November 2016

Federal Way Link Extension

Final Environmental Impact Statement

SOUNDTRANSIT
Central Puget Sound
Regional Transit Authority

U.S. Department of Transportation
Federal Transit Administration

November 18, 2016

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 Final Environmental Impact Statement (Final EIS) on the proposed Federal Way Link Extension. Sound Transit is the project proponent.

The Final 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 Final EIS examines the project alternatives, including the preferred alternative identified by the Sound Transit Board in July 2015.

The major choices for the project involve the route of the light rail line and station locations. The Sound Transit Board will consider the alternatives evaluated in the Final EIS, public and agency comments on the Draft EIS, and other information before selecting the project to build. After the Sound Transit Board selects the project to build, FTA will issue a Record of Decision, which will state FTA's decision on the project and list mitigation commitments to reduce or avoid impacts.

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

Sincerely,

Kent Hale
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FEDERAL WAY LINK EXTENSION
KING COUNTY, WASHINGTON
FINAL 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
CITY OF SEATAC
CITY OF DES MOINES
CITY OF KENT
CITY OF FEDERAL WAY

26 October 2016
Date of Approval

Linda M. Gehrke
Linda Gehrke
Regional Administrator
NEPA Responsible Official
For Federal Transit Administration, Region 10

10/26/2016
Date of Approval

Perry Weinberg
Perry Weinberg
Director, Office of Environmental Affairs and Sustainability
SEPA Responsible Official
For Central Puget Sound Regional Transit Authority

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. Currently, there is projected funding to construct from the Angle Lake Station in SeaTac to Kent/Des Moines in the vicinity of Highline College. In June 2016 the Sound Transit Board of Directors adopted the Sound Transit 3 (ST3) plan. If funding for ST3 is approved by the voters in November 2016, ST3 includes funds for construction to the Federal Way Transit Center.

The FWLE is part of the larger regional network of light rail proposed under the ST2 Plan. 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 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 Final Environmental Impact Statement (EIS) evaluates a Preferred Alternative, several other light rail alternatives, and a No Build Alternative. The No Build Alternative represents the transportation system and environment as they would exist if the proposed project were not built. It 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.

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. If funding for the ST3 plan is approved by voters, FWLE stations at Kent/Des Moines, S 272nd Star Lake, and Federal Way Transit Center are expected to open in 2024.

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

Linda Gehrke, Regional Administrator for Region 10
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915 Second Avenue, Suite 3142
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SEPA Responsible Official

Perry Weinberg, Director, Office of Environmental Affairs and Sustainability
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Federal Transit Administration
Daniel Drais, Environmental Protection Specialist (206) 220-4465
Federal Transit Administration, Region 10
915 2nd Avenue, Suite 3142
Seattle, WA 98174-1002

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 Record of Decision • National Historic Preservation Act Section 106 Determination • US Department of Transportation Act Section 4(f) Determination • Endangered Species Act Determination
U.S. Army Corps of Engineers	• Clean Water Act, Section 404 Wetlands Approval
U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration Fisheries Service	• Federal Endangered Species Act Consultation
State, County, and Regional Agencies	
Washington Department of Fish and Wildlife	• Hydraulic Project Approval
Washington State Department of Archaeology and Historic Preservation	• National Historic Preservation Act Section 106 Consultation
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

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 • 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 Final EIS was prepared by staff at FTA and Sound Transit and 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 Final Environmental Impact Statement

November 18, 2016

Next Actions

Following publication of the Final EIS, FTA will accept comments on the Final EIS for 30 days. All comments on the Final EIS are due by close of business on December 19, 2016. Send written comments to the following address:

Federal Transit Administration, Region 10
Attention: Federal Way Link Extension Final EIS Comments
915 Second Avenue, Suite 3142
Seattle, Washington 98174-1002

E-mail comments should be sent to fta.tro10mail@dot.gov. Written or e-mailed comments should include the commenter's name and return address.

Following publication of the Final EIS, the Sound Transit Board of Directors will select the FWLE alternative to build. After the Board's decision, FTA is expected to issue a Record of Decision. Substantive comments on the Final EIS will be included with responses in FTA's Record of Decision.

Related Documents

- *Sound Transit 3: The Regional Transit System Plan for Central Puget Sound* (Sound Transit, 2016)
- *Draft Environmental Impact Statement, Federal Way Link Extension* (Sound Transit, 2015)
- *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], 2010)
- *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, 2005)

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 Final 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
- Final 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 Final 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

Appeals

SEPA challenges to this Final EIS are governed by Sound Transit Resolution R7-1 and the SEPA rules and regulations (Chapter 43.21 Revised Code of Washington and Washington Administrative Code 197-11-680). Sound Transit Resolution R7-1 is available online at: http://www.soundtransit.org/About-Sound-Transit/Board-of-

Directors/Board-archives/Resolutions-archive/1994-1997-Resolutions.

As provided in Resolution R7-1, appeals of SEPA determinations must be made in writing by filing a letter of appeal and paying the required fee within 14 days following the date the environmental document is issued under SEPA. Letters of appeal should be addressed to Peter Rogoff, Chief Executive Officer, Sound Transit, Union Station, 401 South Jackson Street, Seattle, Washington 98104-2826.

For this Final EIS, appeals must be received by Sound Transit on or before 5:00 p.m. on December 2, 2016. Additional details about the appeals process and requirements are set out in Resolution R7-1 and in the SEPA rules and regulations.

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- D4.1 Potentially Affected Parcels
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I. Response to Draft EIS Comments *(on CD)*

J. Location of Preferred Alternative within I-5 Right-of-Way *(under separate cover in* Technical Appendices *volume and on CD)*

A CD is provided with the Final EIS and all files are available on the project website at http://www.soundtransit.org/Projects-and-Plans/Federal-Way-Link-Extension. Printed versions are available on request.

EXECUTIVE SUMMARY

ES.1 Introduction

The Central Puget Sound Regional Transit Authority (Sound Transit) proposes to build and operate the Federal Way Link Extension (FWLE), which would expand the regional light rail system from SeaTac to Federal Way, Washington (Exhibit ES-1). The FWLE would be in the cities of SeaTac, Des Moines, Kent, and Federal Way in King County. It 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. *Sound Transit 3: The Regional Transit System Plan for Central Puget Sound (ST3)*, would fund the remainder of the project, if approved by the voters in November 2016.

The FWLE could be constructed in phases, with an interim terminus station at either Kent/Des Moines or S 272nd Street. This Final 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 Puget Sound Regional Council's (PSRC) *VISION 2040* (PSRC, 2009) and the updated Sound Transit *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 Final EIS evaluates a Preferred Alternative, three other light rail (build) alternatives, and a No Build Alternative. The No Build Alternative 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 light rail alternatives include at-grade, elevated, and trench light rail profiles with different station configurations. The Preferred Alternative and three build alternatives each have between four and nine station or alignment options.

Exhibit ES-2 shows the anticipated schedule milestones for construction to Kent/Des Moines and start-up. The duration could change depending on available funds and construction costs.

EXHIBIT ES-1
SOUND TRANSIT REGIONAL LIGHT RAIL SYSTEM

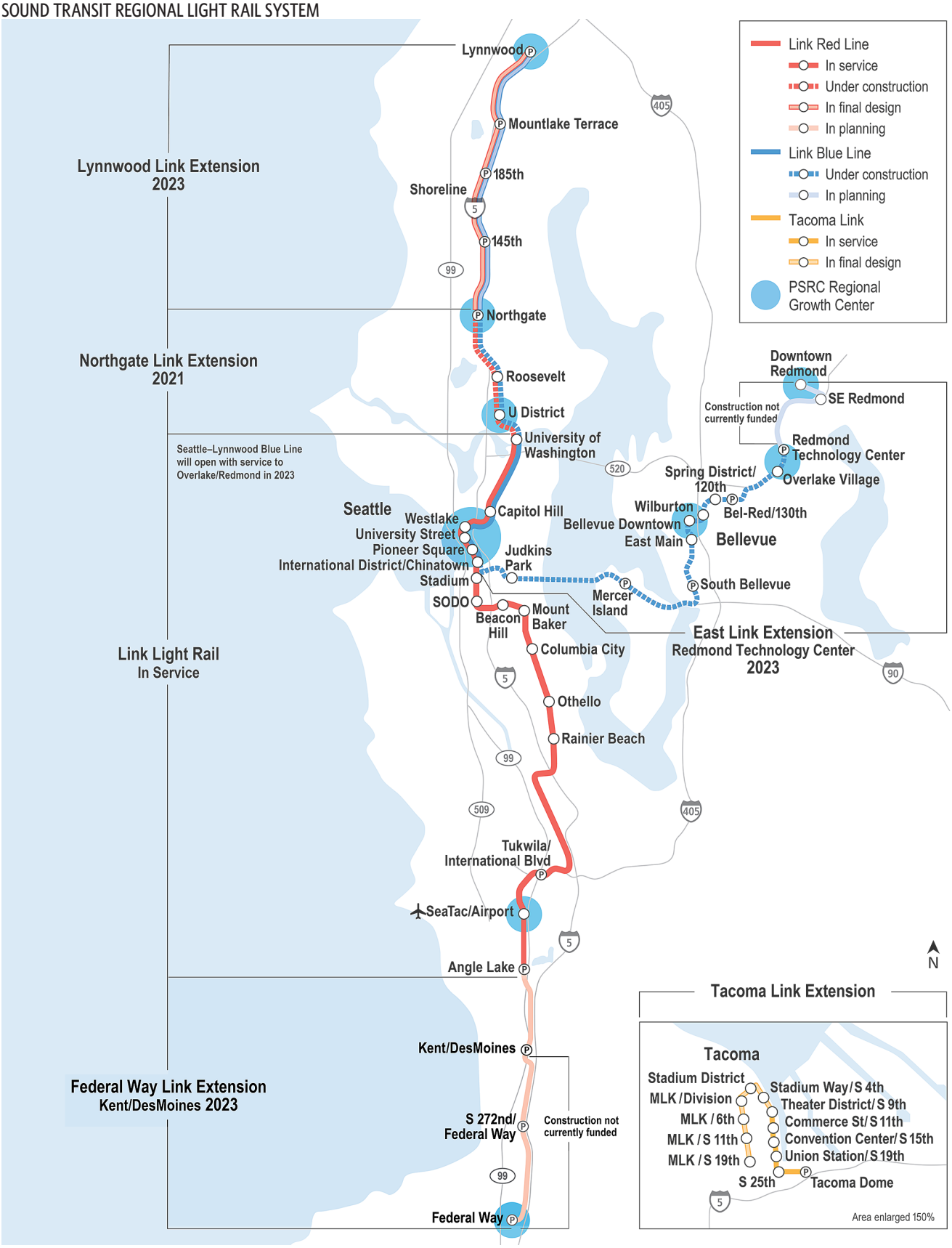


EXHIBIT ES-2
PROJECT MILESTONES

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 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

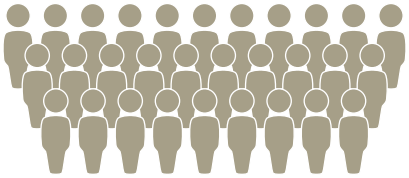
The following conditions within the project corridor demonstrate the need for the project:

- Increasing congestion on I-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 up to 80 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.
- People in the FWLE corridor need reliable and efficient peak and off-peak transit service to connect 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 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, 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. The FWLE 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. 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.

Bus service frequency in 2035 without the FWLE is expected to operate at the same level as existing conditions or better. Service frequency to other regional destinations besides Downtown Seattle would continue to be limited and generally only in the peak direction of travel. Adding the FWLE would improve service frequency between the FWLE corridor and many other Puget Sound regional destinations and growth centers, including Downtown Seattle, the University of Washington, Northgate, Lynnwood, Bellevue, Overlake, and Redmond and provide continuous two-way service for 20 hours a day. 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, because some bus riders would transfer to light rail.



7,500-9,000 NEW RIDERS ARE EXPECTED

For people who live and work in the corridor, the project would create an additional and more efficient form of transit in the corridor and to other regional centers. It would complement other local and regional transit services. Of the projected 35,000 to 39,500 riders who would board light rail in the FWLE corridor each day, approximately 7,500 to 9,000 are expected to be new transit riders. Ridership forecasts for all alternatives are estimated to be similar as the station locations and travel times are similar.

Providing reliable, frequent service to multiple regional destinations would provide greater transit connectivity for transit-dependent populations than currently available or planned for under the No Build Alternative. Benefits for these populations would include improved access to more employment opportunities and better access to services in larger regional centers, such as Seattle or Bellevue. The FWLE would also reduce vehicle miles traveled by 160,000 miles and vehicle hours traveled by 10,000 hours each weekday. This would also reduce vehicle emissions in the corridor.

The FWLE would help fulfill plans for HCT in the South Corridor in place since the 1990s. The voter-approved funding package described in ST2 included the light rail extension to S 272nd Street. ST3 includes funding for construction from Kent-Des Moines to the Federal Way Transit Center.

ES.4 Alternatives Considered

The Sound Transit Board of Directors (Board) defined four build alternatives for study in the EIS in 2013 after a wide range of alternatives was considered during early scoping, an alternatives analysis, National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) scoping, and public and agency input. The FWLE Draft EIS compared a No Build Alternative to the four build alternatives. After considering the Draft EIS and the public and agency comments, the Board passed Motion M2015-56 in July 2015 identifying the I-5 Alternative with the Kent/Des Moines SR 99 East Station Option as the Preferred Alternative.

This Final EIS compares the environmental effects of a No Build Alternative, the Preferred Alternative, and the three other build alternatives.

When it identified the Preferred Alternative, the Board directed Sound Transit staff to work with stakeholders to develop and evaluate potential improvements to it related to optimizing station locations, identifying ways to improve transit-oriented development (TOD) and access, and to accommodate a future light rail extension to the south on either I-5 or SR 99.

Sound Transit conducted stakeholder workshops for each station from fall 2015 to spring 2016. These workshops gained consensus on station locations and identified access improvements to be included in the project or developed by others. Near-term and long-term development opportunities were also identified for the Kent/Des Moines Station.

In addition to these workshops, refinements to the Preferred Alternative were made since the Draft EIS was published to minimize impacts or address challenges identified during preliminary engineering. These include:

- Adding the S 272nd Elevated Star Lake Station Option and the S 317th Elevated Alignment Option, to address groundwater levels
- Shifting the alignment east approximately 15-feet to avoid impacts on the Puget Sound Energy Midway Substation
- Elevating the alignment entirely over Bingaman Creek and realigning the creek around the guideway columns, to not preclude fish passage improvements by others
- Extending the pocket track between S 304th Street and S 317th Street to accommodate overnight storage of two 4-car trains
- Refining the footprint to allow for landscaping around project elements as mitigation for visual impacts

Highline College

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 Washington State Department of Transportation (WSDOT).

With the FWLE, RapidRide A Line would continue to serve SR 99. It would provide local service between the stations and access to the Link and the regional transportation systems.

The SR 509 Extension Project would extend SR 509 from its current southern terminus at S 188th Street in SeaTac east to I-5 at the northern end of the FWLE corridor. The FWLE alternatives have been designed to accommodate the SR 509 Extension approved in the 2003 Record of Decision (ROD). Appendix F, Conceptual Design Plans, shows the proposed SR 509 Extension in relation to the FWLE. The SR 509 Extension was funded in 2015 and is expected to begin construction during the FWLE construction period. It is included in the No Build Alternative, and impacts from concurrent construction periods are discussed in Chapter 6, Cumulative Impacts. WSDOT is currently reevaluating the design of the project. Sound Transit and WSDOT will continue to coordinate with each other as the design of the SR 509 Extension and FWLE advance.

ES.4.1 NO BUILD ALTERNATIVE

The No Build Alternative would be the transportation system and environment as they would exist without the FWLE. It 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, and 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 the Operations and Maintenance Facility East. It 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. The SR 509 Extension Project, planned by WSDOT, is included in this alternative.

ES.4.2 BUILD ALTERNATIVES

This section summarizes the Preferred Alternative and three other build alternatives, the impacts associated with each alternative, and the various station and alignment options. The four build alternatives are shown in Exhibits ES-3A-3D. This section 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 or ST3 and further evaluation of their consistency with these plans would be required before they could be added to the FWLE. Table ES-1 provides an overview of these alternatives, options, and potential additional stations.

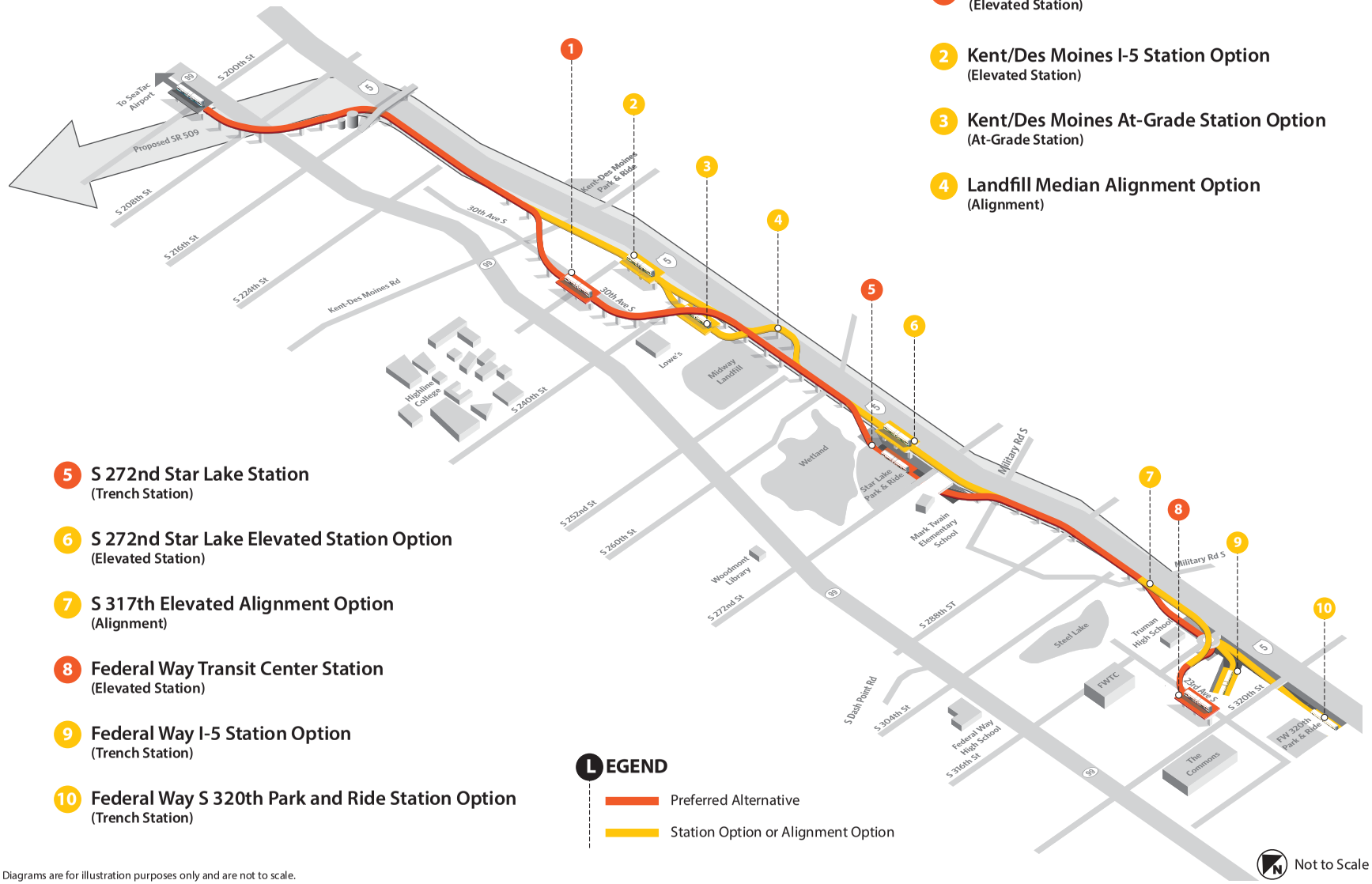
Parking would be provided at the Kent/Des Moines, S 272nd Street, and Federal Way City Center stations. All Kent/Des Moines stations would provide 1,000 spaces (500 in a garage, 500 surface) if the project is only initially built to Kent/Des Moines. The number of spaces could be reduced to 500 when the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

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

Alternative	Stations	Station Options	Potential Additional Stations (not funded in ST2 or ST3)	Alignment Options
No Build	▪ None	▪ None	▪ None	▪ None
Preferred	▪ Kent/Des Moines ▪ S 272nd Star Lake ▪ Federal Way Transit Center	▪ Kent/Des Moines At-Grade ▪ Kent/Des Moines I-5 ▪ S 272nd Star Lake Elevated ▪ Federal Way I-5 ▪ Federal Way S 320th Park-and-Ride	▪ None	▪ Landfill Median ▪ S 317th Elevated
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
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

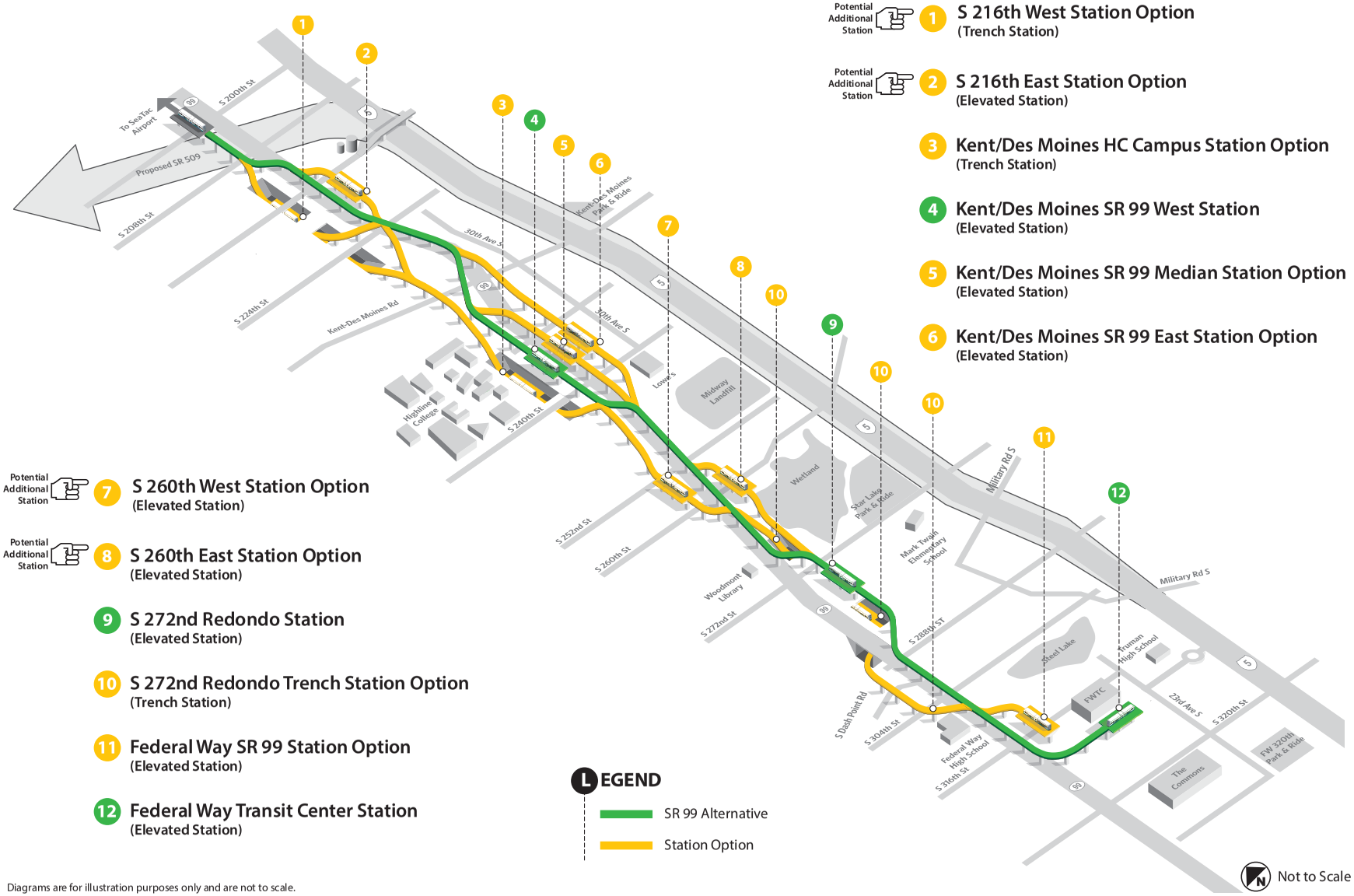
What are the Stations?	What are the Station Options?	What are the Potential Additional Stations?	What is an Alignment Option?
There are three stations associated with each alternative: Kent/Des Moines, S 272nd (either Redondo or Star Lake) and Federal Way Transit Center.	Station Options are alternative locations for each station area: Kent/Des Moines, S 272nd Street, and Federal Way City 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



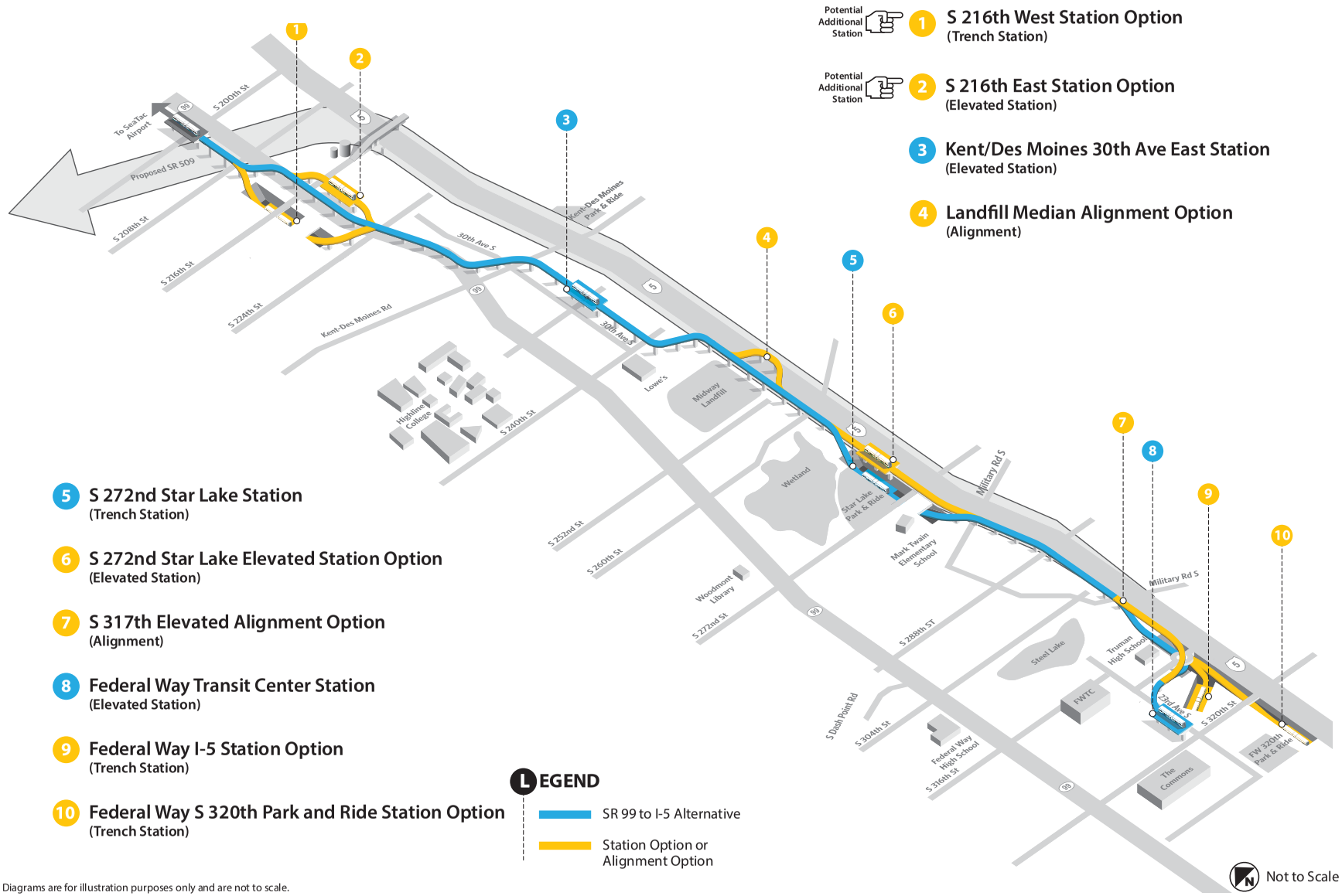
Diagrams are for illustration purposes only and are not to scale.

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

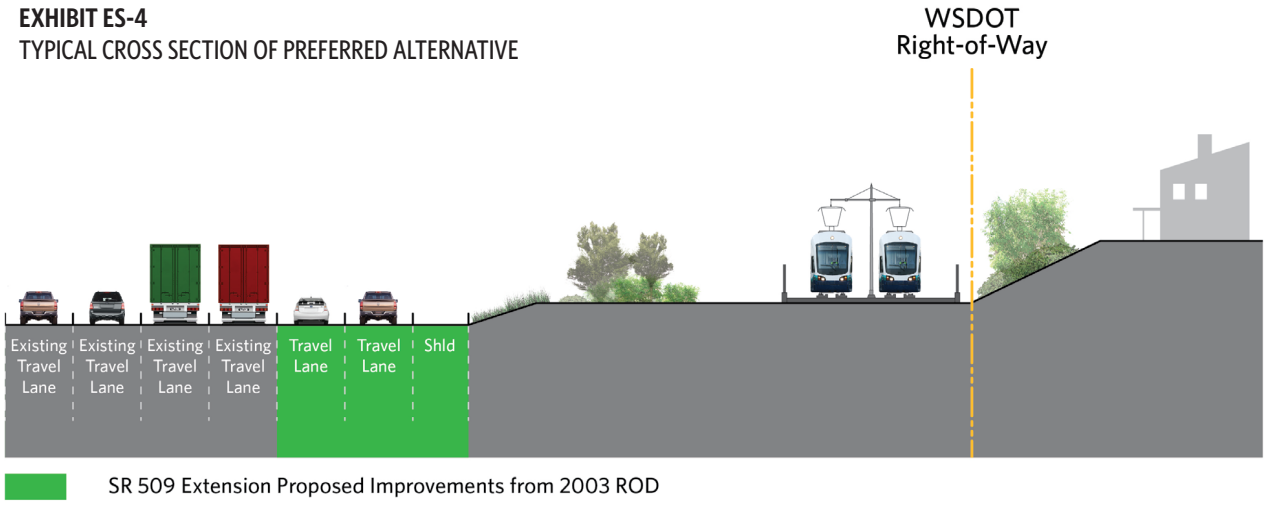
Diagrams are for illustration purposes only and are not to scale.

Preferred Alternative

COST	TRAVEL TIME	DAILY RIDERSHIP
$1.54 Billion	12 Minutes	36,500 Riders

STATIONS	DAILY BOARDINGS	TOD POTENTIAL
Kent/Des Moines Station	3,500 Riders	Moderate
S 272nd Star Lake Station	3,000 Riders	Low
Federal Way Transit Center Station	12,500 Riders	High

EXHIBIT ES-4
TYPICAL CROSS SECTION OF PREFERRED ALTERNATIVE

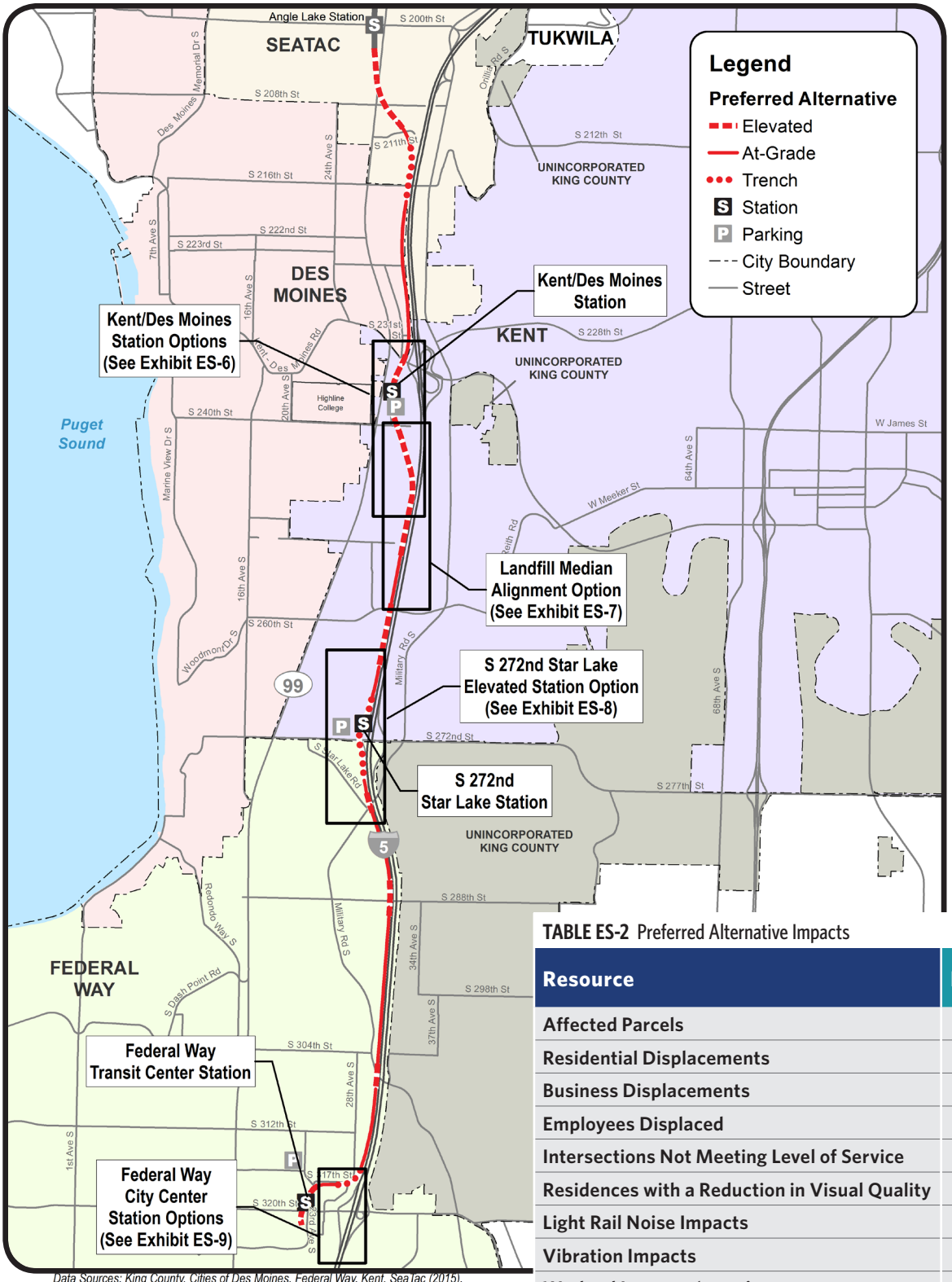


Proposed condition southbound (not to scale)

The Preferred Alternative was described as the I-5 Alternative in the Draft EIS. It 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 (Exhibits ES-4 and ES-5). It would be in or adjacent to the future SR 509 WSDOT right-of-way until S 231st Street, and would allow for the planned future build-out of I-5 in this area based on the 2003 design of the SR 509 Extension Project. Between approximately S 245th Street and S 317th Street, the alignment would be mostly in the I-5 right-of-way except to access stations, which would be outside of the right-of-way. The Preferred Alternative would be at-grade where existing topography allows and road crossings would be grade-separated.

Table ES-2 summarizes key impacts of the Preferred Alternative. This alternative would have the second most residential displacements but the least business displacements. It would have the most impacts on wetlands, wetland buffers and upland habitat. It would also realign approximately 1,015 feet of Bingaman Creek. Noise impacts would affect residences on the west side of I-5, and would require reconstructing an existing I-5 noise barrier near S 288th Street. The Preferred Alternative would have the least noise impacts but the second most vibration impacts. All noise impacts could be mitigated but there could be four residual vibration impacts. 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 guideway. Sound Transit would restore the playfield to existing conditions following construction. Removal of mature trees and vegetation from the west side of I-5 would reduce the visual quality from medium to low for many adjacent residences. The Preferred Alternative includes the station with the highest overall TOD potential, the Preferred Federal Way Transit Center Station, as well as the station with the lowest overall TOD potential, the S 272nd Star Lake Station. The Preferred Kent/Des Moines Station scores in the middle of all stations in that station area.

EXHIBIT ES-5
PREFERRED ALTERNATIVE



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

TABLE ES-2 Preferred Alternative Impacts

Resource	Impact
Affected Parcels	211
Residential Displacements	196
Business Displacements	42
Employees Displaced	370
Intersections Not Meeting Level of Service	10
Residences with a Reduction in Visual Quality	290
Light Rail Noise Impacts	647
Vibration Impacts	193
Wetland Impacts (acres)	1.3
Upland Habitat Impacts (acres)	35

Station Options
KENT/DES MOINES

The Kent/Des Moines At-Grade Station Option (Exhibit ES-6) would cost $110M less than the Preferred Alternative, and the Kent/Des Moines I-5 Station Option would cost $20M more. The Kent/Des Moines At-Grade Station Option would reduce residential displacements. Both options would decrease business displacements and employee displacements (Table ES-3). Vibration impacts would decrease with both options because of differences in displacements; noise impacts would decrease with the I-5 Station Option. All noise and vibration impacts could be mitigated. The At-Grade Station Option would have traffic impacts at one additional intersection, which could be mitigated. Both options would decrease ridership.

