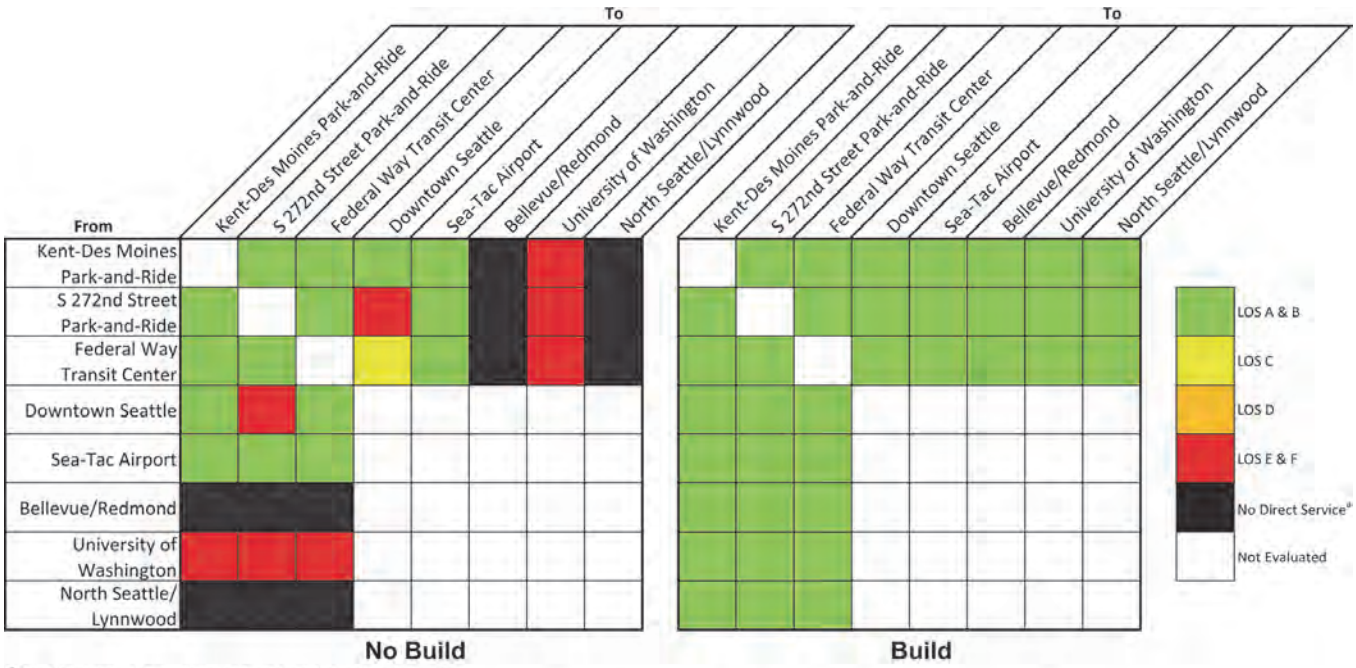
Hours of Service

Exhibit 3-8 shows the LOS for hours of service for the 2035 No Build and build alternatives. The 2035 No Build transit hours of service are assumed to remain the same as existing transit operations. With the No Build Alternative, the hours of service to Downtown Seattle from the Federal Way Transit Center and the Redondo Heights/Star Lake service areas would be LOS C and LOS F, respectively. With the build alternatives, continuous, two-way transit service would be provided for 20 hours, resulting in LOS A for all evaluated areas.

Passenger Load

Passenger load LOS for the No Build and light rail alternatives was analyzed using estimated PM peak period passenger volume forecasts from the Sound Transit ridership model (Sound Transit, 2012). Under the No Build Alternative, transit passenger load is expected to be at LOS A or B in the northbound direction of travel.

Traveling southbound from origins such as Downtown Seattle and the University of Washington, the passenger load LOS is expected to be LOS D. On average, buses would exceed their seated capacity on several routes during the PM peak period. With the build alternatives, bus passenger loads would improve to LOS A, and light rail passenger loads would range from LOS A to C.



[a]No direct service or requires one or more bus transfers.
At LOS A, service is available most or all day (>19 hr) while at LOS F, transit service is only offered for a few hours a day(<3 hr).

EXHIBIT 3-8
2035 No Build Alternative and Build Alternatives Transit Level of Service for Hours of Service

3.5.2.7 Reliability and On-time Performance

The future reliability of bus service for the No Build Alternative is expected to degrade compared with existing conditions. By year 2035, key transit facilities, such as I-5 HOV lanes, are expected to have speeds decrease by up to 30 percent in the peak direction of travel during the PM peak period. Poor bus reliability could result in passengers becoming less confident of arriving at the scheduled time, and as a result they might take an earlier trip to ensure getting to their destination on-time or take another mode of travel.

With the build alternatives, light rail operating in the corridor would be more reliable because it would operate in an exclusive right-of-way and have no at-grade vehicle crossing conflicts. However, light rail reliability in the corridor could be affected by unexpected delays at station areas or by system delays outside of the FWLE corridor where light rail is operating at-grade with traffic.

Transit Transfer Effects

Transit transfers can make service more efficient for operators; however, increases in travel time, the potential to miss a connection, and increasing the complexity of a transit trip can be less convenient for passengers. Therefore, with an increase in transfers, transit riders might choose not to use transit for their trip.

3.5.2.8 Transit Transfers

Transfers include trips between multiple buses or between a bus and light rail/commuter rail. Riders will accept transit transfers if they provide reliable, quick transfer connections. Evidence has shown that short transfers are acceptable and

might only be a minor inconvenience to riders. Several hubs in the Sound Transit region, including the Federal Way Transit Center within the study area, are considered "multi-centered" route hubs where bus routes converge so transfers can be made to multiple destinations in one location. The transfer rate with the No Build Alternative would be 1.47 boardings per trip in 2035 and would be similar with any of the build alternatives.

3.5.3 Arterial and Local Street Operations

This section describes the effect of the No Build and build alternatives on arterial and local streets in the study area. This section includes year 2035 traffic volume forecasts; expected traffic generated at stations; intersection operations; and changes in access, circulation, traffic control, and traffic safety. Section 4.3 in Appendix G1 provides additional details regarding arterial and local street operations, including network growth rates, trips generation, and intersection LOS.

3.5.3.1 Future Arterial and Local Street System

Traffic Forecasts

Year 2035 AM and PM peak hour traffic volume forecasts were developed for the FWLE based on the PSRC's current population and land use forecasts. Overall, by 2035, traffic volumes in the study area are expected to increase by an average annual growth rate of approximately 0.7 percent in the AM and PM peak hours for the No Build Alternative.

For the build alternatives, the anticipated vehicular trip generation was calculated for each station area based on information from Sound Transit's Ridership Model (Sound Transit, 2012) and station characteristics. The vehicle trips at a station are comprised of three different types: (1) park-and-ride vehicle trips, (2) passenger drop-off/pick-up trips, and (3) buses. The increase in vehicle trips was applied to No Build Alternative traffic volume forecasts to develop an estimate of the traffic volumes with the build alternatives. This vehicle forecast is conservative because it does not consider people changing their travel mode from driving in the No Build Alternative to using transit with the FWLE.

For stations that include a park-and-ride, it was assumed that the vehicle trips within the 3-hour peak period would reflect the park-and-ride lot being full. This provides a conservatively high estimate of traffic impacts near the stations because it assumes each lot would be

at capacity. It was assumed that slightly less than half (45 percent) of the 3-hour peak period trips would occur during the peak hour. Also, based on research from the Tukwila International Boulevard Station, it was assumed that 10 percent of PM peak period ridership at each FWLE station would be from riders being dropped off or picked up. Bus routes trips were estimated based on preliminary bus service assumptions provided by Metro and Sound Transit.

In general, station areas that would have the greatest increase in parking would have the greatest increase in vehicular traffic. With the build alternatives, the S 272nd Redondo Station would have the highest increase in vehicle trip generation because it is currently underused and the FWLE is proposing to add 700 stalls to the existing facility. The trip generation at the Kent/Des Moines Station would not vary substantially among the build alternatives or station options as the parking and transit services are assumed to be fairly consistent among the alternatives and station options.

Trip generation at the Federal Way Transit Center Station is expected to vary depending on the alternative and station options, with a modest increase in vehicle trips. However, this station would have a noticeable increase in passenger drop-off/pick-up trips (slightly more than 300 vehicles per hour) because it would be the end-of-the line station. The number of buses at the Federal Way Transit Center Station could decrease slightly as a result of the elimination of some bus routes that would duplicate light rail service. The Federal Way S 320th Park-and-Ride Station Option would have the highest increase in vehicle activity among the transit center station options.

The potential additional stations at S 216th Street and S 260th Street (West and East options) would have the lowest trip generation because park-and-ride parking would not be provided. Table 3-12 shows the total vehicle trip generation associated with the FWLE light rail stations and alternatives as well as with each station option and the interim condition.

Interim Terminus Conditions

The Kent/Des Moines Station would provide 1,000 parking stalls in the interim terminus condition. These stalls and an overall increase in station activity would generate more trips under an interim station condition compared to the full length condition.

TABLE 3-12
Park-and-Ride Capacity and Trip Generation Assumptions by Station

Station Area	Alternative	Park-and-Ride Capacity			Existing Underutilized Parking[c]	Total Available Parking for FWLE[d]	Peak Hour Vehicle Generation[a]		
		Existing	Proposed Increase[b, c]	With FWLE[b, c]			Full Length Alternative	Kent/Des Moines Interim Terminus	S272nd Interim Terminus
S 216th Street[e]	SR 99, SR 99 to I-5	0	0	0	N/A	0	30	30	30
Kent/Des Moines	SR 99, I-5, SR 99 to I-5, I-5 to SR 99	0	+500 (+1,000)	500 (1,000)	N/A	+500 (+1,000)	310 to 350	610-770	320-400
S 260th Street[e]	SR 99, I-5 to SR 99	0	0	0	N/A	0	10	10	10
S 272nd Redondo	SR 99, I-5 to SR 99	697	+700 (+700)	1,397 (1,397)	643	+1,343 (+1,343)	670	N/A	710
S 272nd Star Lake	I-5, SR 99 to I-5	540	+700 (+700)	1240 (1,240)	229	+929 (+929)	480 to 490	N/A	570
Federal Way SR 99	SR 99	0	+400 (N/A)	400 (N/A)	N/A	+400 (N/A)	460	N/A	N/A
Federal Way Transit Center and	SR 99, I-5, SR 99 to I-5, I-5 to SR 99	1,190	+400 (N/A)	1,590 (N/A)	11	+411 (N/A)	460 to 520	N/A	N/A
Federal Way I-5	I-5	0	+400 (N/A)	400 (N/A)	N/A	+400 (N/A)	460	N/A	N/A
Federal Way S 320th Park-and-Ride	I-5	877	+400 (N/A)	1,277 (N/A)	485	+885 (N/A)	780	N/A	N/A

Note: Full length (interim condition).

[a] Includes park-and-ride, passenger drop-off/pick-up, and bus transit vehicle trips; assumes full park-and-ride lots. Values rounded to the nearest 10.

[b] Full length build alternative parking spaces shown outside parenthesis. Interim conditions park-and-ride capacity shown inside parenthesis.

[c] Source: Metro, 2012b.

[d] Total available parking assumes park-and-ride capacity with FWLE and any existing unused parking at existing park-and-ride lots.

[e] No park-and-ride assumed at these stations; only includes passenger drop-off/pick-up and bus transit vehicle trips.

N/A = not applicable.

The number of parking stalls provided with the S 272nd Redondo and Star Lake stations would not change between interim and full length conditions. Even so, there would be an increase in the passenger drop-off/pick-up trips at these two stations in the interim terminus condition because it would be an end of the line station.

3.5.3.2 Traffic Circulation, Property Access, and Traffic Control

The build alternatives would have some effect on property access, traffic circulation patterns, and traffic control, depending on the alternative and station options compared with the No Build Alternative, which is expected to remain similar to existing conditions. Trench options would require shifting traffic movements to specific access points but would still provide a similar level of access as elevated alternatives. The changes and effects described in this section are based on the conceptual light rail guideway and station area plans (Appendix F, Conceptual Design Drawings).

SR 99 Alternative

The SR 99 Alternative and its station options are not expected to substantially affect private property access and vehicular circulation, except around the Kent/Des Moines Station area. The S 272nd Redondo and Federal Way Transit Center stations would be located at existing park-and-ride facilities, and no changes to vehicle circulation and access are expected.