EXHIBIT ES-6
KENT / DES MOINES STATION OPTIONS

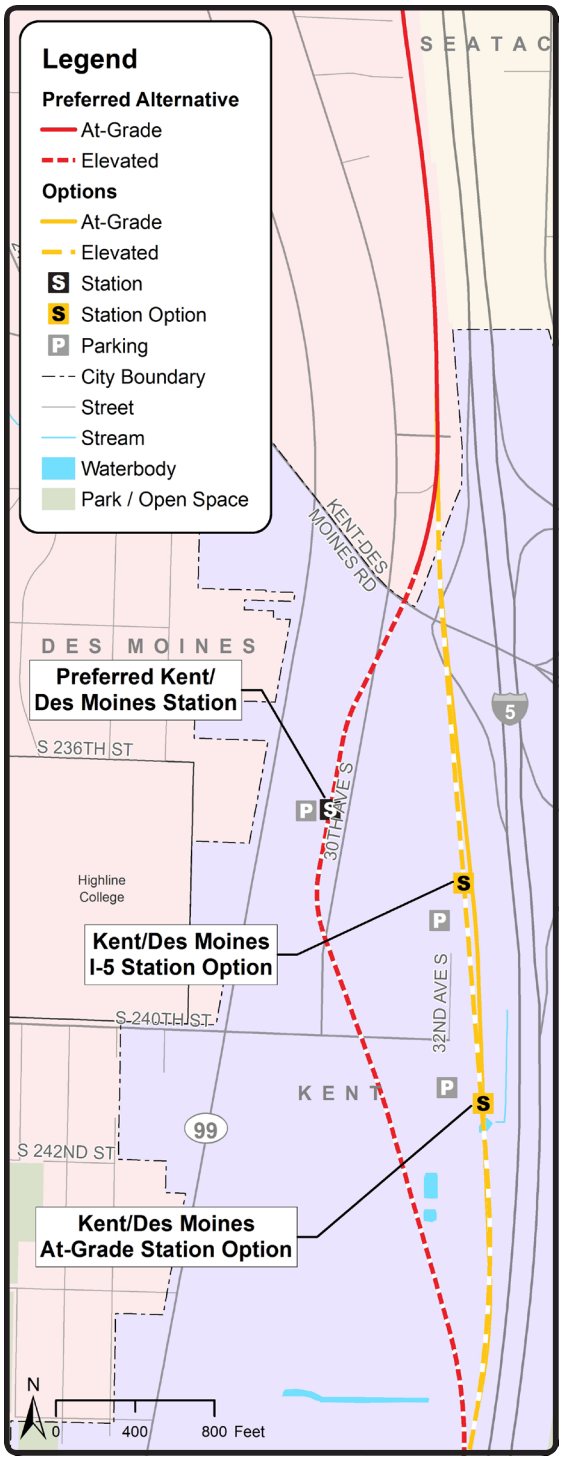


TABLE ES-3
PERFORMANCE MEASURES & IMPACTS COMPARED TO PREFERRED ALTERNATIVE

LEGEND ↑ Increase ↓ Decrease	At-Grade Station Option	I-5 Station Option
Performance Measures		
Cost Difference	↓ $110 million	↑ $20 million
Change in Total FWLE Daily Boardings	↓ 500	↓ 500
Change in Travel Time (minutes)	No Change	No Change
TOD Potential within 1/4 mile (acres)	Lower	Lower

Resource	Impacts	
Affected Parcels	↓ 37	↓ 33
Residential Displacements	↓ 57	↑ 42
Business Displacements	↓ 16	↓ 12
Employees Displaced	↓ 100	↓ 50
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	↑ 14	↓ 29
Vibration Impacts	↓ 8	↓ 8
Wetland Impacts (acres)	↑ 0.6	↑ 0.6
Upland Habitat Impacts (acres)	↑ 1.5	↑ 2.9

Alignment Option

LANDFILL MEDIAN ALIGNMENT OPTION

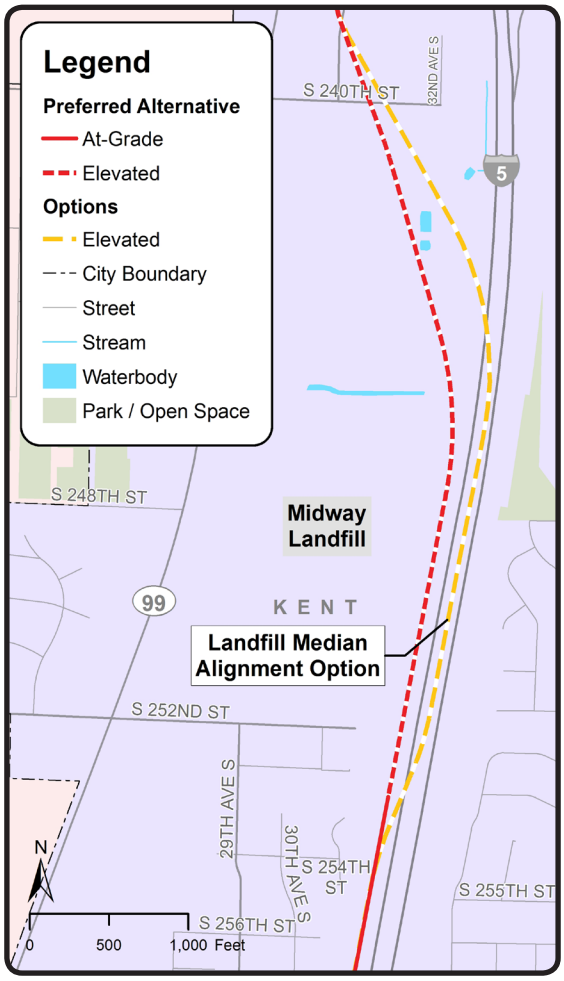
There would be minimal changes in impacts with this alignment option (Exhibit ES-7 and Table ES-4). It could decrease costs by up to $10M when compared to the Preferred Alternative, by eliminating the removal of waste from the landfill. This option could also avoid the potential engineering and regulatory challenges associated with crossing the Midway Landfill. Use of the I-5 median for light rail for this option may conflict with WSDOT's long-term plans. This option would have additional noise impacts but would reduce upland habitat loss. 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-4
PERFORMANCE MEASURES & IMPACTS COMPARED TO PREFERRED ALTERNATIVE

LEGEND	↑ Increase ⇩ Decrease	Landfill Median Alignment Option
Performance Measures		
Cost Difference		⇩ $10 million
Change in Total FWLE Daily Boardings		Not Applicable
Change in Travel Time (minutes)		Not Applicable
TOD Potential within 1/4 mile (acres)		Not Applicable

Resource	Impacts
Affected Parcels	⇩ 8
Residential Displacements	↑ 1
Business Displacements	No Change
Employees Displaced	No Change
Intersections Not Meeting Level of Service	No Change
Residences with a Reduction in Visual Quality	No Change
Light Rail Noise Impacts	↑ 41
Vibration Impacts	No Change
Wetland Impacts (acres)	No Change
Upland Habitat Impacts (acres)	⇩ 1.1

EXHIBIT ES-7
LANDFILL MEDIAN ALIGNMENT OPTION



Station Option

S 272ND STAR LAKE ELEVATED

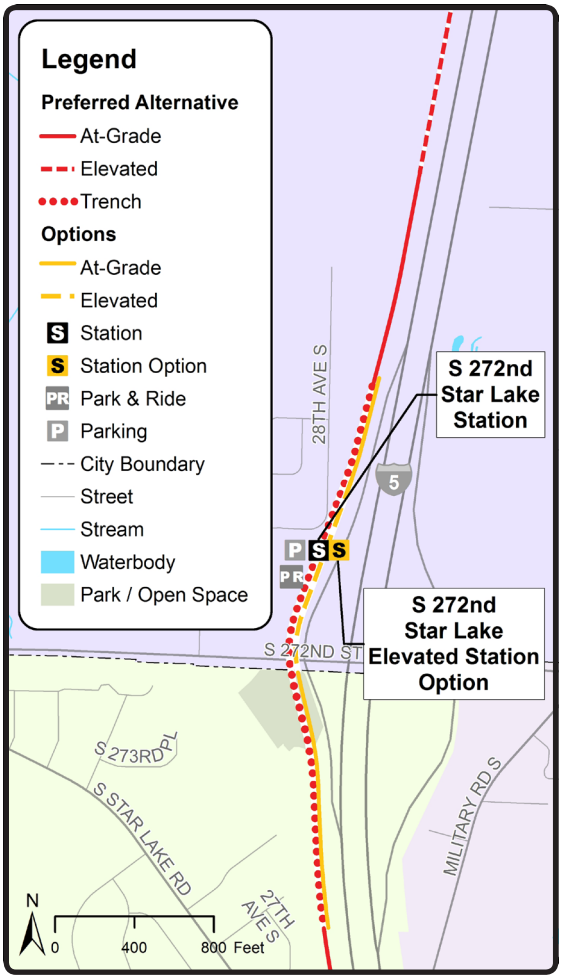
The S 272nd Star Lake Elevated Station Option (Exhibit ES-8) would cost approximately $30M less than the Preferred Alternative. This option would have minor or no changes in impacts for most resources other than noise (Table ES-5). Noise impacts would increase, but could be mitigated. While the elevated guideway (either on columns or retained fill) would be more visible from residences and Mark Twain Elementary School, it would reduce visual quality for the same number of sensitive viewers as the Preferred Alternative. The guideway would cross the eastern edge of the Mark Twain Elementary School playfield on retained fill and would reduce the playfield size by 0.1 acre.

TABLE ES-5
PERFORMANCE MEASURES & IMPACTS COMPARED TO PREFERRED ALTERNATIVE

LEGEND	↑ Increase ↓ Decrease	S 272nd Star Lake Elevated Station Option
Performance Measures		
Cost Difference		↓ $30 million
Change in Total FWLE Daily Boardings		No Change
Change in Travel Time (minutes)		No Change
TOD Potential within 1/4 mile (acres)		No Change

Resource	Impacts
Affected Parcels	↓ 3
Residential Displacements	No Change
Business Displacements	No Change
Employees Displaced	No Change
Intersections Not Meeting Level of Service	No Change
Residences with a Reduction in Visual Quality	No Change
Light Rail Noise Impacts	↑ 64
Vibration Impacts	No Change
Wetland Impacts (acres)	No Change
Upland Habitat Impacts (acres)	↑ 0.6

EXHIBIT ES-8
S 272ND STAR LAKE ELEVATED STATION OPTION



Alignment Option

S 317TH ELEVATED ALIGNMENT OPTION

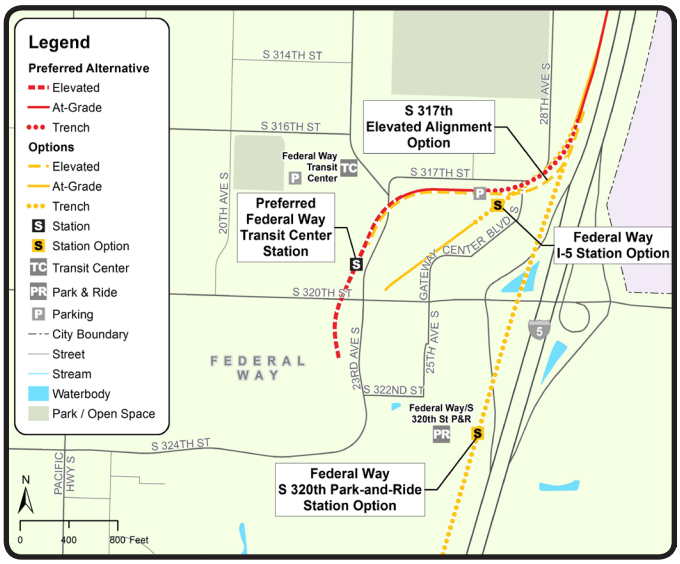
The S 317th Elevated Alignment Option (Exhibit ES-9) would cost approximately $2M less than the Preferred Alternative. This option would have minor or no changes in impacts for most resources other than noise (Table ES-6). Noise impacts would increase, but could be mitigated. While the elevated guideway (either on columns or retained fill) would be more visible from residences, and Truman High School, it would reduce visual quality for the same number of sensitive viewers as the Preferred Alternative.

TABLE ES-6
PERFORMANCE MEASURES & IMPACTS COMPARED TO PREFERRED ALTERNATIVE

LEGEND ↑ Increase ↓ Decrease	S 317th Elevated Alignment Option
Performance Measures	
Cost Difference	↓ $2 million
Change in Total FWLE Daily Boardings	Not Applicable
Change in Travel Time (minutes)	Not Applicable
TOD Potential	Not Applicable

Resource	Impacts
Affected Parcels	No Change
Residential Displacements	No Change
Business Displacements	No Change
Employees Displaced	No Change
Intersections Not Meeting Level of Service	No Change
Residences with a Reduction in Visual Quality	No Change
Light Rail Noise Impacts	↑ 112
Vibration Impacts	No Change
Wetland Impacts (acres)	No Change
Upland Habitat Impacts (acres)	No Change

EXHIBIT ES-9
S 317TH ELEVATED ALIGNMENT OPTION AND FEDERAL WAY CITY CENTER OPTIONS



Station Options

FEDERAL WAY CITY CENTER

The Federal Way City Center station options (Exhibit ES-9) would be center-platform stations with a tail track after the station platform.

The Federal Way I-5 Station Option would cost $40M less than the Preferred Federal Way Transit Center Station, while the Federal Way S 320th Park-and-Ride Station Option would cost $130M more. Both options would decrease ridership and business displacements. Only the S 320th Park-and-Ride Station Option would increase residential displacements (Table ES-7). The I-5 Station Option would have less impact on upland habitat. The S 320th Park-and-Ride Station Option would have fewer noise impacts while the I-5 Station Option would have more. There would be no change in vibration impacts for either option. All noise and vibration impacts could be mitigated.

TABLE ES-7
PERFORMANCE MEASURES & IMPACTS COMPARED TO PREFERRED ALTERNATIVE

LEGEND	↑ Increase	↓ Decrease	I-5 Station Option	S 320th P&R Station Option
Performance Measures				
Cost Difference			↓ $40 million	↑ $130 million
Change in Total FWLE Daily Boardings			↓ 2,500	↓ 1,500
Change in Travel Time (minutes)			No Change	No Change
TOD Potential within 1/4 mile (acres)			Lower	Lower

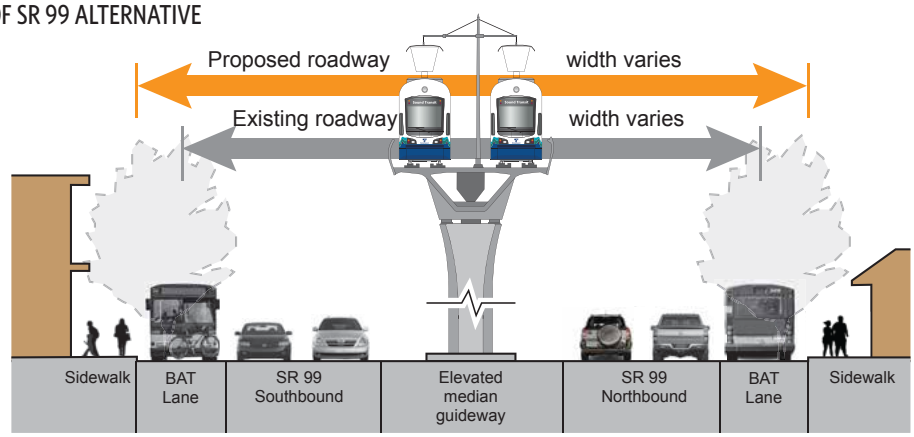
Resource	Impacts	
Affected Parcels	↓ 7	↓ 12
Residential Displacements	No Change	↑ 19
Business Displacements	↓ 4	↓ 19
Employees Displaced	↓ 40	↓ 260
Intersections Not Meeting Level of Service	No Change	No Change
Residences with a Reduction in Visual Quality	No Change	No Change
Light Rail Noise Impacts	↑ 45	↓ 3
Vibration Impacts	No Change	No Change
Wetland Impacts (acres)	No Change	↑ 0.1
Upland Habitat Impacts (acres)	↓ 0.3	↑ 0.4

SR 99 Alternative

COST	TRAVEL TIME	DAILY RIDERSHIP
$1.89 Billion	12 Minutes	36,500 Riders

STATIONS	DAILY BOARDINGS	TOD POTENTIAL
Kent/Des Moines Station	3,500 Riders	Moderate
S 272nd Redondo Station	3,500 Riders	Moderate
Federal Way Transit Center Station	12,500 Riders	High

EXHIBIT ES-10
CROSS SECTION OF SR 99 ALTERNATIVE



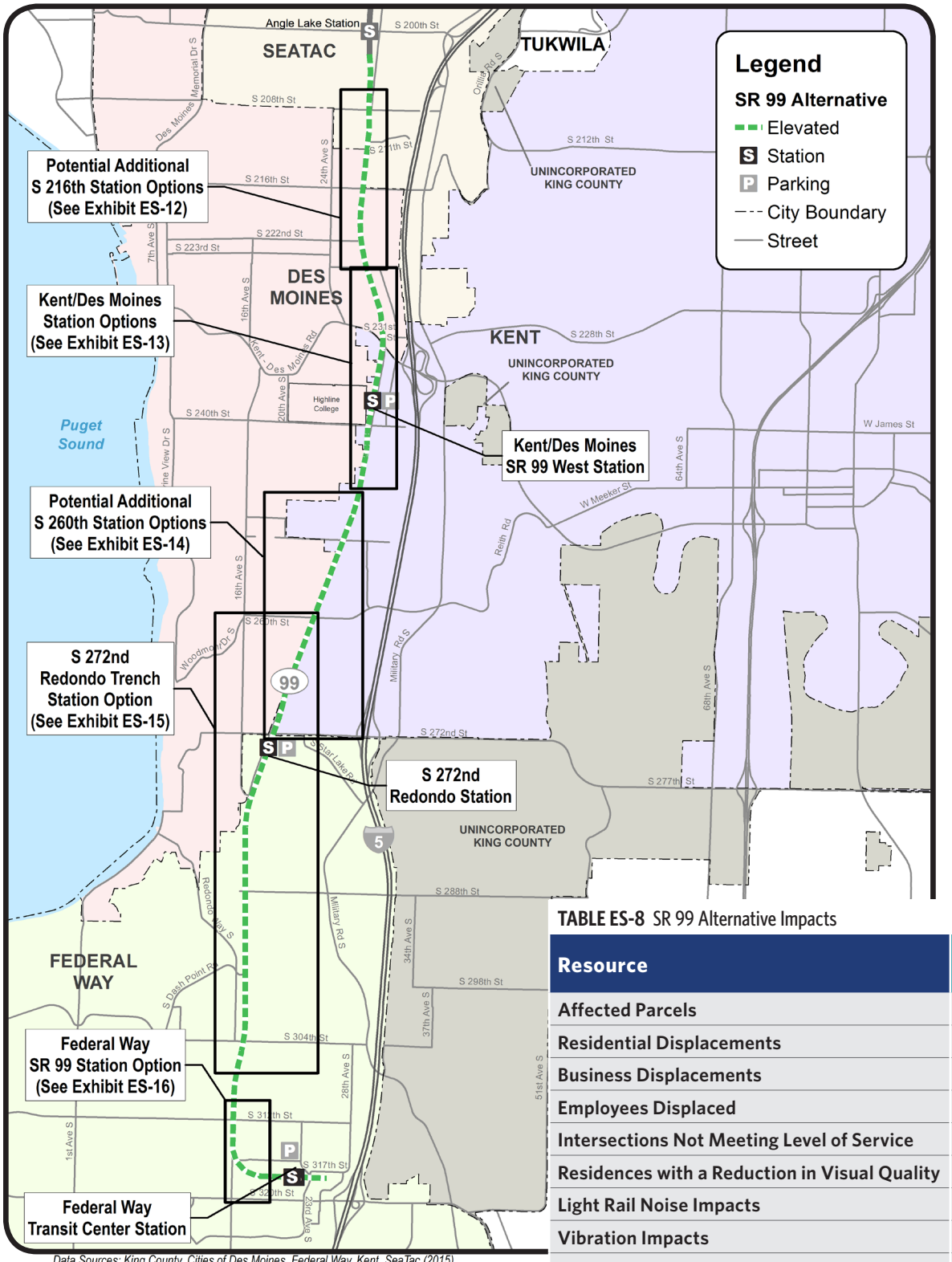
Proposed condition looking north (not to scale)

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-10). This alternative has several station options and two potential additional stations not included in the ST2 or ST3 plans. These stations are shown on Exhibit ES-11 and described on the following pages. Exhibit ES-10 shows a typical cross-section of the alignment in the SR 99 median. Table ES-8 summarizes the impacts of the SR 99 Alternative.

The SR 99 Alternative is projected to have the same ridership and travel time as the Preferred Alternative and the least residential displacements. It would displace the most businesses and employees, 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 most noise impacts, but the second least vibration impacts. It 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 have similar TOD potential as the Preferred Alternative at the Kent/Des Moines and Federal Way Transit Center station areas, and greater potential at the S 272nd station area.

EXHIBIT ES-11
SR 99 ALTERNATIVE



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

N
0 0.5 1 2 Miles

TABLE ES-8 SR 99 Alternative Impacts

Resource	Impact
Affected Parcels	292
Residential Displacements	36
Business Displacements	101
Employees Displaced	580
Intersections Not Meeting Level of Service	10
Residences with a Reduction in Visual Quality	260
Light Rail Noise Impacts	2,266
Vibration Impacts	50
Wetland Impacts (acres)	<0.1
Upland Habitat Impacts (acres)	2.9

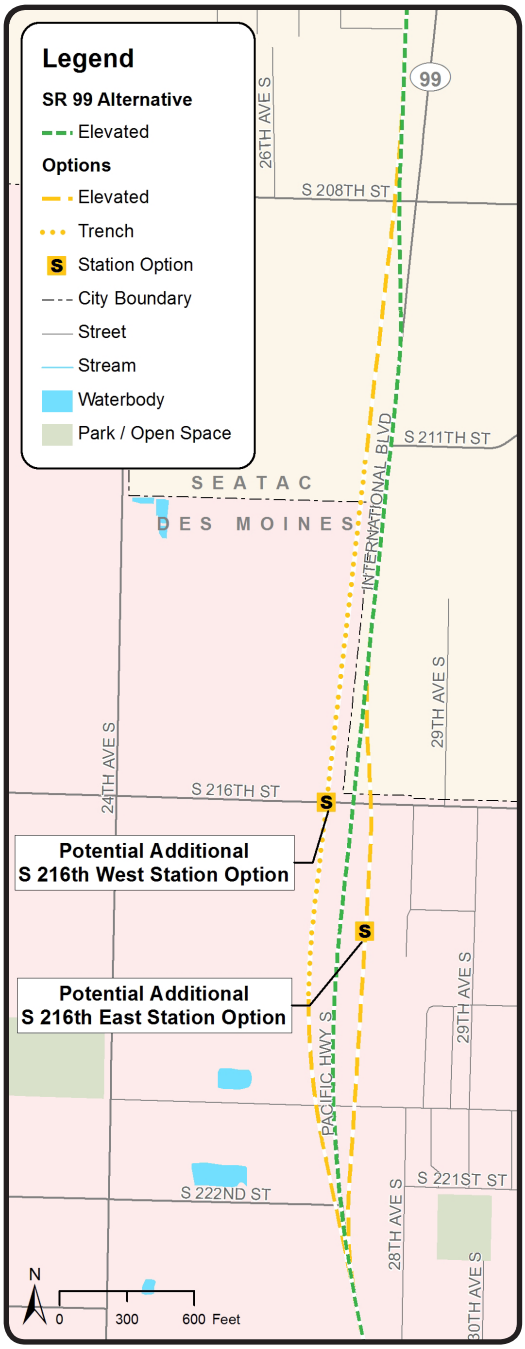
Potential Additional Station Options
S 216TH STREET

Two options were evaluated for the potential additional station at S 216th Street (Exhibit ES-12). The S 216th West Station Option would travel in a trench under S 216th Street west of SR 99 and would add $90M 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 $80M. The east station option would displace more residents than the west station option, but the west station option would displace more businesses and employees (Table ES-9). Both would reduce noise impacts. 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 with either option. The S 216th West Station Option would reduce visual impacts by being in a trench on the west side of SR 99. Both station options would increase ridership and TOD potential relative to the SR 99 Alternative. Both options would increase travel time by less than one minute.

TABLE ES-9
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	↑ $90 million	↑ $80 million
Change in Total FWLE Daily Boardings	↑ 1,500	↑ 1,500
Change in Travel Time (minutes)	↑ <1	↑ <1
TOD Potential within 1/4 mile (acres)	Higher	Higher
Resource	**Impacts**	
Affected Parcels	↑ 6	↑ 5
Residential Displacements	No Change	↑ 26
Business Displacements	↑ 13	↑ 5
Employees Displaced	↑ 60	↑ 10
Intersections Not Meeting Level of Service	No Change	No Change
Residences with a Reduction in Visual Quality	↓ 15	No Change
Light Rail Noise Impacts	↓ 201	↓ 4
Vibration Impacts	↓ 50	↑ 16
Wetland Impacts (acres)	No Change	No Change
Upland Habitat Impacts (acres)	↑ 0.5	No Change

EXHIBIT ES-12
S 216TH STATION OPTIONS



Station Options

KENT/DES MOINES

The Kent/Des Moines SR 99 Median Station and East Station options (Exhibit ES-13) would increase the project cost and the HC Campus Station Option would reduce it. All options would increase residential displacements (Table ES-10). The SR 99 East Station Option would have the greatest increase in businesses displaced, while the HC Campus Station Option would have the greatest increase in employees displaced. The Kent/Des Moines SR 99 East Station Option would reduce noise impacts and the Kent/Des Moines HC Campus Station Option would increase noise and 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.

EXHIBIT ES-13
KENT/DES MOINES STATION OPTIONS

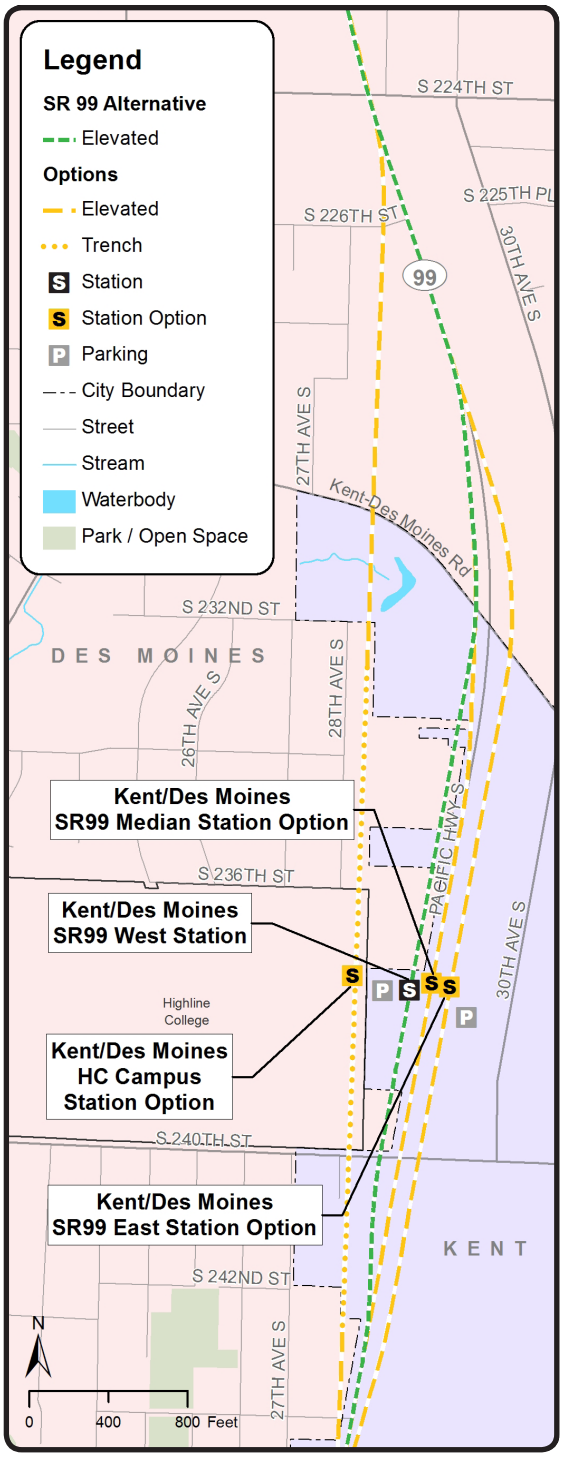


TABLE ES-10
PERFORMANCE MEASURES & IMPACTS COMPARED TO SR 99 ALTERNATIVE

LEGEND ↑ Increase ↓ Decrease	HC Campus Station Option	SR 99 Median Station Option	SR 99 East Station Option
Performance Measures			
Cost Difference	↓ $20 million	↑ $20 million	↑ $10 million
Change in Total FWLE Daily Boardings	No Change	No Change	No Change
Change in Travel Time (minutes)	No Change	No Change	No Change
TOD Potential within 1/4 mile (acres)	No Change	No Change	No Change
Resource	**Impacts**		
Affected Parcels	↑ 19	↑ 1	↓ 9
Residential Displacements	↑ 39	↑ 14	↑ 34
Business Displacements	↓ 7	↑ 2	↑ 8
Employees 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	↑ 161	↑ 36	↓ 40
Vibration Impacts	↑ 12	No Change	No Change
Wetland Impacts (acres)	↑ 0.2	No Change	No Change
Upland Habitat Impacts (acres)	↓ 0.2	↓ 0.9	↓ 1.0

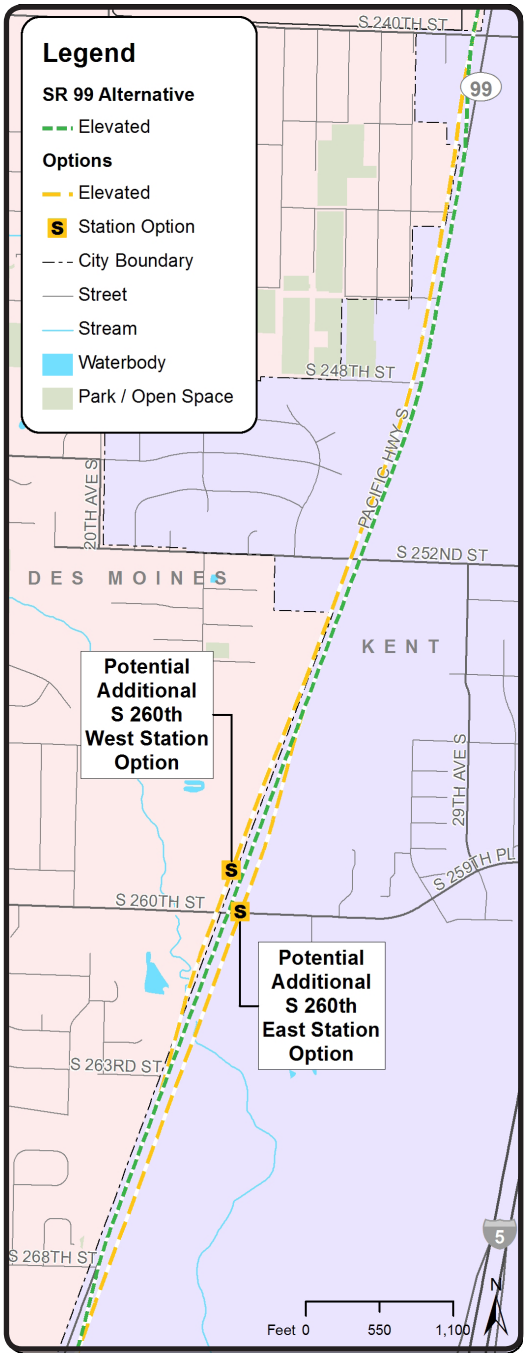
Potential Additional Station Options
S 260TH STREET

The potential additional station at S 260th Street (Exhibit ES-14) would add between $70M and $90M 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-9). 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 have greater impacts on the McSorley Creek Wetlands and forested areas. Both Station Options would increase ridership and TOD potential relative to the SR 99 Alternative. Both options would increase travel time by less than one minute.

TABLE ES-11
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	↑ $70 million	↑ $90 million
Change in Total FWLE Daily Boardings	↑ 1,000	↑ 1,000
Change in Travel Time (minutes)	↑ <1	↑ <1
TOD Potential within 1/4 mile (acres)	Higher	Higher
Resource	**Impacts**	
Affected Parcels	↓ 15	↓ 6
Residential Displacements	No Change	↑ 3
Business Displacements	↑ 18	↑ 18
Employees 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	↓ 88	↓ 36
Vibration Impacts	↑ 12	↑ 2
Wetland Impacts (acres)	↑ 0.1	↑ 0.4
Upland Habitat Impacts (acres)	↑ 0.5	↑ 0.2

EXHIBIT ES-14
S 260TH STATION OPTIONS



Station Option

S 272ND REDONDO TRENCH

The S 272nd Redondo Trench Station Option (Exhibit ES-15) would cost $10M less than the SR 99 Alternative (Table ES-12). It would increase residential displacements but would decrease the business displacements. It would displace more employees due to different businesses being impacted. This option would cross McSorley Creek and Redondo Creek and would have additional impacts on the McSorley Creek wetlands. It would not impact views of Puget Sound from SR 99 near S 288th Street, but it would still have 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.

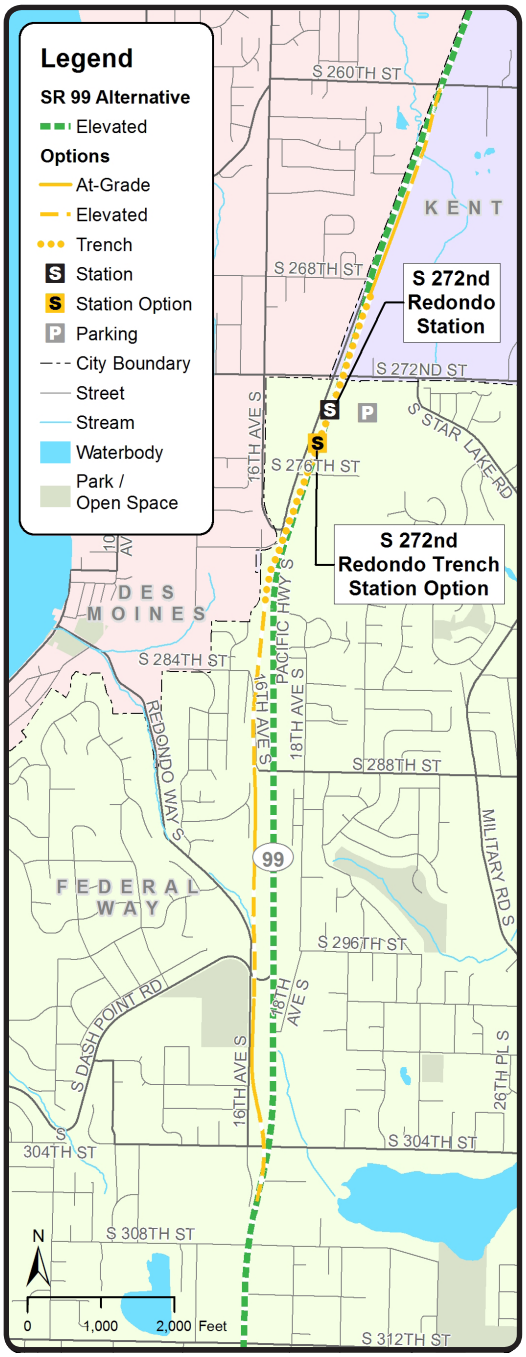
TABLE ES-12
PERFORMANCE MEASURES & IMPACTS COMPARED TO SR 99 ALTERNATIVE

LEGEND	↑ Increase	↓ Decrease

Performance Measures	S 272nd Redondo Trench Station Option
Cost Difference	↓ $10 million
Change in Total FWLE Daily Boardings	No Change
Change in Travel Time (minutes)	No Change
TOD Potential within 1/4 mile (acres)	No Change

Resource	Impacts
Affected Parcels	↓ 22
Residential Displacements	↑ 4
Business Displacements	↓ 1
Employees Displaced	↑ 60
Intersections Not Meeting Level of Service	No Change
Residences with a Reduction in Visual Quality	↑ 40
Light Rail Noise Impacts	↓ 439
Vibration Impacts	↑ 181
Wetland Impacts (acres)	↑ 0.4
Upland Habitat Impacts (acres)	↑ 3.9

EXHIBIT ES-15
S 272ND REDONDO TRENCH STATION OPTION



Station Option

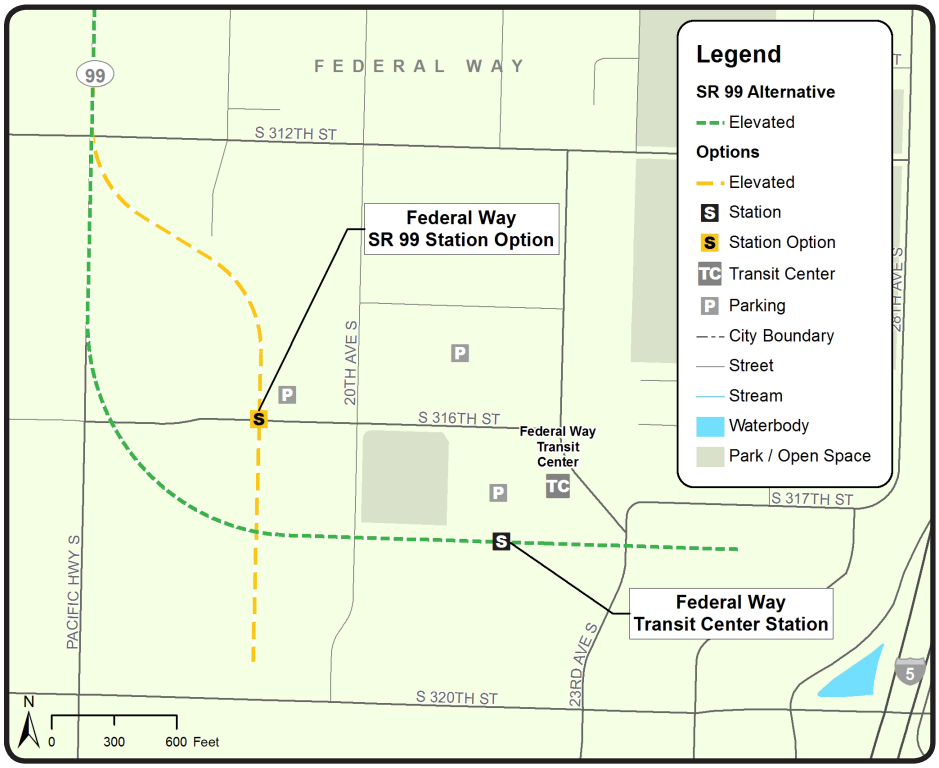
FEDERAL WAY SR 99

The Federal Way SR 99 Station Option (Exhibit ES-16) would be closer to SR 99, reducing the overall length, reducing the cost by $60M, and reducing business displacements (Table ES-13). 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, a retention pond, a small portion of a path and open lawn, and landscaping. The loss of parking could be mitigated and the path could be relocated. This station option would decrease ridership.