In general, the SR 99 Alternative would operate in an exclusive right-of-way, grade-separated, within the existing SR 99 median. When light rail operates in the SR 99 median, the median would be widened to accommodate guideway columns. All existing mid-block turn locations would be maintained, although their location could shift slightly to provide adequate sight distance between the columns. All existing property access would be maintained.

Most SR 99 intersections would be reconstructed to accommodate the light rail median alignment while maintaining the existing channelization and turn pocket storage lengths. Crosswalk lengths across SR 99 would typically increase. Some vehicle turn movements (e.g., right turns) would be delayed by increased pedestrian activity in crosswalks near stations. As a result, traffic signal timings would be modified to accommodate increased pedestrian volumes. All of the Kent/Des Moines station options would also require a new traffic signal at the SR 99/S 236th Lane intersection. The potential additional

stations at S 216th and S260th streets would have low levels of traffic because they would not have any parking; therefore, impacts on traffic circulation and access would be minimal.

Kent/Des Moines Stations

For all Kent/Des Moines stations, S 236th Lane would be reconstructed between Highline College and 30th Avenue S, and a new traffic signal would be provided at the S 236th Lane/SR 99 intersection to accommodate all traffic movements at this location. Access to the station's parking areas would be provided via S 236th Lane, S 240th Street, 30th Avenue S, and driveways along SR 99. S 236th Lane and 30th Avenue S would be improved as part of the station construction. Appendix F, Conceptual Design Drawings, shows the extent of roadway improvements near the station area. With the Kent/Des Moines SR 99 Median Station Option, access and circulation would be similar to the Kent/Des Moines SR 99 West Station. Because the SR 99 median between the S 236th Lane and S 240th Street intersections would be widened, pedestrians would cross SR 99 in two separate pedestrian crossing intervals—one to the west of the median and one to the east of the median at the S 236th Lane and S 240th Street intersections.

S 272nd Redondo Station

The S 272nd Redondo Station and S 272nd Redondo Trench Station Option would be located at the existing Redondo Heights Park-and-Ride and access would be similar to existing conditions. Internal circulation would be improved with an access road connecting S 276th Street and S 272nd Street. Vehicles could use this road for access between the station and S 272nd Street. This station would not include any changes in traffic control.

Access to the S 272nd Redondo Trench Station would be similar to the S 272nd Redondo Station. Compared to the S 272nd Redondo Station, the passenger drop-off/pick-up area would be located farther south along the access road adjacent to the north station entry.

Federal Way Transit Center Station

With the Federal Way Transit Center Station, new driveways would be provided for the transit layover and parking area along 21st Avenue S and 23rd Avenue S south of the existing transit center. This station would not include any changes to the existing transit center access and circulation. The Federal Way SR 99 Station Option would include a new east-west road between the existing Federal Way

Transit Center and the Federal Way SR 99 Station Option to allow buses to connect between the two transit facilities. This street may only allow buses between 19th Avenue S and 21st Avenue S. A road between S 316th Street and S 314th Street would be provided to allow entry to the station property north of 316th Street. Access to the 400-stall parking lot associated with this option would be provided along 20th Avenue S and S 316th Street.

I-5 Alternative

No change in property access, traffic circulation, or signal control would result from the I-5 Alternative except for specific improvements to the Kent/Des Moines Station area and the I-5 Landfill Median Alignment Option. WSDOT I-5 maintenance activities would change from existing conditions, but the impacts are not expected to be substantial or adversely impact operations of I-5 or the maintenance of clear zones. The S 272nd Star Lake and Federal Way Transit Center stations would be located at the existing transit facilities; therefore, impacts on vehicle circulation and access are not expected.

WSDOT routinely performs maintenance activities along I-5. Maintenance activities generally include mowing, stormwater facility maintanence, spraying noxious weeds, accessing Intelligent Transportation System (ITS) equipment and signs, and removing invasive plant species. Typical maintenance activities, such as mowing, are generally performed adjacent (within a 10-foot wide area) to the edge of pavement. To perform these maintenance activities, WSDOT will typically park vehicles in the shoulder and provide advance warning signage to drivers. The current design of the I-5 Alternative would not affect this type of maintenance activity as WSDOT would continue to be able to perform maintenance activites between I-5 and the guideway from the I-5 shoulder.

For maintenence access west of the guideway, such as servicing stormwater facilities and removing invasive weeds, access from I-5 would be provided beneath the guideway where there would be vertical clearances of 10 feet or more or from local streets.

The Landfill Median Option would require breaks in sections of the guardrail to allow access for maintenance equipment. It would not otherwise affect access, circulation, or Interstate operations. Even though most of this alternative is adjacent to I-5, there would be no circulation or access impacts on I-5 because the number and

configuration of freeway lanes, interchange accesses, and freeway shoulder would be maintained. This alternative would travel near three I-5 interchanges (Kent-Des Moines Road, S 272nd Street, and S 317th Street) but would be grade-separated (either above or below) from the interchange ramps and cross streets; therefore, no changes to intersection control or traffic circulation are expected.

The Landfill Median Alignment Option would not affect property access, circulation, or traffic operations on I-5.

Kent/Des Moines Stations

With the Kent/Des Moines I-5 Station, S 236th Lane would be extended between SR 99 and the station area and include a new traffic signal at the S 236th Lane and SR 99 intersection. Access to the parking areas with this station would be provided along 30th Avenue S via S 236th Lane and S 240th Street. S 236th Lane and 30th Avenue S would be improved as part of the station construction. Appendix F, Conceptual Design Drawings, shows the extent of roadway improvements near the station area.

The Kent/Des Moines At-Grade Station Option would be located adjacent to I-5 south of S 240th Street. Primary station access would be at S 240th Street, which would be extended between SR 99 and the station area. Property access, circulation, and traffic control north of S 240th Street would remain the same as under the No Build Alternative. A new road (S 242nd Street) would extend from SR 99 to the station area. Access within the station site would connect S 240th Street and S 242nd Street. This road would provide access to the transit bus service and passenger drop-off/pick-up areas.

Property access, circulation, and traffic control at the Kent/Des Moines SR 99 East Station Option would be the same as the Kent/Des Moines stations described under the SR 99 Alternative.

S 272nd Star Lake Station

The S 272nd Star Lake Station would be located at the existing Star Lake Park-and-Ride. Access to the site would continue to be via 26th Avenue S; however, the road would be reconfigured for the station. No changes to adjacent property access or circulation are anticipated.

Federal Way City Center Stations

Property access, circulation, and traffic control at the Federal Way Transit Center Station would be the same as described above for this station under the SR 99 Alternative.

Transit and vehicle access would be provided to the Federal Way I-5 Station Option along S 317th Street. Access to the park-and-ride area would also be provided along 23rd Avenue S. Access to the passenger drop-off/pick-up area would be provided along S Gateway Center Plaza. Vehicles from the north that are dropping off or picking up passengers would need to circulate around the station and use S 320th Street to access the drop-off area. No change in property access, circulation, or traffic control beyond the station area is expected.

The Federal Way S 320th Park-and-Ride Station Option would be located at the existing S 320th Street Park-and-Ride. Access would remain along 23rd Avenue S and access along 25th Avenue S would be modified so vehicles leaving the station could also use this road. Currently, this street provides bus access out of the park-and-ride.

Bus routes accessing the station would be from S 320th Street, 23rd Avenue S, and 25th Avenue S because the existing transit-only egress from the southbound I-5 on-ramp would be removed. No changes to traffic control are expected with this option.

SR 99 to I-5 Alternative

The SR 99 to I-5 Alternative would have similar circulation, access, and traffic control to the SR 99 Alternative north of S 224th Street. At S 224th Street, this alternative would transition to the east side of SR 99 and continue toward I-5, then become the same as the I-5 Alternative near the Midway Landfill. No impacts are expected to the I-5 mainline or any ramp terminals with the SR 99 to I-5 Alternative.

Traffic circulation, property access, circulation, and traffic control for the Kent/Des Moines 30th Avenue East Station would be similar to the Kent/Des Moines SR 99 East Station Option described under the SR 99 Alternative except driveways would not be provided along SR 99. Property access, local circulation, and traffic control at the S 272nd Star Lake and Federal Way Transit Center stations would be the same as described for these stations under the I-5 Alternative.

Station Options

The SR 99 to I-5 Alternative would have the same potential additional station at S 216th Street as described under the SR 99 Alternative,

and the Federal Way City Center Station Options described under the I-5 Alternative. Property access, local circulation, and traffic control at these stations would be the same for each of these options, as described previously.

I-5 to SR 99 Alternative

North of the Kent-Des Moines Road, the I-5 to SR 99 Alternative would have similar circulation, access, and traffic control as the I-5 Alternative. Near Kent-Des Moines Road, this alternative would begin to transition to the west to SR 99 near S 231st Street. This alternative would then become similar to the SR 99 Alternative. No impacts are expected to the I-5 mainline or any ramp terminals with the I-5 to SR 99 Alternative.

Property access, local circulation, and traffic control at the Kent/Des Moines 30th Avenue West Station would be the same as with the Kent/Des Moines SR 99 East Station Option described previously under the I-5 Alternative. Property access, local circulation, and traffic control at the S 272nd Redondo and Federal Way Transit Center stations would be the same as described under the SR 99 Alternative.

Station Options

The I-5 to SR 99 Alternative would include the S 260th West and East potential additional stations, the S 272nd Redondo Trench Station Option, and the Federal Way SR 99 Station Option as described for the SR 99 Alternative. Property access, local circulation, and traffic control at these stations would be the same for each of these options as described under the SR 99 Alternative.

3.5.3.3 Traffic Operations

For the year 2035 traffic operations analysis, the conditions under the No Build Alternative are compared to the build alternatives and their station options. With input from the local jurisdictions, Sound Transit selected 63 intersections for analysis in the PM peak hour (see Exhibit 3-1). These locations include intersections that would be most directly affected by the FWLE, such as a change in channelization, roadway width, or signal control, and those intersections that would be indirectly affected, such as by a change in vehicular or pedestrian activity. An AM peak hour analysis was also conducted but with a smaller study area focused on I-5 ramp terminals and intersections adjacent to stations with a park-and-ride.

The traffic operations analysis and any potential mitigation measures consider the travel time and delay for both vehicles and buses. In

general, the build alternatives and their options would maintain or improve the speed and reliability of travel for both autos and buses.

LOS standards for each agency are presented in Table 3-4. Under the No Build Alternative, four intersections would operate worse than the agency standard. Most intersections near light rail stations are expected to operate at an LOS similar to the No Build Alternative. The exceptions occur around the Kent/Des Moines and S 272nd Street station areas where the LOS degrades with the project. Additionally, a few other intersections show a LOS degradation that would be dependent on a station design option. Exhibits 3-9 through 3-11 present the 2035 AM and PM peak hour intersection LOS among the No Build Alternative and build alternatives.

At I-5 ramp terminals, off-ramp vehicle queue lengths were also analyzed to assess if any vehicle queues would reach the I-5 mainline. This analysis is described under Section 3.5.3.4, I-5 Ramp Terminal Operations.