TABLE ES-13
PERFORMANCE MEASURES & IMPACTS COMPARED TO SR 99 ALTERNATIVE

LEGEND	↑ Increase ↓ Decrease	FW SR 99 Station Option
Performance Measures		
Cost Difference		↓ $60 million
Change in Total FWLE Daily Boardings		↓ 2,500
Change in Travel Time (minutes)		↓ <1
TOD Potential within 1/4 mile (acres)		No Change
Resource		**Impacts**
Affected Parcels		↓ 7
Residential Displacements		No Change
Business Displacements		↓ 13
Employees Displaced		↓ 20
Intersections Not Meeting Level of Service		No Change
Residences with a Reduction in Visual Quality		No Change
Light Rail Noise Impacts		↑ 47
Vibration Impacts		No Change
Wetland Impacts (acres)		No Change
Upland Habitat Impacts (acres)		No Change

EXHIBIT ES-16
FEDERAL WAY SR 99 STATION OPTION



SR 99 to I-5 Alternative

COST	TRAVEL TIME	DAILY RIDERSHIP
$1.59 Billion	13 Minutes	35,000 Riders

STATIONS	DAILY BOARDINGS	TOD POTENTIAL
Kent/Des Moines Station	3,000 Riders	Moderate
S 272nd Star Lake Station	3,000 Riders	Low
Federal Way Transit Center Station	12,000 Riders	High

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

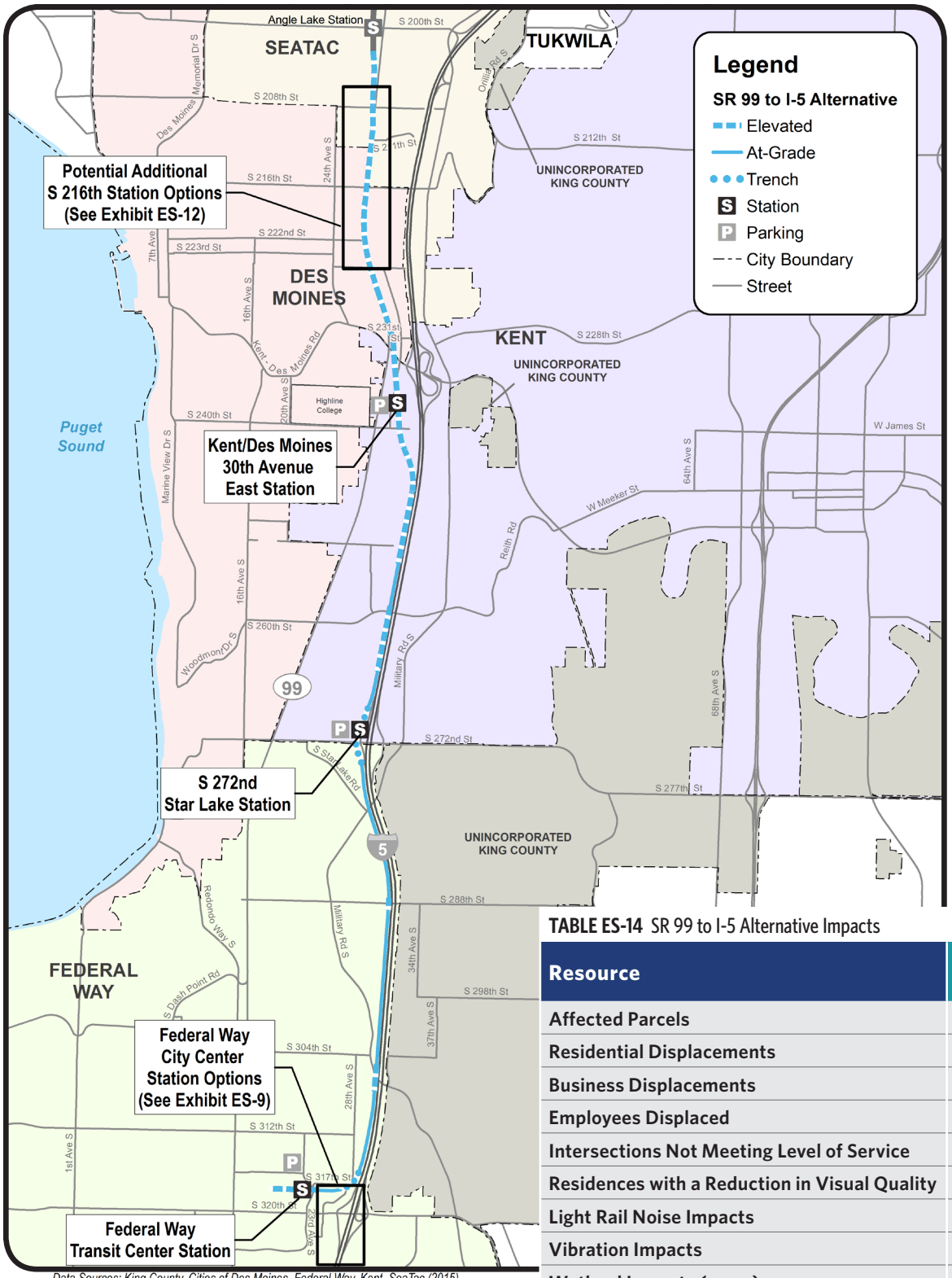
These options would have the same impacts as identified for these options on the previous pages.

The SR 99 to I-5 Alternative (Exhibit ES-17) 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 similar to the Preferred Alternative to the Federal Way Transit Center. Stations at S 272nd Street and the Federal Way Transit Center would be the same as the Preferred Alternative. Table ES-14 summarizes the impacts of the SR 99 to I-5 Alternative.

The SR 99 to I-5 Alternative would have the lowest ridership and would have a minute longer travel time than the Preferred Alternative or the SR 99 Alternative. It would cost more than the Preferred Alternative but less than the SR 99 or I-5 to SR 99 alternatives.

The SR 99 to I-5 Alternative would have the least parcels affected. It would avoid many of the business displacements associated with the SR 99 Alternative and many of the residential displacements associated with the Preferred Alternative. It would have fewer impacts on wetlands and upland habitat along I-5 than the Preferred Alternative, but would have greater impacts on Bingaman Creek, which would be piped south of S 288th Street. However, if this alternative were selected as the project to be built, it could be redesigned to reduce impacts on this stream. Also, similar to the Preferred Alternative, this alternative would have temporary impacts on the playfield at Mark Twain Elementary. 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 Preferred Alternative. It would have the greatest vibration impacts. All noise and vibration impacts could be mitigated.

EXHIBIT ES-17
SR 99 TO I-5 ALTERNATIVE



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

TABLE ES-14 SR 99 to I-5 Alternative Impacts

Resource	Impact
Affected Parcels	119
Residential Displacements	108
Business Displacements	46
Employees Displaced	420
Intersections Not Meeting Level of Service	8
Residences with a Reduction in Visual Quality	175
Light Rail Noise Impacts	1,200
Vibration Impacts	209
Wetland Impacts (acres)	0.7
Upland Habitat Impacts (acres)	21.7

I-5 to SR 99 Alternative

COST	TRAVEL TIME	DAILY RIDERSHIP
$1.84 Billion	13 Minutes	35,500 Riders

STATIONS	DAILY BOARDINGS	TOD POTENTIAL
Kent/Des Moines Station	3,000 Riders	Moderate
S 272nd Redondo Station	3,500 Riders	Moderate
Federal Way Transit Center Station	12,000 Riders	High

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:

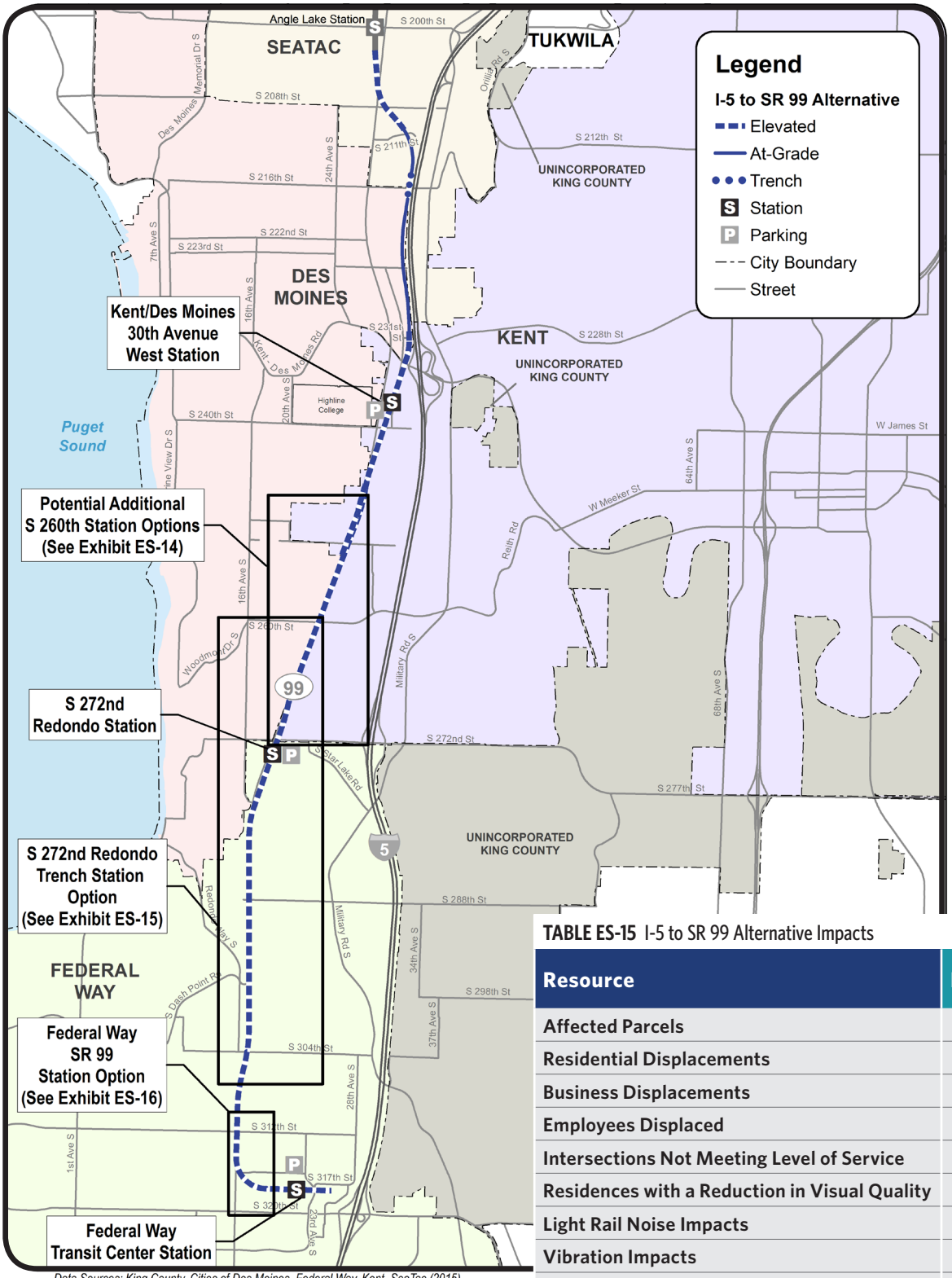
- Potential additional station at S 260th (West & East options)
- 272nd Redondo Trench Station Option
- Federal Way SR 99 Station Option

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-18) would have the same alignment as the Preferred Alternative from the Angle Lake Station to just north of Kent-Des Moines Road. It 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-15 summarizes the key impacts of the I-5 to SR 99 Alternative.

The I-5 to SR 99 Alternative would have slightly higher ridership than the SR 99 to I-5 Alternative, and lower ridership than the Preferred or SR 99 alternatives. Travel time would be a minute longer than the Preferred or SR 99 alternatives, but the same as the SR 99 to I-5 Alternative. This alternative would cost more than the Preferred and the SR 99 to I-5 alternatives, but slightly less than the SR 99 Alternative. It would displace the most residents, slightly higher than the Preferred Alternative, but would displace slightly fewer businesses than 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 upland habitat impacts along SR 99. This alternative would have the second most noise impacts, but the least vibration impacts. Visual quality impacts would be slightly less than the SR 99 Alternative.

EXHIBIT ES-18
I-5 TO SR 99 ALTERNATIVE



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

TABLE ES-15 I-5 to SR 99 Alternative Impacts

Resource	Impact
Affected Parcels	339
Residential Displacements	203
Business Displacements	96
Employees Displaced	500
Intersections Not Meeting Level of Service	9
Residences with a Reduction in Visual Quality	375
Light Rail Noise Impacts	1,860
Vibration Impacts	45
Wetland Impacts (acres)	<0.1
Upland Habitat Impacts (acres)	3.5

ES.5 Comparison of Alternatives

This section summarizes key performance measures and impacts for all alternatives. Table ES-16 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-16, ridership and travel time would be similar for all alternatives.

Residential displacements would be higher for the alternatives that travel along I-5, while business displacements would be higher for the SR 99 alternatives. The Preferred 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-16
FWLE ALTERNATIVE CHARACTERISTICS AND IMPACTS

	Alternative (Range of Impacts with Options)			
	Preferred	SR 99	SR 99 to I-5	I-5 to SR 99
Performance Measures				
Cost (2014 Dollars in billions)	$1.54	$1.89	$1.59	$1.84
Daily Projected Riders	36,500 (31,000- 36,500)	36,500 (21,500- 39,500)	35,000	35,500
Travel Time in minutes	12 (12)	12 (12-14)	13 (12-13)	13 (12-13)
Resource	**Impacts**			
Parcels Affected	211 (151- 211)	292 (239-321)	119 (110-126)	339 (296-339)
Residential Displacements	196 (139-258)	36 (36-108)	108 (108-154)	203 (203-210)
Business Displacements	42 (7-42)	101 (80-146)	46 (21-53)	96 (82-114)
Employees Displaced	370 (10-370)	580 (480-1,040)	420 (210-490)	500 (480-640)
Intersections Not Meeting Level of Service [All impacts can be mitigated]	10(10-10)	10(10-10)	8 (8-8)	9 (9-9)
Acres of Land Converted to Transportation Use	47.7(36.2-56.2)	40.6 (38.5-79.0)	35.2(26.2-49.6)	44.1(44.1-60.6)
Residences with a Reduction in Visual Quality	290 (290-290)	260 (245-315)	175(160-175)	375 (375-415)
Number of Light Rail Noise Impacts Before Mitigation [All impacts can be mitigated]	647 (615-864)	2,266 (1,664-2,474)	1,200 (999-1,288)	1,860 (1,385-1,907)
Number of Vibration/ Ground Borne Noise Impacts [All impacts can be mitigated[a]]	193 (185-193)/ 0 (0-0)	50 (0-271)/ 1 (1-1)	209 (159-225)/ 0 (0-0)	45 (45-238)/ 1 (1-1)
Acres of Wetland/ Wetland Buffer Impacted	1.3(1.3-2.0)/ 6.6 (6.4-8.1)	< 0.1 (<0.1-0.7)/ 0.2 (0.2-0.7)	0.7 (0.7-0.8)/ 4.1 (3.8-4.3)	< 0.1 (<0.1-0.4)/ 0.4 (0.5-0.9)
Length of Stream Impacts in Feet / Acres of Stream Buffers Impacted	1,015 (1,015-1,015)/ 2.5 (2.5-2.5)	0 (0-0)/ < 0.1 (<0.1-0.6)	1,015 (1,015-1,015)/ 1.4 (1.4-1.9)	0 (0-0)/ < 0.1 (<0.1-0.6)
Acres Upland Habitat Impacts	35.0 (33.6-38.9)	2.9 (1.9-8.0)	21.7 (21.6-22.8)	3.5 (3.5-7.9)
Number of Historic Properties Impacted	0 (0-0)	1 (1-2)	0 (0-0)	1 (1-1)
Number of Section 4(f) Resouces Impacted	0 (0-0)	1 (1-3)	0 (0-0)	1 (1-2)

[a] The Preferred Alternative would have 4 residual impacts.

Construction for alternatives along SR 99 would be more disruptive to the community due to lane closures adjacent to the construction area. Construction for alternatives along I-5 would not affect traffic on I-5 except for potential lane closures at S 216th Street, for tree removal along the alignment, and transmission line relocations over I-5 and for the Landfill Median Alignment Option. Cross streets over or under I-5 would be partially closed for construction. The Preferred and SR 99 to I-5 alternatives would have 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. The S 272nd Star Lake Elevated Station Option would have permanent impacts on the Mark Twain Elementary playfield.

Existing sound wall along a portion of an elevated guideway.

ES.6 Transit Oriented Development (TOD) Potential

As part of its TOD program, Sound Transit would evaluate development opportunities at specific locations as part of the station area planning efforts during final design. Sound Transit has evaluated the relative degree to which the FWLE station locations could support TOD using four factors: access, land use plans and policies, market support, and development potential. This analysis is documented in the *Federal Way Link Extension Transit Oriented Development Study* (Sound Transit, 2015) and the *Federal Way Link Extension Transit Oriented Development Study Addendum* (Sound Transit, 2016a).

In general, all stations within the same station area have similar **market support** scores. **Land use** scores for stations associated with SR 99 alignments are generally higher than stations associated with I-5 alignments. **Access** scores begin to differentiate station options, and **development potential** scores vary the most within general station areas.

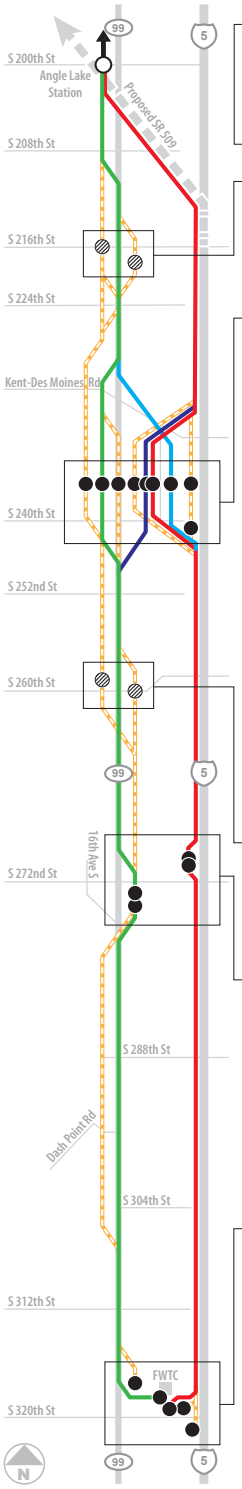
Overall, the Federal Way Transit Center Station and Federal Way SR 99 Station Option would have the greatest development potential, followed by the Kent/Des Moines At-Grade and I-5 station options.

The TOD potential for alternatives is primarily a reflection of the station area scores (see Exhibit ES-19). For example, any I-5 alignment must connect to the S 272nd Star Lake Station, which is the lowest-performing station overall in terms of TOD potential. This station lowers the TOD potential score for that alternative.

The S 216th Street and S 260th Street potential additional stations would increase the TOD potential for alternatives that could include these stations.

EXHIBIT ES-19

SUMMARY OF TOD POTENTIAL WITHIN FWLE CORRIDOR BY STATION OPTION



TOD Potential within FWLE Corridor

Low | Moderate | High

	OVERALL	ACCESS	LAND USE PLANS & POLICIES	MARKET SUPPORT	DEVELOPMENT POTENTIAL
POTENTIAL ADDITIONAL S 216TH STATION AREA					
S 216th West Station Option	High	High	Moderate	Moderate	Low-Moderate
S 216th East Station Option	High	High	Moderate	Moderate	Low
KENT/DES MOINES STATION AREA					
Kent/Des Moines HC Campus Station Option	High	High	High	Moderate	Low
Kent/Des Moines SR 99 West Station	High	High	High	Moderate	Low-Moderate
Kent/Des Moines SR 99 Median Station Option	High	Moderate	High	Moderate	Low
Kent/Des Moines SR 99 East Station Option	High	High	High	Moderate	Low-Moderate
Kent/Des Moines 30th Avenue West Station	High	High	Moderate	Moderate	Low-Moderate
Preferred Kent/Des Moines Station	High	High	Moderate	Moderate	Low-Moderate
Kent/Des Moines 30th Avenue East Station	High	High	Moderate	Moderate	Low-Moderate
Kent/Des Moines I-5 Station Option	Low-Moderate	Moderate	Low	Low-Moderate	Low-Moderate
Kent/Des Moines At-Grade Station Option	Low-Moderate	Low-Moderate	Low	Low-Moderate	High
POTENTIAL ADDITIONAL S 260TH STATION AREA					
S 260th West Station Option	Low-Moderate	High	Low-Moderate	Low-Moderate	Low
S 260th East Station Option	Low	High	Low-Moderate	Low-Moderate	Low
S 272ND STATION AREA					
S 272nd Redondo Station	Low-Moderate	High	Moderate	Low-Moderate	Low
S 272nd Redondo Trench Station Option	Low-Moderate	High	Moderate	Low-Moderate	Low
Preferred S 272nd Star Lake Station	Low	Moderate	Low	Low-Moderate	Low
S 272nd Star Lake Elevated Station Option	Low	Moderate	Low	Low-Moderate	Low
FEDERAL WAY STATION AREA					
Federal Way SR 99 Station Option	High	High	High	High	Moderate
Federal Way Transit Center Station (SR 99)	High	High	High	High	High
Preferred Federal Way Transit Center Station	High	High	High	High	High
Federal Way I-5 Station Option	High	High	Moderate	High	Low-Moderate
Federal Way S 320th Park and Ride Station Option	Low-Moderate	High	Low-Moderate	High	Low

NOTE:
- Stations listed west to east within each station area.
- These results are relative rankings for the FWLE corridor and represent whether a station is more or less supportive of TOD within this corridor.

ES.7 Avoidance, Minimization, and Mitigation Measures

Sound Transit will comply with applicable federal, state, and local environmental regulations and apply reasonable mitigation measures to reduce significant adverse impacts. The Final EIS identifies potential measures to mitigate adverse impacts of the project alternatives as well as avoidance and minimization measures that would be part of the project. These measures would be refined through final design and permitting. The Federal Transit Administration (FTA) will issue the NEPA ROD after the Final EIS that will include a list of all committed mitigation measures for the project to be built.

The following is a summary of key areas where mitigation measures are necessary:

Transportation: Mitigation would be needed at nine or ten intersections, depending on the alternative selected, and could include restriping, adding right- or left-turn pockets, allowing U-turn movements at intersections, and adding or optimizing traffic signals.

Visual: Sound Transit would use a variety of measures at different locations to mitigate adverse visual impacts: landscaping buffers, plantings between guideway columns and in front of retaining or sound walls, aesthetic treatment of walls, and context-sensitive design at stations and park-and-rides. It would mitigate tree removal along the I-5 corridor according to the WSDOT Roadside Policy Manual, and trees removed outside of WSDOT right-of-way would be mitigated per the local jurisdiction requirements.

Noise: Sound Transit would use sound walls and other design measures to mitigate noise impacts. The need for building insulation will be investigated where necessary.

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

Ecosystems: During final design and permitting, Sound Transit will first try to avoid and minimize impacts on wetlands and streams through design measures and best management practices. Where impacts are unavoidable, Sound Transit will mitigate them in accordance with applicable federal regulations, local critical area ordinances, and permit requirements. Sound Transit is committed to no net loss of wetland functions and wetland areas for the FWLE.

Parks: Mitigation measures for impacts on Federal Way Town Square Park would include purchase of replacement land, enhancement or restoration of the existing park, or financial compensation.

ES.8 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:

- Removal of mature trees and upland habitat 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 Preferred Alternative, SR 99 to I-5 Alternative, and I-5 to SR 99 Alternative.
- The elevated guideway associated with the SR 99 and I-5 to SR 99 alternatives 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.

25,000 RESIDENTS AND BUSINESSES RECEIVED A MAILER ANNOUNCING THE AVAILABILITY OF THE DRAFT EIS, HOW TO COMMENT, AND INFORMATION ABOUT THE DRAFT EIS ALTERNATIVES. 640 COMMENT SUBMITTALS ON THE DRAFT EIS WERE RECEIVED.

Some temporary impacts during construction would not be avoidable and could be significant and adverse in some locations. These impacts would include temporary but long-term lane or roadway closures, loss of parking, and noise and vibration. Detour routes 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.9 Public and Agency Involvement

Sound Transit and the 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. Comments were accepted at these meetings and via mail and email. 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 in April 2015 included a formal review and comment period with two public meetings with hearings.

After review and consideration of the Draft EIS findings and comments from the public and agencies, the Sound Transit Board identified a Preferred Alternative for evaluation in the Final EIS. Sound Transit notified the public of the Preferred Alternative through listserv emails, website updates, circulation of a press release, and attendance at community events and neighborhood meetings from August 2015 to October 2016. A Notice of Availability for this Final EIS was posted in the Federal Register and the

SEPA Register on November 18, 2016, along with notices in local newspapers and on the Sound Transit website. Notification of the Final EIS was sent to the project's distribution list of interested parties and agencies, Sound Transit's mailing lists, those who commented on the Draft EIS, and addresses within a half mile of the project.

Once the Sound Transit Board selects an alternative to build, Sound Transit will continue to coordinate throughout final design and construction with affected agencies and local communities. Appendix B of the Final 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 area.

ES.10 Other Environmental Considerations

ES.10.1 SECTION 4(F) RESOURCES

Section 4(f) is a U.S. Department of Transportation statute that protects significant historic properties, publicly owned parks, publicly owned recreation areas, and fish and wildlife refuges. It prevents FTA from approving a project that adversely affects these properties unless (1) there is no feasible and prudent alternative, and (2) the project minimizes the impacts as much as possible. When FTA determines that the use of a Section 4(f) property has only a de minimis impact, the Section 4(f) restrictions do not apply.

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. The impacted area is used for parking, landscaping, part of the loop pathway, and a bioretention pond. If this station option is selected as part of the project to build, it would be designed to minimize the impact on the park as described in Appendix E, Section 4(f) and Section 6(f) Evaluation, of

the Final EIS. By implementing measures to minimize harm such as realigning the loop path and replacing the bioretention facility, the station option would not have an adverse effect on any of the park's recreational activities, features, or attributes. If the station option is advanced, FTA's preliminary determination is that the impact to Town Square Park would be de minimis. FTA would coordinate with the City of Federal Way to obtain its concurrence on the de minimis determination.

The project's potential Section 4(f) use of historic properties is limited to partial acquisition of two parcels containing buildings eligible for the National Register. One parcel contains most of Highline College, including several historic buildings and associated parking lots. The Kent/Des Moines HC Campus Station Option associated with the SR 99 Alternative would use an edge of the east parking lot. The other parcel is on SR 99 in Federal Way and includes the eligible US Bank building and parking. The SR 99 and the I 5 to SR 99 alternatives would acquire a narrow strip of the parking lot on this parcel. The acquisition and use of land under either of these scenarios would not affect the physical integrity of the 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 if these alternatives or options were selected as the project to be built.

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

ES.10.2 ENVIRONMENTAL JUSTICE

Chapter 7 of the EIS assesses whether the FWLE alternatives would result in disproportionately high and adverse effects on minority and/or low-income populations. It also describes engagement with 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 benefits to minority and low-income populations, FTA has determined 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 minority and low-income residents, including 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.11 Areas of Controversy and Issues to Be Resolved

Areas of controversy and issues to resolve include:

- **Funding:** Funding from ST2 tax revenue is projected to be available to construct the FWLE from Angle Lake Station to the Kent/Des Moines Station. ST3, on the November 2016 ballot, would authorize and fund the project to the Federal Way Transit Center.
- **Location of Preferred Alternative in WSDOT right-of-way and use of WSDOT right-of-way:** Sound Transit must secure agreements and approvals from WSDOT and the Federal Highway Administration (FHWA) for the following:
    - Use of portions of the I-5 right-of-way
    - Modifications to other parts of the freeway, such as shoulders or existing noise walls
    - Construction staging and access
    - Lane closures affecting the interstate highway
    - Any modifications that could affect highway operations or safety

  Most of these approvals would occur during final design. Sound Transit has coordinated with FHWA and WSDOT to develop conceptual engineering definitions for the alternatives, but as final design progresses, FHWA or WSDOT could request modifications or place other restrictions on the project. Sound Transit has worked successfully with WSDOT and FHWA to obtain approvals for right-of-way use for other Sound Transit projects, but it would affect the project cost, construction impacts, and schedule if Sound Transit is not able to use the right-of-way as anticipated in the current design of the alternatives. In addition, the Preferred Alternative alignment could be shifted east within the WSDOT right-of-way to minimize some visual, noise, vibration, and ecosystem impacts based on further coordination with FHWA and WSDOT. Such a shift might require additional guardrail or other highway design features to maintain highway safety.
- **Midway Landfill:** Sound Transit will need to continue coordination with the US Environmental Protection Agency (EPA) and the Washington State Department of Ecology because Midway Landfill is a Superfund site. Prior to building the FWLE at the Midway Landfill, EPA will need to evaluate Sound Transit's design and construction plans to determine whether the FWLE is consistent with the remedial action that has been implemented at the Midway Landfill and what documentation is needed related to the remedy as described in the Midway Landfill Record of Decision under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (EPA, 2000).
- **Mark Twain Elementary School:** Sound Transit has continued its coordination with Federal Way Public Schools regarding design of the Preferred Alternative and its effects on school district property. The Preferred Alternative studied in the Final EIS includes a trench profile underneath a portion of the school ballfield. The S 272nd Star Lake Elevated Station Option includes an elevated profile design that would be above ground on the same portion of the ballfield. When the Sound Transit Board selects the alternative to be built, the profile of the guideway in this location will be resolved. Under either scenario, Sound Transit expects ongoing coordination with the school district related to construction period effects, final design of the light rail guideway, and appropriate mitigation measures for project impacts.
- **Potential additional stations:** Stations at S 216th Street and S 260th Street were not included in the ST2 or ST3 plans. Further evaluation of consistency with these plans would be required before they could be added to the FWLE. The Preferred Alternative does not include any potential additional stations.

Sound Transit would continue to coordinate with the appropriate federal, state, and local agencies and jurisdictions to address these issues.

ES.12 Next Steps

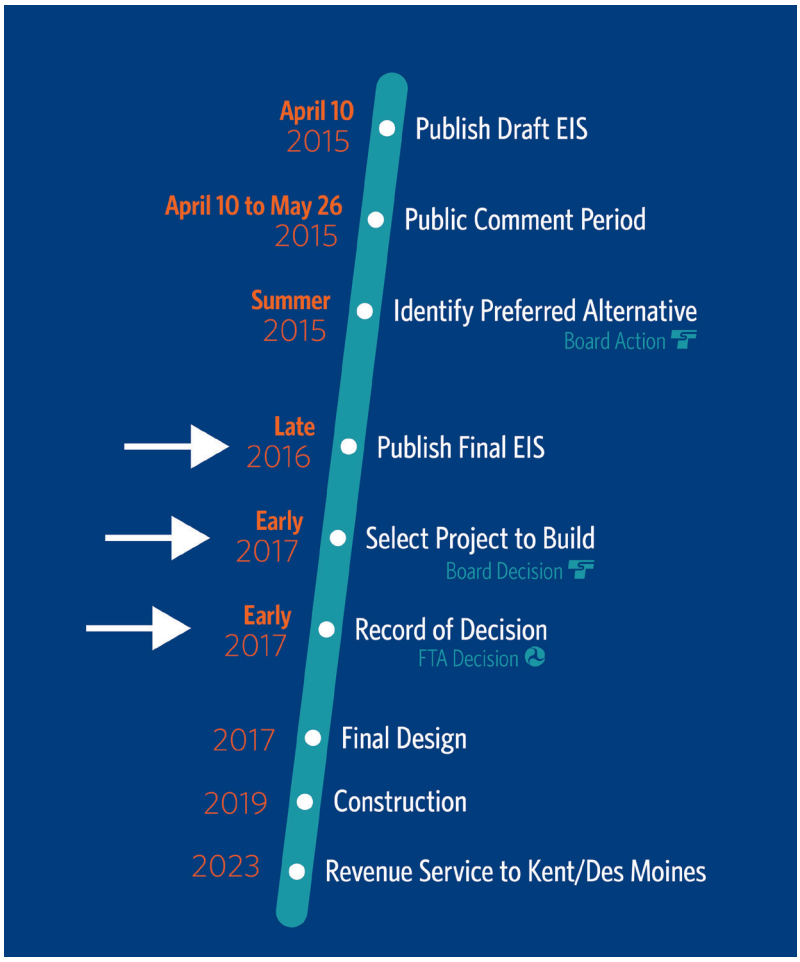
Following publication of the Final EIS, FTA will accept comments on the Final EIS for 30 days.

After considering the analysis in the Final EIS, including public and agency comments, the Sound Transit Board will select the project alternative to be built. FTA is then expected to publish a ROD for the project that will document 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.

In general, FTA must combine the Final EIS and ROD into a single document. However, that requirement does not apply when FTA finds that it is not practical to combine the documents, such as when a Draft EIS does not identify a Preferred Alternative, or when timing requirements make a joint Final EIS/ROD impractical (e.g., if state law bars a final project decision until the Final EIS has issued). Both of those circumstances exist in this case. Because FTA has determined it is not practical to issue a combined Final EIS and ROD, it is publishing these documents separately.

After the Sound Transit Board selects the project to be built and FTA issues a ROD, Sound Transit will initiate final design, begin property acquisition, plan construction, and apply for other permits and approvals needed to construct and operate the light rail project. If the selected project is within I-5 right-of-way, FHWA is expected to issue a combined ROD with FTA or its own ROD for the project and can use this Final EIS to meet its NEPA and other applicable decision requirements. Similarly, local jurisdictions issuing permits for the project may rely on the Final EIS to satisfy their SEPA requirements. Final design, permitting, and right-of-way acquisition are scheduled for 2017 and 2018.

EXHIBIT ES-20
NEXT STEPS



References

Puget Sound Regional Council (PSRC). 2009. *VISION 2040*.
http://www.psrc.org/growth/vision2040/.
December 2009.

Sound Transit. 2016a. *Sound Transit 3: The Regional Transit System Plan for Central Puget Sound (ST3)*.
http://soundtransit3.org/document-library
Adopted June 23, 2016.

Sound Transit. 2016b. *Federal Way Link Extension Transit Oriented Development Study Addendum.*
November 2016.

Sound Transit. 2014. *Regional Transit Long-Range Plan*.
http://www.soundtransit.org/longrangeplan.
Adopted in 1996; updated in 2005 and in December 2014.

Sound Transit. 2008. *Sound Transit 2: A Mass Transit Guide; The Regional Transit System Plan for Central Puget Sound (ST2)*.
http://www.soundtransit.org/sites/default/files/documents/pdf/st2/transitexapansion/st2_plan_web.pdf.
July 2008.

Washington State Department of Transportation (WSDOT). 2015. *Roadside Policy Manual*. M3110.
http://www.wsdot.wa.gov/Publications/Manuals/M3110.htm.
August 2015.

1.0 Purpose and Need for Federal Way Link Extension

The Central Puget Sound Regional Transit Authority (Sound Transit) is proposing the Federal Way Link Extension (FWLE) to expand the regional light rail system south from SeaTac to Des Moines, Kent and Federal Way in King County. This 7.6-mile extension would connect the Angle Lake Station 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. This project was previously known as the Federal Way Transit Extension and is part of the Sound Transit 2 (ST2) program of projects.

Exhibit 1-1 shows how the FWLE would integrate into the planned regional light rail system and connect the northern, southern, and eastern reaches of the greater Seattle metropolitan area. Exhibit 1-2 shows the project location relative to the four FWLE corridor cities and major destinations in these cities. As of the 2010 U.S. Census, about 85,000 people lived within a half mile of the project corridor in SeaTac, Des Moines, Kent, and Federal Way, and the Puget Sound Regional Council (PSRC) estimates there are about 27,000 jobs in the corridor. The total population and employment in these cities is even higher, with 278,000 people and 125,000 jobs as of 2014 (PSRC, 2015a).

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. The project will:

- 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.

Purpose and Need Statement

The purpose and need section describes why the agency is proposing to invest taxpayer dollars in the project. It clarifies what problems the project is addressing and justifies the expenditure needed. The purpose and need therefore drive the process for alternatives consideration, in-depth analysis, and ultimate project selection.