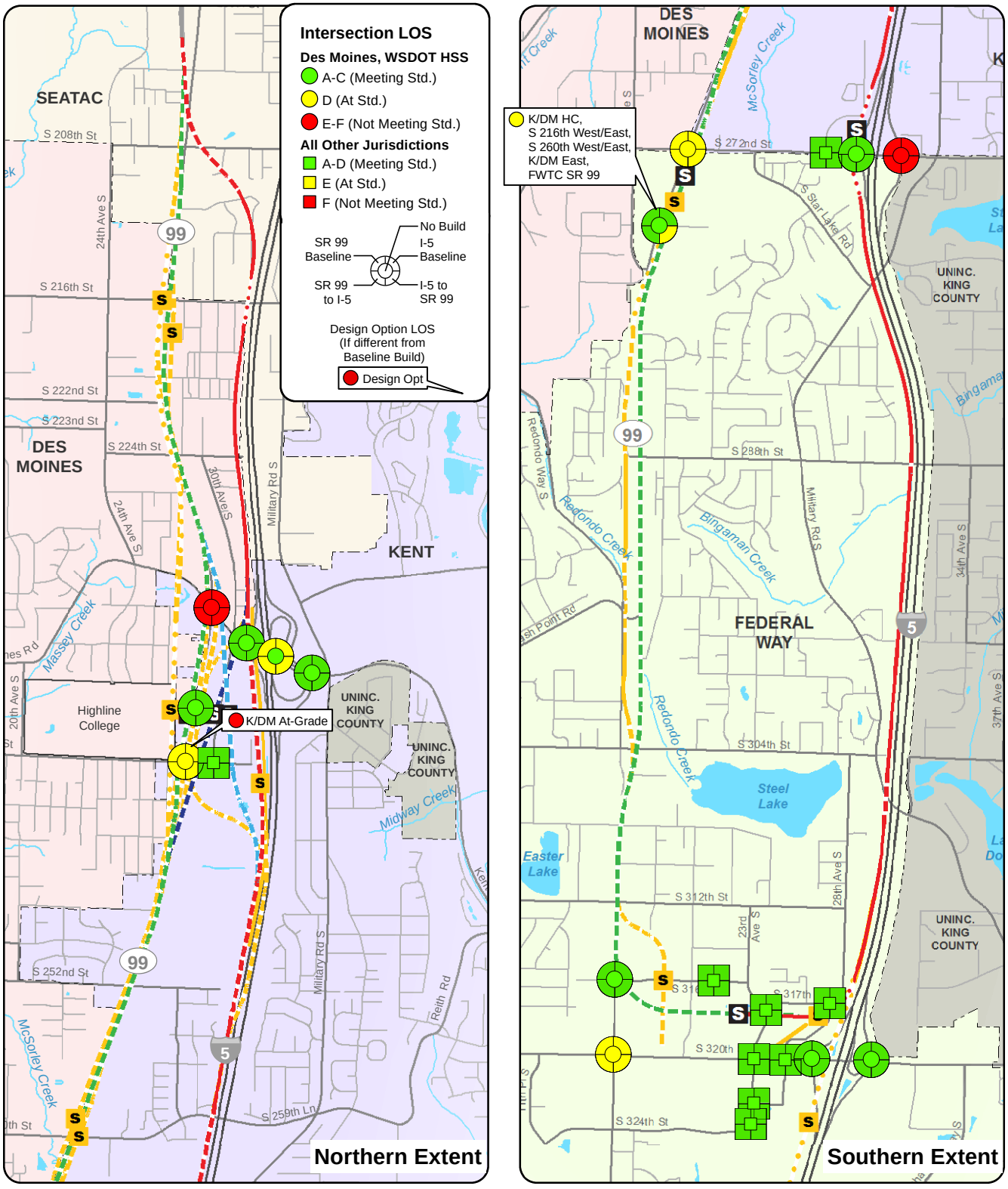
Full Length Build Alternatives

SR 99 Alternative

The majority of the intersections analyzed for the SR 99 Alternative would operate similar to the No Build Alternative in year 2035. Of the intersections analyzed, three intersections would operate worse than the No Build Alternative and not meet LOS standard. These impacts would be caused by the increased vehicles traveling to and from the station areas.

- SR 99/Kent-Des Moines Road (AM and PM peaks)
- I-5 southbound ramps/Kent-Des Moines Road (PM peak only)
- I-5 northbound ramps/ S 272nd Street (AM peak only)

No intersection LOS impacts were determined near the Federal Way Transit Center station area. There would be no changes in LOS between the SR 99 Alternative and any of the SR 99 station or alignment options.



Legend

SR 99 Alternative
- Elevated

I-5 Alternative
- Elevated
- At-Grade
- Trench

SR 99 to I-5 Alternative
- Elevated

I-5 to SR 99 Alternative
- Elevated

Options
- Elevated
- At-Grade
- Trench

Stations
- S Station for Alternatives
- S Station for Options

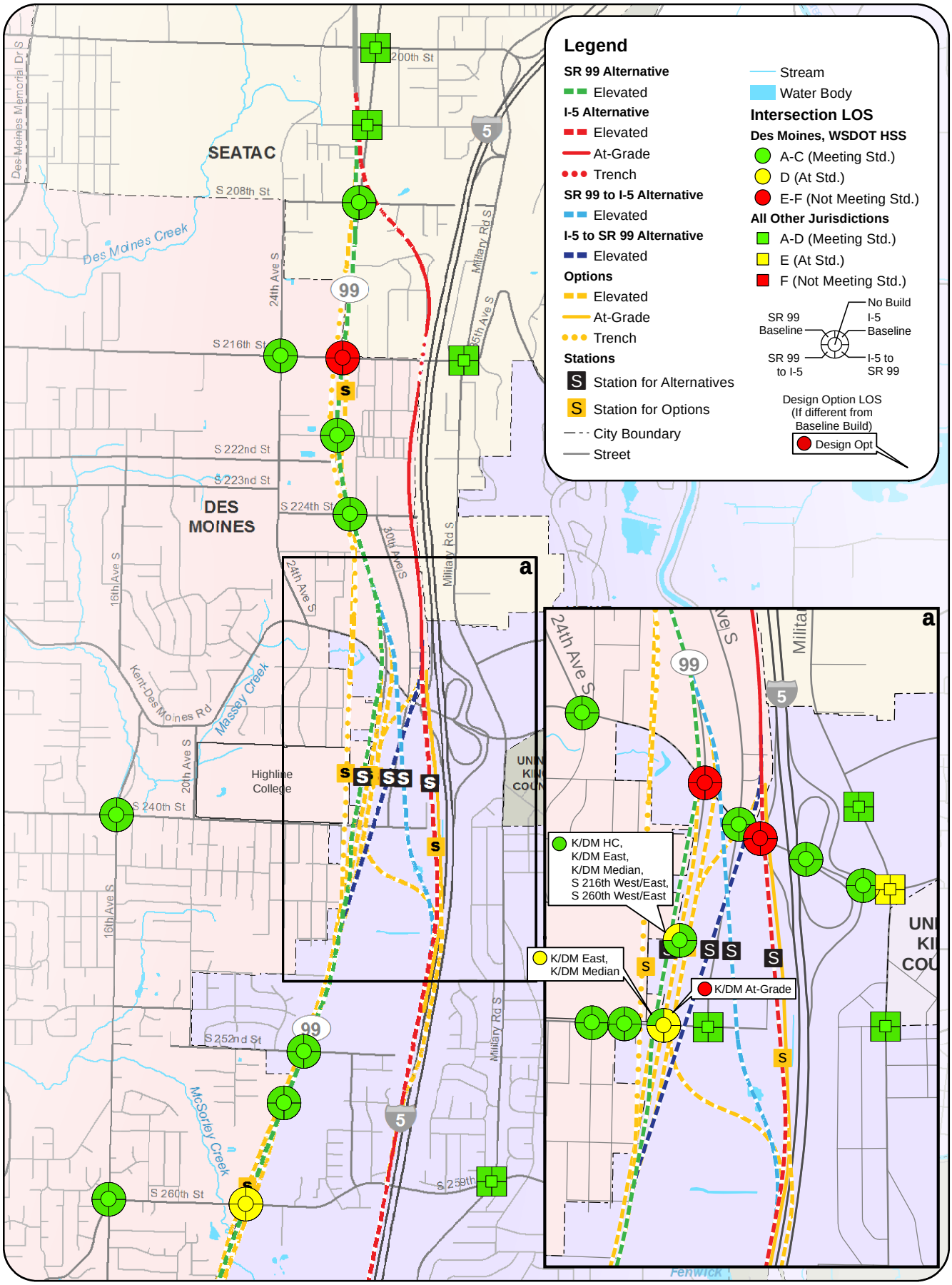
- City Boundary
- Street
- Stream
- Water Body

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).
HSS = Highway of Statewide Significance

N

0 0.25 0.5 1 Miles

EXHIBIT 3-9
2035 AM No Build and Build Alternatives Level of Service Northern and Southern Study Area Extents
Federal Way Link Extension

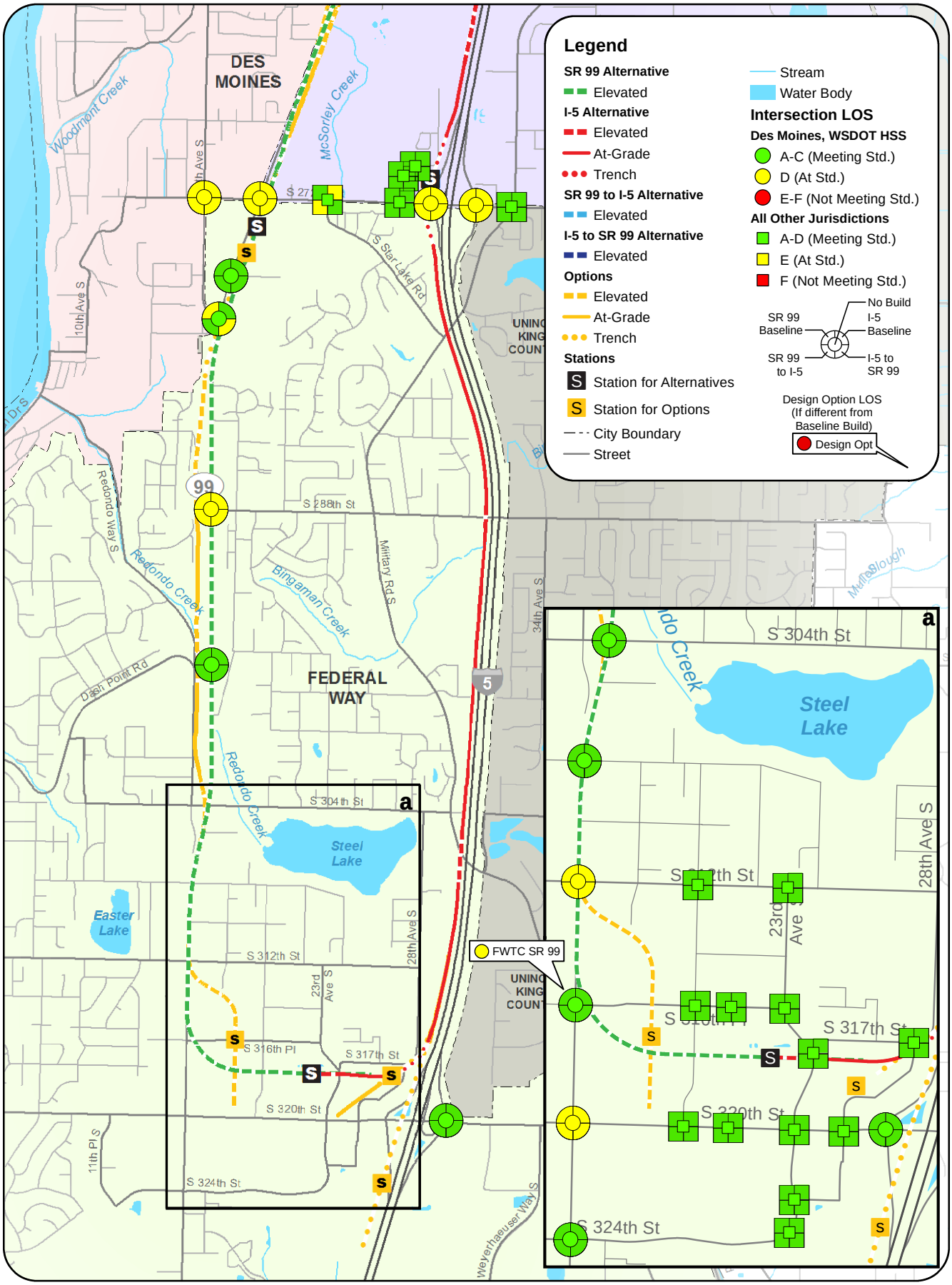


Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).
HSS = Highway of Statewide Significance

N

0 0.25 0.5 1 Miles

EXHIBIT 3-10
2035 PM No Build and Build Alternatives
Level of Service Northern Study Area Extent
Federal Way Link Extension



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).
HSS = Highway of Statewide Significance

N

0 0.25 0.5 1 Miles

EXHIBIT 3-11
2035 PM No Build and Build Alternatives
Level of Service Southern Study Area Extent
Federal Way Link Extension

I-5 Alternative

The intersections described above under the SR 99 Alternative that would operate worse than the No Build Alternative would operate the same with the I-5 Alternative. This applies to all station and alignment options except the I-5 At-Grade Station Option. With the I-5 At-Grade Station Option, the SR 99 and S 240th Street intersection would also operate worse than with the No Build Alternative and would not meet agency LOS standards. With this station option, vehicle traffic associated with the station would travel along S 240th Street, thus increasing the congestion at the intersection compared to the No Build Alternative.

SR 99 to I-5 Alternative

The SR 99 to I-5 Alternative would have intersection LOS results similar to the SR 99 Alternative north of the Kent/Des Moines Station and intersection LOS results similar to the I-5 Alternative south of the Kent/Des Moines Station. Therefore, the same three intersections previously described would operate worse than the No Build Alternative and not meet LOS standards.

I-5 to SR 99 Alternative

The I-5 to SR 99 Alternative would have intersection LOS results similar to the I-5 Alternative north of Kent/Des Moines Station and results similar to the SR 99 Alternative south of Kent/Des Moines Station. Therefore, the same three intersections previously described would operate worse than the No Build Alternative and not meet LOS standards.

Interim Terminus Condition Analysis

Intersection LOS analyses were also conducted for the Kent/Des Moines and S 272nd Redondo or Star Lake stations interim terminus conditions for both the SR 99 and I-5 Alternatives.

SR 99 Alternative

The two intersections listed below that are identified for the full length SR 99 Alternative as not meeting agency LOS standards and operating worse than the No Build Alternative would also be affected in both the Kent/Des Moines and S 272nd Redondo interim terminus station conditions:

- SR 99/Kent-Des Moines Road (AM and PM peaks)
- I-5 southbound ramps/Kent-Des Moines Road (PM peak only)

Kent/Des Moines Station Interim Terminus Condition

In addition to the two intersections already identified as being affected with the SR 99 Alternative, the I-5 northbound off-ramp at Kent-Des Moines Road would operate worse than the No Build Alternative and not meet agency LOS standards in the AM peak hour. This would be a result of the increase in vehicles heading to the Kent/Des Moines Station in the morning with the larger park-and-ride and without light rail south of this station.

S 272nd Redondo Station Interim Terminus Condition

With the S 272nd Redondo Station interim terminus condition, the following three additional intersections would operate worse than the No Build Alternative and not meet agency LOS standards:

- I-5 northbound ramps/ S 272nd Street (AM peak only)
- I-5 southbound ramps/ S 272nd Street (PM peak only)
- SR 99/ S 276th Street (AM peak only)

All of these intersections would operate worse than the No Build Alternative because there would be an increase in the number of vehicles traveling to and from the S 272nd Redondo Station with no light rail station south of this location.

I-5 Alternative

The intersections identified with the full length I-5 Alternative as not meeting agency LOS standards and operating worse than the No Build Alternative would also be affected in both the Kent/Des Moines and S 272nd Star Lake stations interim terminus conditions. However, in the Kent/Des Moines interim terminus condition, the I-5 northbound ramps/ S 272nd Street intersection would operate the same as in the No Build condition.

Kent/Des Moines Station Interim Terminus Condition

Similar to the Kent/Des Moines Station interim terminus condition under the SR 99 Alternative, the I-5 northbound off-ramp at Kent-Des Moines Road would also operate worse than the No Build Alternative and not meet agency LOS standards in the AM peak hour.

S 272nd Star Lake Station Interim Terminus Condition

No additional intersections beyond those three identified in the full-length I-5 Alternative would not meet agency LOS standards and operate worse than the No Build Alternative.

3.5.3.4 I-5 Ramp Terminal Operations

The intersections at I-5 interchanges (Kent-Des Moines Road, S 272nd Street, S 317th Street, and S 320th Street) were analyzed based on their proximity to future FWLE stations, the potential for vehicle trips to and from the stations to travel through these interchanges, and to assess the change in vehicle queue lengths on the off-ramps compared with the No Build Alternative.. The intersection LOS results were described previously under Subsection 3.4.3.3. Additional queue length information is provided in Appendix E, I-5 Ramp Terminal Queue Length Results, of Appendix G1.

Year 2035 vehicle queue lengths at the Kent-Des Moines Road southbound off-ramp would increase with all of the full length build alternatives and would increase at the northbound off-ramp with the Kent/Des Moines Station interim terminus condition. Even with longer queue lengths, the forecasted vehicle queues are not expected to extend onto the I-5 mainline or in the portion of the ramp used to decelerate from freeway to ramp speeds.

The S 272nd Street northbound off-ramp queue length is also expected to increase with all the full length build alternatives and in both the S 272nd Redondo and Star Lake stations interim terminus conditions; however, these queues would also occur only on the off-ramp and not reach the I-5 mainline or the ramp deceleration area. The S 317th Street and S 320th Street interchanges would not be noticeably affected (by intersection LOS or queue length) with the build alternatives or any of the station options. The forecasted vehicle queues at these ramps are not expected to back up onto the I-5 mainline ramp deceleration area.

3.5.4 Safety

The safety of the transportation system for all users was assessed for the build alternatives and station options. Overall, the safety of the transportation system is expected to be minimally affected compared with the No Build Alternative because the build alternatives would be grade-separated and operate in exclusive right-of-way with no direct conflicts with vehicles, pedestrians, or bicyclists. The design would also adhere to both light rail and roadway standards to minimize the potential effects on traffic safety.

If transportation infrastructure such as mid-block U-turns, medians, and intersection sizing are removed or modified with the FWLE, these facilities would be replaced or upgraded to ensure that the

transportation system would not be considerably affected. Additionally, infrastructure elements of the FWLE, such as walls and columns, would be designed to comply with WSDOT standards in order to ensure minimal conflicts resulting from fixed objects, clearances, and other infrastructure-related safety concerns.

3.5.4.1 SR 99 Alternative

The SR 99 Alternative would increase vehicle and nonmotorized activity around the station areas, which could increase the potential for conflicts between different travel modes, including vehicle/vehicle, pedestrian/vehicle, pedestrian/bicycle, or bicycle/vehicle conflicts; however, these are not expected to affect accident rates or appreciably affect safety. This alternative would widen SR 99 at some intersections and increase pedestrian crossing distances. All station options in the Kent/Des Moines and the S 272nd Redondo station areas would require many passengers transferring between RapidRide A Line and the station platform to cross at least part of SR 99, thus increasing the risk of pedestrian/vehicle collisions. For the Federal Way Transit Center Station option, the level of increased nonmotorized activity around the station area could increase the potential for conflicts with cars and buses.

Station Options

Potential impacts would not change for the Kent/Des Moines station options and the Federal Way SR 99 station option except the Kent/Des Moines SR 99 Median Station Option. This option would widen SR 99 and therefore increase the pedestrian crossing distances. The S 216th and S 260th potential additional stations would have less potential for congestion-related crashes compared to other stations with park-and-ride facilities because they would have fewer vehicles accessing the stations from not having any parking.

3.5.4.2 I-5 Alternative

The I-5 Alternative would have a minimal effect on traffic safety in the study area. There would be an increase in vehicle and nonmotorized activity around the station areas, which would increase the potential for conflicts between different travel modes; however, these are not expected to affect accident rates or appreciably affect safety. Vehicle queues at I-5 ramp terminals are expected to increase; however, they are not expected to back up to the I-5 mainline or affect how vehicles decelerate from freeway to ramp speeds.

The I-5 Alternative would be like current conditions in having an adequate clear zone along most of the alignment, and guardrails or barrier in all other places. This alternative has the same potential for future clear zone as the No Build Alternative. The entire I-5 guideway alignment would be located more than 46 feet away from the existing edge of the pavement. Moreover, it has been designed not to interfere with any existing or potential future I-5 clear zone areas, and to allow WSDOT to create adequate clear zones where they do not currently exist or are substandard. The I-5 clear zone safety analysis is further discussed in Appendix G1, Transportation Technical Report, Section 4.4.3.1, and in Appendix H, Section H2.1.1, of this Draft EIS.

Station and Alignment Options

All I-5 station options would have a minimal effect on traffic safety in the study area. Increases in vehicle and nonmotorized activity around the stations would be similar compared to the I-5 Alternative.

The Landfill Median Alignment Option would transition into the I-5 median for approximately 1/2 mile from south of S 240th Street to approximately S 252nd Street. This option would place guideway columns in the median without altering the existing travel lanes, shoulder, or median width. The light rail guideway would be located less than 30 feet from the edge of traveled way when the alignment is in the I-5 median. A barrier along the inside shoulder of I-5 southbound and northbound mainlines would be proposed to protect the guideway columns from vehicle collisions. Furthermore, as the guideway transitions to and from the I-5 median, a barrier would be required along the southbound I-5 outside shoulder to shield the guideway. Based on safety analysis using the HSM, adding a barrier, such as guardrail, through this median section of both directions of I-5 and along the southbound I-5 outside shoulder could result in an increase of up to two crashes per year.

3.5.4.3 SR 99 to I-5 Alternative

The SR 99 to I-5 Alternative would have the same impacts as the SR 99 Alternative north of the Kent/Des Moines Station and the same impacts as the I-5 Alternative south of the Kent/Des Moines Station. There would be no additional impacts associated with the Kent/Des Moines 30th Avenue East Station.

3.5.4.4 I-5 to SR 99 Alternative

The I-5 to SR 99 Alternative would have the same impacts as the I-5 Alternative north of the Kent/Des Moines Station and the same impacts as the SR 99 Alternative south of the Kent/Des Moines Station. There would be no additional impacts associated with the Kent/Des Moines 30th Avenue West Station.

3.5.5 Parking

Parking for the build alternatives would be provided in the station areas either with existing parking and/or, if part of the station, additional park-and-ride stalls. The parking assessment evaluated whether the build alternatives would remove public (on- and off-street) and private (off-street) parking along the alignment and at the station areas and if the demand for station parking could potentially exceed the available park-and-ride capacity. If so, there could be spillover to nearby on-street parking that surrounds the station areas.

3.5.5.1 Parking Impacts

The build alternatives would have minimal impact on public on-street and off-street parking compared with the No Build Alternative (assumed to be similar to existing conditions), with 40 spaces removed in the Kent/Des Moines Station area with the I-5 and I-5 to SR 99 alternatives. Each build alternative would remove some private parking. Table 3-13 summarizes the number of public (on- and off-street) and private parking that would be removed by each alternative.

TABLE 3-13
Summary of Parking Impacts by FWLE Alternative

Alternative	Removed Public Parking		Removed Private Parking	Total
	On-Street	Off-Street		
SR 99 Alternative	**0**	**0**	**600** (540–1,240)	**600**
I-5 Alternative	**20**	**20**	**370** (220–590)	**410**
SR 99 to I-5 Alternative	**0**	**0**	**250** (100–350)	**250**
I-5 to SR 99 Alternative	**20**	**20**	**790** (780–1,080)	**830**

Notes:
Parking numbers are rounded up to the nearest 10 stalls.
Number in parenthesis represents the range of off-street private parking removed with each alternative's station options. See Table 4-38 in Appendix G1 for further information.

Private parking spaces within properties that are expected to be entirely acquired by Sound Transit for a build alternative are not included because there would be no demand for these spaces when the existing use is displaced. Displaced off-street private parking

resulting from partial property acquisitions could reduce business opportunities. The amount of private parking removed under the build alternatives would range between 250 and 790 parking stalls. The I-5 to SR 99 Alternative would remove the greatest amount of off-street private parking, and the SR 99 to I-5 Alternative would remove the least amount of parking. There would be no additional impact on public (on-street or off-street) parking with any of the station options. The amount of private parking removed could be more substantial with the station and alignment options—up to 230 more parking stalls (refer to Table 4-38 in Appendix G1).

All SR 99 station options except the Kent/Des Moines SR 99 Median Station Option and the potential additional station at S 260th Street (East option) would have additional impacts on private parking. The Federal Way SR 99 Station would have the greatest parking impact of all design options, with 230 additional parking spaces removed, while the S 272nd Redondo Trench Station Option would have the least additional impact, with only 10 additional parking stalls removed. The Kent/Des Moines SR 99 Median Station Option would reduce the number of parking stalls removed by 50 compared with the SR 99 Alternative, and the potential additional station at S 260th Street (East option) would reduce the number of parking stalls removed by 10.

With the I-5 Alternative, only the Kent/Des Moines SR 99 East Station Option would increase parking impacts, with 220 additional parking spaces removed. The Federal Way City Center station options would reduce the number of parking spaces removed by up to 150. Impacts from station options for the SR 99 to I-5 and I-5 to SR 99 alternatives would be the same as for the SR 99 and I-5 alternatives.