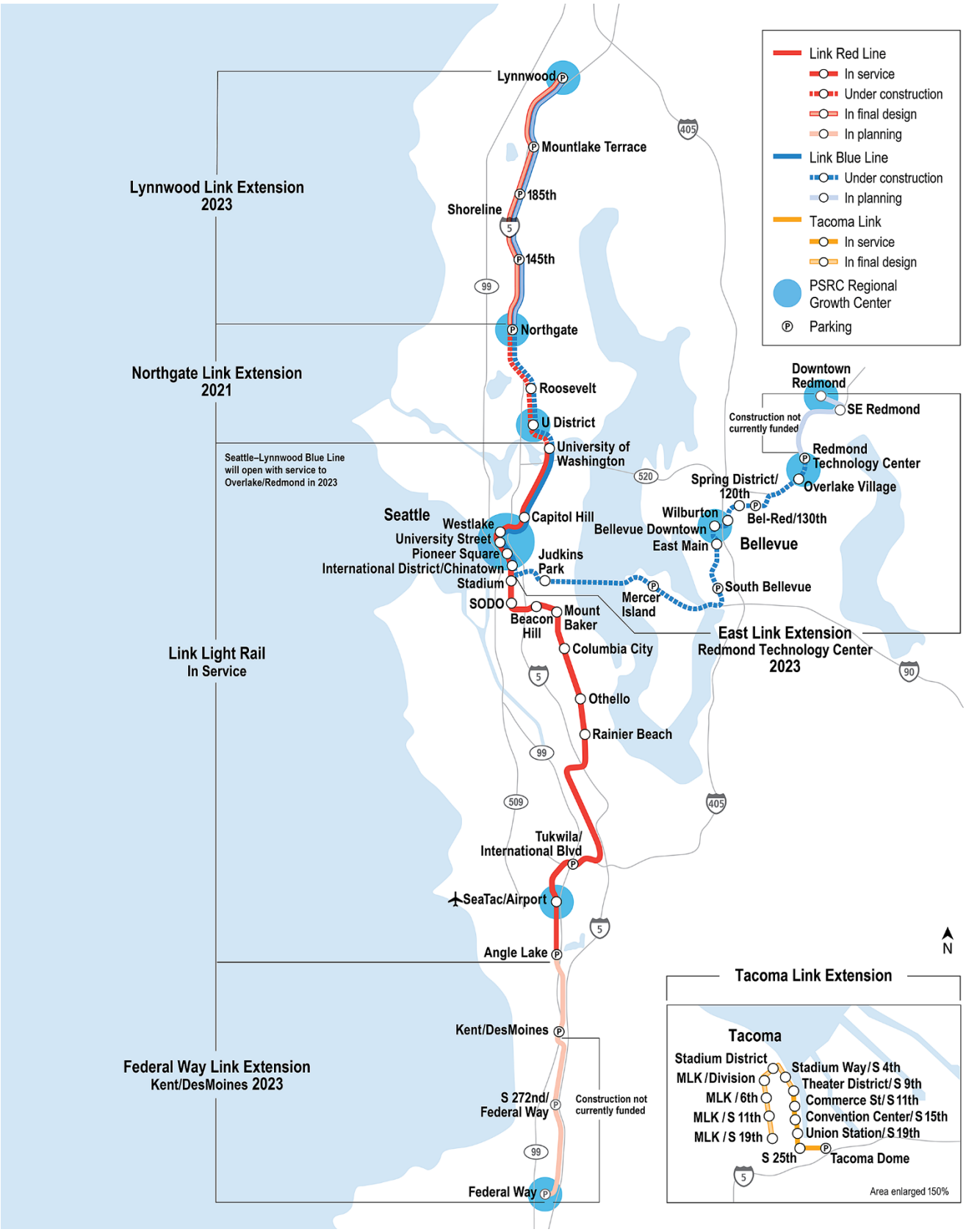
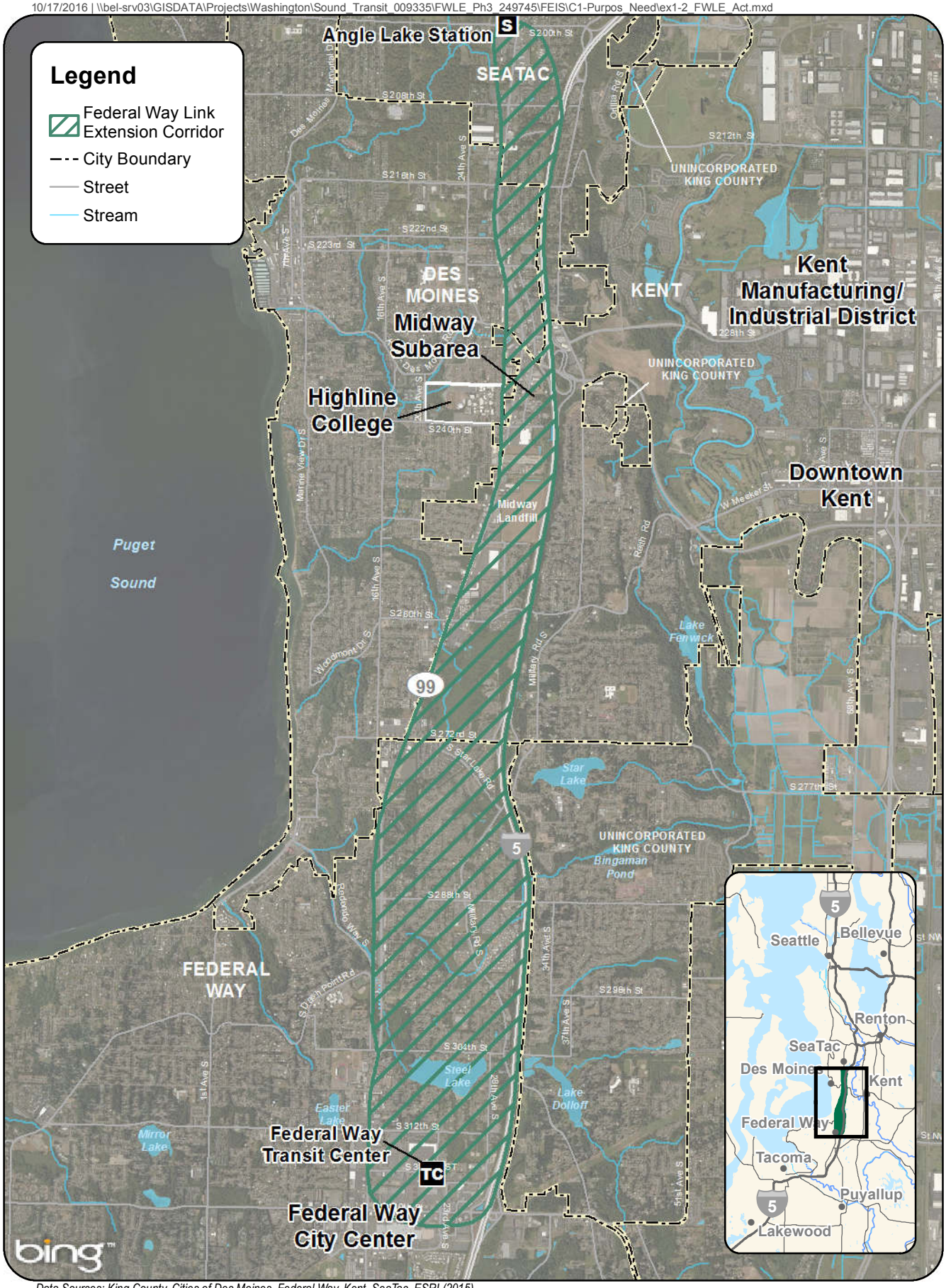


EXHIBIT 1-1
Sound Transit Link Light Rail System and FWLE Location



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac, ESRI (2015).

N

0 0.5 1 2 Miles

EXHIBIT 1-2

FWLE Corridor and Activity Centers

- Expand mobility by improving connections to the regional multimodal transportation system with peak and off-peak transit 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. 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 (Sound Transit, 2014a).
- Implement a financially feasible HCT system to help preserve and promote a healthy environment.

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. It can operate on exclusive rights-of-way such as a rail track or dedicated busway, or on existing streets with mixed traffic. Its main goal is to provide faster, more convenient, and more reliable service for more passengers.

1.2 Need for the FWLE

The FWLE is needed for six key reasons described below.

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 is expected to increase and degrade transit performance and reliability. Section 3.4.2, Transit Operations, provides additional information on existing transit performance in the FWLE area.
- Despite some substantial investments benefitting transit in the corridor (see text box), congestion extends well beyond typical commuting hours and leads to unreliable travel times. I-5 between Federal Way and Seattle is typically congested for 10 hours each weekday. By 2035, without major investments, it is expected to worsen to 14 hours on weekdays.
- A single-occupancy driver going between Federal Way and Downtown Seattle (approximately 22 miles) during peak

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
- Continuous 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

periods, when congestion is high and delays are unpredictable, must allow 62 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 morning peak hour and about 10 minutes more in the afternoon peak hour.

- Projected growth and increasing congestion will further degrade bus service. Section 3.4.3, Arterial and Local Streets Operations, describes the intersections in the FWLE study area that already fail, or barely meet, state and/or local standards, including 13 intersections along SR 99, Kent-Des Moines Road (SR 516), S 272nd Street, and Military Road S. By 2035, 20 intersections in the study area will fail or will barely meet state and/or local standards. 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 International Boulevard light rail station. When this trip is combined with Central Link light rail, it 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.

Need #2: North-south transit demand is expected to grow by up to 80 percent by 2035 as a result of residential and employment growth in the FWLE study area (Sound Transit, 2014b). This growth will require additional and more reliable transportation options than currently exist.

- Between 2010 and 2035, population will grow over 24 percent in cities within the FWLE corridor, and employment will grow 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 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 two 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) that have either existing or planned Link access.

- PSRC's metropolitan transportation plan, *Transportation 2040* (PSRC, 2015c), identifies new transportation improvements needed in and between these growth centers to support concentrating growth in existing urbanized areas. These improvements cover multiples modes, including transit.
- 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. This undesirable condition may worsen in the future, forcing passengers to stand for the duration of their travel and slowing 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.

Limits of Existing Transit Service:

- Most regional express bus service in the FWLE study area running on I-5 is Seattle-centric and operates at 30-minute headways in the peak periods, with limited or non-existent off-peak and weekend service. The bus routes using I-5 make limited stops and primarily 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 for 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 employment centers. It 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:

- Over 40 percent of workers residing in the corridor worked in retail, manufacturing, warehousing, transportation, communications, or utilities in 2015 (PSRC, 2015b). Retail and manufacturing work schedules frequently do not conform to peak-hour commute transit service. For instance, about 14 percent of 2013 U.S. Census American Community Survey respondents in the FWLE corridor began their commute between 4 p.m. and 5 a.m.
- Households in the corridor need reliable transit service to employment centers outside the FWLE corridor during non-peak hours 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 SeaTac, Des Moines, Kent, and Federal Way. 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. It improves access to schools, jobs, family, and health care for transit-dependent youth and seniors.

- Transportation costs are problematic and rising steadily. Tolls are being implemented on major freeways in the region, with more tolls expected in the next several years. The price of fuel fluctuates, but generally increases over time. PSRC forecasts a 40 percent increase in parking costs for major regional growth centers. All these expenses increase burdens on low-income residents and impede access to employment and educational opportunities, and health care services.

- The corridor has a higher proportion of low-income residents than King County as a whole. The 2010-2014 American Community Survey reported that nearly 18 percent of the population in the FWLE corridor had incomes at or below the federal poverty level, compared to less than 12 percent for King County. There are some areas along SR 99 where over 50 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 2014-2015 school year.
- 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 rely on transit.

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.

Agencies have been planning for HCT in the FWLE corridor for over 30 years. Table 1-1 lists the plans that have called for HCT in this corridor over the last 35 years. As the population grows, the need for regional mobility remains vital to maintain a healthy economy. In anticipation of this project, cities in the corridor updated their local comprehensive plans to encourage transit-oriented development in certain areas.

TABLE 1-1

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, which identifies potential rail extension in the corridor; voters approve funding for *Sound Move*, the initial package of 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	Sound Transit publishes Regional Transit Long-Range Plan Supplemental EIS and updates the Long-Range Plan, which identifies light rail extension in the corridor.

TABLE 1-1 (CONTINUED)

History of HCT/Light Rail Planning in the FWLE 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 include 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.
2014	Sound Transit publishes Regional Transit Long-Range Plan Supplemental EIS and updates the Long-Range Plan, which continues to identify light rail extension in the corridor.
2016	Sound Transit adopts the Sound Transit 3 (ST3) plan; if funding approved by voters, it funds FWLE construction to the Federal Way Transit Center.

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 support actions to increase energy efficiency and 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

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."

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2.0 Alternatives Considered

This chapter describes the Final Environmental Impact Statement (Final EIS) alternatives for the Federal Way Link Extension (FWLE). It also summarizes the alternatives developed but not further considered during the early scoping process and Alternatives Analysis. This Final EIS evaluates a Preferred Alternative, three other light rail alternatives, and a No Build Alternative. The No Build Alternative 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.

This chapter is organized into the following sections:

- 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 Relationship to RapidRide A Line and SR 509 Extension Project
- 2.7 Next Steps and Schedule

2.1 Overview

The FWLE corridor is generally bounded by State Route (SR) 99 to the west, Interstate 5 (I-5) to the east, S 200th Street to the north, and S 320th Street to the south (see Exhibit 1-2). Alternatives outside this area or with different origins or destinations were not considered because they would not meet the project's purpose and need. The FWLE 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. Section 2.3 presents additional detail on this process, the alternatives evaluated, and the alternatives not carried forward. As shown in Exhibit 2-1 and Table 2-1, this Final EIS evaluates a No Build Alternative and four build alternatives, including the Preferred Alternative. Each build alternative includes three stations: Kent/Des Moines, S 272nd Street, and the Federal Way Transit Center.

Station Option

Station options are alternate locations for each station area: Kent/Des Moines, S 272nd Street, and Federal Way City 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 a station.

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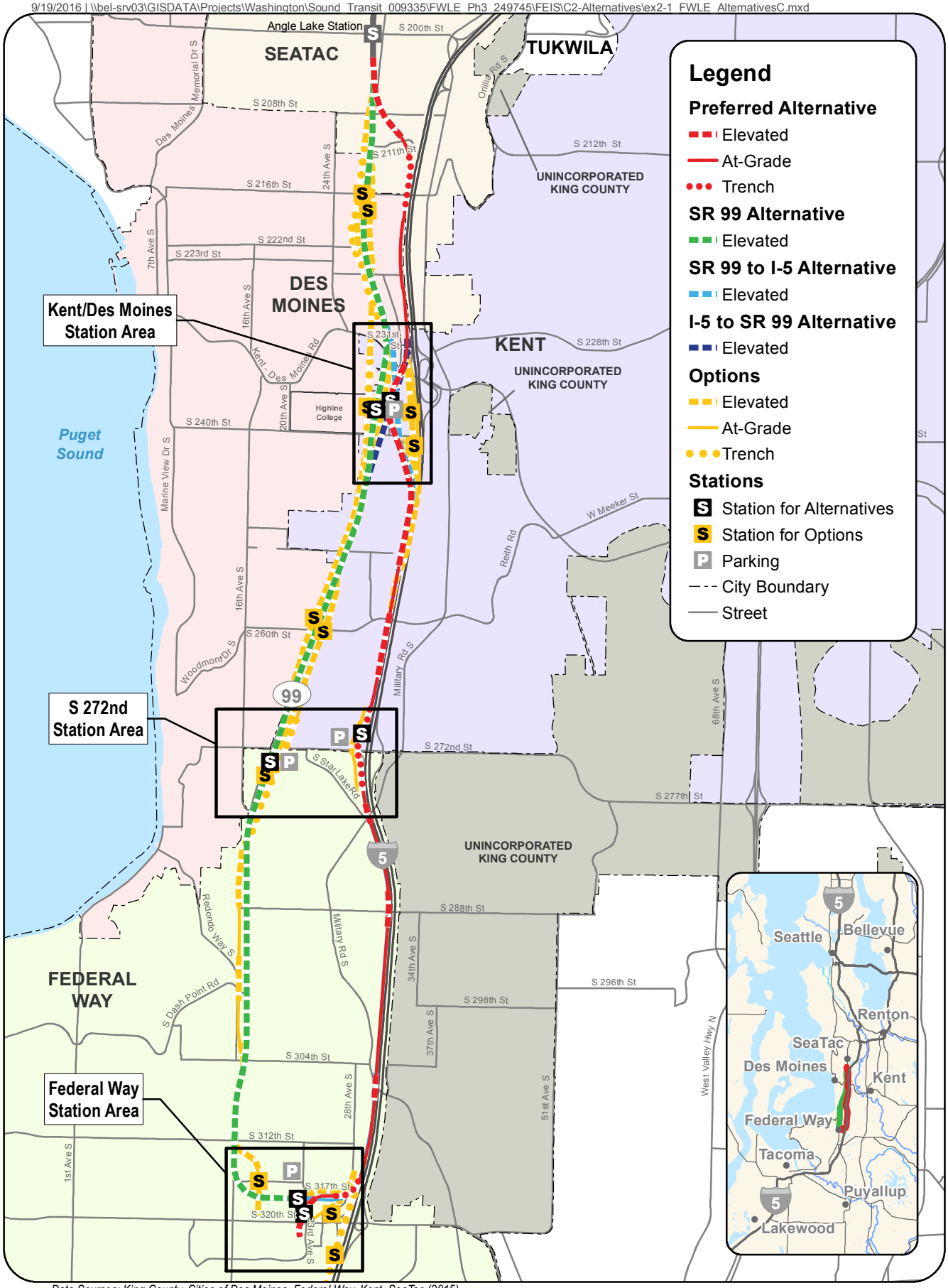

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

N

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EXHIBIT 2-1
FWLE Alternatives

Federal Way Link Extension

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

Alternative	Stations	Station Options	Potential Additional Stations (not funded in ST2 or ST3)	Alignment Options
No Build	None	None	None	None
Preferred	• Kent/Des Moines • S 272nd Star Lake • Federal Way Transit Center	• Kent/Des Moines At-Grade • Kent/Des Moines I-5 • S 272nd Star Lake Elevated • Federal Way I-5 • Federal Way S 320th Park-and-Ride	None	• Landfill Median • S 317th Elevated
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
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

ST2 = Sound Transit 2 (Sound Transit, 2008)
ST3 = Sound Transit 3 (Sound Transit, 2016)

For the Kent/Des Moines and Federal Way Transit Center stations, a primary location and one or more station options have been identified. The SR 99 Alternative has one station option at S 272nd Street. The Preferred Alternative also has an alignment option at the Midway Landfill for avoiding or minimizing impacts at this location.

After considering the Draft EIS and the public and agency comments received, the Sound Transit Board passed Motion M2015-56 in July 2015, identifying the I-5 Alternative with the Kent/Des Moines SR 99 East Station Option as the Preferred Alternative. (Throughout the Final EIS, this alternative is referred to as the Preferred Alternative.)

When it identified the Preferred Alternative, the Board directed Sound Transit staff to work with stakeholders to develop and evaluate potential improvements to it in three areas. These include:

- Optimize the location of the Preferred Kent/Des Moines Station to facilitate access to Highline College and enhance future transit-

oriented development (TOD) potential in the Midway area of Kent and Des Moines.

- Identify ways to improve the potential for TOD all along the corridor, such as through better east-west transit connections to stations, pedestrian and bike access improvements, and placemaking initiatives and development opportunities.
- Modify the preferred Federal Way Transit Center station to facilitate multimodal connections to the existing Federal Way Transit Center, enhance TOD potential in the downtown area, and accommodate a future light rail extension to the south on either I-5 or SR 99.

Sound Transit conducted four stakeholder workshops for the Kent/Des Moines Station in September and October 2015. The stakeholders reached consensus that the Preferred Kent/Des Moines Station should optimize access for all modes of transport, create a safe pedestrian environment, and create near-term and long-term development opportunities. Following the workshops, the group recommended the location on the west side of 30th Avenue S with the following refinements (some of which are beyond Sound Transit's authority):

- Provide a connection to campus.
- Include walkways, lighting, and other treatments.
- Enhance pedestrian crossing safety at SR 99.
- Facilitate near-term TOD and mixed-income housing along S 236th Street.
- Maintain existing on-campus Metro bus stops and consider providing more frequent east-west transit service.
- Improve pedestrian access to neighborhoods.
- Consider naming the station "Highline Station" or "Highline College Station."
- Continue stakeholder engagement for station planning.

Stakeholder Workshops

Stakeholders that were invited to participate in workshops for one or more of the Preferred Alternative stations include:

- City of Kent
- City of Des Moines
- Highline College
- Highline College students
- WSDOT
- King County Metro
- Puget Sound Regional Council
- King County Executive's Office
- Transportation Choices
- OneAmerica
- Futurewise
- Urban Land Institute

Sound Transit met with the City of Federal Way and King County Metro in September and October 2015 to optimize the location of the Preferred Federal Way Transit Center Station. The preferred alignment for this station is along the west side of 23rd Avenue S and north of S 320th Street. The tail track would extend over S 320th

Street. A stakeholder workshop was conducted in December 2015 to review the station layout and discuss multimodal connections to the transit center and TOD potential.

Sound Transit met with the City of Kent, Federal Way Public Schools, and King County Metro throughout fall 2015 and winter 2016 to optimize the Preferred S 272nd Star Lake Station. A stakeholder workshop was also conducted in March 2016 that focused on potential non-motorized station access improvements, particularly along S 272nd Street to SR 99. The participants developed improvements that could be implemented, some of which would require collaboration among multiple jurisdictions.

Accordingly, Sound Transit modified the design of the Preferred Alternative to shift the Kent/Des Moines Station about 200 feet from the east side of SR 99 to the west side of 30th Avenue S, and to re-orient the Federal Way Transit Center Station from east-west to north-south. These changes also affected the alignments to and from the stations to some degree.

In addition to these workshops, additional changes to the Preferred Alternative were made since the Draft EIS was published to minimize impacts or address challenges identified during preliminary engineering. These include:

- Adding the S 272nd Elevated Star Lake Station Option and the S 317th Elevated Alignment Option, to address higher than expected groundwater levels in both locations
- Shifting the alignment east approximately 15-feet to avoid impacts on the Puget Sound Energy Midway Substation
- Elevating the alignment entirely over Bingaman Creek and realigning the creek around the guideway columns, due to new information on fish use of the creek downstream
- Extending the pocket track between S 304th Street and S 317th Street to accommodate overnight storage of up to two 4-car trains
- Refining the footprint to allow for landscaping around project elements as mitigation for visual impacts

Compared to the I-5 Alternative with the Kent/Des Moines SR 99 East Station Option in the Draft EIS, these changes would have the following effects:

- Minor changes in properties affected, with fewer residential, business, and employee displacements
- Acquisition of one more high-risk hazardous materials site for the Federal Way Transit Center Station
- Reduced stream impacts from elevating the alignment over Bingaman Creek
- Reduced upland habitat impacts from footprint minimization efforts
- Additional visual and noise impacts with the S 272nd Elevated Star Lake Station Option and the S 317th Elevated Alignment Option
- Permanent impacts to a portion of the playfield at Mark Twain Elementary School from the S 272nd Elevated Star Lake Station Option

There would not be substantial differences in impacts related to the changes in the Preferred Alternative alignment and footprint for traffic, light rail operations, land use, social, air quality, vibration, energy, geology, utilities, and historic and archaeological resources.

For this Final EIS, the Federal Way Transit Center is the terminus of the project. Any of the Federal Way Transit Center station options would permit a future Link extension to Tacoma along either 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, where having an interim station would result in different impacts, this Final EIS analyzes the impacts of two shorter segments: Angle Lake to Kent/Des Moines and Angle Lake to S 272nd Street.

Interim Terminus

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 Preferred Alternative has no potential additional stations. However, other build alternatives include potential additional stations along SR 99 at S 216th Street and S 260th Street. Both station locations include options on the eastern and western sides of SR 99. These stations were not part of the ST2 funding package and are not included in the ST3 funding package, but could be added to the project if Sound Transit determines that they are consistent with those plans, if additional funding becomes available, and if an alignment on SR 99 were built.

The SR 99 to I-5 and I-5 to SR 99 alternatives use portions of both the Preferred and SR 99 alternatives. The Final 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 Exhibit 2-1.

2.2.1 No Build Alternative

The No Build Alternative includes projects, funding packages, and proposals in the central Puget Sound Region that are planned to occur with or without the FWLE. No Build improvements include roadway and transit actions by state, regional, and local agencies that are currently funded or committed, and those that are likely to be implemented based on approved and committed funding. The same population and employment growth projections by Puget Sound Regional Council through 2035 inform the No Build and build alternatives.

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 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 in Bellevue

It also includes the SR 509 Extension Project (SR 509 Extension), a Washington State Department of Transportation (WSDOT) major freeway extension connecting the existing SR 509 terminus in SeaTac with I-5 at the northern end of the FWLE corridor. King County Metro, Pierce Transit, and Sound Transit are planning bus service modifications to take advantage of the SR 509 Extension. There will be more bus routes serving the FWLE corridor, with better headways. The bus network used in the Final EIS

SR 509 Extension Project

This project is sometimes known by other names, such as the "State Route 509: Corridor Completion/I-5/South Access Road Project" (2003 Record of Decision), the "SR 509 Corridor Freight and Congestion Relief Project" (WSDOT website), and the "SR 167, SR 509 and I-5 Puget Sound Gateway Project" (WSDOT website and Connecting Washington Transportation Bill).

analysis is consistent with the future service plans developed by the transit agencies. Appendix A of the Transportation Technical Report (Appendix G1 of this EIS) describes the major projects assumed in the No Build Alternative.

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 (see Table 2-2 in Section 2.2.7 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 and walls or barriers to restrict other access. Emergency access points would be located approximately every 2,500 feet. Alternatives along I-5 would require construction of new limited-access roads for these access points.

Elevated structures would require support columns or other bridging support structures. For at-grade guideway in areas with slopes, retaining walls might be needed next to an adjacent hillside or 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

The profile along I-5 would vary between at-grade, elevated, and trench, based on topography. The developed nature of the FWLE corridor and large number of cross streets require an elevated guideway along SR 99. The profiles of the alternatives and options are shown in Exhibits 2-8 to 2-10, 2-12, 2-13, and 2-17 through 2-23 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.

At-Grade

At-grade light rail operates best in areas with less than 6 percent grade and in areas with adequate space within reserved street rights-

of-way or off-street corridors. At-grade is typically the least-cost profile. This project would have an at-grade profile only within WSDOT's I-5 right-of-way for the Preferred Alternative, the SR 99 to I-5 Alternative, and the I-5 to SR 99 Alternative. No at-grade crossings of roadways are proposed.

Vegetation Next to the Guideway

Per Sound Transit's Design Criteria Manual, Sound Transit must maintain an approximately 11-foot zone beyond the guideway footprint free of trees that could overhang onto the guideway. Depending on the profile type and site conditions, the width of this zone varies slightly. Sound Transit would plant shrubs and groundcover in this area.

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 guideway must have a minimum clearance of at least 16.5 feet near roadways, but topography and other considerations can 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

With a trench profile, the trackway is cut into the ground with a retaining wall on one side or both sides. With a retained fill profile, the trackway is built 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 travel under roadways.

2.2.2.2 Stations

The project includes three light rail stations and two potential additional stations. The stations would be elevated, at-grade, or in a trench depending upon the site conditions and the engineering requirements of the guideway.

Boarding platforms about 380 feet long would serve four-car trains with center platforms (in the center with tracks on both sides) (Exhibit 2-2) or side platforms (on the outer side of the tracks). Escalators, elevators, and stairs would provide access to the elevated or trenched platforms (Exhibit 2-3). All stations would meet Americans with Disabilities Act (ADA), public access, fire code, and life-safety requirements.

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 garage or a surface lot.

Depending on funding, Sound Transit may build the FWLE in phases. The Kent/Des Moines Station or the S 272nd Street Station (or both in different phases) could serve as an interim terminus station before construction extends to the Federal Way Transit Center. An 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.

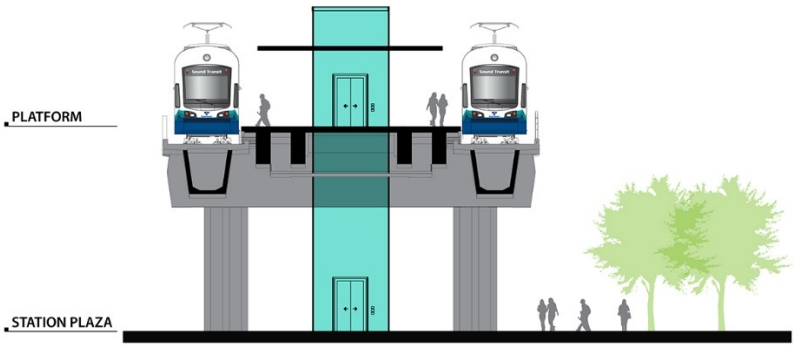

EXHIBIT 2-2
Elevated Center Platform Station

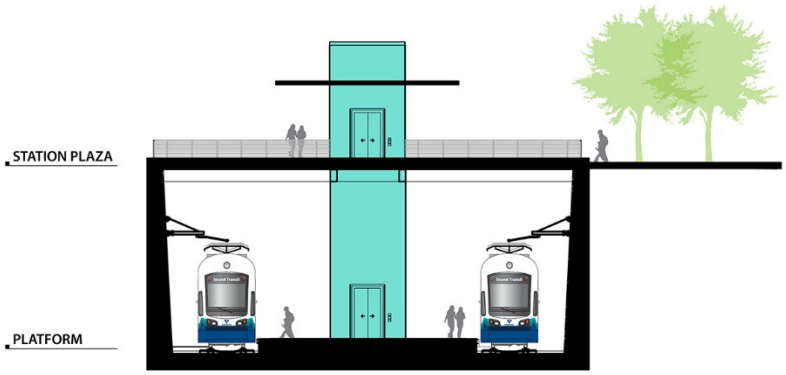

EXHIBIT 2-3
Trench Center Platform Station

2.2.2.3 Access

Link riders could access stations by bus, automobile, bicycle, and walking. Sound Transit and King County Metro transit routes would provide service based on the FWLE Conceptual Transit Service Plan, which is described in more detail in the Transportation Technical Report in Appendix G1. 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 either bus stops on nearby streets or dedicated bus facilities within the station area.

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. Each station's parking allocation reflects the existing parking supply and use, surrounding land use characteristics, multi-modal access expectations (pedestrian, bicycle, arterial and highway connections, and transit transfers), and parking use at comparable facilities. Extra parking would be provided at the Kent/Des Moines Station if it were an interim terminus, but only temporarily because the demand for parking would shift to the south when the project extended to the S 272nd Street and Federal Way Transit Center stations. Additional parking would not be needed at the S 272nd Street station if it were

an interim terminus. All stations would have areas for rider drop-off/pick-up. Sound Transit would make road improvements (such as sidewalks, bike lanes, or widening to accommodate projected traffic levels) or extensions at some stations.

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 are included at all FWLE terminus station alternatives, including interim ones.

Crossover tracks connect two parallel tracks and allow trains to change safely from one track to the other (Exhibit 2-4). FWLE will include crossovers in various locations 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, supported on 15- to 23-foot-high steel poles about 200 feet apart (Exhibit 2-5). The poles are typically between the two tracks.

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, screened by a wall or fence (Exhibit 2-6). TPSSs would be 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. They 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 Preferred Alternative

The Preferred Alternative (Exhibits 2-7 and 2-8) would leave the Angle Lake Station and cross to the east side of SR 99 near the proposed SR 509 Extension (see Section 2.6 for additional information on the SR 509 Extension). It would continue in the future SR 509 WSDOT right-of-way until it reaches I-5. From S 211th Street to S 231st Street, the alignment would be west of the WSDOT right-of-way to allow for the planned future build-out of I-5. Appendix F, Conceptual Design Drawings, 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.

EXHIBIT 2-7
Typical Cross-Section, At-Grade Profile - Preferred Alternative

Some parts of this alternative would be at-grade (Exhibit 2-7) or in a trench where topography allows. All road crossings would be grade-separated. All stations would have center platforms and transit connections.

2.2.3.1 Kent/Des Moines Station

This elevated station would be along the west side of 30th Avenue S, spanning a new S 236th Street that would extend between SR 99 and the I-5 right-of-way. This would place it approximately 200 feet east of the SR 99 East Station Option in the Draft EIS. It would have approximately 1,000 parking spaces (500 surface, 500 in a new garage) if used as an interim terminus. Parking would be reduced to 500 spaces when the system was extended south with additional parking at other stations. After construction of the station, approximately 1.2 acres of surplus staging area between the proposed surface parking lots and S 236th Street would be available for TOD.

Kent/Des Moines Station

The Preferred Kent/Des Moines Station would include a new S 236th Street east and west of SR 99 to provide access to the station and parking areas. In a change from the Draft EIS, two other roadways would connect SR 99 to 30th Avenue S at S 234th and S 238th streets to provide parking access. S 236th Street would be used for bus and paratransit access as well. Bus layover space would be provided east of 30th Avenue S.

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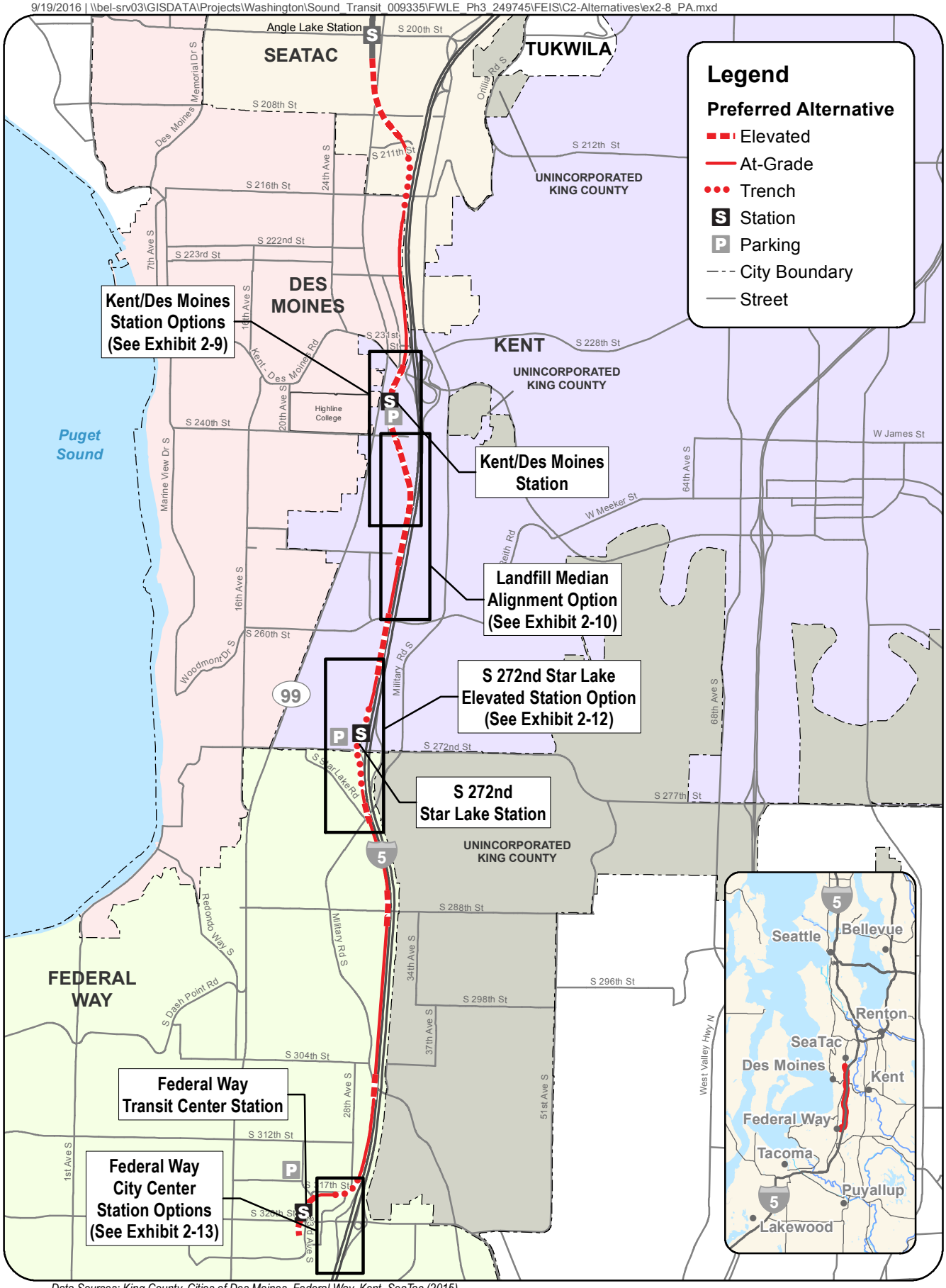

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

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0 0.5 1 2 Miles

EXHIBIT 2-8
Preferred Alternative

Federal Way Link Extension

Non-motorized access improvements proposed in the station area (generally between Kent-Des Moines Road and S 240th Street) as part of the project include:

- Sidewalks on SR 99, S 236th Street, 30th Avenue S, the new S 234th Street, and the new S 238th Street
- Shared-use path on the east side of 30th Avenue S and on the south side of S 236th Street (west of SR 99)

2.2.3.2 S 272nd Star Lake Station

This trenched station would be at the Star Lake Park-and-Ride and have up to 1,240 parking spaces in a new parking garage, about 700 more than the existing parking. Its construction would require realigning 26th/28th Avenue S for approximately 250 feet. Access to the station and parking garage would be from 26th/28th Avenue S. This station would be approximately 140 feet north of its location in the Draft EIS, but would still be on the park-and-ride property.

Non-motorized access improvements proposed in the station area as part of the project include:

- Pedestrian crossing improvement of 28th Avenue S north of Star Lake Park-and-Ride
- An ADA accessible pathway to the station plaza from S 272nd Street
- Sidewalk improvements along 26th/28th Avenue S and S 272nd Street
- Pedestrian and bike connections from 28th Avenue S and S 272nd Street to station plaza
- Improved flyer stop connection
- Pedestrian intersection improvements at 26th Avenue S and S 272nd Street
- A shared use path on the south side of S 272nd Street, west of 26th Avenue S
- Lighting and aesthetic improvements on S 272nd under I-5
- Pedestrian safety improvements across the northbound on-ramp from S 272nd Street

Other Kent/Des Moines Station Non-Motorized Access Improvements

Through the stakeholder workshops, the following non-motorized access improvements were also recommended for local jurisdictions to lead:

- Connections to the Barnes Creek Trail and Green River Trail (via Veterans Drive and Kent-Des Moines Road)
- Access across Kent-Des Moines Road at 30th Avenue S and improvements on 30th Avenue S north of Kent-Des Moines Road
- A connection south along I-5 to S 260th and 272nd streets
- Access north to residential neighborhoods and west through the Highline College campus and to the Des Moines waterfront
- A connection east over I-5 near S 240th Street
- A connection to the I-5 flyer stop at Kent-Des Moines Road
- A mid-block crossing of SR 99 south of S 240th Street

Other S 272nd Star Lake Station Non-Motorized Access Improvements

Through the stakeholder workshops, the following non-motorized access improvements were also recommended for local jurisdictions to lead:

- Improvements to existing bike routes on 16th Avenue S and Military Road S
- Creation of bike routes on S Star Lake Road and S 272nd Street
- A pedestrian path connection between Redondo Heights Park-and-Ride and S 272nd Street
- Extension of shared-use path on the south side of S 272nd Street
- Improved bike and pedestrian access under I-5
- Shared use path on north side of S 272nd Street between I-5 and Military Road S
- Improved pedestrian lighting on S 272nd Street.

2.2.3.3 Federal Way Transit Center Station

This station would be elevated and in a north-south orientation south of the existing Federal Way Transit Center, parallel to 23rd Avenue S and north of S 320th Street, unlike in the Draft EIS, where this station was oriented east-west. The station would have a 400-space parking garage and a pedestrian connection to the existing 1,200-space Federal Way Transit Center parking garage. The transit center would be relocated south to the west side of the station to more directly link bus service and light rail. A roundabout would be added to the intersection of S 317th Street and 23rd Avenue S along with a one-way transit-only road into the station area and transit center for more direct bus access. This would be different from the Draft EIS, which used the existing transit center for bus circulation.

Non-motorized access improvements proposed in the station area as part of the project include:

- Sidewalks on new S 318th and 319th streets between 21st Avenue S and 23rd Avenue S and along new 22nd Avenue S between S 317th and 320th streets
- Sidewalks and protected pedestrian crossings at new roundabout at 23rd Avenue S and S 317th Street
- New pedestrian crossing of S 317th Street at 22nd Avenue S
- A shared-use pathway on south side of S 317th Street between 28th Avenue S and 23rd Avenue S

Other Federal Way Transit Center Station Non-Motorized Access Improvements

Through the stakeholder workshops, the following non-motorized access improvements were also recommended for local jurisdictions to lead:

- Sidewalks east of Town Square Park
- Mid-block crossings of S 316th Street at 21st Avenue S and of SR 99 at S 318th Street
- Consolidated driveways and improved sidewalks along S 320th Street between 23rd Avenue S and SR 99
- Completion of proposed bike routes along S 324th Street, 23rd Avenue S, Gateway Center Boulevard S, 28th Avenue S, and S 312th Street
- Wayfinding to connect S 320th Park-and-Ride and Federal Way Transit Center Station
- Pedestrian and bike connection to east of I-5

2.2.3.4 Kent/Des Moines Station Options

All Kent/Des Moines Station options (Exhibit 2-9) would have center platforms and parking for approximately 1,000 vehicles (500 surface, 500 in a new garage) if used as an interim terminus. Parking could be reduced to 500 spaces when the station is no longer the terminus.

Kent/Des Moines I-5 Station Option

This station option would be elevated adjacent to the west side of I-5. It would transition into the I-5 right-of-way south of S 240th Street. This station would include construction of a new S 236th Street.