3.5.5.2 Station Area Parking

All of the light rail station areas that currently have existing park-and-rides would have additional parking to accommodate the forecasted parking demand with the FWLE. With all of the full length build alternatives, there would be about 1,600 additional park-and-ride stalls provided at the stations. No parking would be provided at the S 216th and S 260th Street potential additional stations..

At the Kent/Des Moines Station, 500 structured parking spaces would be provided. At either the S 272nd Star Lake Station or the S 272nd Redondo Station, 700 spaces would be provided in addition to the current park-and-ride parking supply. At any of the Federal Way

Transit Center stations, an additional 400 spaces would be provided adjacent to the light rail station. At the existing Federal Way Transit Center, the 1,190 existing spaces would remain.

Under an interim terminus condition, an additional 500 parking spaces (for a total of 1,000 parking spaces) would be provided at the Kent/Des Moines Station. These parking spaces would likely be on a surface lot.

Hide-and-Ride

This activity, which occurs when transit users park in neighborhoods surrounding transit stations, is generally caused by parking demand that exceeds supply at the transit station.

Hide-and-ride parking is more likely to occur when there is a substantial amount of easily accessible on-street public parking and the forecasted park-and-ride demand would be greater than the park-and-ride capacity. No hide-and-ride parking is expected near the Kent/Des Moines stations because public on-street parking is not available and the forecasted parking demand is less than the parking capacity. The S 272nd Street stations are also forecasted to have excess parking capacity; therefore, hide-and-ride activity is not expected at either S 272nd Street station. Stations in the Federal Way City Center area would have the potential for hide-and-ride activity. However, the potential for hide-and-ride activity is low because there would be a limited number of available on-street parking spaces and the park-and-ride supply at nearby stations are forecasted to have excess capacity available for these vehicles to potentially use.

The potential additional stations at S 216th Street and S 260th Street also would have the potential for hide-and-ride activity because no park-and-ride would be provided at the stations. However, very limited public on-street parking is available near the S 260th station options; therefore, the hide-and-ride potential would be minimized. At the S 216th station options, the S 216th West Station would have limited nearby public on-street parking, which would minimize the hide-and-ride potential. However, the S 216th East Station would be adjacent to residential neighborhoods to the south and east that have some available on-street parking; therefore, hide-and-ride activity could be experienced with this station option.

At the Kent/Des Moines Station, there is a potential that the designated park-and-ride spaces for light rail could be used by Highline College students because of its proximity to the Highline College campus. Currently, Highline College charges students a fee to park on campus. This could result in some students choosing to park

in nearby park-and-ride lot(s), thereby reducing the available capacity of the park-and-ride for transit users.

3.5.6 Nonmotorized Facilities

The FWLE station layout and location with respect to surrounding land uses and transit services would affect the travel mode people use to access and circulate around each station. Existing and year 2035 pedestrian and bicycle facilities in the FWLE corridor are shown in Exhibits 3-12 and 3-13, respectively. New facilities that are planned and have identified funding sources were assumed to be part of the No Build Alternative; however, generally these facilities would not be located near the FWLE stations.

The nonmotorized facilities were inventoried and evaluated for a walkshed of 1/2 mile and a bikeshed of 1 mile around each FWLE station area, assuming the actual walk or bicycle distance on the roadway system from the station platform. Natural barriers, such as topography, were not included as part of the walk- and bikeshed analysis; however, they could make nonmotorized travel less attractive.

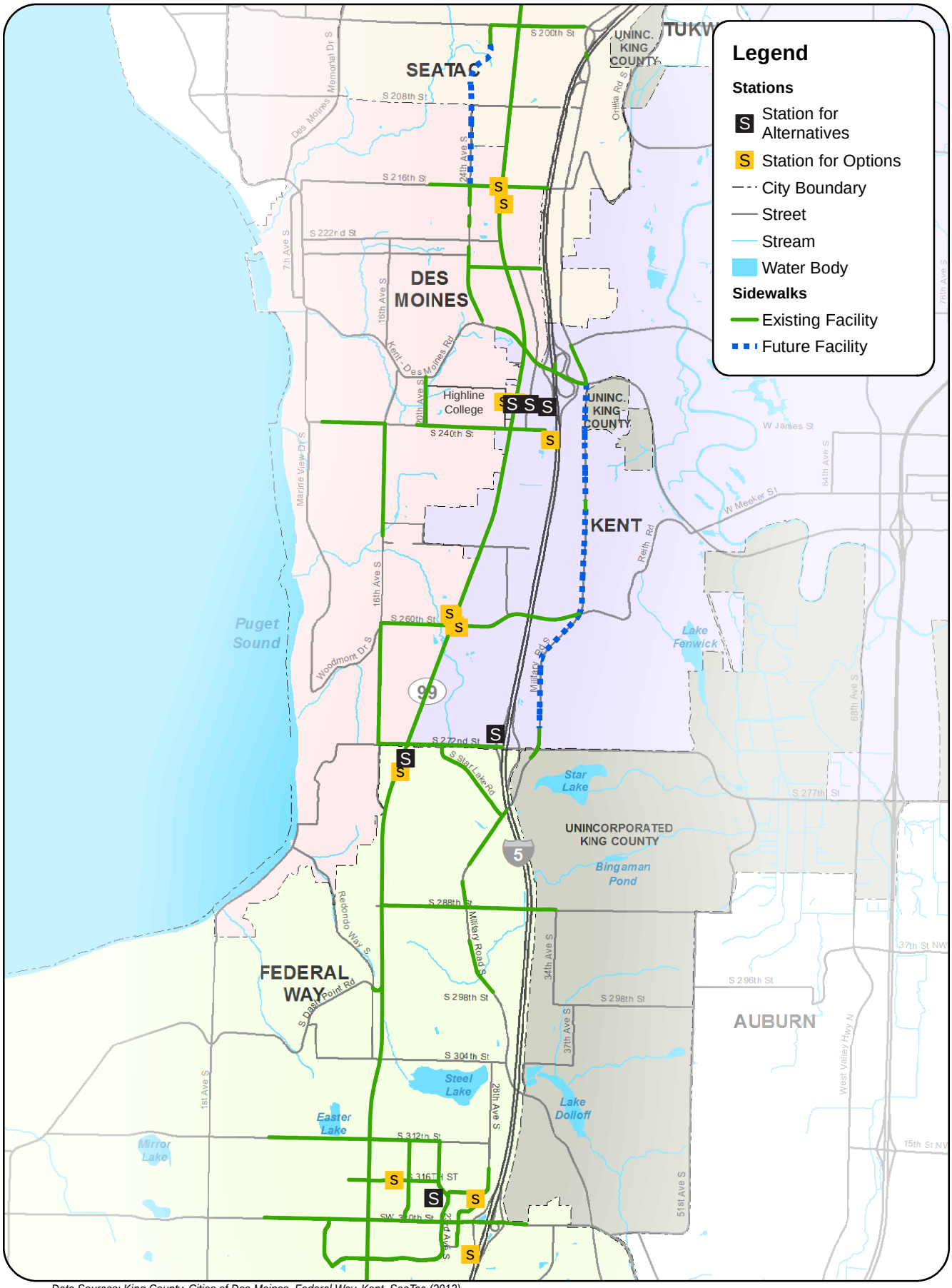
Walkshed and Bikeshed

A walkable (or bikeable) area around a particular point of interest. For the FWLE stations, the walkshed is defined as a 1/2-mile actual walk distance, while a bikeshed is defined as a 1-mile bicycle distance via streets and nonmotorized use trails to a station.

A 1/2-mile walkshed and 1-mile bikeshed were also used to assess the potential population and employment that could directly access the light rail without requiring motorized travel. All of the Kent/ Des Moines station options would have similar population and employment within a 1/2-mile walkshed and 1-mile bikeshed. At these stations, employment would range between 2,200 and 2,700 persons, and population would range between 2,100 to 2,600 persons within a 1/2-mile walkshed. The S 272nd Street station options would have the least employment (200 persons) of all FWLE stations within a 1/2-mile walk; however, within a 1-mile bike ride, the S 272nd Redondo Station would provide greater accessibility to nearby businesses than the S 272nd Star Lake Station. The Federal Way Transit Center would serve the highest amount of both employment and population (4,100 and 3,600 persons, respectively) based on a 1/2-mile walk, while the Federal Way SR 99 Station Option would serve the highest population and employment (both 8,100 persons) based on a 1-mile bike ride. Appendix G1 provides more detail on the population and employment within these walksheds and bikesheds and the methodology used for assessing impacts, including pedestrian trip generation and pedestrian LOS, on nonmotorized facilities.

Pedestrian LOS

The FWLE analysis focused on three components of the pedestrian experience 1) holding areas while waiting to cross an intersection 2) circulation area within crosswalks and 3) the overall pedestrian experience. As the volume of pedestrians increases, the area available for maneuverability and comfort is decreased. LOS C or better represents that pedestrians can move at their desired speed. At LOS D or worse, the speed and ability to pass slower pedestrians becomes more restricted. At LOS F, speed is severely restricted and contact with other pedestrians is



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).

EXHIBIT 3-12
Existing and Future Sidewalk Locations

Federal Way Link Extension

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).

EXHIBIT 3-13
Existing and Future Bicycle Facilities and Routes
Federal Way Link Extension

A pedestrian LOS analysis was conducted for signalized intersections located within 300 feet of the FWLE station areas for the 2035 PM peak hour. Pedestrian facilities near the FWLE light rail stations are expected to have an LOS score ranging between LOS A and LOS C with the No Build Alternative. Most LOS C crosswalks are across SR 99 and S 272nd Street, which require longer crossing distances because of the width of these streets.

For the build alternatives, the accessibility to the station areas would be a major contributor to the nonmotorized activity at the stations. The presence of sidewalks, bicycle lanes, and other nonmotorized facilities would enable connections to the transit system with the surrounding land uses. The location of crossings, bus stops, drop-off/pick-up areas, and park-and-ride lots are design elements that would also affect the way pedestrian trips circulate within the station areas. Tables 3-14 and 3-15 show the total pedestrian trips estimated at the FWLE stations during the PM peak hour, respectively, and Table 3-16 shows the pedestrian trips at the stations in the interim terminus conditions. The total pedestrian trips forecasted at each station were categorized if they access the station by auto, transit transfer, or walk/bicycle.

TABLE 3-14
2035 PM Peak Hour Pedestrian Trip Generation at FWLE Alternatives Stations

Station Area	Alternative	Total Pedestrian trips (persons/hr)	Auto (persons/hr)[a]	Walk/Bicycle (persons/hr)[b]	Transit (persons/hr)[b]
Kent/Des Moines	SR 99	950	290	160	500
	I-5	570	280	160	130
	I-5 to SR 99	780	280	150	350
	SR 99 to I-5	750	290	160	300
S 272nd Redondo	SR 99	850	700	60	90
	I-5 to SR 99	850	700	60	90
S 272nd Star Lake	I-5	910	490	130	290
	SR 99 to I-5	900	490	120	290
Federal Way Transit Center	SR 99	1,670	380	<10	1,290
	I-5	1,700	390	<10	1,310
	I-5 to SR 99	1,640	380	<10	1,260
	SR 99 to I-5	1,600	380	<10	1,220

Note: The trips by mode may not add up to total trips due to rounding to nearest 10.
[a] Source: Parking Stall Estimate and Passenger Drop-off/Pick-up forecasts
[b] Source: Sound Transit Ridership Model

TABLE 3-15
2035 PM Peak Hour Pedestrian Trip Generation at FWLE Alternatives Station Options

Station Area	Alternative	Station Option	Total Pedestrian trips (persons/hr)	Automobile (persons/hr)[a]	Walk/Bicycle (persons/hr)[b]	Transit (persons/hr)[b]
Kent/Des Moines	SR 99	Highline College Campus	960	300	160	500
		SR 99 Median	960	300	160	500
		SR 99 East	960	300	160	500
	I-5	At-Grade	590	280	160	150
		SR 99 East	830	300	160	370
Federal Way Transit Center or City Center	SR 99	Federal Way SR 99	1,780	370	120	1,290
	I-5	Federal Way I-5	1,500	370	30	1,100
		Federal Way S 320th Park-and-Ride	2,460	650	<10	1,810
S 216th Street	SR 99	West	220	20	190	10
		East	220	20	190	10
S 260th Street	SR 99	West	170	10	160	<10
		East	170	10	160	<10

Note: The trips by mode may not add up to total trips due to rounding to nearest 10.
[a] Source: Parking Stall Estimate and Passenger Drop-off/Pick-up forecasts
[b] Source: Sound Transit Ridership Model

TABLE 3-16
2035 PM Peak Hour Pedestrian Trip Generation at FWLE Stations (Interim Terminus Conditions)

Station Area	Alternative	Station Option	Total Pedestrian trips (persons/hr)	Auto (persons/hr)[a]	Walk/Bicycle (persons/hr)[b]	Transit (persons/hr)[b]
Kent/Des Moines	SR 99	West	2,010	600	130	1,280
		Highline College Campus	2,010	600	130	1,280
		SR 99 Median	2,010	600	130	1,280
		SR 99 East	2,010	600	130	1,280
	I-5	I-5	1,380	560	110	710
		At-Grade	1,380	560	110	710
		SR 99 East	2,010	600	130	1,280
	SR 99 to I-5	30th Avenue East	1,380	560	110	710
	I-5 to SR 99	30th Avenue West	1,380	560	110	710
S 272nd Redondo	SR 99, I-5 to SR 99	Redondo	1,020	720	50	250
S 272nd Star Lake	I-5, SR 99 to I-5	Star Lake	1,360	540	130	690

Note: The trips by mode may not add up to total trips due to rounding to nearest 10.
[a] Source: Parking Stall Estimate and Passenger Drop-off/Pick-up forecasts
[b] Source: Sound Transit Ridership Model

Generally, the pedestrian LOS for the FWLE alternatives would range between LOS A and LOS D. For most intersections, a lower LOS rating would be attributed to a noticeable increase in pedestrian volume (e.g., where the park-and-ride facilities or transit stops are not

located adjacent to light rail stations). For some intersections in the interim terminus condition, the pedestrian LOS would be LOS D. To accommodate some of the larger pedestrian volumes, at some locations, sidewalk and crosswalk widths exceeding design standards would be constructed with the project. A discussion of the nonmotorized elements and pedestrian LOS is provided in the following subsections for each station area.

3.5.6.1 Kent/Des Moines Station

Exhibit 3-14 shows the walk- and bikesheds for the build alternatives and station options in the Kent/Des Moines Station area. In general, all the Kent/Des Moines build alternatives and station options would have a fairly similar walk- and bikeshed. In the Kent/Des Moines station area, I-5 is a major barrier to walking and bicycle trips east of I-5. Pedestrian crossings along SR 99 would be provided at the signalized intersections of S 240th Street and Kent-Des Moines Road.

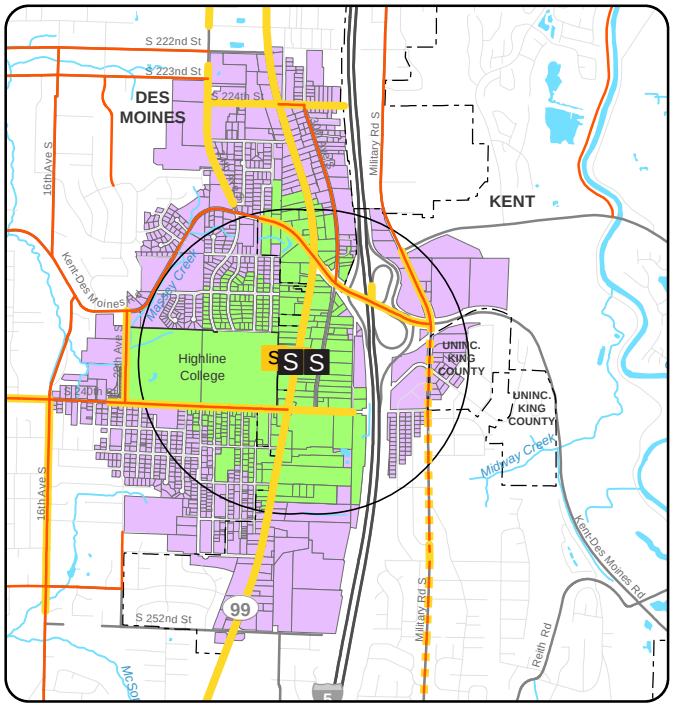
The proposed signalized intersection on SR 99 at S 236th Lane would provide crosswalks on all approaches. This would be provided in all of the FWLE alternatives, except with the Kent/Des Moines At-Grade Station Option.

For the FWLE alternatives and station options adjacent to SR 99, the majority of the pedestrian trips at the station would be riders transferring between light rail and the RapidRide A Line.

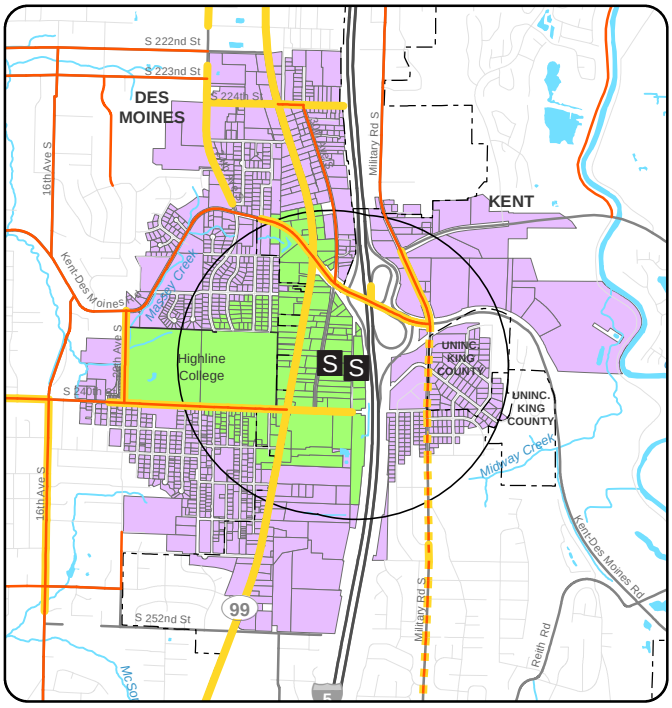
With the station located farther east of SR 99, the number of pedestrian trips transferring between light rail and the RapidRide A Line would decrease because of the longer walking distance between the station and SR 99. At crosswalks near the station, the pedestrian LOS is expected to range from LOS A to LOS C for the No Build Alternative and all build alternatives and station options.

3.5.6.2 S 272nd Redondo Station

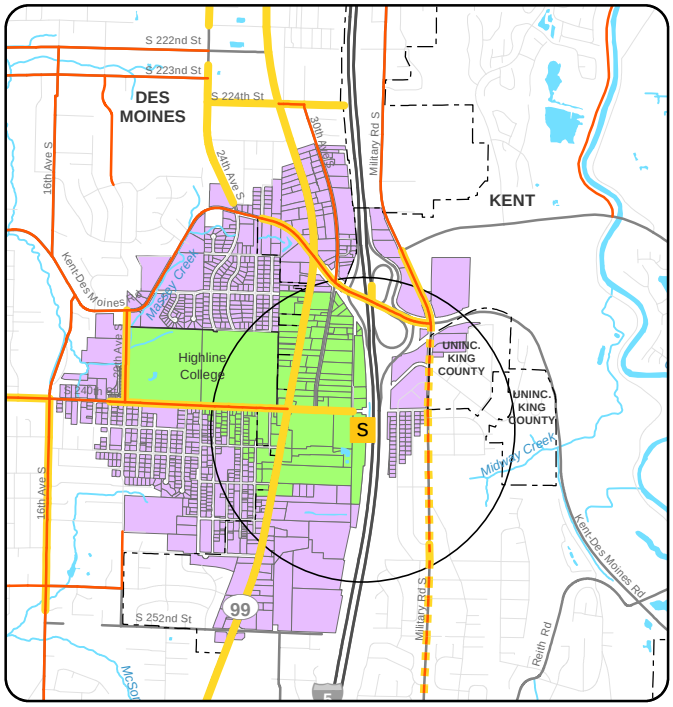
Exhibit 3-15 shows the walk- and bikesheds for the S 272nd Redondo Station. The SR 99 and I-5 to SR 99 alternatives would serve the S 272nd Redondo Station area just south of S 272nd Street. Poor sidewalk connectivity limits the walkshed for the residential neighborhoods southeast of the station area. Sound Transit would provide pedestrian crossings of SR 99 at the signalized intersections of S 276th Street and S 272nd Street.



SR 99 West Station with SR 99 East, SR 99 Median, HC Station & 30th Avenue West Options



I-5 Station & 30th Avenue East Station



I-5 At-Grade Station Option

Legend

Stations

- S — Station for Alternatives
- S — Station for Options
- City Boundary
- Street
- Stream
- Water Body
- 1/2-Mile Walkshed Parcels
- 1-Mile Bikeshed Parcels
- 1/2-Mile Buffer

Bike Facilities

- Existing Bike Facilities
- Future Bike Facilities

Sidewalks

- Existing Sidewalks
- Future Sidewalks

N

Notes:
-Bike facility types include: lanes, routes, shared roadways, paths, and trails.
-Sheds were calculated based on roadway network and on-road distances.
-HC = Highline College

EXHIBIT 3-14
Kent/Des Moines Station Area
Walksheds and Bikesheds
Federal Way Link Extension

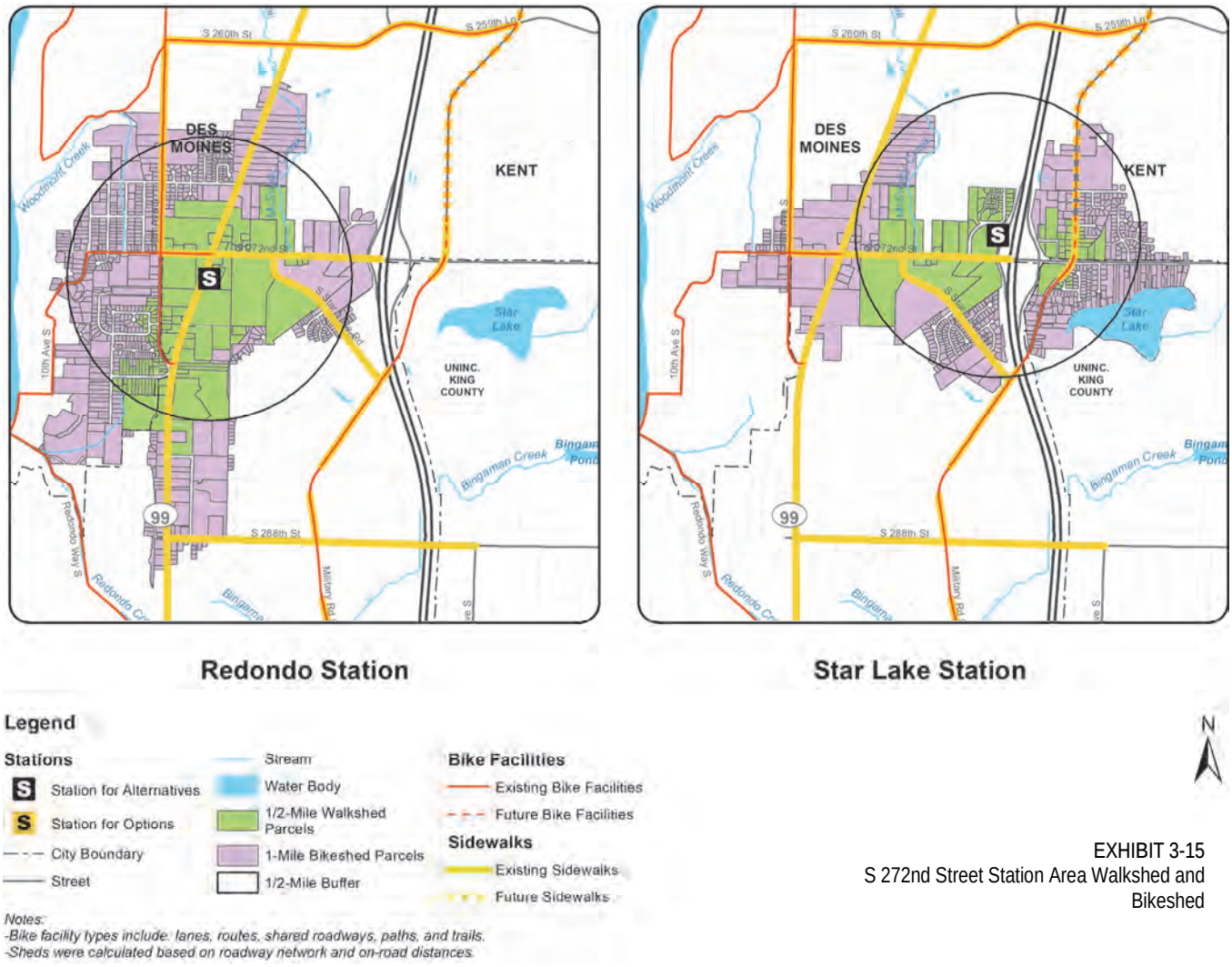


EXHIBIT 3-15
S 272nd Street Station Area Walkshed and Bikeshed

The pedestrian LOS would be between LOS A and LOS C, except for the south leg of the SR 99 and S 276th Street intersection, which would be at LOS D.