The at-grade station option would be next to the I-5 right-of-way, just south of S 240th Street, and would follow the same alignment as the I-5 Station Option.

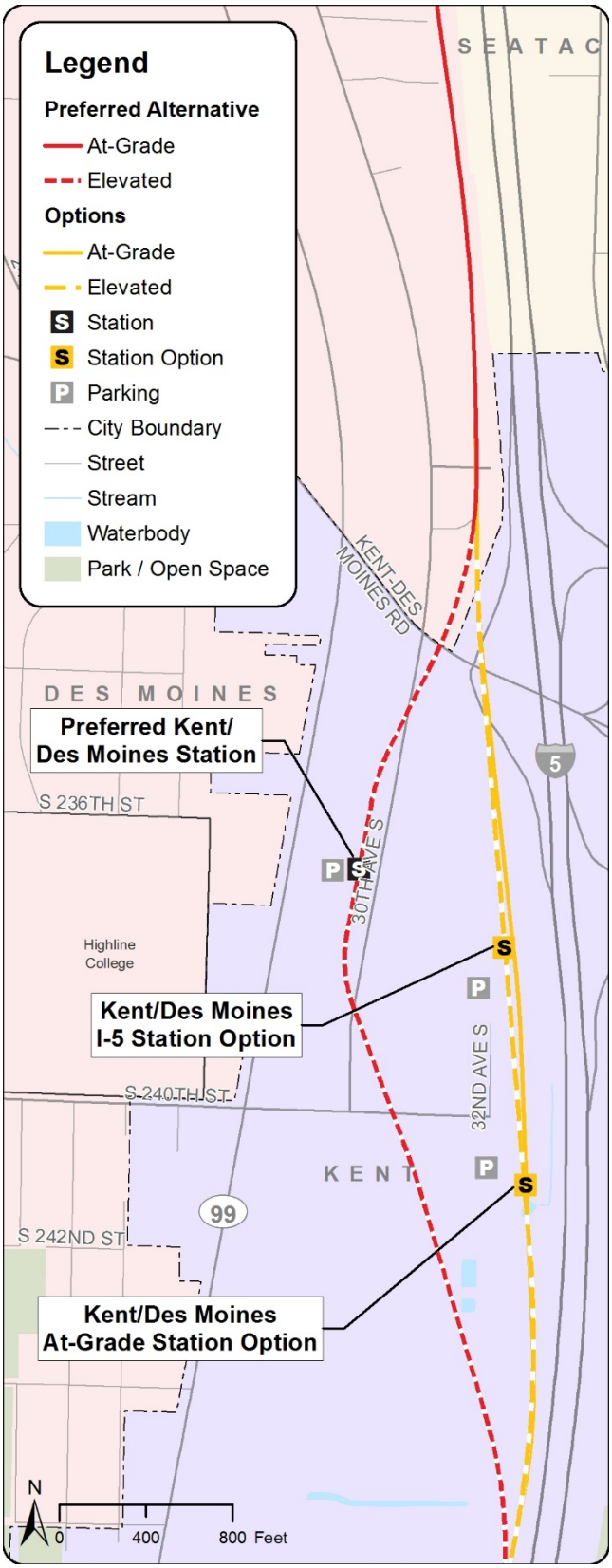


EXHIBIT 2-9
Kent/Des Moines Station Options

2.2.3.5 Landfill Median Alignment Option

To avoid the potential engineering challenges of crossing the Midway Landfill, the Landfill Median Alignment Option was developed during the Draft EIS to address uncertainties about geologic conditions under the landfill and regulatory requirements for construction. Geotechnical borings completed to date confirm that crossing the landfill is viable. This alignment option (Exhibits 2-10 and 2-11) would transition to the I-5 median south of S 240th Street and then back to the west side of I-5 at approximately S 252nd Street. It would span the southbound lanes of I-5 to access the median.

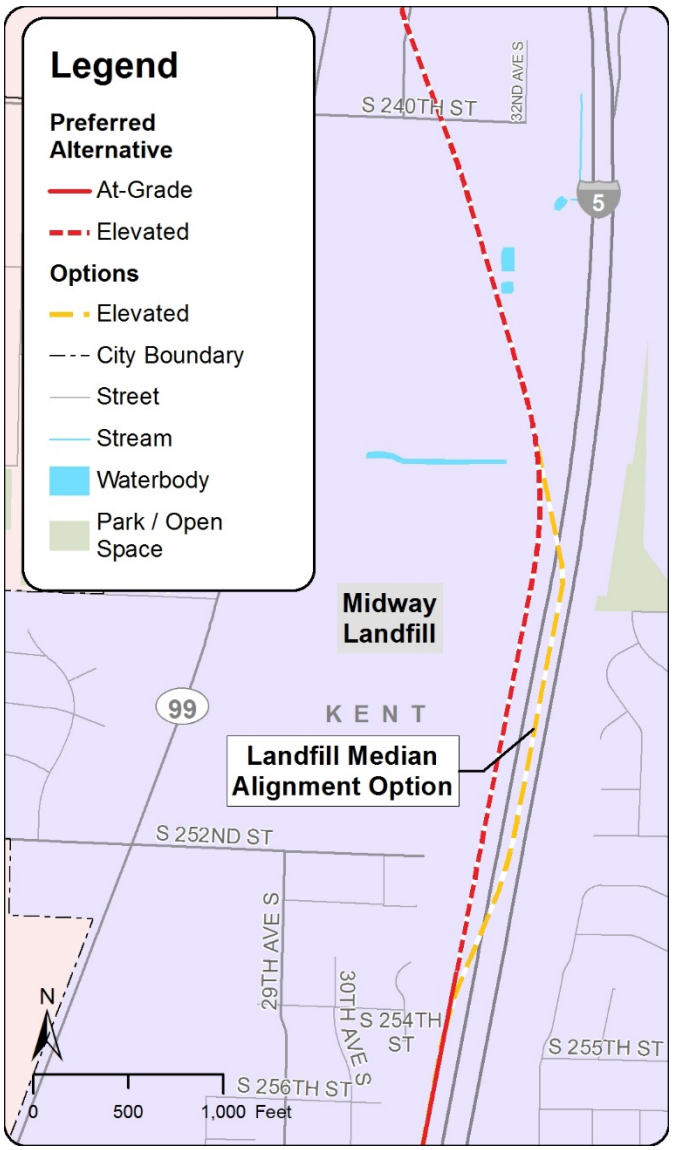


EXHIBIT 2-10
Landfill Median Alignment Option

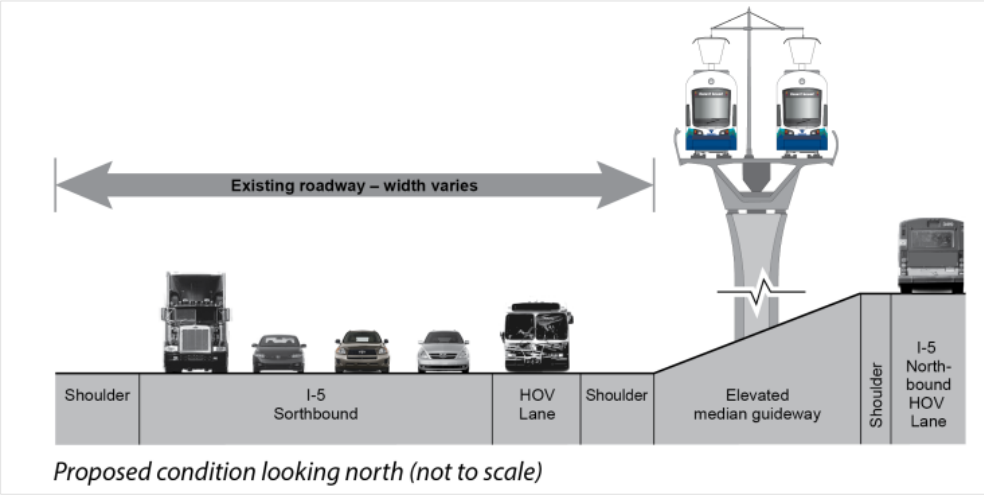


EXHIBIT 2-11
Typical Cross-Section – Landfill Median Alignment Option

2.2.3.6 S 272nd Star Lake Elevated Station Option

The S 272nd Star Lake Elevated Station Option would be an elevated alignment for approximately 3,000 feet (Exhibit 2-12). The station would be in the same location as the trench station, and the layout of the parking garage and bus circulation would be the same. The guideway would be on retained fill on the east side of 28th Avenue S up to the station, and then on columns from the station to the south side of S 272nd Street. It would return to retained fill to cross the east side of the Mark Twain Elementary School property before entering the I-5 right-of-way south of the school. This option was added due to the potential challenges in constructing, operating, and maintaining a trenched facility where groundwater levels are higher than had been anticipated.

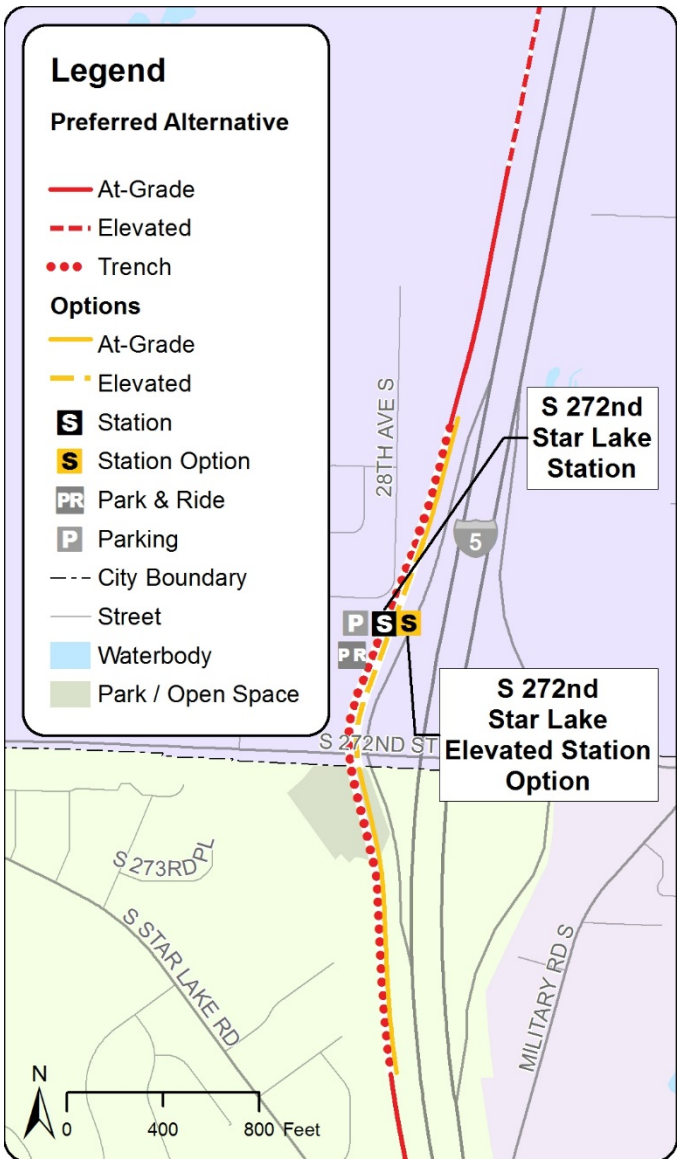


EXHIBIT 2-12
S 272nd Star Lake Elevated Station Option

2.2.3.7 S 317th Elevated Alignment Option

This alignment option would be an elevated guideway between approximately S 312th Street and 23rd Ave S (Exhibit 2-13). The alignment would be the same as the Preferred Alternative except for crossing the 28th Avenue S and S 317th Street intersection. It would span over the intersection on the north side of the roundabout. South of S 317th Street, the alignment is the same as the Preferred Alternative and would not change the Federal Way Transit Center Station. This option was added due to the potential challenges in constructing, operating, and maintaining a trenched facility where groundwater levels are higher than had been anticipated. This option could not be combined with either of the Federal Way City Center station options due to differences in profiles.

2.2.3.8 Federal Way City Center Station Options

All the Federal Way City Center station options (Exhibit 2-13) have center platforms.

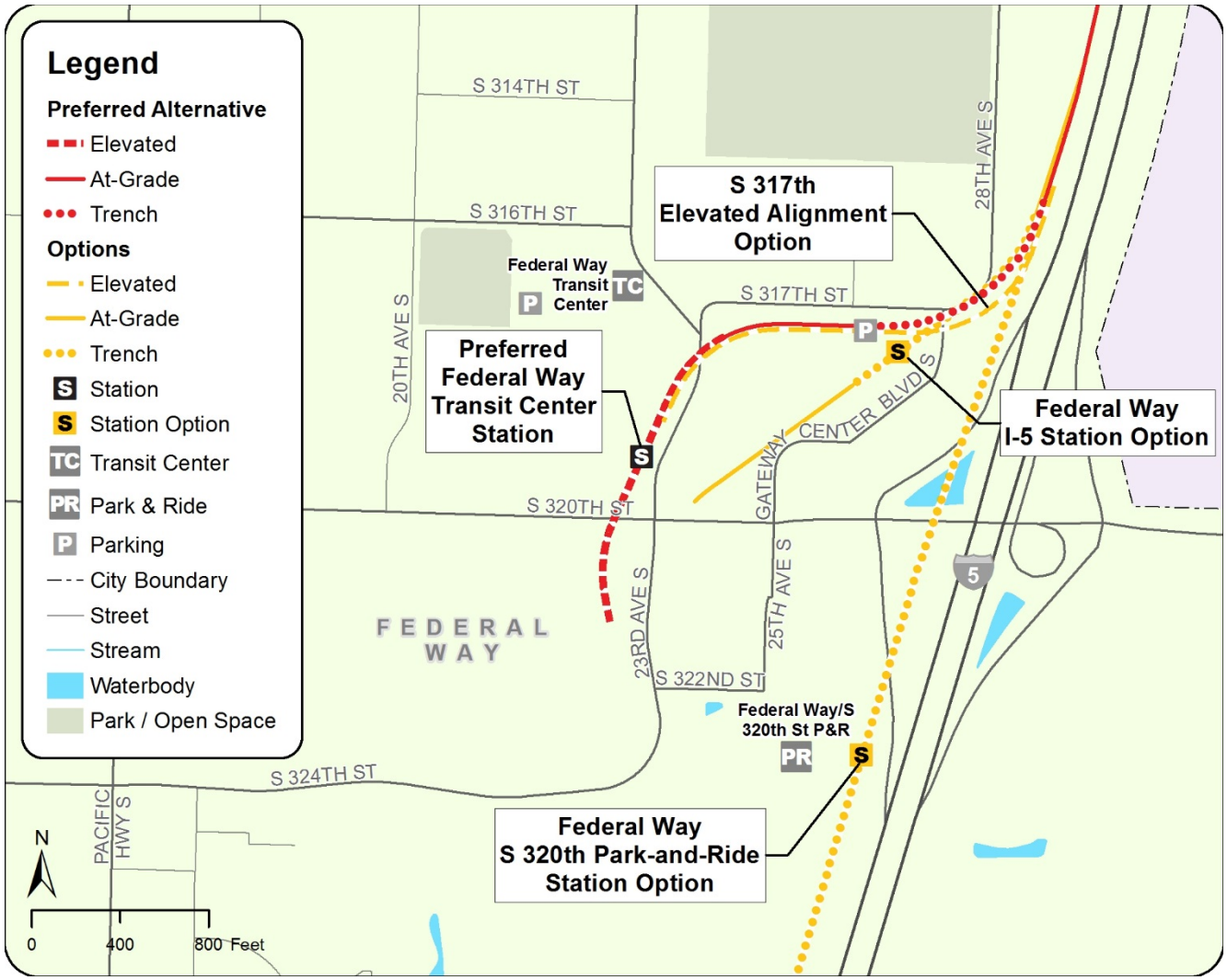


EXHIBIT 2-13
S 317th Elevated Alignment Option and Federal Way City Center Station Options

Federal Way I-5 Station Option

This station option would be both in a trench and at-grade and 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 add about 700 parking spaces in a parking garage, for a total of approximately 1,600 spaces. Transit service would be provided, including connections to the Federal Way Transit Center.

2.2.4 SR 99 Alternative

The SR 99 Alternative (Exhibit 2-14) would exit the Angle Lake Station along 28th Avenue S, cross over WSDOT's proposed SR 509 Extension (see Section 2.6), 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 the crossings of Kent-Des Moines Road and S 272nd Street. The alignment would be largely in the public right-of-way, and both the alignment and the stations would be elevated.

It would require additional right-of-way in some areas for intersection widening or station access improvements. The three stations below would be center-platform configurations. Any potential additional stations would have side-platform configurations. Typical cross-sections for median, west, and east alignments are shown on Exhibits 2-15, 2-16, and 2-17.

2.2.4.1 Kent/Des Moines SR 99 West Station

This station would be on the west side of SR 99 between S 236th Street 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 in a new garage) if the station were an interim terminus. Parking could be reduced by about half when the station is no longer the terminus.

Kent/Des Moines Station

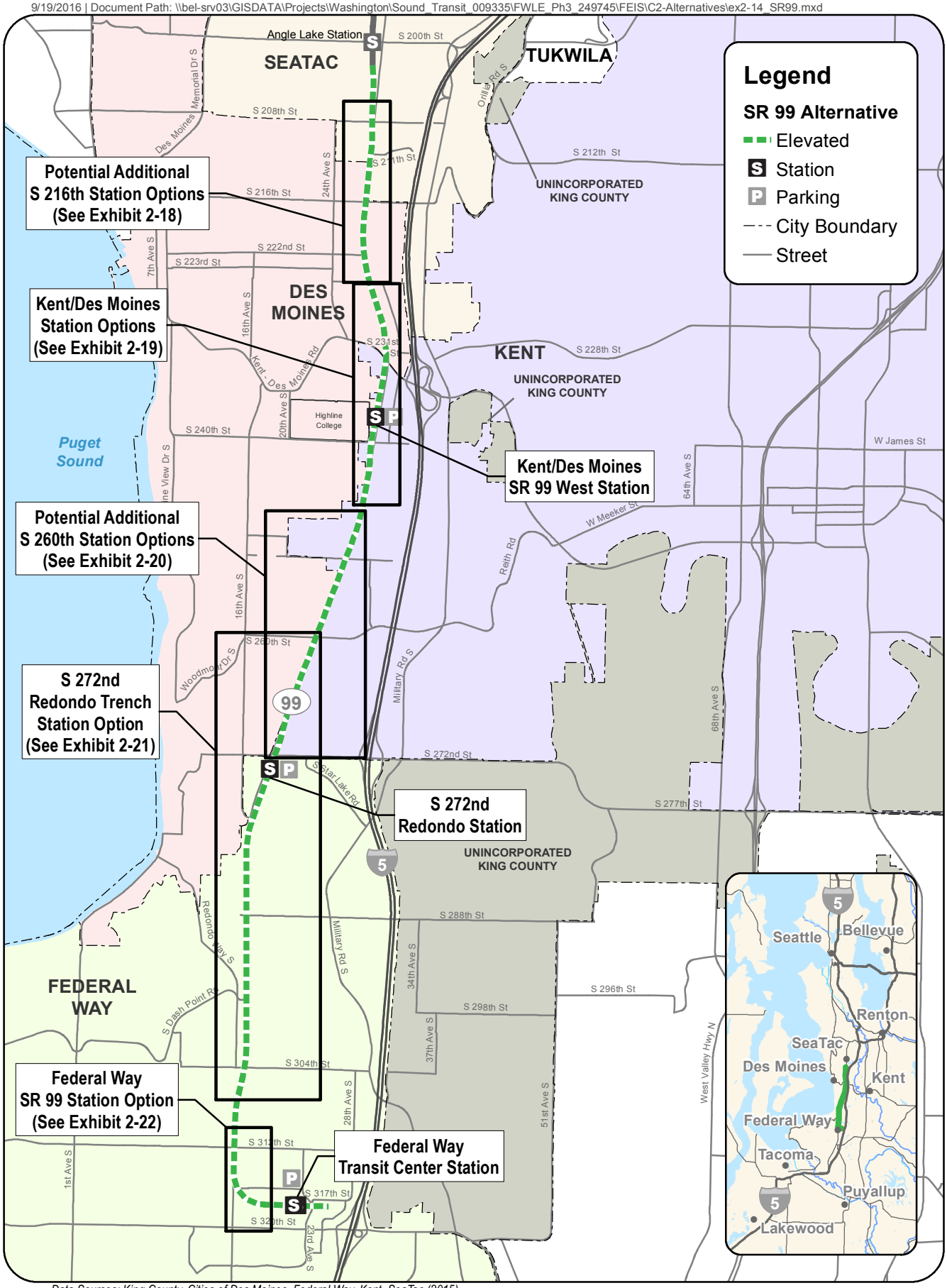
The Kent/Des Moines Station and station options for the SR 99 Alternative would include construction of a new S 236th Street east of SR 99 to provide access to the station and parking area.

2.2.4.2 S 272nd Redondo Station

The guideway 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 garage parking spaces, about 700 more than now. 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.

2.2.4.3 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 (2015).

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EXHIBIT 2-14
SR 99 Alternative

Federal Way Link Extension

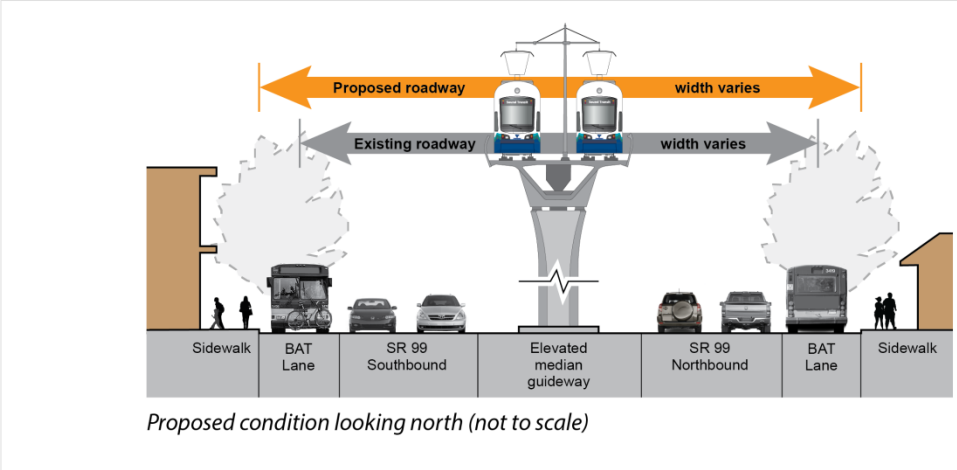

EXHIBIT 2-15
Typical Cross-Section - SR 99 Alternative - Median

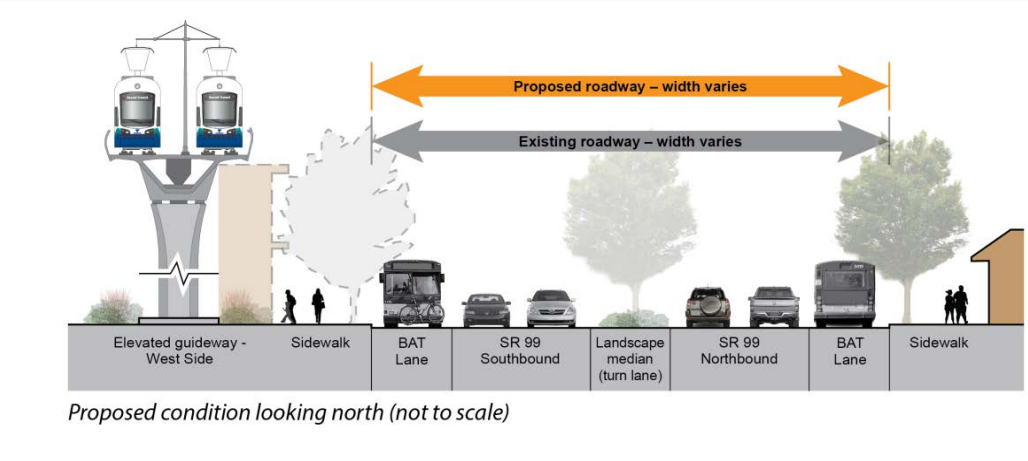

EXHIBIT 2-16
Typical Cross-Section - SR 99 Alternative and Station Options- West or East Side

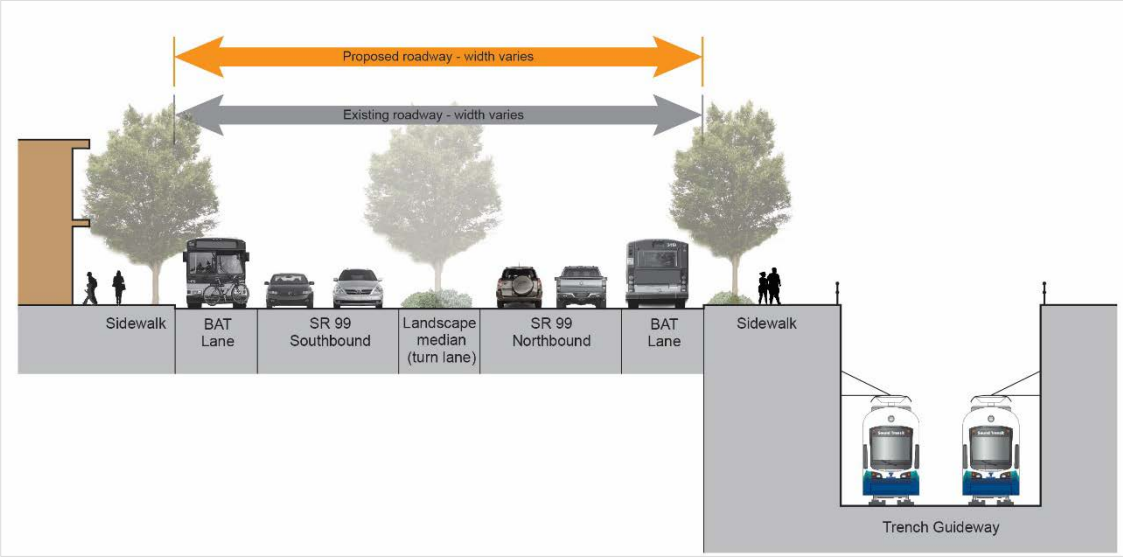

EXHIBIT 2-17
Typical Cross-Section for SR 99 Station Options with Trench-West or East Side

2.2.4.4 S 216th Potential Additional Station

A potential additional S 216th Station (Exhibit 2-18) could be built on either side of SR 99. A side-platform design would preserve the ability to add the station at a later time. There would be no patron parking built with this station. This station is not funded under ST2 or the proposed ST3.

S 216th West Station Option

Similar to the SR 99 Alternative, the alignment for this potential additional station would exit the Angle Lake Station and follow the SR 509 right-of-way to the west side of SR 99. It 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 approached S 220th Street. Entrances to the station would be on 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 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.

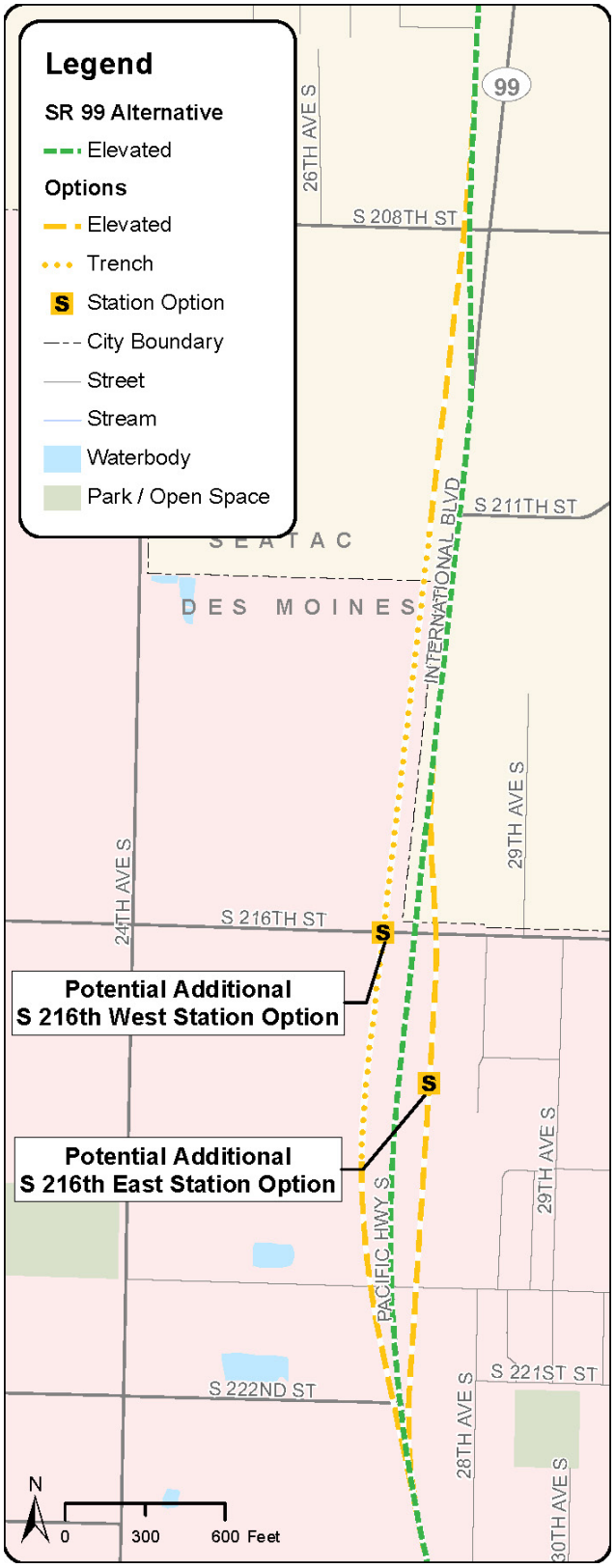

EXHIBIT 2-18
S 216th Potential Additional Station Options

2.2.4.5 Kent/Des Moines Station Options

All Kent/Des Moines station options (Exhibit 2-19) would have center platforms and parking for approximately 1,000 vehicles (500 surface, 500 in a new garage) if an interim terminus. The parking could be reduced to 500 spaces when the station is no longer the terminus.

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 Street. 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.

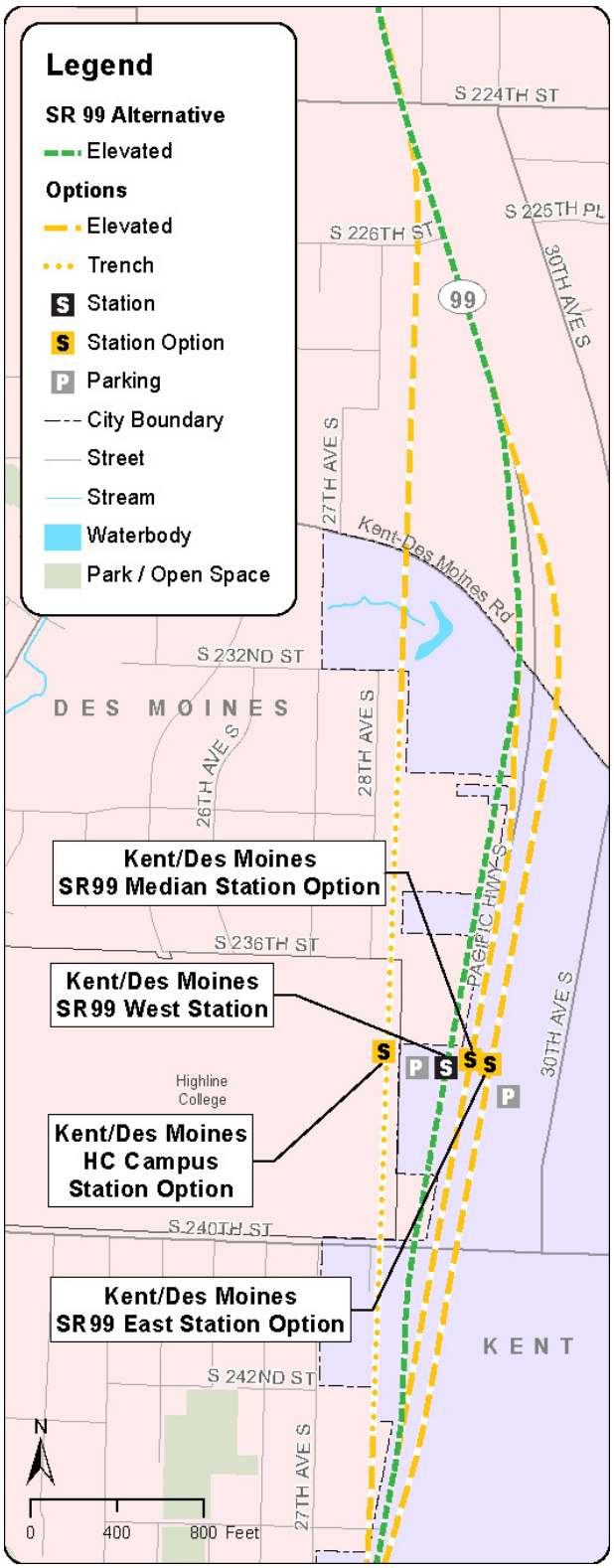

EXHIBIT 2-19
Kent/Des Moines Station Options

2.2.4.6 S 260th Potential Additional Station

The project could have a potential additional station (Exhibit 2-20) on either the east or west side of SR 99. A side-platform design would preserve the potential for this station to be built at a later time. There would be no patron parking built with this station. This station location is not funded under ST2 or the proposed ST3.

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.

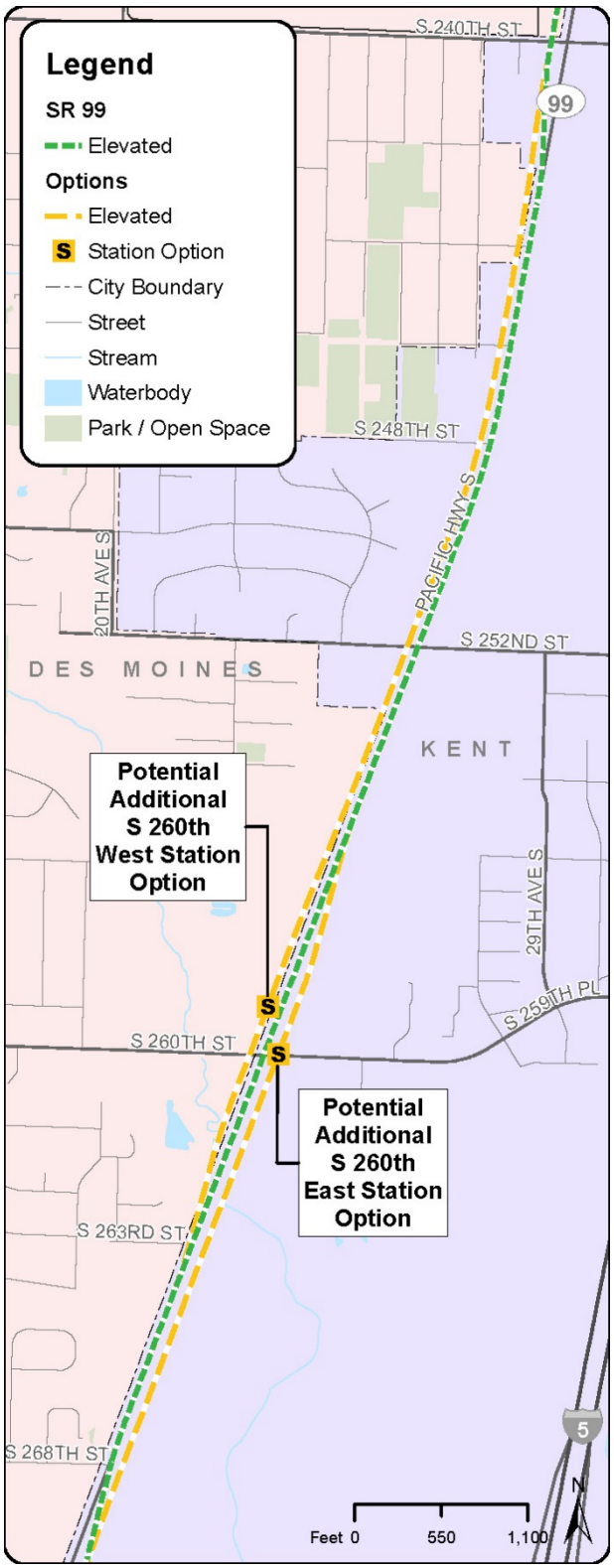

EXHIBIT 2-20
S 260th Potential Additional Station Options

2.2.4.7 S 272nd Redondo Trench Station Option

The alignment for the S 272nd Redondo Trench Station Option (Exhibit 2-21) 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 a trench station at the existing Redondo Heights Park-and-Ride and then continue south, crossing under SR 99 near S 279th Street. It would travel behind properties fronting the west side of SR 99 and would be elevated but lower than 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.

2.2.4.8 Federal Way SR 99 Station Option

The alignment for the Federal Way SR 99 Station Option (Exhibit 2-22) 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.

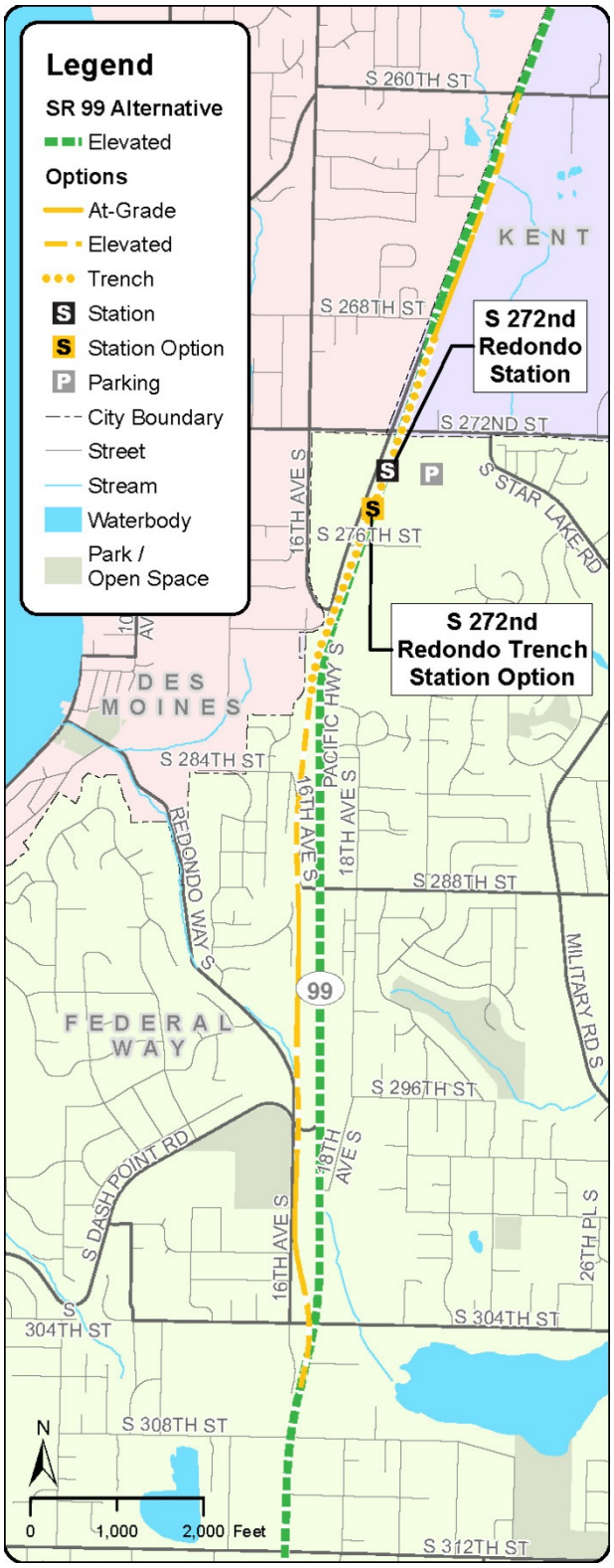

EXHIBIT 2-21
S 272nd Redondo Trench Station Option

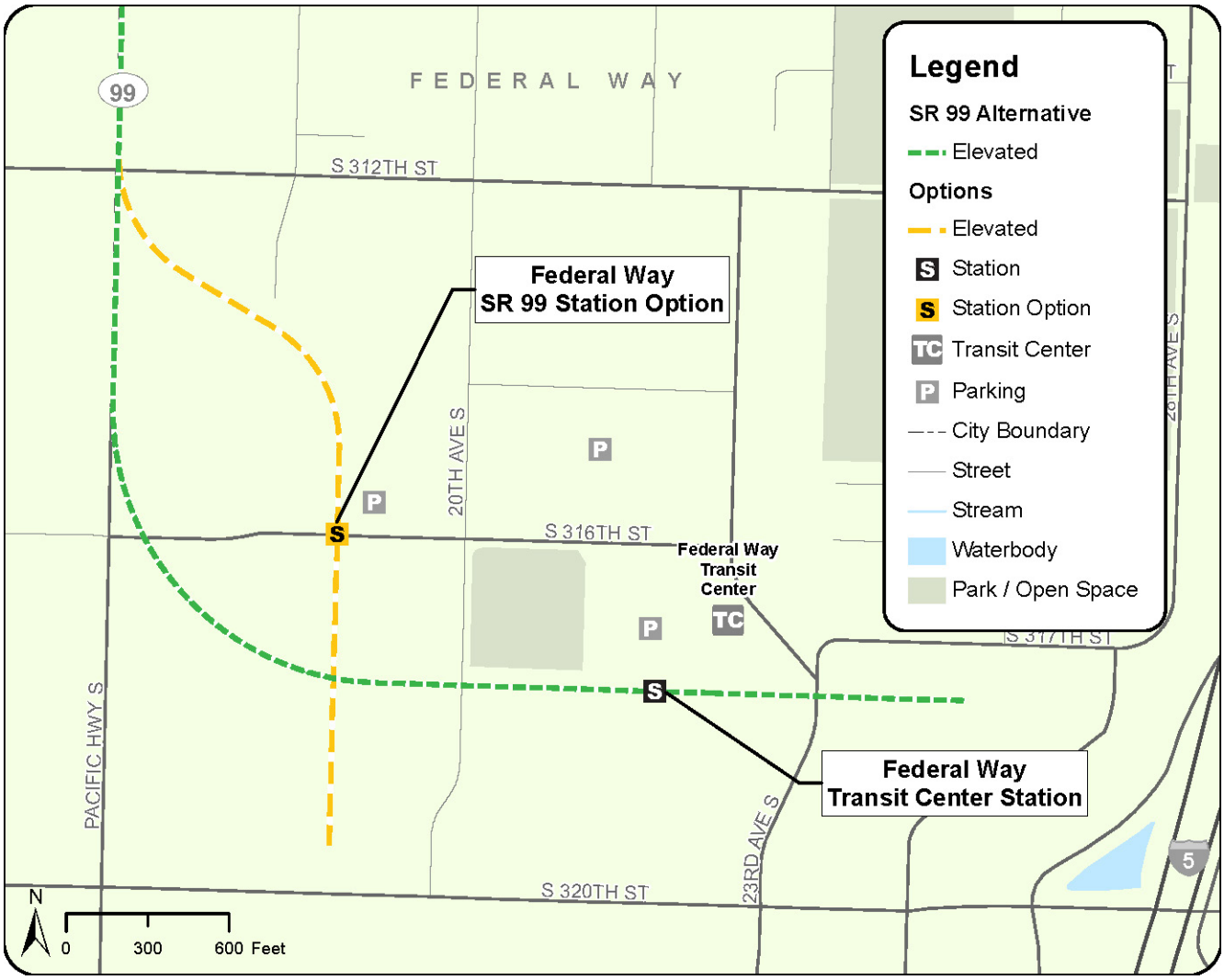

EXHIBIT 2-22
Federal Way SR 99 Station Option

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 2-1). It would then transition to 30th Avenue S with a Kent/Des Moines 30th Avenue East Station north of S 240th Street. After leaving the station, the alignment would transition to the I-5 right-of-way and remain in the right-of-way to S 317th Street, where it would exit and travel west to the Federal Way Transit Center Station.

The S 272nd Star Lake Station would be the same as the Preferred Alternative, but the Federal Way Transit Center Station would be directly south of the transit center and oriented east-west. This alternative would be mostly elevated (Exhibit 2-24).

SR 99 to I-5 Alternative Station Options

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

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

Potential Additional Stations

It could also have the following potential additional station options associated with the SR 99 Alternative:

- 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 in a new garage) if used as an interim terminus, reduced to 500 when the station is no longer the terminus.

2.2.5.2 S 272nd Star Lake Station

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

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 current 1,200.

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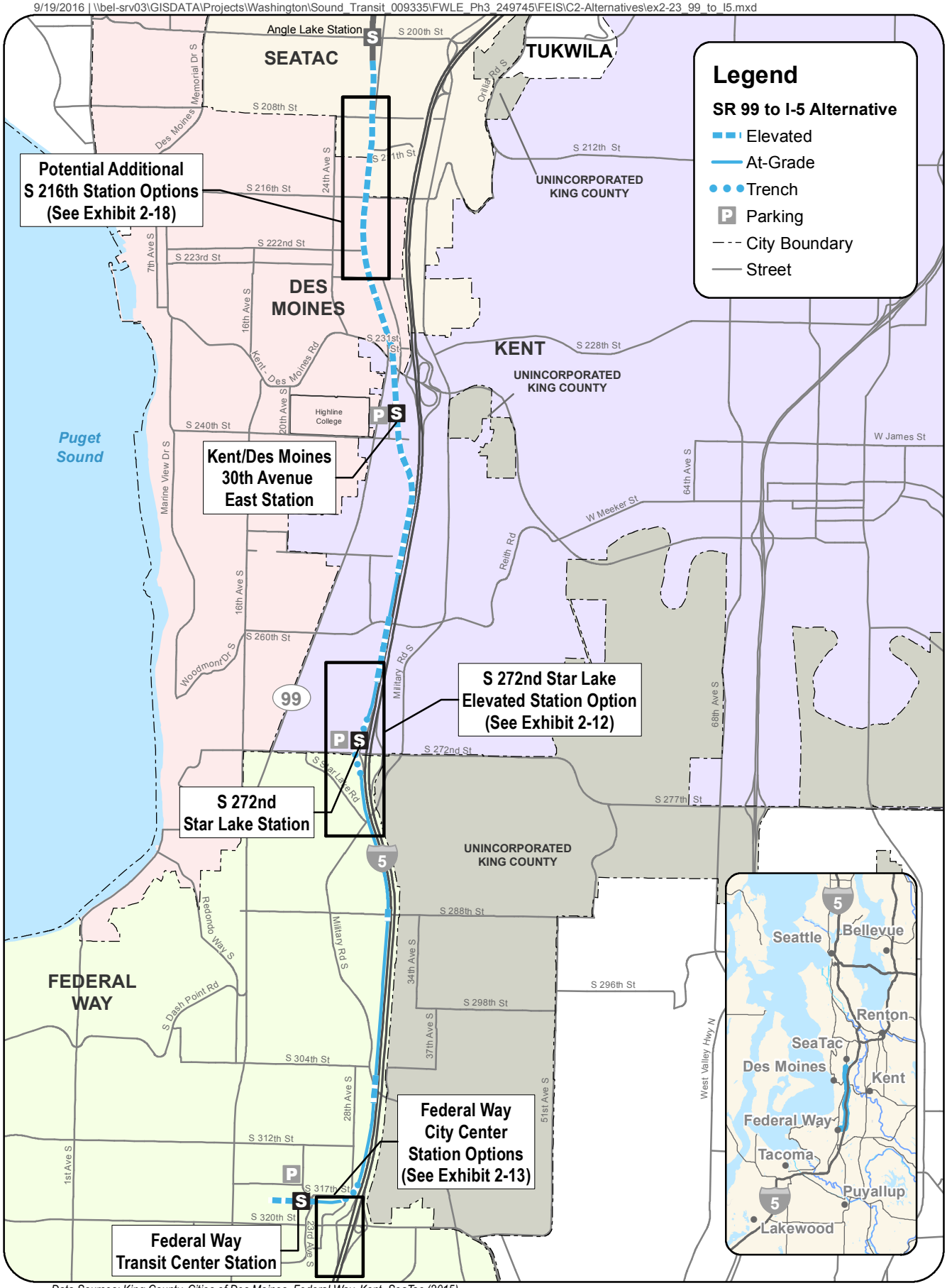

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

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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 exit the Angle Lake Station and head east, crossing SR 99 and following the future SR 509 Extension to just north of Kent-Des Moines Road (Exhibit 2-1). 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.

I-5 to SR 99 Alternative 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

It could also have the following potential additional station options associated with the SR 99 Alternative:

- 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 in a new garage) if used as an interim terminus. Spaces could be reduced to 500 when the station is no longer the terminus.

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 garage parking spaces, about 700 more than the existing. 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 current 1,200.

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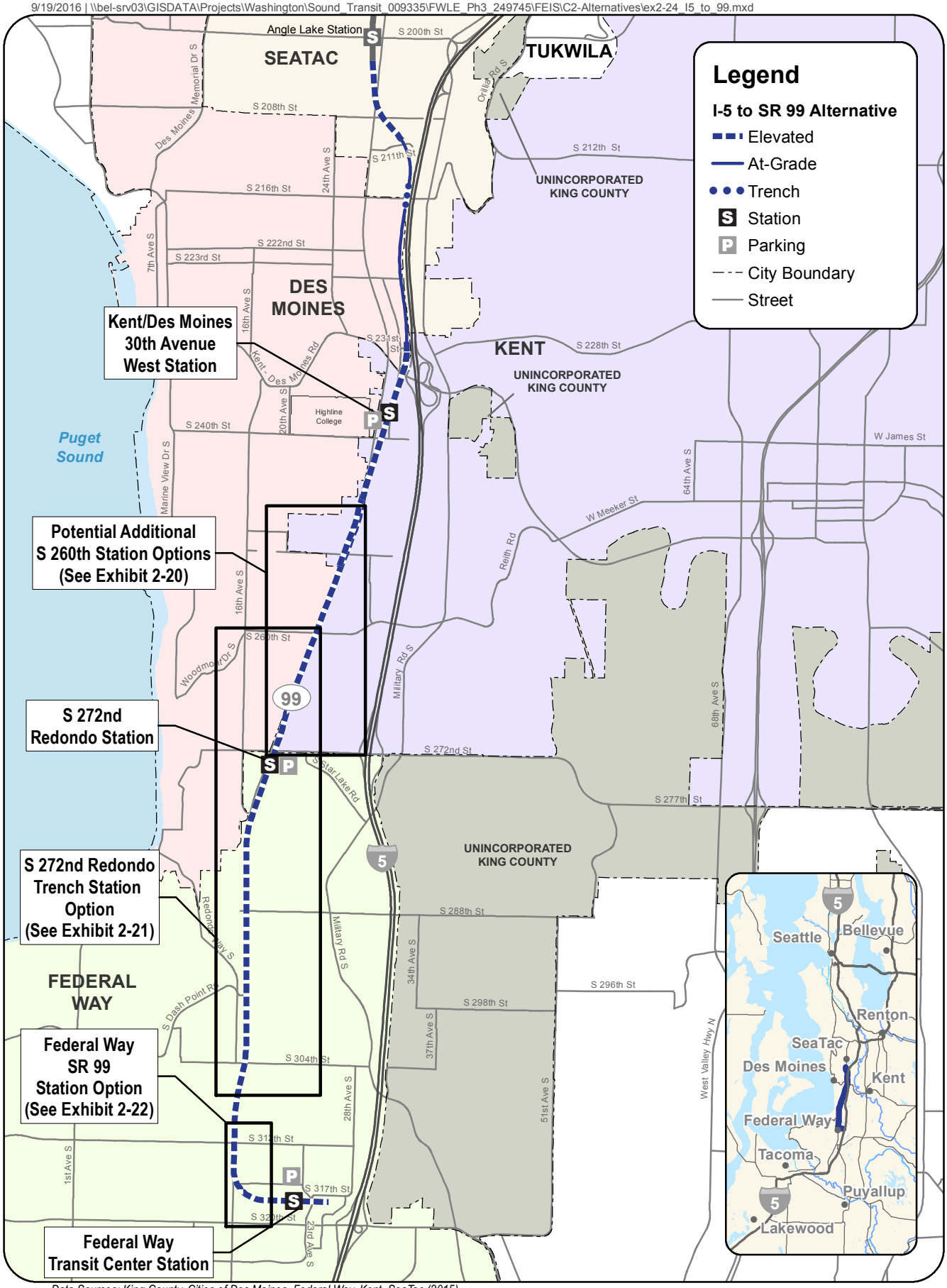

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

N

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EXHIBIT 2-24
I-5 to SR 99 Alternative

Federal Way Link Extension

2.2.7 Operation and Vehicle Maintenance

The FWLE is planned to operate 20 hours per day Monday through Saturday and 18 hours on Sunday. 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.

TABLE 2-2
Weekday Service Periods

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

There is currently one Link operations and maintenance facility (OMF) in Seattle, constructed as part of Central Link and opened in 2009. Sound Transit plans to construct a second operations and maintenance facility in Bellevue, expected to be complete by 2020. 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 funded under ST2. The light rail vehicles for FWLE would be stored, maintained, inspected, and repaired at the Seattle OMF and would be deployed primarily from this OMF, although a terminus station (either interim or the Federal Way Transit Center) could provide overnight storage of up to four four-car trains. (Overnight storage at a terminus station would allow deployment of northbound trains at the beginning of service each day.) Trains could be stored on the tail tracks, station platform areas, or in a pocket track near the end of the line at the close of service each night. Support facilities at the station may include 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. Vehicle, track, and systems maintenance occurs between 1 a.m. and 5 a.m. daily, outside of normal hours of light rail service.

Preliminary operating plans have two trains deployed between approximately 4:30 and 5 a.m., to be staged for the beginning of morning service at FWLE stations. Similarly, two trains may operate between approximately 1 and 1:30 a.m. along the FWLE as they return to the OMF or terminus station at the close of service each day.

If voters approve ST3 funding to extend light rail south of the Federal Way Transit Center, Sound Transit would evaluate the need for an additional OMF for south King County. An OMF is not proposed for the FWLE corridor and is not evaluated in this Final EIS.

2.3 Alternatives Development and Scoping

2.3.1 Development of Draft EIS Alternatives

Sound Transit began planning in 2004 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. The planning history for the FWLE corridor is summarized in Table 1-1 in Chapter 1. (Until September 2013, this project was referred to as the Federal Way Transit Extension.)

Sound Transit completed early scoping and an Alternatives Analysis process in 2012 and 2013 to identify reasonable alternatives to be evaluated in the Draft EIS. The 30-day early scoping period was held in October and November 2012. Additional information on public involvement for this process is described in Appendix B.

Feedback received during the early scoping period was positive and supported improved transit service in the project corridor, with noticeable support for light rail. 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 Analysis, including multiple modes (Exhibit 2-25).

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 had impacts or costs that outweighed potential benefits. Sound Transit evaluated the remaining 14 alternatives in Level 1 and narrowed this to 5 alignments in Level 2. Level 2 also 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).

Screening Details

The Level 1 and Level 2 alternatives screening reports in Appendix C, Alternatives Analysis Reports and Scoping Summary, detail the specific measures used and the results of the evaluation.

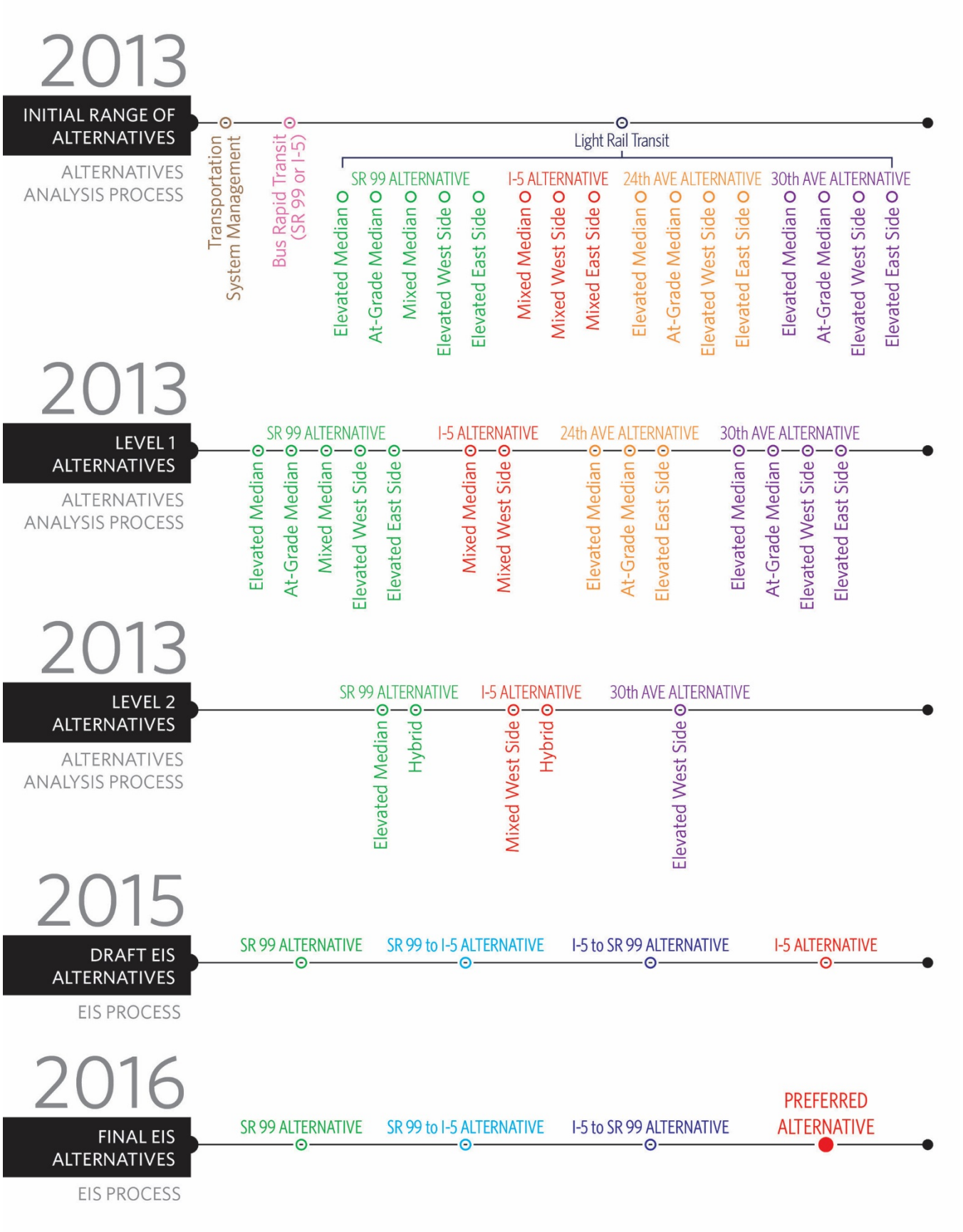

EXHIBIT 2-25
FWLE Alternatives Development and Evaluation

Table 2-3 lists the criteria used for Level 1 and Level 2 alternatives evaluations. All Level 2 alignment and station alternatives were carried forward into the scoping process for the EIS.

After the Alternatives Analysis, Sound Transit conducted another scoping process under the National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) to solicit further input on the project Purpose and Need statement and on the appropriate 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. Additional information on public involvement for this process is described in Appendix B. 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 2-3
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 1/2 mile of station	Does not differentiate between alternatives; not considered in Level 2
		EM6: Elderly population (age 65 or older) within 1/2 mile of station	Does not differentiate between alternatives; not considered in Level 2
		EM7: Youth population (age 16 or younger) within 1/2 mile of station	Does not differentiate between alternatives; not considered in Level 2
		EM8: 0-car households within 1/2 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	Transit-supportive land use and	LU9: How well an alternative provides enhanced mobility to	Existing land use
			Planned land use

TABLE 2-3
FWLE Alternatives Analysis Evaluation Criteria

Purpose and Need Objective	Evaluation Criterion	Level 1 Measures	Level 2 Measures
Economic Development	economic development policies	existing high-density land use centers	High density/TOD zoning
			Underutilized parcels
			Population
			Employment
			Households
			Parking opportunities
			Non-motorized access
Preserve a Healthy Environment	Effect on natural environment	EN10: Impacts on wetlands	Wetlands
		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 1/4 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

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 did not advance 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 of the project, which is to expand the light rail system from SeaTac to Federal Way, consistent with Sound Transit's Long-Range Plan.
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. This takes advantage of the existing transit center and the many bus routes that serve it. The Waterbury Park Apartments are approximately one mile southwest of the transit center. Relocating the Federal Way Transit Center Station to this location would not take advantage of the existing bus transit connections. Adding an additional station at this location would not be warranted because it would be so close to the Federal Way Transit Center Station.
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 to extend this road over the freeway.	The City of Kent's *Midway Subarea Plan* calls for this road extension in the future. Roadway improvements, such as extending S 240th Street over I-5, are not proposed as part of the FWLE because access to the station from the east will be provided from Kent-Des Moines Road.
Station at S 288th and Pacific Highway.	A S 288th Street station was evaluated during the Alternatives Analysis, but did not advance because of the lower population and employment within 1/2 mile as well as limited access.

Following the public scoping period, the Sound Transit Board reviewed the comments received and the Alternatives Analysis findings. In September 2013, the Board approved Motion 2013-77, which directed Sound Transit staff to study four alternatives in the Draft EIS (see Exhibit 2-25). It also called for potential design options on SR 99 and I-5, and established baseline stations at Kent/Des Moines, S 272nd Street, and Federal Way Transit Center, and potential additional stations for the SR 99 Alternative at S 216th Street and S 260th Street. During development of the Draft EIS, Sound Transit continued to coordinate with agencies and local jurisdictions to refine the conceptual design of these alternatives for evaluation in the Draft EIS.

2.3.2 Draft EIS Public and Agency Comments Suggesting New or Modified EIS Alternatives

Before preparing the Final EIS, Sound Transit reviewed comments on the Draft EIS that suggested modifying the alternatives or adding

other alternatives. Some comments suggested minor shifts in the alignments and stations. No comments suggested any entirely new alignments in the FWLE corridor.

More details on specific comments and Sound Transit's responses are provided in Chapter 9, Comment Summary, and in Appendix I, Response to Draft EIS Comments.

2.4 Environmental Practices and Commitments

As an agency that has built and operated light rail, commuter rail, and regional express bus service in multiple Puget Sound communities, Sound Transit has established programs, best practices, and policies. These include the agency's sustainability and environmental management program (as outlined in Sound Transit's 2015 Sustainability Plan update) and a commitment to satisfying all applicable laws and regulations and mitigating significant adverse environmental impacts responsibly and reasonably, consistent with Sound Transit's policies. Because compliance with these programs, practices, and policies is incorporated into the planning, development, construction, and operation of the FWLE project, they are relevant to understanding the project's environmental impacts.

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. The agency 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, by doing the following:

- Comply fully 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.
- Educate the public about the environmental benefits of transit.

In 2007, the Sound Transit Board directed the agency's Chief Executive Officer to integrate sustainable practices and strategies throughout the agency. In addition to setting yearly targets for sustainability, in 2011, Sound Transit adopted a Sustainability Plan establishing long-term and short-term priorities. The plan, which was updated in 2015, addresses 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 such as the FWLE.

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.

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. In August 2015, the American Public Transportation Association awarded Sound Transit the highest level

of recognition ("platinum") for Sound Transit's commitment to sustainability.

In addition to meeting environmental commitments, Sound Transit will avoid and minimize impacts where possible. Where adverse impacts cannot be avoided, this Final EIS identifies potential measures to mitigate the adverse impacts of the FWLE. Mitigation measures will be refined through final design and permitting. Appendix H, Mitigation Plan, contains a preliminary list of the mitigation commitments for the Preferred Alternative. When a project alternative is selected to be built, mitigation commitments will be finalized and documented in the NEPA Record of Decision (ROD).

2.5 Estimated Project Costs and Funding

2.5.1 Project Funding

In 2008, voters approved funding for ST2, which included funding to construct the portion of the FWLE from the Angle Lake Station in SeaTac to S 272nd Street. Following this vote, the Great Recession lowered Sound Transit's revenue forecast through 2023 by 30 percent. Sound Transit thus realigned the ST2 program in 2010 to ensure that it can deliver the majority of the ST2 program, including part of FWLE, by 2023. The current projection of ST2 tax revenue only allows for construction to Kent/Des Moines. Additional funding sources to complete the project could include Federal Transit Administration (FTA) grants or additional voter-approved tax revenue. Funds for construction to the Federal Way Transit Center are included in the Sound Transit 3 (ST3) funding package (Sound Transit, 2016) to be submitted to the voters in November 2016.

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 grants, bonds, and fare box revenue.

2.5.2 Project Cost Estimates

Estimated project costs based on the current level of design 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, and shows how selecting any of the options would affect the cost. The estimated project cost includes construction costs, right-of-way acquisition costs, engineering costs, and contingency, but not the cost of additional light rail vehicles needed to operate the FWLE.

TABLE 2-5
Estimated Project Cost in 2016$ for Full Project (Angle Lake to Federal Way Transit Center)

Alternative	Estimated Cost
Preferred Alternative	$1.54 billion
Kent /Des Moines At-Grade Station Option	- $110 million
Kent /Des Moines I-5 Station Option	+ $20 million
Landfill Median Alignment Option	- $10 million
S 272nd Star Lake Elevated Station Option	- $30 million
S 317th Elevated Alignment Option	- $2 million
Federal Way I-5 Station Option	- $40 million
Federal Way S 320th Park-and-Ride Station Option	+ $130 million
SR 99 Alternative	$1.89 billion
S 216th Street Potential Additional Station (West Option)	+ $90 million
S 216th Street Potential Additional Station (East Option)	+ $80 million
Kent/Des Moines HC Campus Station Option	- $20 million
Kent/Des Moines HC Campus Station Option from S 216th W Station Option	+ $250 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)	+ $70 million
S 260th Street Potential Additional Station (East Option)	+ $90 million
S 272nd Redondo Trench Station Option	- $10 million
Federal Way SR 99 Station Option	- $60 million
SR 99 to I-5 Alternative	$1.59 billion
I-5 to SR 99 Alternative	$1.84 billion

TABLE 2-6
Interim Termini Estimated Cost in 2016$ (Cost from Angle Lake Station)

Terminus	Preferred Alternative	SR 99 Alternative	SR 99 to I-5 Alternative	I-5 to SR 99 Alternative
Kent/Des Moines Station	$490 million	$570 million	$580 million	$520 million
S 272nd Street Station	$900 million	$1.18 billion	$1.08 billion	$1.10 billion

Table 2-7 provides an estimate of annual operating costs for the Preferred Alternative and a range for all the alternatives. The major determinants of maintenance and operating costs are service levels, running time, and trackway profile. Like the capital costs in Tables 2-5 and 2-6, these estimates will be refined during final design.

TABLE 2-7
Estimated Annual Operating Cost in 2016$ (Cost from Angle Lake Station)

Terminus	Preferred Alternative	All FWLE Alternatives
Federal Way Station (Full-length)	$12.1 million	$11.7 to 12.5 million
Kent/Des Moines Station	$4.8 million	$4.8 to 5.3 million
S 272nd Street Station	$7.5 million	$7.1 to 7.6 billion

2.6 Relationship to RapidRide A Line and SR 509 Extension Project

The FWLE would intersect with the King County Metro RapidRide A Line and the planned WSDOT SR 509 Extension (Exhibit 2-26). FWLE operations would complement RapidRide's service. RapidRide A Line would continue to serve SR 99 with the FWLE, providing local service between the stations and helping transit-dependent populations and others access Link and the regional transportation system.

The proposed WSDOT SR 509 Extension received a federal ROD in 2003, but funding up until 2015 was limited to right-of-way acquisition. The project described in the ROD would extend SR 509 from 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. The Washington State Legislature approved funding for the project in June 2015. Appendix F, Conceptual Design Drawings, shows the proposed SR 509 Extension in relation to the FWLE using the design approved in 2003. WSDOT is currently revisiting the proposed design and NEPA documentation for this project.

As design of the SR 509 Extension and FWLE projects advance, Sound Transit and WSDOT will work together to identify opportunities for cost sharing, reduced impacts, and combined mitigation. Construction of the two projects is expected to overlap in some areas, with FWLE construction planned for 2019 to 2023 and SR 509 Extension construction planned for 2021 to 2030 (Exhibit 2-27).

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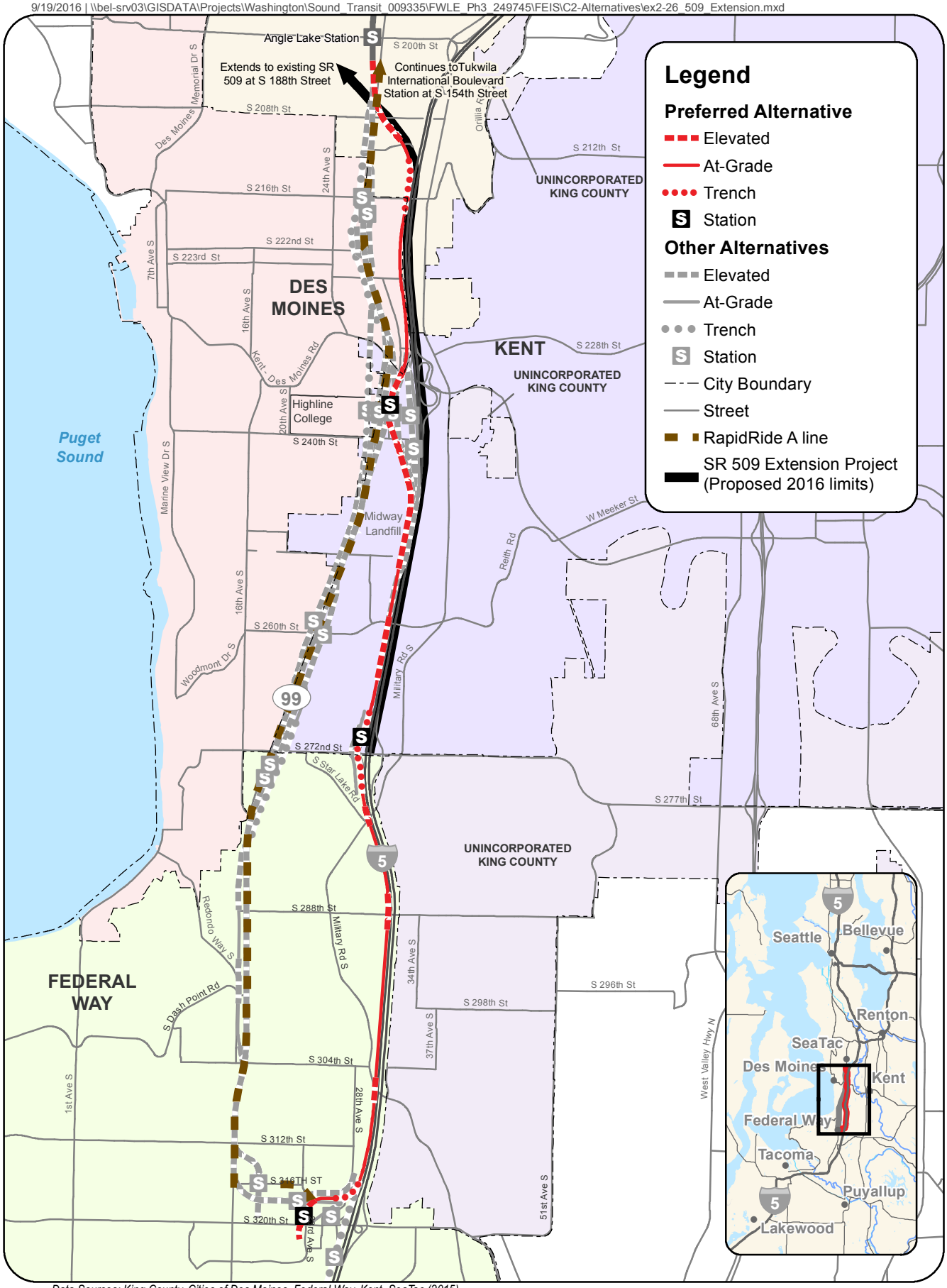

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

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EXHIBIT 2-26

SR 509 Extension Project and RapidRide A Line within FWLE Corridor

Federal Way Link Extension

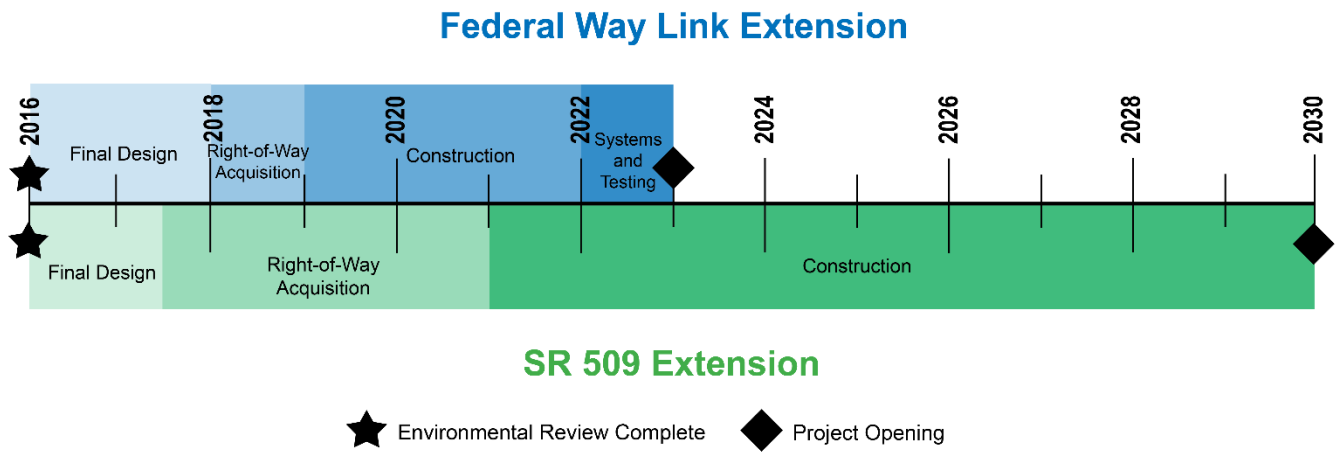


EXHIBIT 2-27
Construction Schedules for FWLE and SR 509 Extension

2.7 Next Steps and Schedule

FTA will accept comments on the Final EIS for 30 days. All comments on the Final EIS are due by close of business on December 19, 2016. After considering the analysis in the Final EIS, including public and agency comments and responses, the Sound Transit Board will select the project alternative to build. FTA is then expected to publish a ROD that will document how 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.

In general, FTA must combine the Final EIS and ROD into a single document (49 United States Code 304(a)b). That requirement does not apply when FTA finds that it is not practicable to combine the documents, however, such as when a Draft EIS does not identify a Preferred Alternative or when timing requirements make a joint Final EIS/ROD impracticable (e.g., if state law bars a final project decision until the Final EIS has issued). Both of those circumstances exist in this case.

Because FTA has determined it is not practical to issue a combined Final EIS and ROD, it is publishing these documents separately.

After the Sound Transit Board selects the project to be built and FTA issues a ROD, Sound Transit will initiate final design, begin property

acquisition, conduct construction planning, and apply for other permits and approvals needed to construct and operate the light rail project within the interstate right-of-way. The Federal Highway Administration is expected to issue a combined ROD with FTA or its own ROD for the project and can use this Final EIS to meet its NEPA and other decision requirements. Similarly, local jurisdictions issuing permits for the project may rely on the Final EIS to satisfy their SEPA requirements. Sound Transit anticipates final design, permitting, and right-of-way acquisition in 2017 and 2018, construction starting in 2019, and service starting in 2023.

2.7.1 Project Schedule

Exhibit 2-28 shows the anticipated schedule milestones for construction to Kent/Des Moines and start-up. In June 2016 the Sound Transit Board adopted the ST3 Plan. If funding for the plan is approved by voters in November 2016, the project schedule would be adjusted accordingly. The ST3 Plan calls for building the FWLE from Angle Lake to Federal Way Transit Center with service at all three stations opening concurrently in 2024.

2.7.2 Benefits and Disadvantages of Delaying Implementation

As required by SEPA, this section discusses the benefits and disadvantages of delaying the proposed project instead of approving it now.

Delaying the project would postpone impacts associated with project construction but would also postpone realizing a major component of the region's long-range plans for managing growth and transportation and the opportunity to link neighborhoods with Puget Sound regional employment centers. Delay would limit economic development from the movement of people and goods. Delay would also allow projects to develop that might 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.

EXHIBIT 2-28
Project Milestones

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

3.0 Transportation Environment and Consequences

3.1 Summary

This chapter describes the characteristics of the transportation system in the FWLE vicinity and discusses potential impacts and mitigation measures associated with the alternatives described in Chapter 2. This chapter is organized as follows:

- 3.1 Summary
- 3.2 Transportation Elements and Study Area
- 3.3 Methodology and Assumptions
- 3.4 Affected Environment
- 3.5 Environmental Impacts
- 3.6 Indirect Impacts
- 3.7 Potential Mitigation Measures

Short-term construction impacts are discussed in Chapter 5, Construction. Cumulative impacts are discussed in Chapter 6, Cumulative Impacts.

Table 3-1 summarizes key transportation findings that are discussed later in this chapter. The Transportation Technical Report in Appendix G1 includes more detailed analysis.