3.5.6.3 S 272nd Star Lake Station

The I-5 and SR 99 to I-5 alternatives would serve the S 272nd Star Lake Station area. The walk- and bikesheds for this station area are focused west of the station area because of limited walk and bicycle facilities south of S 272nd Street and the wetlands to the northwest of the station area. Exhibit 3-15 shows the walk and bikesheds for the S 272nd Star Lake Station area.

The pedestrian LOS would range between LOS A and LOS C at the S 272nd Street/26th Avenue S intersection under the No Build, I-5, and SR 99 to I-5 alternatives.

3.5.6.4 Federal Way Transit Center Station

The majority of commercial development surrounding the existing Federal Way Transit Center station area is accessible by sidewalks, but the area lacks bicycle facilities. The location of the station area between SR 99 and I-5 generally limits the walk- and bikesheds between those two regional facilities. Exhibit 3-16 shows the walk- and bikesheds for the Federal Way Transit Center area.

With the Federal Way station locations north of S 320th Street, the pedestrian LOS would be the same as the No Build Alternative (LOS A to LOS C) for crosswalks at signalized intersections. At the S 320th Street Park-and-Ride Station, the pedestrian LOS score would change from LOS B to LOS C at the S 322nd Street/23rd Avenue S intersection.

3.5.6.5 S 216th Station and S 260th Station Options

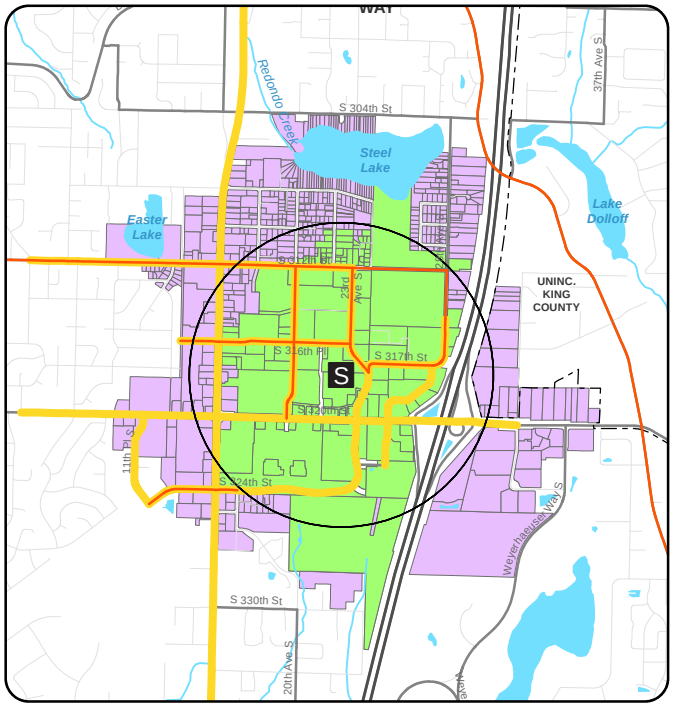
Potential additional stations at S 216th Street and S 260th Street (West or East options) would have connections to nonmotorized facilities that provide access in all directions. Exhibit 3-17 shows the walk- and bikesheds for these potential additional station areas.

The pedestrian LOS with these station options would be the same as with the No Build Alternative (LOS A to LOS C) for crosswalks at signalized intersections, except for the south leg of the S 216th Street/SR 99 intersection for the S 216th Street potential additional stations (West and East options), where the pedestrian LOS would be D.

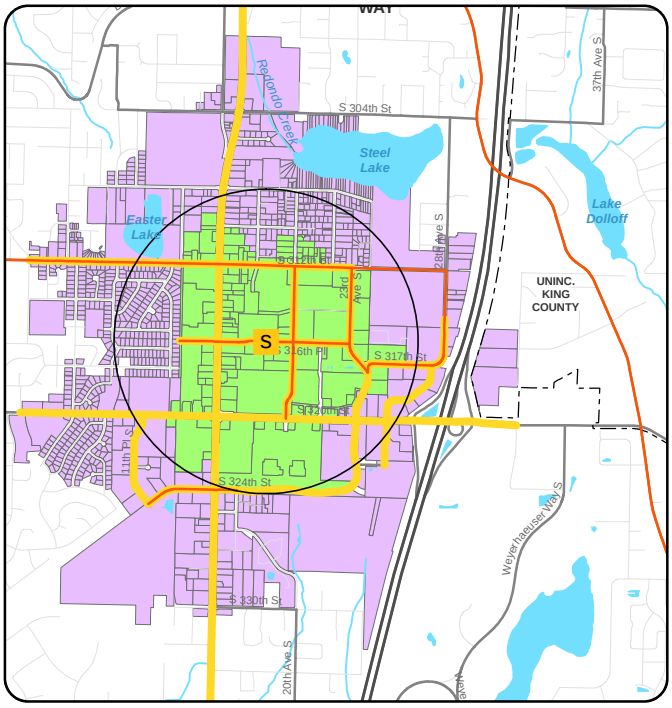
3.5.6.6 Kent/Des Moines Interim Terminus Conditions

Nonmotorized facilities provided under the Kent/Des Moines interim terminus condition would be the same as with the full length build alternatives and station options.

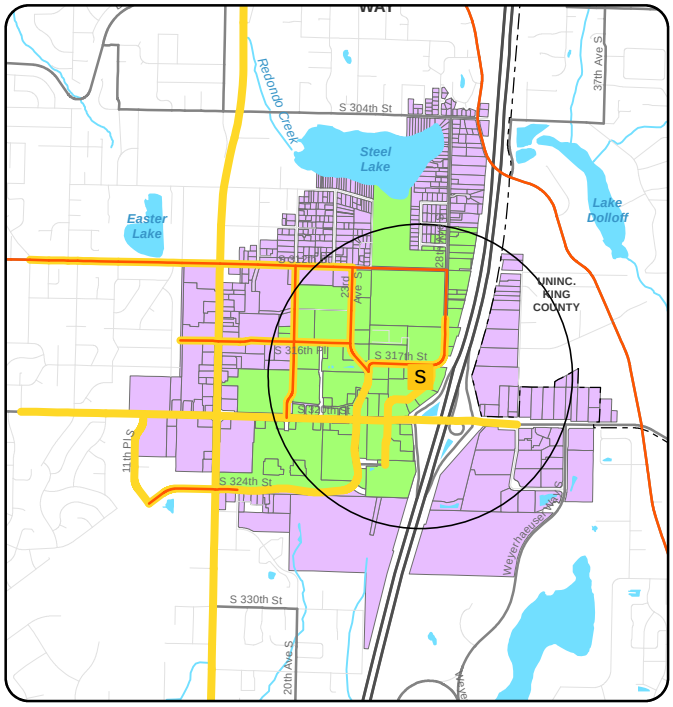
With the Kent/Des Moines station options located on the west side or median of SR 99, a pedestrian LOS of up to D would occur at the S 236th Lane/SR 99 intersection. This would be because of an increased number of pedestrian trips transferring between bus service and the park-and-ride across SR 99 compared with the full-length alternatives. The south crosswalk with the Kent/Des Moines SR 99 Median Station Option at the SR 99/S 236th Lane intersection would serve as the northern station entry. Providing a sidewalk and crosswalk with widths greater than typical standards would achieve an acceptable LOS at this location.



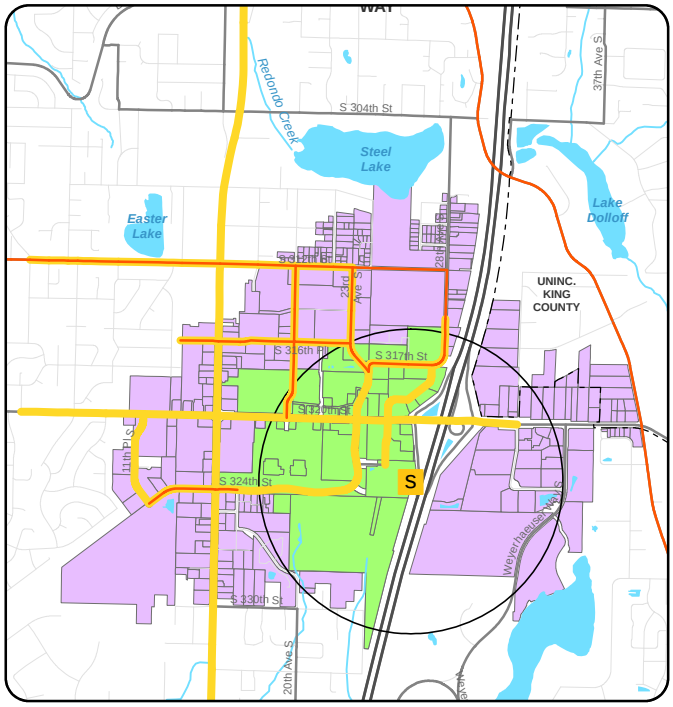
Federal Way Transit Center Station



SR 99 Station Option



I-5 Station Option



S 320th Park-and-Ride Station Option

Legend

Stations

- S — Station for Alternatives
- S — Station for Options
- City Boundary
- Street
- Stream
- Water Body
- 1/2-Mile Walkshed Parcels
- 1-Mile Bikeshed Parcels
- 1/2-Mile Buffer

Bike Facilities

- Existing Bike Facilities
- Future Bike Facilities

Sidewalks

- Existing Sidewalks
- Future Sidewalks

N

Notes:
-Bike facility types include: lanes, routes, shared roadways, paths, and trails.
-Sheds were calculated based on roadway network and on-road distances.

EXHIBIT 3-16
Federal Way Transit Center Station Area
Walksheds and Bikesheds
Federal Way Link Extension