TABLE 3-1
Transportation Key Findings

Transportation Element	Key Findings
Regional Facilities and Travel	• All build alternatives would reduce regional vehicle miles traveled (VMT) by 160,000 miles per day and vehicle hours traveled (VHT) by 10,000 hours per day compared with the No Build Alternative. • All build alternatives would slightly reduce screenline traffic volumes and volume-to-capacity (v/c) ratios compared with the No Build Alternative. • All build alternatives would increase person and transit trips through the corridor.
Arterials and Local Streets Operations	• Among the full-length alternatives, the S 272nd Star Lake and S 272nd Redondo stations would add the most park-and-ride spaces (up to 700). Under interim terminus conditions, the Kent/Des Moines Station would add up to 1,000 parking spaces. • Stations with park-and-rides would add between 360 trips (PM peak hour at the Kent/Des Moines Station) and 700 trips (PM peak hour with the S 272nd Redondo Station interim terminus condition). • Property access and circulation impacts would be minimal because the FWLE would not conflict with roadway operations. In places, additional access roads and traffic control would enhance circulation.

TABLE 3-1
Transportation Key Findings

Transportation Element	Key Findings
	• All full-length FWLE alternatives would contribute to a below standard level of service (LOS) at 9 of the 63 intersections evaluated. Proposed mitigation would make all of these locations perform similar to or better than the No Build Alternative. • The interim conditions would affect the same intersections as the full-length alternatives near the FWLE stations that are constructed. The S 272nd Redondo Station interim terminus would affect one additional intersection.
Transit Operations	• Up to 39,500 daily transit riders would use the FWLE. • All build alternatives would improve transit service hours, frequency, and passenger load. • All build alternatives would be more reliable than the current bus system because they would operate in an exclusive right-of-way. • All build alternatives would have travel time comparable to bus service between downtown Seattle and the Federal Way Transit Center and would be noticeably faster between Federal Way Transit Center and all regional destinations north and east of Seattle. • The proposed stations would accommodate connections with non-motorized, transit transfer, and automobile access trips.
Safety	• The FWLE would shift up to 9,000 people per day from driving or taking another non-transit mode to transit and reduce VMT in the region by up to 160,000. This would create a safety benefit because less vehicles would be expected to result in fewer crashes. • All build alternatives would have minimal safety effects because they would operate in an exclusive guideway. • All build alternatives would increase vehicle and non-motorized activity around the station areas, increasing potential conflicts. • All build alternatives and options, with the exception of the Landfill Median Alignment Option, would maintain the southbound I-5 clear zone and would not require the addition of outside guardrail. The Preferred Alternative would not have any quantifiable impact on the safety of the I-5 mainline. The Landfill Median Alignment Option would add guardrail along the southbound outside shoulder, which could result in up to one more crash per year. • All build alternatives would cause additional traffic volumes that could result in up to two crashes per year at each of the three I-5 interchanges within the study area (Kent-Des Moines Road, S 272nd Street, and S 320th Street).
Parking	• The Preferred Alternative and the I-5 to SR 99 Alternative would remove up to 20 public parking spaces near S 212th Street. • All build alternatives would remove 170 to 470 parking stalls on private properties. Individual station and alignment options could remove up to 580 more stalls. • The project's 1,600-stall park-and-ride capacity would accommodate the forecasted parking demand. Hide-and-ride could occur at some stations, most likely at the potential additional S 216th East Station Option due to available on-street parking nearby. • Highline College students might use the nearby Kent/Des Moines Station park-and-ride. A parking management program at this location would maximize the capacity for transit riders.
Non-motorized Facilities	• I-5 would be a major barrier to walking and biking that would deter some non-motorized trips from accessing most stations. SR 99, S 272nd Street, and S 320th Street are also barriers, with high traffic volumes and vehicle speeds and long pedestrian crossings, all of which would discourage pedestrians and bicyclists from accessing stations near them. • The Federal Way S 320th Park-and-Ride Station Option would have the most pedestrian activity during the PM peak hour (1,840 persons) among the full-length alternatives. The potential additional S 260th Street station options would have the least pedestrian activity (about 250 persons). Under

TABLE 3-1
Transportation Key Findings

Transportation Element	Key Findings
	the interim terminus condition, 1,900 pedestrians would use the Kent/Des Moines Station during the PM peak hour. • The most pedestrian/bicycle activity to and from the station would be at the Kent/Des Moines Station, the potential additional S 216th (West or East) Station, and potential additional S 260th (West or East) Station. • Pedestrian LOS would degrade where pedestrians would need to cross the street to reach park-and-ride facilities or transit stops, compared with station locations where transit users would not need to cross a street to access the station. However, the LOS would generally be acceptable with all FWLE alternatives.
Freight Mobility and Access	• Freight mobility and access would improve under the No Build and Build Alternatives compared with existing conditions because the SR 509 and SR 167 extension projects will create new regional highway connections to I-5. All the build alternatives would operate in an exclusive guideway, so their effects on freight would be minimal and similar to their impacts on automobiles. • Freight movements would benefit at some locations from project improvements and/or mitigation.

3.2 Transportation Elements and Study Area

Affected environment, environmental impacts, and potential mitigation measures are considered separately herein for each of the seven elements of the transportation system analysis (see box to the right).

This chapter addresses I-5 highway operations and safety as part of the following elements:

- Regional Facilities and Travel (Sections 3.4.1 and 3.5.1) – Screenline performance
- Arterial and Local Street Operations (Sections 3.4.3 and 3.5.3) – I-5 ramp terminal intersection operations and off-ramp queues
- Safety (Sections 3.4.4 and 3.5.4) – Crash history and I-5 clear zone

The analysis did not evaluate navigable waterways because there are none in the study area.

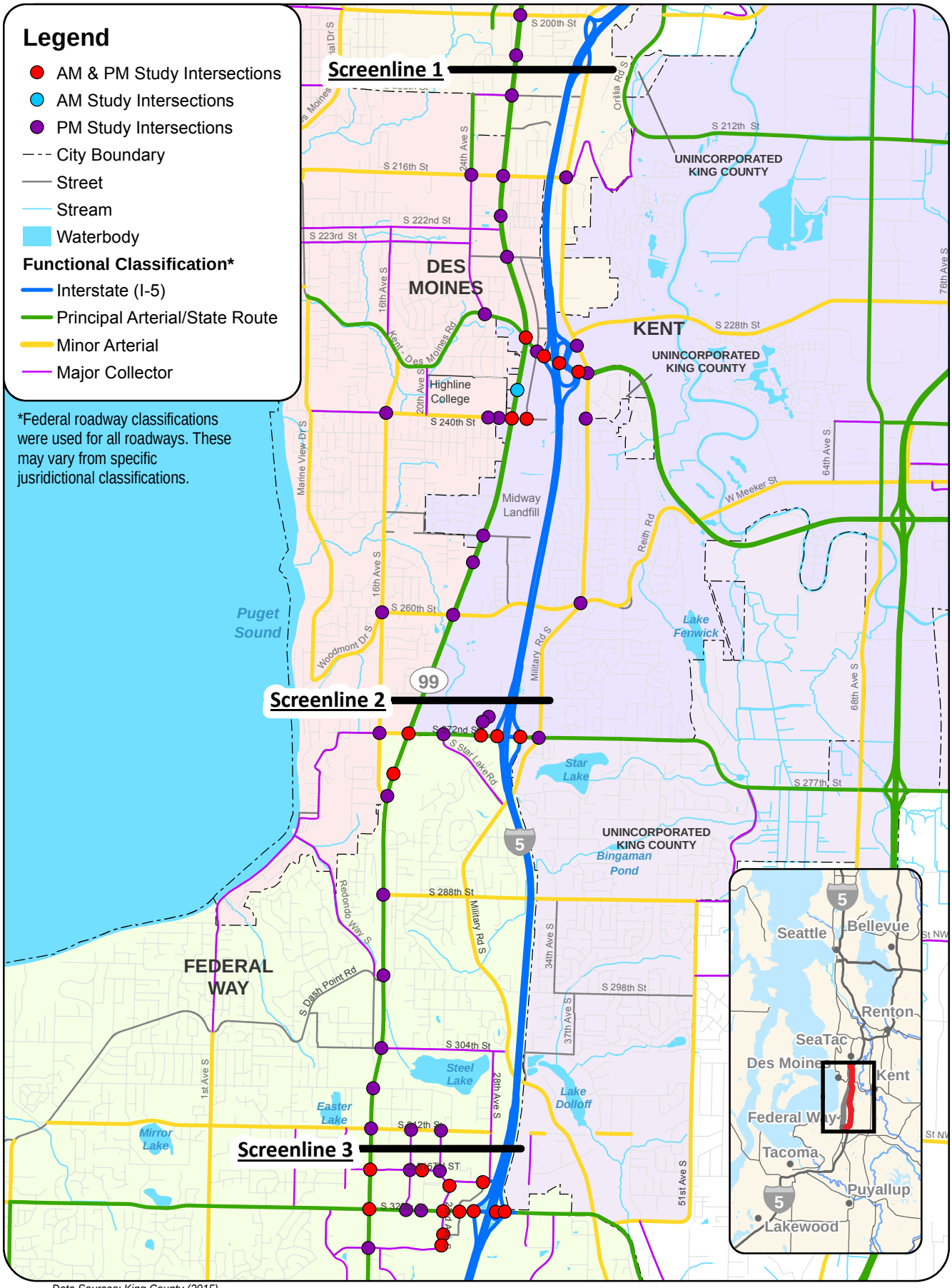
Exhibit 3-1 shows the study area, major roadways, and intersections studied.

Transportation System Elements Analyzed

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

Study Area

The transportation study area is generally between SR 99 and I-5 from S 200th Street in the City of SeaTac south to approximately S 324th Street in the City of Federal Way. The LOS analysis used intersections along major arterials and near station areas. Around stations, the study area is a fixed distance that depends on the element being studied, such as non-motorized travel distances.



Data Sources: King County (2015)

N

0 0.5 1 2 Miles

EXHIBIT 3-1
FWLE Transportation Study Area

The affected environment describes existing conditions between 2011 and 2015, by transportation element. The impact analysis used the design year 2035 to match agency planning periods. The impact analysis compares the No Build Alternative to the build alternatives, including potential mitigation.

Design Year 2035

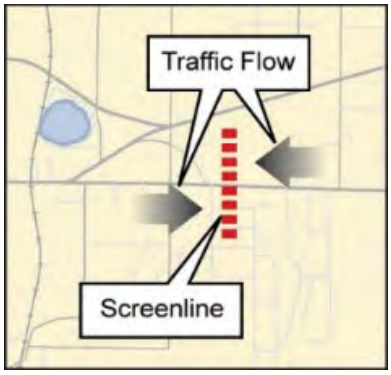
The year for which ridership forecasts and traffic volumes are estimated to determine the design features required for the proposed FWLE improvements.

3.3 Methodology and Assumptions

The Final EIS Transportation Technical Analysis Methodology, including assumptions and updates since the Draft EIS, (Appendix A of Appendix G1, Transportation Technical Report) describes the methodology and assumptions used to analyze the FWLE transportation impacts, addressing:

- Agency guidelines and regulations for the transportation analysis
- Data collected and sources, such as traffic volumes, parking supply and utilization, pedestrian and bicycle facilities, crash data, and transit service characteristics
- Transportation analysis methodology – definitions and procedures for regional traffic analysis, transit operations, local and arterial traffic analysis, intersection operational 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, non-motorized facilities and modes, property access and circulation, freight, transit, and construction

Sound Transit studied transportation impacts from three different perspectives: regional, screenline (corridor), and local operations. The regional and screenline assessments were large-scale studies, while the operational assessment identified and analyzed specific roadways, intersections, and transit facilities.



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

Table 3-2 summarizes changes in transportation analysis assumptions between the Draft and Final EIS.

TABLE 3-2
Changes in Assumptions

Change in Assumption from Draft EIS to Final EIS[a]	Reason for Change	Elements Affected
Background projects updated to include: • WSDOT SR 509 Corridor Completion and Freight Improvement Project (SR 509 Extension) as defined in the FHWA 2003 ROD • WSDOT SR 167 Tacoma to Edgewood New Freeway Construction Project as defined in FHWA 2007 ROD • WSDOT I-5/SR 161/ SR 18: Federal Way Triangle Vicinity Improvements • Local jurisdiction/agency intersection and roadway projects as part of TIPs and CIPs	Approval of Connecting Washington (statewide transportation package) and updates from local agencies	Regional Facilities and Travel, Transit Operations, Arterials and Local Street Operations, Parking, Non-Motorized Facilities, Freight Mobility and Access
More bus routes serving the FWLE corridor, with better headways.	King County Metro, Pierce Transit, and Sound Transit planning bus service modifications	Transit Operations, Non-Motorized Facilities
Transportation system and transit forecasts updated to reflect the most recent PSRC and Sound Transit demand models.	Reflect 2015 conditions and latest regional land use forecasts	Regional Facilities and Travel, Transit Operations, Arterials and Local Street Operations, Parking, Non-Motorized Facilities, Freight Mobility and Access
Existing year for transit data changed from 2013 to 2015.	Reflect 2015 ridership and service conditions	Affected Environment, Transit Operations
Revised jurisdictional LOS standards.	Updated with new City of Federal Way standard	Arterials and Local Street Operations

[a] Details of changes assumed are described in detail in Appendix A, Transportation Technical Analysis Methodology, in Appendix G1.

CIPs = capital improvement programs; FHWA = Federal Highway Administration; PSRC = Puget Sound Regional Council; ROD = Record of Decision; TIPs = transportation improvement programs

3.4 Affected Environment

3.4.1 Regional Facilities and Travel

The study area is served by two north-south highway facilities, SR 99 and I-5, with mainly arterial roadways such as Kent-Des Moines Road (also known as SR 516), S 272nd Street, and S 320th Street as east-west connections. These arterials provide connections both in the study area and to/from areas to the west and east. Few regional facilities directly connect the study area to the region's major population and employment areas. Travel is constrained on these roadways during the peak periods.

3.4.1.1 Vehicle Miles Traveled and Vehicle Hours Traveled

The over 85 million daily VMT within the central Puget Sound Region (which includes King, Kitsap, Pierce, and Snohomish counties) result in over 2.8 million VHT per day and approximately 340,000 VHD per day for all users of the transportation system.

3.4.1.2 Regional Roadways

Table 3-3 and Exhibit 3-1 identify interstate freeways and state highways in the study area. The table's ADT volume is a range because travel characteristics vary along these regional roadways.

Transportation Analysis Terms

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

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

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

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

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

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

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

TABLE 3-3
Existing Regional Highway Facilities

Roadway	Roadway Classification	Number of Lanes	Speed Limit (mph)	ADT[a]	Bike Lanes	Sidewalk
I-5	Freeway	8 – 10	60	176,000 – 206,000[b]	N	N
SR 99	Principal Arterial	4 – 6	40 – 45	23,000 – 36,000	N	Y
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, 2012).
mph = miles per hour; N = no; Y = yes

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.

SR 99 (also called International Boulevard through the city of SeaTac and Pacific Highway S through the cities of Kent, Des Moines, and Federal Way) is a WSDOT HSS extending through Seattle south to Fife. SR 99 is part of the NHS, and runs west of I-5 in the study area.

Kent-Des Moines Road is an east-west principal arterial connecting to Downtown Kent, the Kent Manufacturing/ Industrial Center, and Downtown Des Moines. The road is a non-HSS, and part of the NHS.

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 needed to connect major communities in the state.

Highway of regional significance (non-HSS): State transportation facilities 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

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

Vehicle v/c ratio is the performance measure used to assess travel conditions on the regional facilities in the study area. A v/c ratio over 0.9 suggest deficiencies; over 1.0, that the road cannot effectively accommodate all traffic and congestion is likely prohibiting efficient movement of people and goods. Mode-share information from the PSRC and Sound Transit travel demand models breaks down the roadway vehicle demand by vehicular type (e.g., SOVs, HOVs, and transit).

The three screenlines cross areas with volumes at or close to capacity, indicating substantial congestion in the southbound direction (the peak direction in the PM peak hour). Commuters leaving Downtown Seattle and large employment centers north of the study area during the PM peak period add to congestion. Northbound travel does not contribute as much during the PM peak.

3.4.2 Transit Operations

3.4.2.1 Transit Service and Facilities

Transit centers and park-and-ride facilities provide approximately 3,700 parking spaces. Area facilities 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

Appendix G1 provides a list of transit routes that serve these facilities. In general, King County Metro Transit (Metro), Sound Transit, and Pierce Transit serve these facilities, as follows:

- Metro – most area bus service, including RapidRide A Line; express/regional and local service routes throughout King County
- Sound Transit's Regional Express buses – regional service from the study area to King and Pierce counties
- Pierce Transit buses – service between Pierce County and south King County

As of fall 2015, 26 bus routes serve the study area. Peak service travels to regional destinations north of the study area, including Downtown Seattle, First Hill, and the University of Washington. Local feeder routes from surrounding communities provide all-day service.

Transit Facilities Evaluated

The LOS analysis evaluated service reliability, including on-time performance, at five regional transit facilities:

- International District/Chinatown
- Kent-Des Moines Park-and-Ride/ Kent-Des Moines I-5 Freeway Stop
- Highline College
- Star Lake Park-and-Ride
- Federal Way Transit Center

3.4.2.2 Transit Levels of Service

Transit performance analysis used the following LOS performance measures for the PM peak period (3:00 p.m. to 7:00 p.m.), unless otherwise noted:

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

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

The majority of the transit routes currently operate with a peak period service frequency of LOS D or worse: transit headways (frequency of passing a location) average 21 minutes or longer. Bus routes between Downtown Seattle and the FWLE study area currently operate at average headways of 15 to 30 minutes, with most routes at a 30-minute headway. The RapidRide A Line between Tukwila and Federal Way on SR 99 has the most frequent bus service in the study area: 10-minute headways during the PM peak period. It is the only route that operates at LOS B or better.

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.

Existing transit routes provide little to no service between the study area the key Puget Sound regional employment centers of Downtown Bellevue, Redmond, the University of Washington, Northgate, and Lynnwood. In the study area, frequent transit service is available along SR 99 all day, as RapidRide A Line travels between Federal Way Transit Center and the City of SeaTac, operating with 10-minute average headways.

Despite overcrowding on some routes, the existing passenger load LOS is generally acceptable. Table C-1 in Appendix G1 presents detailed bus passenger load data.

Transportation analysis evaluated on-time reliability for 10-minute-or-greater-headway routes by looking at on-time performance (a departure being 1 minute early to 5 minutes late). On-time performance for FWLE station area transit routes is poor (LOS F) on average because of roadway congestion and wide variations in roadway travel times. The Highline College hub offers the most reliable transit service, with a 65 percent average on-time performance. International District/Chinatown was evaluated because regional transit service between Seattle and the FWLE study area travels through the station; it has the least reliable service, with a 28 percent average on-time performance.

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 no bicycle lanes. Average daily traffic volumes, speed limits, and functional classification are described in more detail in Appendix G1.

3.4.3.2 Intersection Operations and Level of Service

The transportation analysis looked at intersections to understand the local operating conditions. Agency intersection LOS standards are shown in Table 3-4.

AM and PM peak hour intersection LOS analysis used the collected peak-hour traffic volumes. All of the intersections currently meet the respective jurisdictions' 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. Appendix G1 includes a detailed summary of the traffic analysis results for the existing AM and PM peak hour conditions, signal control, and the applicable LOS standard.

Intersection Levels of Service

The quality of intersection operations is described in LOS terms. LOS ratings range from A to F; LOS A represents the best operations, and LOS F represents the poorest. LOS was calculated for all study intersections. Intersections are considered to operate acceptably when they operate at or better than the 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.

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 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
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 Pacific Highway South (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	v/c of 1.2 for signalized intersections v/c of 1.0 for unsignalized intersections Maintain an average v/c of 1.1 for signalized intersections within City Center
King County	LOS E for signalized and unsignalized intersections

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

Sources: City of Des Moines, 2015; City of Federal Way, 2015; City of Kent, 2008; King County, 2001; WSDOT, 2010.

v/c for Des Moines is based on the critical movement.

< = less than

3.4.4 Safety

Sound Transit collected crash data records over a 5-year period (2007 to 2011—the most recent available when this analysis was done) for intersections, arterials, and I-5 (mainline and ramps) in the study

area. Detailed crash frequencies and rates are included in Appendix G1, Tables 3-12 through 3-14. The majority of the crashes in the study area occurred at intersections. The highest crash rate locations in the FWLE study area over the 5-year period are at:

- Intersection of SR 99 and Kent-Des Moines Road: 2.16 crashes per million entering vehicles (MEV)
- S 320th Street corridor between SR 99 and I-5: 2.99 crashes per million vehicle miles traveled (MVMT)
- Two SR 99 segments over the statewide average:
  - S 216th Street to Kent-Des Moines Road (2.55 crashes per MVMT)
  - S 288th Street to S 320th Street (2.56 crashes per MVMT)

Between 2007 and 2011, there were a total of 1,705 crashes on the mainline and 378 crashes on the I-5 ramps through the study area. All I-5 mainline segments have a crash rate lower than the 2011 WSDOT statewide collision average for interstates in urban areas (1.24 crashes per MVMT). The southbound off-ramp to S 320th Street has the highest crash frequency (about 17 crashes per year) and highest volume of any ramp studied.

A clear zone inventory for the I-5 outside mainline was completed for the western edge (southbound) of I-5 between S 211th Street and S 317th Street, and the I-5 median between S 244th Street and S 256th Street. The *Highway Safety Manual* (American Association of State Highway and Transportation Officials, 2014) does not allow for the analysis of a median clear zone and, therefore, the inside mainline clear zone was not analyzed. Based on the 2015 WSDOT *Design Manual* criteria for highway safety clear zones, the outside clear zone width along the FWLE corridor should range between 30 and 45 feet measured from the outermost traffic lane. The inventory assessed the following two conditions:

Clear Zone

The WSDOT Design Manual 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 the clear zone is affected by existing barriers required for safety (e.g., guardrail, barrier, or walls)

Based on this, approximately two-thirds of the southbound I-5 mainline currently has a clear zone and currently meets the Design Manual guidelines.

3.4.5 Parking

Table 3-16 in Appendix G1 shows that on-street parking surrounding the potential FWLE stations is between 13 and 43 percent filled. All park-and-rides in the study area except Redondo Heights are filled 38 percent or more; Redondo Heights Park-and-Ride is 9 percent filled.

There are no privately operated parking facilities near the FWLE station locations. Most parking in the Kent/Des Moines Station area is in residential neighborhoods and generally restricted to residential use. On-street parking east of I-5 is 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 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 Non-motorized Facilities

Some arterials, such as Kent-Des Moines Road east of I-5 and S 240th Street, and many local streets are missing sidewalks on one or both sides of the road.

Intermittent sidewalks around interchange areas, high traffic volumes, and congestion combine to discourage non-motorized travel between the station areas and locations east of I-5 at the Kent-Des Moines, S 272nd Street, and S 320th Street interchanges.

The study area has few bicycle facilities and multi-use trails. South 216th Street has a designated bicycle lane that runs the entire length between I-5 and Puget Sound, while Kent-Des Moines Road, S 240th Street, and S 260th Street are all signed bicycle routes that have a wide shoulder to accommodate bicycles. They do not necessarily have marked lanes. Signage generally alerts drivers that bicyclists share the roadway with vehicles. There are 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 project alignment but are outside the study area.

3.4.7 Freight Mobility and Access

Truck mobility in the Puget Sound Region is largely supported by a system of designated freight routes (Exhibit 3-2) that connect major freight destinations. In the study area, these routes move goods to and from major hubs such as the Port of Seattle, Sea-Tac Airport, Kent Manufacturing/Industrial Center, and the Port of Tacoma. There are no active freight rail lines in the study area.

I-5 is a key freight corridor that serves not only the Puget Sound Region, but also national and international markets. Between Sea-Tac Airport and Kent-Des Moines Road, SR 99 carried 3.6 million tons of freight in 2013. 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/or the Kent Manufacturing/Industrial Center.

3.5 Environmental Impacts

Sound Transit reviewed agency and station long-range plans to identify planned and funded transportation projects. Appendix G1 lists the projects assumed to be in place under both the No Build Alternative and build alternatives. The long-term effects in the following sections compare the No Build Alternative with the build alternatives for the year 2035. For all elements, the discussion of the No Build Alternative is integrated with the build alternatives. Impacts from the No Build Alternative are not quantified for some elements (Parking, Safety, Non-motorized Facilities, and Freight Mobility) because the conditions would be similar to the existing conditions.

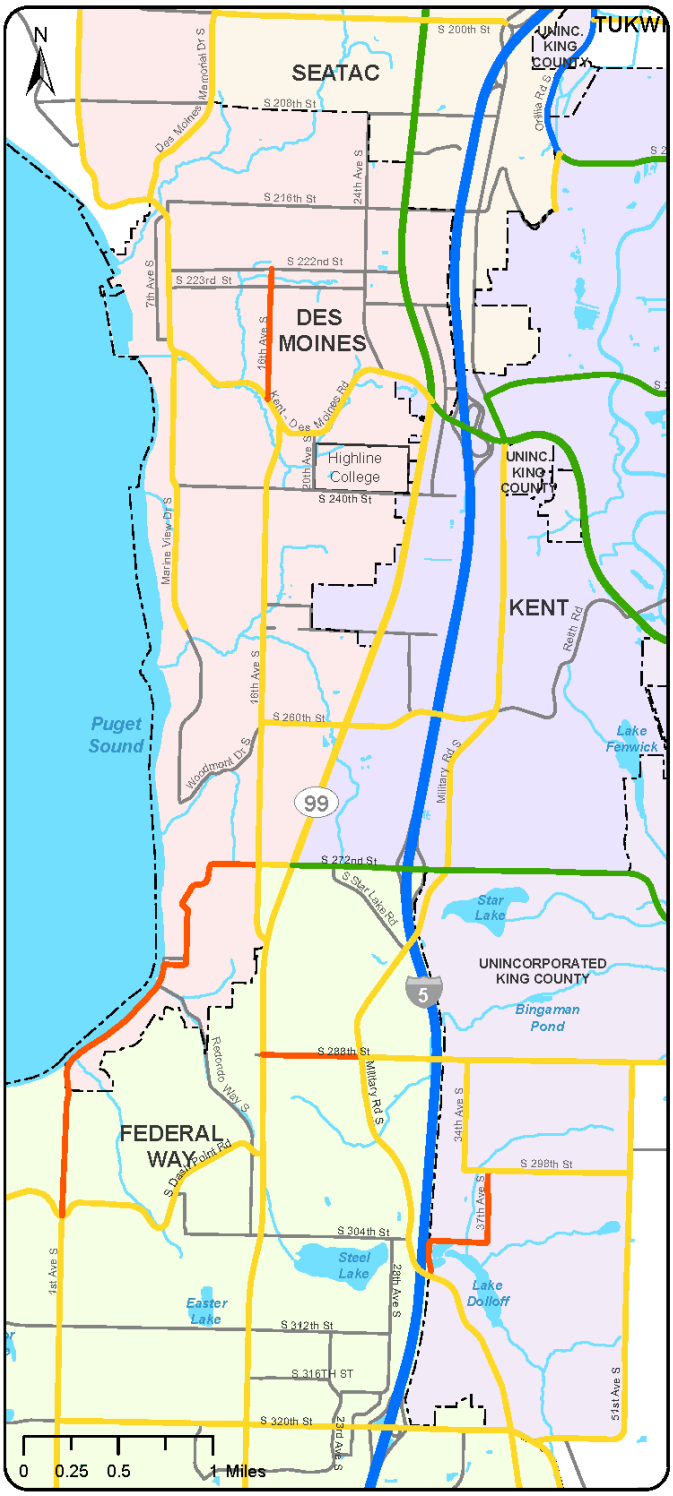


EXHIBIT 3-2
Existing Freight

Analysis of the build alternatives impacts assumed 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. Sound Transit also identified potential mitigation to improve conditions for the build alternatives. Changes and effects described in this section are based on the conceptual light rail guideway and station area plans (Appendix F, Conceptual Design Drawings). Additional information on the impacts described below can be found in Section 4.0, Environmental Impacts, of Appendix G1.

3.5.1 Regional Facilities and Travel

This section discusses regional traffic patterns (projected vehicle forecasts, traffic congestion, and mode share) for the No Build and build alternatives. All of the build alternatives would have similar impacts, and the Preferred Alternative is presented as representative of all build alternatives. Refer to Section 3.4.3 for I-5 ramp terminal operational and queuing analysis and Section 3.4.4 for the I-5 safety analysis.

The study area's future arterial and local street system includes planned and funded roadway and transit projects and transit service changes that were incorporated into the transportation analysis for the 2035 No Build and build alternatives.

Traffic volumes are expected to increase approximately 20 percent by 2035 because of static travel patterns and projected continued regional population growth. Compound growth rate calculations indicate growth of approximately 0.83 percent annually. Exhibit 3-3 shows the 2035 No Build Alternative v/c ratios for major regional facilities. Congestion would affect most major freeways and arterials in King County.

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

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 Preferred Alternative for 2035.

By attracting some automobile drivers to light rail instead of driving, FWLE build alternatives would likely

cause the following approximate regional reductions on typical weekdays compared with the No Build Alternative:

- VMT – 160,000 miles per day
- VHT – 10,000 hours per day
- VHD – 9,000 hours per day

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.

3.5.1.2 Screenline Performance

Sound Transit analyzed the AM peak hour, PM peak hour, daily traffic volumes, and v/c ratios at three screenline locations in the study area (Exhibit 3-1).

The FWLE would increase transit ridership and slightly decrease traffic volumes and congestion across all screenlines. Modest volume decreases are expected in both the peak and off-peak directions, but most roads across the screenlines would operate at or near capacity (i.e., v/c equal to or greater than 0.90) in the peak direction with or without the FWLE.

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	113,690,000	4,075,000	861,000
Build Alternatives[a]	113,530,000	4,065,000	852,000
Change	-160,000	-10,000	-9,000

Source: PSRC, 2014
[a] Preferred Alternative is documented for comparison purposes. Other alternatives and station options would have similar regional impacts.

3.5.1.3 Person Mode of Travel

With the build alternatives, the number of persons traveling through the study area during the PM peak hour is expected to increase, with a higher proportion on transit modes. Shifts to transit with the build alternatives would cause a slight decrease in SOV and HOV person demand. The transit mode share would increase from 3–4 percent to 4–6 percent for northbound travel, and from 9–12 percent to 11–15 percent for southbound travel.

3.5.2 Transit Service and Operations

This section discusses transit service and circulation, regional and local bus transit, bus and light rail travel times, ridership, station area mode of access, transit LOS measures, transit reliability and on-time performance, and transit transfer rates for all alternatives.

3.5.2.1 Transit Service and Circulation

Transit facility improvements planned for the FWLE include new light rail stations with new or expanded park-and-ride capacity and improved transit connectivity from multimodal transit hubs. This would further integrate modes of access for bus, transit, automobile, and pedestrians into one convenient location.

3.5.2.2 Regional and Local Bus Transit

The No Build Alternative includes a new light rail station at Angle Lake and transit bus route and service modifications reflective of proposed changes within each of the local transit agency's long-range plans. Transit agencies have also identified conceptual bus service plans that could be integrated with implementation of the FWLE. The information provided by these agencies identifies where a potential change to a route may occur, including truncating, eliminating, rerouting, or increasing frequency to integrate with light rail service. RapidRide A Line would continue to operate along SR 99 with the FWLE, providing local service between the stations and offering access to the light rail transit system.

3.5.2.3 Transit Travel Time

Light rail travel times between the Federal Way Transit Center Station and the Angle Lake Station would range between 12 and 14 minutes, depending on the selected alternative and station options. Shorter alignments with 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 presented in Chapter 2, Alternatives Considered.

Table 3-6 shows the estimated 2035 PM peak period transit (bus and light rail) travel times between the Federal Way Transit Center and key regional Puget Sound destinations. The travel times assume the Preferred Alternative and the corresponding three FWLE stations (Kent/Des Moines, S 272nd Star Lake, and Federal Way Transit Center) and do not include the potential additional S 216th or S 260th station options.

TABLE 3-6
2035 PM Peak Period Transit Travel Times (minutes) and Transfers between Federal Way Transit Center and Regional Centers

Regional Centers	No Build Alternative[a]		Preferred Alternative[b]	
	Travel Time (min)	# of Transfers	Travel Time (min)	# of Transfers
Downtown Seattle (International District/Chinatown Station)	47[c]	0	46	0
Sea-Tac Airport	45[c]	0	15	0
Downtown Bellevue	75[d]	1	70[e]	1
University of Washington	66[d]	0	57	0
Northgate	74[d]	1	65	0
Lynnwood	88[d]	1	79	0
Overlake	85[d]	1	80[e]	1

[a] No Build Alternative travel times calculated based on quickest route using bus and/or light rail service.

[b] Preferred Alternative travel times calculated using only light rail service.

[c] Sources: No Build Alternatives – Travel time for a representative bus route using Sound Transit's Trip Planner from February 2016 (Sound Transit 2016). Travel times were factored to 2035 by using future estimated roadway congestion based on regional growth (PSRC, 2014). Preferred Alternative and Central Link/East Link Travel Times – Sound Transit light rail travel time estimates (Sound Transit, 2014).

[d] Trip assumes light rail taken to the International District/Chinatown, and an 8-minute transfer time was assumed to access a surface bus to Federal Way Transit Center.

[e] Trip assumes light rail taken to the International District/Chinatown, 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 Transit Center would be 1 to 30 minutes faster with the Preferred Alternative. Express bus service (with limited stops, using I-5 exclusively) between Federal Way and Downtown Seattle (International District/Chinatown) would take 47 minutes under the No Build Alternative. With the Preferred Alternative, the light rail trip between Federal Way and Downtown Seattle would take 46 minutes. 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 as bus trips. While bus service is frequent and generally a direct 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, the trip would be more reliable even though the overall travel times would be similar.

The largest travel time improvement would be between Sea-Tac Airport and Federal Way. The travel time from Federal Way to Sea-Tac Airport is forecasted to be 45 minutes under the No Build Alternative. Bus routes between these two destinations stop frequently and are delayed by congestion and traffic signals on arterials, thus increasing travel time. Light rail would have fewer stops

and would not be delayed by vehicular traffic, resulting in a 30-minute shorter travel time under the build alternatives.

With the No Build Alternative, buses in Downtown Seattle and north of downtown would use surface streets and be slowed by traffic congestion. With the Preferred Alternative, a light rail trip between the Federal Way Transit Center and Downtown Seattle or northern destinations would avoid this because by 2035 the Downtown Seattle Transit Tunnel will be used exclusively by light rail. This would increase travel time savings for trips to destinations north of the International District/Chinatown Station, such as Westlake Center and University of Washington.

Light rail would save at least 9 minutes of travel time for locations north of downtown Seattle. For the Northgate and Lynnwood destinations, a transfer from bus to light rail would be required under the No Build Alternative, 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 PSRC's 2014 land use forecasts that assume substantial growth in the study area for the year 2035 (close to a 50 percent increase in employment and households surrounding the Kent-Des Moines station area) and were the basis for ridership projections.

PSRC 2014 Forecast

PSRC created this land use set, (called the "local targets" forecasts), 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.

Table 3-7 shows the 2035 daily transit ridership for the No Build and build alternatives and the expected 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 between 35,000 and 39,500 daily riders, depending on the alternative, with up to 9,000 new riders. Under all build alternatives, the number of regional (Sound Transit service area) daily transit boardings is expected to increase by up to 1.4 percent.

TABLE 3-7
2035 FWLE Weekday Transit Trips and FWLE Riders

Measure	No Build Alternative	Build Alternatives					
		Preferred	SR 99	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]	651,000	659,500	659,500	659,000	659,000	660,000	660,000
Total Daily Systemwide Link Boardings[d]	308,000	335,000	335,500	333,500	334,500	336,000 – 336,500	337,500
Total FWLE Light Rail Riders	N/A	36,500	36,500	35,000	35,500	37,500 - 38,000	39,500
2035 New Transit Riders	N/A	8,000	8,500	7,500	8,000	8,500	9,000

Source: Sound Transit, 2014

[a] Range 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] Total daily systemwide boardings includes transfers between the FWLE and East Link. Therefore, the change in total boardings between the No Build Alternative and build alternatives is higher than the change in total boardings at the proposed FWLE stations.
N/A = not applicable

Exhibit 3-4 shows average 2035 weekday and PM peak period (3 p.m. to 6 p.m.) station boardings for the build alternatives. Exhibit 3-5 shows this information for the station options. On both exhibits, the station boardings include only trips starting at each FWLE station and the Angle Lake Station, while total trips shown in Table 3-7 include all trips from the FWLE stations and does not include boardings at Angle Lake Station. Angle Lake Station is used to show how the FWLE would influence this adjacent station.

Station	No Build Alternative	Preferred Alternative	SR 99 Alternative	SR 99 to I-5 Alternative	I-5 to SR 99 Alternative
Angle Lake	7,000 (1,200)	4,500 (1,100)	4,500 (1,100)	5,000 (1,100)	4,500 (1,100)
Kent/Des Moines		3,500 (700)	3,500 (700)	3,000 (600)	3,000 (700)
S 272nd Redondo/ Star Lake		3,000 (500)	3,500 (500)	3,000 (500)	3,500 (500)
Federal Way Transit Center		12,500 (1,300)	12,500 (1,300)	12,000 (1,300)	12,000 (1,300)
Total Boardings for FWLE Stations[a]		19,000 (2,500)	19,500 (2,500)	18,000 (2,400)	18,500 (2,500)

x,xxx ← Daily Station Boardings (rounded to nearest 500)
(x,xxx) ← PM Peak Period Station Boardings (rounded to nearest 100)

Notes:
Size of circle represents relative magnitude of daily boardings
[a]Total boardings shown do not include Angle Lake Station.

EXHIBIT 3-4
2035 FWLE Build Alternatives Weekday Station Boardings

Station	Preferred Alternative Station Options		Preferred Alternative and SR 99 to I-5 Alternative Station Options		SR 99 Alternative Station Options[a]	
	Kent/Des Moines I-5 Station Option	Kent/Des Moines At-Grade Station Option	Federal Way I-5 Station Option	Federal Way S 320th Park-and-Ride Station Option	S 216th and S 260th Station Options[b]	Federal Way Transit Center SR 99 Station Option
Angle Lake	5,000 (1,200)	5,000 (1,200)	4,500 (1,000)	4,500 (1,000)	4,500 (1,000)	4,500 (900)
S 216th Street					2,000 (500)	
Kent/Des Moines	2,500 (500)	2,500 (600)	3,000 (600)	3,000 (600)	2,500 (600)	3,000 (700)
S 260th Street					1,500 (300)	
S 272nd Redondo/ Star Lake	3,500 (500)	3,500 (500)	3,000 (500)	3,500 (500)	3,000 (400)	3,500 (400)
Federal Way Transit Center	12,500 (1,300)	12,500 (1,300)	10,500 (1,200)	11,000 (1,200)	12,500 (1,300)	10,500 (1,300)
Total Boardings for FWLE Stations[c]	18,500 (2,300)	18,500 (2,400)	16,500 (2,300)	17,500 (2,300)	21,500 (3,100)	17,000 (2,400)

x,xxx ← Daily Station Boardings (rounded to nearest 500)
(x,xxx) ← PM Peak Period Station Boardings (rounded to nearest 100)

Notes:
Size of circle represents relative magnitude of daily boardings
[a] The Kent/Des Moines Station Options would have similar ridership as in the SR 99 Alternative (shown in Exhibit 3-4).
[b] If either S 216th Street or S 260th Street were included in a four-station scenario, each station's ridership would be similar to the five-station scenario.
[c] Total boardings shown do not include Angle Lake Station.