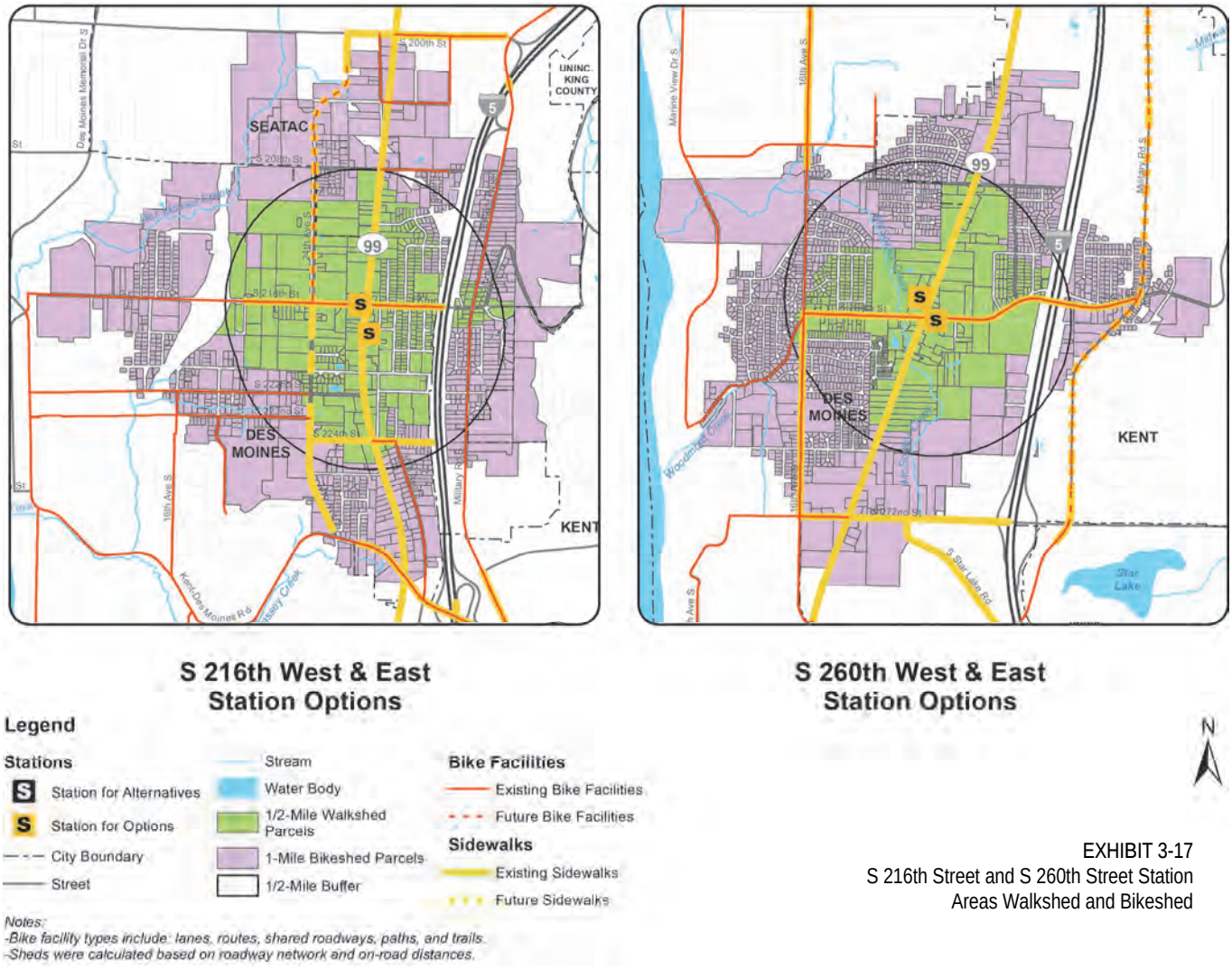


EXHIBIT 3-17
S 216th Street and S 260th Street Station Areas Walkshed and Bikeshed

3.5.6.7 S 272nd Street Interim Terminus Conditions

The nonmotorized facilities provided with the S 272nd Redondo and S 272nd Star Lake stations interim terminus conditions would be the same as with the full length build alternatives and station options.

Pedestrian LOS for signalized intersections around either the S 272nd Redondo or the S 272nd Star Lake stations in the interim terminus conditions would be same as the full length build alternatives. Even though the number of pedestrian trips at the station is expected to be higher under the interim terminus conditions, there is expected to be available pedestrian capacity adjacent to each station.

3.5.7 Freight Mobility and Access

Only minor changes to freight mobility and access are expected with the No Build Alternative beyond the increases in roadway congestion that could occur as expected future traffic volumes increase in the

study area. The 28th/24th Extension Project, planned for completion in 2017 in the cities of SeaTac and Des Moines, will provide an additional freight corridor in the study area.

With the build alternatives on either I-5 or SR 99, trucks would still be expected to use the currently designated freight facilities. The distribution of trucks on SR 99 and I-5 would be similar to existing conditions. As the build alternatives would be either grade-separated or travel in exclusive guideway outside the roadway travel lanes, freight mobility and access would be similar to automobile mobility and access. Isolated freight movements could experience a benefit with the FWLE locations through project improvements and/or mitigation (see Chapter 2, Alternatives Considered, and Section 3.7, Potential Mitigation Measures). Any modifications to the roadway system are not anticipated to affect truck circulation or change truck route designations on the regional and local street system. No at-grade crossings of freight rail tracks would occur with the FWLE.

3.6 Indirect Impacts

The FWLE project would result in reliable light rail service between Federal Way and a majority of the region's urban centers. Light rail service would help facilitate potential increases in residential and employment uses around the stations.

Indirect Impacts

Indirect effects are caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR § 1508.8).

In addition to the future conceptual bus service plan assumed for each alternative, other changes in transit service within the FWLE corridor that are not yet planned or anticipated in response to the FWLE could also result in shifts in ridership. For instance, Sound Transit and King County Metro (Metro) could redeploy and/or reinvest in bus service that would be replaced by light rail service above and beyond what has been assumed in this document. The FWLE could also affect ridership on other transit routes in the corridor, particularly parallel transit service along SR 99. Longer distance bus trips could decrease as some riders shift to light rail, and shorter bus trips could increase as more riders use other transit service to access light rail.

As discussed in Section 3.5.2.4, the land uses assumed in the ridership model included a substantial amount of growth in the study area, based on PSRC's 2013 Land Use Targets data. Light rail service could result in a higher concentration of residential and commercial land

uses, known as transit-oriented development (TOD) surrounding the stations. The Land Use Targets data were developed based on local planned development capacities and regional policies adopted in VISION 2040. It represents a regional development pattern consistent with what local jurisdictions are planning for under the first set of VISION 2040-aligned local growth targets. These plans forecast a substantial amount of population and employment growth in and around the FWLE study area by the year 2035 (PSRC, 2014).

Because the Sound Transit and PSRC models already include the adopted land use changes, the overall FWLE ridership is not expected to substantially change as a result of concentrated development (TOD) around future light rail stations; however, the mode of access to and from stations may shift to a greater percentage of nonmotorized access and lower percentage of automobile access. This could occur as a result of increased population and employment density within the walksheds and bikesheds for the stations. Any development beyond the PSRC's adopted population and employment land use forecasts for 2035 would require further regional and local planning and policy decisions and could result in additional increases in ridership in the FWLE corridor.

3.7 Potential Mitigation Measures

No transportation impacts were identified for freight mobility and access; therefore, no mitigation would be needed for these elements. Potential impacts on I-5 ramp terminal intersections and safety are described in Sections 3.6.2 and 3.6.3.

Mitigation Measures

Actions, projects, or programs intended to reduce or avoid an expected adverse impact of a proposed project. The impact could affect transportation or a particular environmental resource, such as ecosystems. Mitigation can include:

- Avoiding impacts
- Minimizing impacts by limiting the degree or magnitude of an action
- Rectifying impacts by restoration, rehabilitation, or repair of the affected environment
- Reducing or eliminating impacts over time
- Compensating for the impact by replacing or providing substitute resources or environments to offset the loss

3.7.1 Transit Operations

Mitigation for transit services and operations are not expected. The FWLE would improve the regional transit system and provide Sound Transit, Metro, and Pierce Transit the ability to develop bus service integration plans that coordinate bus service with the regional light rail system. Sound Transit would also provide expanded park-and-ride facilities to accommodate the expected increase in transit ridership with the project.

3.7.2 Arterial and Local Street Operations

Mitigation could be required at intersections where the intersection LOS would degrade to levels that do not meet the applicable agency LOS standards when compared to the No Build Alternative. Additionally, if an intersection is not expected to meet

agency LOS standards with the No Build Alternative, mitigation could be required if the FWLE further degrades the intersection performance. Potential mitigation measures at up to seven intersections are summarized in Table 3-17. The potential intersection modifications would improve delay and v/c ratios in the AM and PM peak hour to meet LOS standards, or attain the same or better vehicle delay and v/c ratios for intersections operating below LOS standards in the No Build Alternative.

TABLE 3-17
Potential Transportation Mitigation

Intersection	FWLE Alternative/Option Requiring Mitigation	Full Length Condition	Kent/Des Moines Interim Terminus Condition	S 272nd Interim Terminus Condition
SR 99/Kent-Des Moines Road	All alternatives and Kent/Des Moines station options	Provide a second northbound right-turn pocket at SR 99/ Kent-Des Moines Road intersection that could transition into a third eastbound lane on Kent-Des Moines Road and continue until transitioning into the I-5 northbound loop on-ramp.	Same as full length.	Same as full length.
I-5 Southbound Ramps/Kent-Des Moines Road	All alternatives and Kent/Des Moines station options		Same as full length.	Same as full length.
SR 99/ S 240th Street	I-5 at-grade station option	Provide a second southbound left-turn lane that would require widening of S 240th Street between SR 99 and 30th Avenue S and construct a northbound right-turn pocket. Provide flashing yellow arrow phasing for eastbound/west bound approaches.	Same as full length.	Same as full length.
I-5 Northbound Ramps/S 272nd Street	All alternatives	Provide northbound left-turn pocket.	Same as full length.	Same as full length.
I-5 Northbound Ramps/ Kent-Des Moines Road	All alternatives (Kent/Des Moines Interim Condition only)	No mitigation required.	Provide a traffic signal for the off-ramp and westbound traffic on Kent-Des Moines Road.	No mitigation required.
I-5 Southbound Ramps/S 272nd Street	SR 99 Alternative and I-5 to SR 99 Alternative (S 272nd Interim Condition Only)	No mitigation required.	No mitigation required.	Provide an eastbound right turn pocket to I-5 southbound ramp.
SR 99/S 276th Street	SR 99 Alternative and I-5 to SR 99 Alternative (S 272nd Interim Condition Only)	No mitigation required.	No mitigation required.	Provide a northbound right-turn pocket from SR 99 to S 276th Street.

Vehicle queue lengths are also expected to be similar or improved compared with the No Build Alternative at intersections with the proposed mitigation. Mitigation would not be required around the potential additional stations at S 216th Street and S 260th Street, or in the Federal Way Transit Center area.

As the project design advances, Sound Transit will continue to work with affected jurisdictions/agencies to evaluate potential mitigation strategies for safe, efficient operations. Final mitigation would be determined and agreed upon by Sound Transit and the affected jurisdiction(s) and agency(s). Sound Transit will work with affected agencies during the permitting process to determine Sound Transit's contribution to improve intersections, which may include contributing a proportionate share of costs to improve intersections affected by the FWLE, based on the project's proportionate ratio of trips at the intersection or another equitable method.

3.7.3 Safety

The FWLE alternatives would have no effects on the transportation safety in the FWLE corridor that require mitigation, except as noted along I-5. By designing the project elements, such as placement of guideway columns, to roadway standards, no additional mitigation would be required to improve transportation safety. As noted in Appendix G1, I-5 southbound mainline within the FWLE study area has about 11,500 feet of existing guardrail, walls, or barriers that would shield vehicles from FWLE light rail columns.

In instances where there is a clear zone and the minimum I-5 clear zone could not be maintained through grading, Sound Transit would coordinate with WSDOT to identify the appropriate safety treatment. These treatments may include additional guardrail, barriers, and/or walls.

3.7.4 Parking

For acquired off-street parking resulting from partial property acquisitions, reduced business opportunities might occur. The value of acquired parking depends on the quantity of spaces lost and the business type. Sound Transit would work with private business owners to determine fair market value of the acquired spaces.

The potential for hide-and-ride parking exists at the potential additional station at S 216th Street (East option) and may require mitigation. Sound Transit would work with local jurisdictions to

develop a plan to evaluate and, if necessary, implement hide-and-ride mitigation that could consist of parking meters, restricted parking, passenger and truck load zones, and residential parking zones (RPZs). For parking controls agreed to with the local jurisdictions, Sound Transit would be responsible for the cost of installing the signage or other parking controls for 1 year after the opening of the FWLE. The local jurisdictions would be responsible for monitoring the parking controls and providing all enforcement and maintenance, including ongoing RPZ-related costs. Off-street private lots would be responsible for monitoring and preventing potential hide-and-ride parking within their own lots.

At the Kent/Des Moines Station, Sound Transit could consider a parking management program to deter Highline College students from parking at the station parking areas. The parking management program could include restricted parking signage, permit parking only, priced parking similar to Highline College pricing rates, and/or work with Highline College to develop on-campus pricing strategies that make on-campus parking more attractive.

3.7.5 Nonmotorized Facilities

The FWLE project would not result in any adverse impacts on existing nonmotorized facilities because all of the nonmotorized analysis indicates a LOS D or better near the stations. At stations, Sound Transit would provide pedestrian and bicycle improvements to safely accommodate the projected increase in pedestrian and bicycle travel associated with the FWLE in accordance with *Sound Transit System Access Policy*. Sound Transit would also work with local jurisdictions to determine which pedestrian and bicycle improvements would be most appropriate to support station access and safety. Any new facilities would be expected to meet or exceed local and federal design standards for pedestrian and bicycle facilities.

This page intentionally left blank.