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

These exhibits list potential station areas from north to south. Ridership at each station would vary depending on the combination of stations and station options. For the four build alternatives shown in Exhibit 3-4, total daily boardings in the study area would range from 18,000 to 19,500. Build alternatives with the potential additional stations and station options shown in Exhibit 3-5 would range from 16,500 with the Preferred Alternative with the Federal Way I-5 Station Option, to 21,500 under the SR 99 Alternative with five stations. Although adding stations would increase overall ridership, a portion of those additional station boardings would come from surrounding stations.

The ridership forecasts for the build alternatives are generally similar. 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. These are similar among alternatives, but minor ridership differences in station areas are expected due to the following:

- Differences in population and employment density close to the station
- Connections to local and regional transit (such as proximity to RapidRide stops)
- Details of station access and walkability
- Amount of parking provided at the station

For example, because the Preferred Alternative Kent/Des Moines I-5 and At-Grade station options would be farther from SR 99 and Highline College and would not be directly served by the RapidRide A Line, they would have about 1/3 fewer boardings than station options along or closer to SR 99.

For both the S 272nd Redondo and S 272nd Star Lake stations, bus feeder service (i.e., routes between the station and nearby areas) is assumed. In addition to feeder service, RapidRide A Line also provides bus service near the S 272nd Redondo Station location. Both would contribute to the difference in station boardings between these two stations (Exhibit 3-4).

Tables 3-8 and 3-9 include forecasted ridership and new transit riders for the build alternatives under the Kent/Des Moines and S 272nd Street interim terminus conditions, respectively. Under all interim terminus conditions, regional daily transit trips would slightly increase to over 650,000 per day.

With the Kent/Des Moines interim terminus, the SR 99 Alternative would have the highest total FWLE corridor project riders (12,500), and the I-5 to SR 99 Alternative would have the lowest project riders (9,000).

With the S 272nd Station interim terminus condition, the I-5 to SR 99 and SR 99 alternatives would have slightly more total FWLE corridor project riders (17,500–19,000) than the Preferred Alternative (16,500). Tables 3-8 and 3-9 show the systemwide ridership for both interim terminus conditions. Boardings by station for interim

terminus conditions are shown in Table 4-12 in Appendix G1, Transportation Technical Report.

TABLE 3-8
2035 Kent/Des Moines Station Interim Terminus Weekday Ridership and FWLE Riders

Measure	2035 No Build	2035 Build Alternative			
		Preferred	SR 99	SR 99 to I-5	I-5 to SR 99
Total Regional Daily Transit Trips[a]	651,000	652,500	653,000	652,000	652,000
Total Daily Systemwide Link Boardings[b]	308,000	313,000	314,000	312,500	312,000
Total FWLE Light Rail Riders	N/A	11,000	12,500	10,500	9,000
2035 New Transit Riders	N/A	1,000	1,500	1,000	1,000

Source: Sound Transit, 2014

[a] Includes both light rail and bus riders in the Sound Transit service area.
[b] Total daily systemwide boardings includes transfers between the FWLE and East Link. Therefore, the change in total boardings between the No Build Alternative and build alternatives is higher than the change in total boardings at the proposed FWLE stations.
N/A = not applicable

TABLE 3-9
2035 S 272nd Station Interim Terminus Weekday Ridership and FWLE Riders

Measure	2035 No Build	2035 Build Alternative			
		Preferred	SR 99	SR 99 to I-5	I-5 to SR 99
Total Regional Daily Transit Trips[a]	651,000	654,000	654,500	653,500	653,500
Total Daily Systemwide Link Boardings[b]	308,000	317,500	320,500	317,000	319,000
Total FWLE Light Rail Riders	n/a	16,500	19,000	15,500	17,500
2035 New Transit Riders	n/a	2,500	3,500	2,500	2,500

Source: Sound Transit, 2014

[a] Includes both light rail and bus riders in the Sound Transit service area.
[b] Total daily systemwide boardings includes transfers between the FWLE and East Link. Therefore, the change in total boardings between the No Build Alternative and build alternatives is higher than the change in total boardings at the proposed FWLE stations.
N/A = not applicable

The difference in ridership between the build alternatives would be influenced by a combination of the same factors as the full-length project.

3.5.2.5 Station Area Mode of Access

Sound Transit analyzed modes of access for each type of person trip at a station. Exhibit 3-6 shows the average expected daily mode of access to each station area for the four build alternatives and the station options.

Kent/Des Moines stations 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 farther from RapidRide A Line stops along SR 99.

At S 272nd Street, the Star Lake Station's higher number of transit routes would give it a higher transit transfer percentage than the Redondo Station.

At the Federal Way Transit Center Station, the majority of trips would be transit transfer, with the rest generally automobile-based. Although station area land uses are forecasted to change from the current commercial focus to more mixed use, the mode of access at this station is forecasted to be more focused on transit and automobile modes of access than on pedestrian- and bicycle-based trips. The Federal Way S 320th Park-and-Ride Station Option would generate a higher percentage of automobile-based trips because a larger number of parking spaces would be available for light rail users and fewer feeder transit routes would serve the station area.

No parking is assumed for potential additional stations at S 216th Street and S 260th Street (West or East). Transit transfer potential is limited because only a few bus routes would serve these stations. Access is expected to be predominately non-motorized except for a small portion of passenger drop-off/pick up trips.

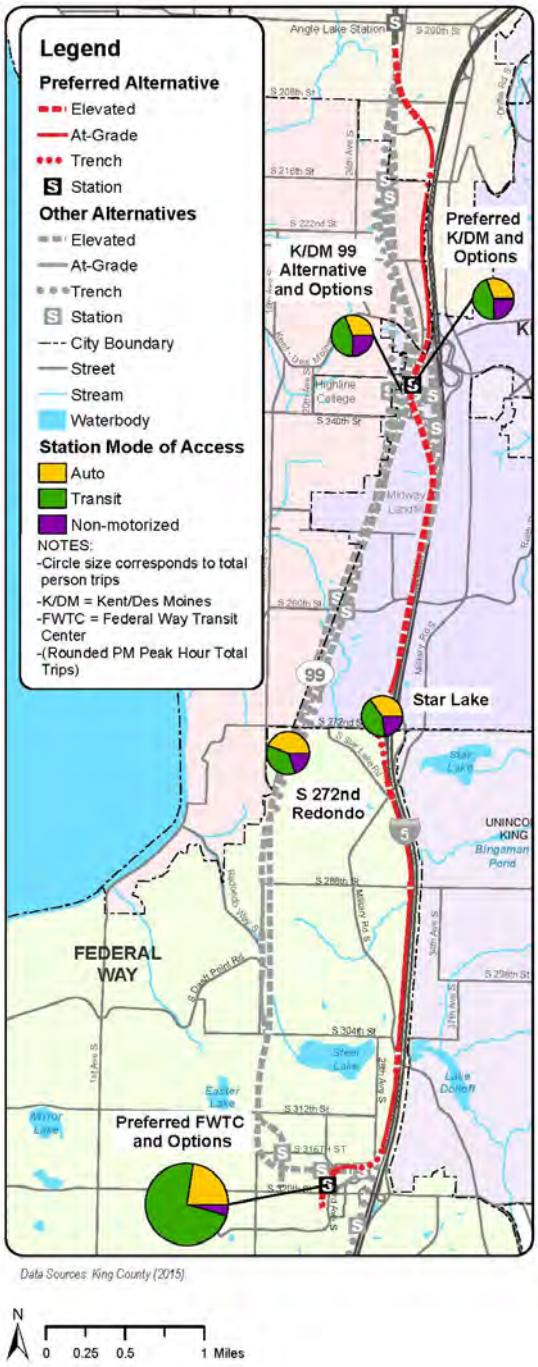


EXHIBIT 3-6
2035 Build Alternatives PM Peak Hour Station Mode of Access

3.5.2.6 Transit LOS Measures

Sound Transit analyzed transit performance with the No Build and build alternatives for 2035 using transit LOS for service frequency, hours of service, passenger loads, and reliability.

Service Frequency

The 2035 No Build Alternative service frequency is expected to have a slightly better LOS when compared to existing conditions. Direct transit service to regional destinations would be limited and generally only provided in the southbound (PM peak) direction. The No Build Alternative would not provide direct northbound transit service (not requiring a transfer) between the study area and North Seattle and Bellevue/Eastside.

With the build alternatives, access to regional destinations east of Lake Washington (Bellevue/Redmond) would require a transfer, but frequency of service and ease of transferring between Link light rail lines

would minimize the transfer time. The FWLE would improve overall service frequency to LOS A for connections between Federal Way, Kent, Des Moines, SeaTac, and many Puget Sound regional destinations.

Hours of Service

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 D and F, respectively. With the build alternatives, continuous, two-way transit service would be provided for 20 hours, resulting in LOS A for all evaluated origin-destination pairs.

Passenger Load

Sound Transit used estimated year 2035 PM peak period passenger volume forecasts from their 2014 ridership model to analyze passenger load LOS. Under the No Build Alternative, transit passenger load is expected to be at LOS B in the northbound direction of travel and at LOS C or D in the southbound. Most buses would not exceed their seated capacity on several routes during the PM peak period. However, many key routes from Seattle would operate at LOS E or F.

With the build alternatives, bus passenger loads would improve to LOS A, and light rail passenger loads would range from LOS A to D.

3.5.2.7 Reliability and On-time Performance

By 2035, speeds on key transit facilities, such as I-5 HOV lanes and major arterial streets, are expected to decrease by up to 40 percent in the peak direction (southbound) during the PM peak period. Bus service reliability for the No Build Alternative is expected to degrade. Passengers could have less confidence in scheduled arrival times and might use another mode of travel or leave earlier to ensure on-time arrival.

Light rail 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, its reliability could be affected by unexpected delays at station areas or by system delays outside of the FWLE corridor, where light rail would operate 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 buses or between a bus and light rail/commuter rail. Riders want reliable, quick transfer connections. Evidence has shown that short transfers are acceptable and only a minor inconvenience to riders. Several hubs in the Sound Transit

region, including the Federal Way Transit Center in the study area, are considered "multi-centered" route hubs where bus routes converge so transfers can be made to multiple destinations at one location. The transfer rate with the No Build Alternative would be approximately 1.62 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 following on arterials and local streets, based on the No Build and build alternatives:

- Year 2035 traffic volume forecasts
- Expected traffic generated at stations
- Intersection operations
- Changes in access, circulation, and traffic control

Section 4.3 in Appendix G1 presents additional details regarding arterial and local street operations, including network growth rates, trip generation, and intersection LOS.

3.5.3.1 Future Arterial and Local Street System

Traffic Forecasts

Sound Transit developed year 2035 AM and PM peak hour traffic volume forecasts for the FWLE based on the PSRC's current population and land use forecasts. Forecasts predict an average annual growth rate for traffic volumes in the study area of approximately 0.8 percent in the AM and PM peak hours.

For the build alternatives, Sound Transit used station characteristics and information from its 2014 Ridership Model to calculate the anticipated vehicular trip generation for each station area. Three different types of station vehicle trips were estimated:

- Park-and-ride
- Passenger drop-off/pick-up
- Buses

The calculated increase in vehicle trips was added to No Build Alternative traffic volume forecasts to estimate traffic volumes with the build alternatives. This vehicle forecast is conservative because it does not consider people changing their travel mode from driving with the No Build Alternative to using transit with the FWLE.

For stations that include a park-and-ride, the following assumptions were made:

- Park-and-ride lots at stations would be completely filled within a 3-hour peak period (creating a conservatively high estimate of traffic impacts near the stations).
- Slightly less than half (45 percent) of the 3-hour peak period trips would occur during the peak hour.
- Highest peak hour trip generation at the station would coincide with the surrounding roadway network peak hour.
- Ten 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, Pierce Transit, and Sound Transit.

All stations would generate vehicular traffic, but stations with park-and-rides would have noticeably more traffic within the station area. 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 similar between the alternatives and station options. The S 272nd Star Lake Station would decrease transit service slightly because bus routes that duplicate light rail service are proposed to be eliminated.

The S 272nd Redondo Station would increase transit trips slightly when compared with the No Build Alternative because some buses would be rerouted to directly serve the station. This station would have the highest increase in vehicle trip generation because it is currently underused and the FWLE is proposing to add up to 700 stalls to the existing park-and-ride.

The Federal Way Transit Center Station would have a modest increase in vehicle trips but a noticeable increase in passenger drop-off/pick-up trips (about 400 vehicles per hour) because it would be the end-of-the-line station. Bus traffic could decrease slightly with the elimination of routes that duplicate light rail service. The potential additional stations at S 216th Street and S 260th Street (West and East options) would have the lowest trip generation because there would be no parking at these stations.

Interim Terminus Conditions

The Kent/Des Moines Station would have 1,000 parking stalls in the interim terminus condition. These stalls and an overall increase in

station activity, with it being an end-of-the-line station, would generate more vehicle trips under an interim terminus condition.

The number of parking stalls with the S 272nd Star Lake or Redondo stations would not change between interim terminus and full-length conditions. However, passenger drop-off/pick-up trips at either of these stations would increase in the interim terminus condition because it would be a terminus station.

3.5.3.2 Traffic Circulation, Property Access, and Traffic Control

The build alternatives would affect traffic circulation patterns, property access, and traffic control, depending on the alternative and station options. Traffic circulation, property access, and traffic control under the No Build Alternative is expected to remain similar to existing conditions. 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).

Preferred Alternative

Because the number and configuration of freeway lanes, interchange access points, and freeway shoulders would be maintained, the Preferred Alternative would not cause any circulation or access impacts on I-5. The Preferred Alternative would be near three I-5 interchanges (Kent-Des Moines Road, S 272nd Street, and S 317th Street), but would be grade-separated from the interchange ramps and cross streets. There would be no changes to intersection control or traffic circulation.

WSDOT I-5 maintenance activities would change with either the Preferred Alternative or the SR 509 Extension under the No Build Alternative, but the impacts are not expected to be substantial or adversely affect I-5 operations or the maintenance of clear zones.

Typical maintenance activities are generally performed adjacent (in a 10-foot-wide area) to the edge of pavement, and WSDOT typically parks vehicles in the shoulder and provides advance warning signage to drivers. With the Preferred Alternative, WSDOT would still be able to perform maintenance activites between I-5 and the light rail guideway from the I-5 shoulder.

For maintenance access west of the guideway, such as servicing stormwater facilities and removing invasive weeds, access from I-5

WSDOT's I-5 Maintenance Activities

WSDOT routinely performs the following maintenance activities along I-5:

- Mowing
- Stormwater facility maintenance
- Spraying noxious weeds
- Accessing Intelligent Transportation System equipment and signs
- Removing invasive plants

would be beneath the guideway. There would be vertical clearances of 16.5 feet or more or from local streets.

There would be some localized changes to property access and circulation outside of station areas with the Preferred Alternative. Between S 212th Street and the Highline Water District property, 32nd Avenue S would be shifted west, but property access would be maintained. The Preferred Alternative would provide new or reconstructed cul de sacs at the eastern end of S 211th Street, S 220th Street, S 221st Street, S 224th Street, S 252nd Street, and S 266th Street, west of I-5. The Preferred Alternative would also include the reconstruction of the eastern edge of the bus turnaround at Mark Twain Elementary School.

Kent/Des Moines Station

S 236th Street would extend between SR 99 and 30th Avenue S to provide access to the Kent/Des Moines Station. Between SR 99 and 30th Avenue S, S 236th Street would have one travel lane in each direction, left-turn lanes, and curbside transit bays. Under the No Build Alternative, a three-legged signal would be built by others at the S 236th Street/SR 99 intersection. With the Preferred Alternative, this traffic signal would be modified to accommodate the extended S 236th Street. The 30th Avenue S intersection would be stop-controlled. From approximately Kent-Des Moines Road to S 240th Street, 30th Avenue S would be improved from a two-lane road to a three-lane road with a two-way left-turn lane.

The Preferred Alternative includes two new, two-lane, east-west roads (S 234th Street and S 238th Street) between SR 99 and 30th Avenue S to improve station area access, circulation, and redevelopment potential. The access to SR 99 would accommodate right-in and right-out turn movements. A southbound left-in turning movement would be allowed at S 238th Street.

Access to the Kent/Des Moines Station parking garage would be along 30th Avenue S and S 236th Street. On-street parking would be near the station platform and accommodate passenger drop-off/pick-up, paratransit, and short-term parking.

Under the interim terminus condition, temporary surface parking lots are proposed between S 234th Street and S 236th Street as well as between S 236th Street and S 238th Street. Access to the temporary parking lots would be from 30th Avenue S for both parking lots, from S 234th Street for the first, and from S 238th Street for the second.

S 272nd Station

The S 272nd Star Lake Station would be at the existing Star Lake Park-and-Ride. Access to the station would still be via 26th Avenue S, but the road would be reconfigured for the station. No new access would be provided via S 272nd Street. No changes to adjacent property access or circulation are anticipated.

The S 272nd Street/26th Avenue S intersection would be improved with additional turn lanes to accommodate increased station area traffic and improve access to the property immediately south of the intersection.

Federal Way Transit Center Station

Three new streets would be constructed between S 317th Street, 23rd Avenue S, S 320th Street, and 21st Avenue S to provide access to the relocated Federal Way Transit Center. S 318th Street and S 319th Street would be constructed as new east-west roads. One new north-south street (22nd Avenue S) would connect between S 317th Street and S 320th Street and also intersect with the new east-west roads. New intersections would be stop-controlled. Some sections of these roads adjacent to the station could be restricted for transit-only use. The existing Federal Way Transit Center bus loop would be relocated closer to the station platform, and S 317th Street would be extended to 21st Avenue S for general purpose travel.

Access to the new 400-stall parking structure for this station would be via S 317th Street between 22nd Avenue S and 23rd Avenue S. No change in access to the existing Federal Way Transit Center parking structure north of S 317th Street is proposed. Access to the passenger drop-off/pick-up area would be east of 22nd Avenue S.

The intersection of 23rd Avenue S and S 317th Street would be converted from a four-leg signal to a five-leg, multi-lane roundabout. The proposed southwest leg would directly connect to the station, would be ingress-only, and restricted to transit use.

With the **Kent/Des Moines I-5 Station Option**, S 236th Street would be extended between SR 99 and the station area. The future three-legged traffic signal at the intersection of SR 99 and S 236th Street under the No Build Alternative would be modified to a four-legged intersection to accommodate this extension. Access to the parking areas with this station would be along 30th Avenue S via S 236th Street and S 240th Street. Both S 236th Street and 30th Avenue S would be improved to provide station access. The passenger drop-

off/pick up area would be along a new access road adjacent to the south station entry.

The **Kent/Des Moines At-Grade Station Option** would be adjacent to I-5 south of S 240th Street, with primary station access at the extended S 240th Street. 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), which would extend from SR 99 to the station area, would connect to S 240th Street at the station site and provide access to the transit bus service and passenger drop-off/pick-up areas.

With the **Landfill Median Alignment Option**, the elevated guideway could encroach over the I-5 shoulder and, potentially, the travel lanes in a few locations; however, property access, circulation, and traffic control would not be affected. Breaks in some guardrail sections would allow maintenance equipment access.

The **S 272nd Star Lake Elevated Station Option** and **S 317th Elevated Alignment Option** would have similar circulation and traffic control as the Preferred Alternative. With the S 317th Elevated Alignment Option, two of the property access points to Gateway Center would be closed along the south side of S 317th Street. Property access for the S 272nd Star Lake Elevated Station Option would be similar to the Preferred S 272nd Star Lake Station.

The **Federal Way I-5 Station Option** would be south of S 317th Street and east of 23rd Avenue S, with transit access along S 317th Street and parking access along 23rd Avenue S. Access to the passenger drop-off/pick-up area would be along S Gateway Center Plaza. No change in property access, circulation, or traffic control beyond the station area is expected with this station option.

The **Federal Way S 320th Park-and-Ride Station Option** would be at the existing S 320th Street Park-and-Ride. Access to the station would remain along 23rd Avenue S and 25th Avenue S. The existing transit-only egress from the southbound I-5 on-ramp would be removed. No changes to property access, circulation, or intersection traffic control at the existing Federal Way Transit Center are expected with this station option.

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 use existing park-and-ride facilities, and minimal changes to vehicle circulation and access are expected.

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

Sound Transit would reconstruct SR 99 intersections as needed 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. Increased pedestrian activity in crosswalks near stations would delay some vehicle turn movements (e.g., right turns). Traffic signal timings would be modified to accommodate the increased pedestrian volumes. The potential additional S 216th and S 260th (West or East) station options would have low traffic levels because there would be no station parking. Impacts on traffic circulation and access would be minimal.

All **Kent/Des Moines** station options under the SR 99 Alternative would extend S 236th Street between Highline College and 30th Avenue S. The future three-legged traffic signal at the intersection of SR 99 and S 236th Street that is part of the No Build Alternative would be modified to a four-legged intersection to accommodate this extension. S 240th Street, an improved S 236th Street and 30th Avenue S, and driveways along SR 99 would provide access to station parking areas. 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 except that pedestrians would cross SR 99 in two separate pedestrian crossing intervals, stopping at the median.

The **S 272nd Redondo Station** and **S 272nd Redondo Trench Station Option** would be at the existing Redondo Heights Park-and-Ride and have access similar to existing conditions. An access road connecting S 276th Street and S 272nd Street would improve internal circulation for access between the station and S 272nd Street. This station would not include any changes in traffic control.

The **Federal Way Transit Center Station** would include new driveways for the transit layover and parking area along 21st Avenue S and 23rd Avenue S, south of the existing transit center. The existing transit center access and circulation would not change.

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 so buses could connect these two transit facilities.

SR 99 to I-5 Alternative

The SR 99 to I-5 Alternative would have circulation, access, and traffic control similar to the SR 99 Alternative north of S 224th Street and similar to the Preferred Alternative south of the Midway Landfill. 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 stations described under the SR 99 Alternative. Compared with the Preferred Alternative, 26th Avenue S would have no additional travel lanes, and the S 272nd Street/26th Avenue S intersection would not be improved. 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.

Station Options

The SR 99 to I-5 Alternative would have the same potential additional station at S 216th Street as under the SR 99 Alternative, and the same Federal Way City Center station options as under the Preferred Alternative. Local traffic circulation, property access, and traffic control at these stations would be the same as described above under the SR 99 Alternative and Preferred Alternative for each of these options.

I-5 to SR 99 Alternative

North of Kent-Des Moines Road, the I-5 to SR 99 Alternative would have circulation, access, and traffic control similar to the Preferred Alternative. Near S 231st Street, this alternative would become similar to the SR 99 Alternative.

Traffic circulation, property access, and traffic control at the Kent/Des Moines 30th Avenue West Station would be similar to the Kent/Des Moines SR 99 East Station described above under the SR 99 Alternative. Traffic circulation, property access, 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 potential additional S 260th (West or East) Station Option, the S 272nd Redondo Trench Station Option, and the Federal Way SR 99 Station Option as described for the SR 99 Alternative, with similar local traffic circulation, property access, and traffic control.

3.5.3.3 Traffic Operations

For the 2035 traffic operations analysis, conditions under the No Build Alternative were compared to the build alternatives and station options. With input from the local jurisdictions, Sound Transit selected 63 intersections for analysis in the PM peak hour (see Exhibit 3-1). Some of these intersections would be physically affected by the FWLE, with changes in channelization, roadway width, or signal control, and some would experience operational effects, such as changes in vehicular or pedestrian activity from proximity to light rail stations. Sound Transit also conducted an AM peak hour analysis with a smaller study area focused on I-5 ramp terminals and intersections adjacent to stations with a park-and-ride.

The 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 automobiles and buses.

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

No Build Alternative

Under the No Build Alternative, eight intersections would operate worse than the applicable agency standard during either the AM or PM peak hours:

- SR 99/S 216th Street
- SR 99/Kent-Des Moines Road
- I-5 northbound ramps/S 272nd Street
- I-5 southbound ramps/S 272nd Street
- SR 99/S 240th Street
- SR 99/S 272nd Street
- Military Road S/259th Place S/S Reith Road
- Military Road S/S 272nd Street

Full-Length Build Alternatives

The majority of the intersections analyzed for the build alternatives would operate similar to the No Build Alternative in 2035. LOS at intersections around the Kent/Des Moines and S 272nd Street station areas would worsen with the FWLE. LOS at one intersection near the Federal Way Transit Center Station could also be affected by the FWLE. Exhibits 3-7 through 3-9 show the 2035 AM and PM peak hour intersection LOS among the No Build Alternative and build alternatives.

Preferred Alternative

The Preferred Alternative would cause two intersections with an acceptable LOS under No Build 2035 conditions to degrade to below jurisdictional LOS standards:

- S Star Lake Road/S 272nd Street
- SR 99/S 320th Street

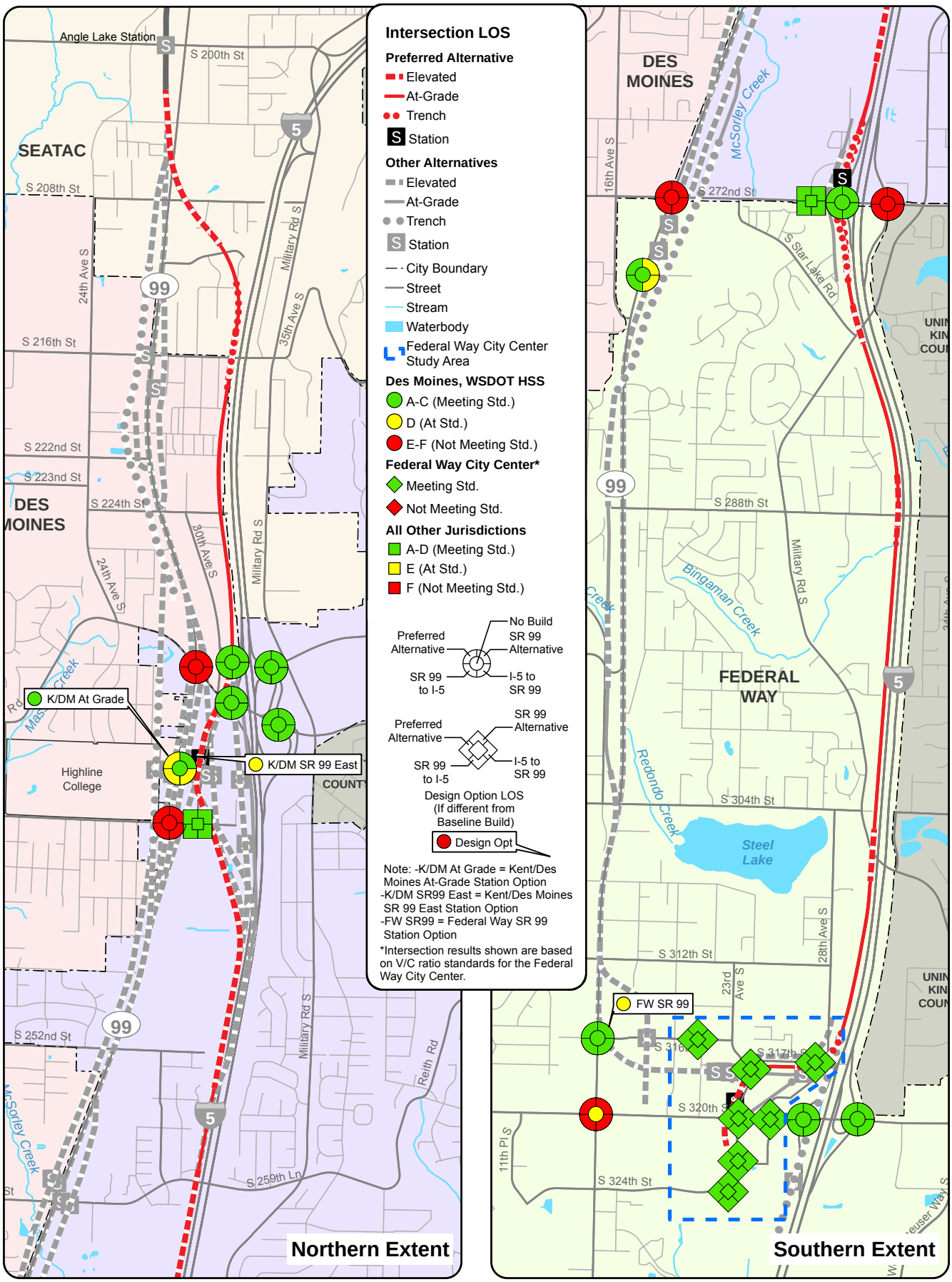
Station area traffic from the Preferred Alternative would further degrade seven intersections that already do not meet jurisdictional LOS standards under the No Build Alternative:

- SR 99/Kent-Des Moines Road
- I-5 northbound ramps/S 272nd Street
- I-5 southbound ramps/S 272nd Street
- SR 99/S 240th Street
- SR 99/S 272nd Street
- Military Road S/259th Place S/S Reith Road
- Military Road S/S 272nd Street

The station options for the Preferred Alternative would not change the affected intersections.

SR 99 Alternative

The SR 99 Alternative would affect LOS at the same nine intersections as described for the Preferred Alternative. No additional intersections would degrade below the jurisdictional LOS standard with the potential additional S 216th Street and S 260th station options.

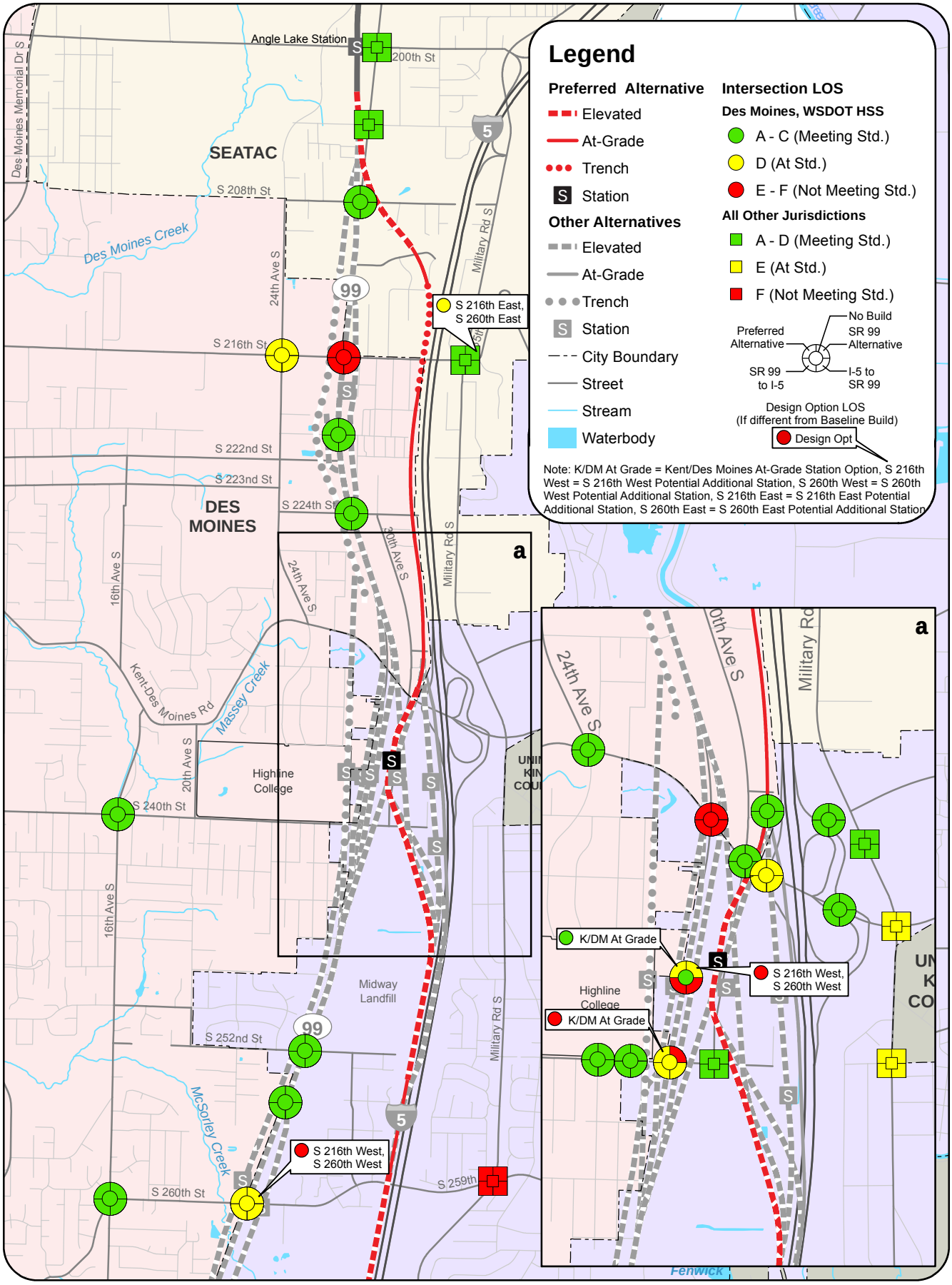


Data Sources: King County (2015)
HSS = Highway of Statewide Significance

N

0 0.25 0.5 1 Miles

EXHIBIT 3-7
2035 AM No Build and Build Alternatives Level of Service Northern and Southern Study Area Extents
Federal Way Link Extension

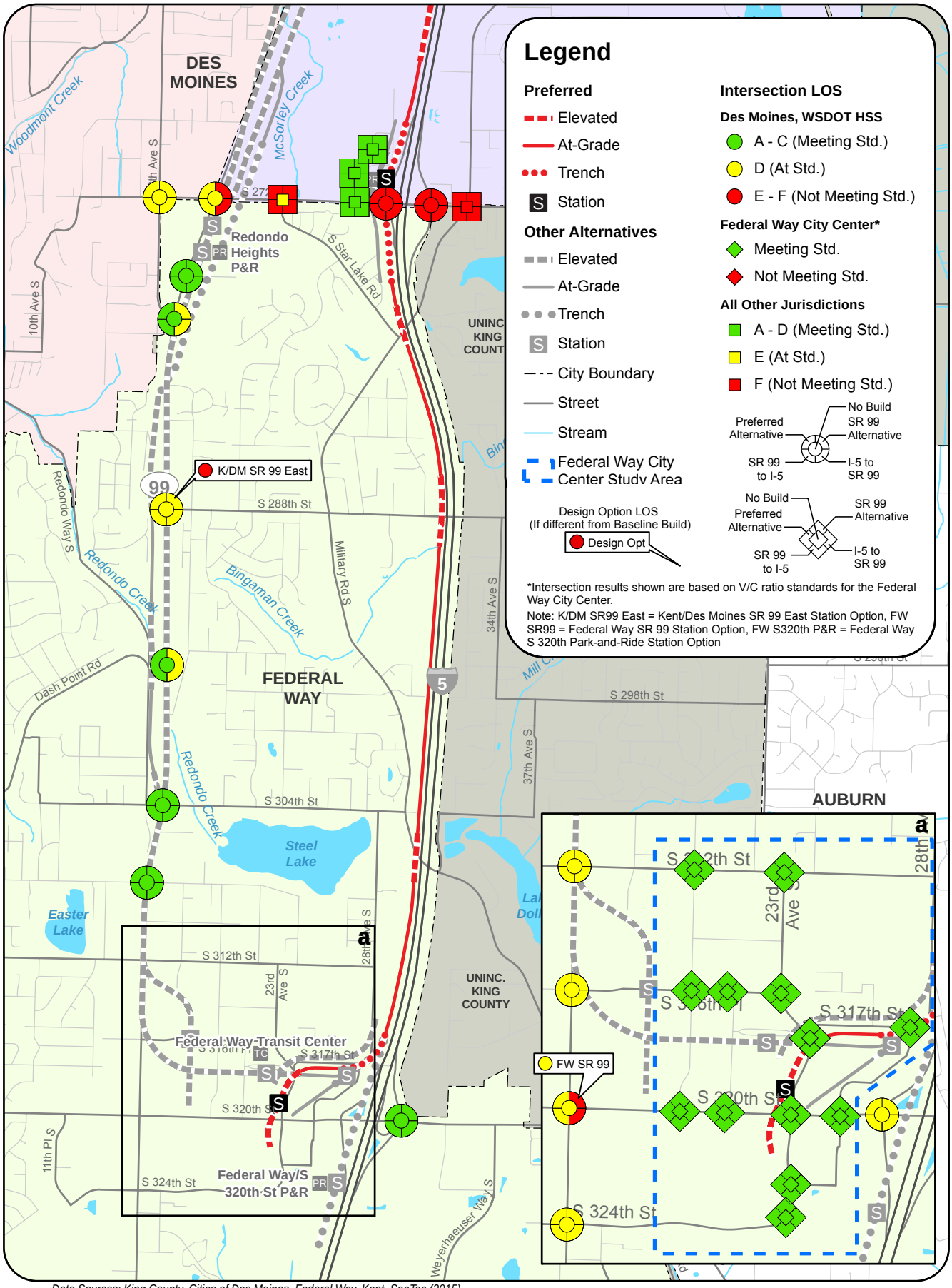


Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).
HSS = Highway of Statewide Significance

N

0 0.25 0.5 1 Miles

EXHIBIT 3-8
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 (2015).
HSS = Highway of Statewide Significance

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EXHIBIT 3-9
2035 PM No Build and Build Alternatives
Level of Service Southern Study Area Extent
Federal Way Link Extension

SR 99 to I-5 Alternative

The SR 99 to I-5 Alternative would have intersection LOS results similar to the Preferred Alternative. The nine intersections listed under the Preferred Alternative would operate worse than the No Build Alternative and not meet jurisdictional LOS standards.

I-5 to SR 99 Alternative

The I-5 to SR 99 Alternative would have intersection LOS results similar to the SR 99 Alternative. The nine intersections listed under the Preferred Alternative would operate worse than the No Build Alternative and not meet jurisdictional LOS standards.

Interim Terminus Condition Analysis

Intersection LOS analyses were conducted for the Kent/Des Moines and S 272nd (Redondo and Star Lake) stations interim terminus conditions. Compared with the full-length condition, more vehicles would be traveling to and from the interim terminus station areas to access light rail. Therefore, the intersections that would be affected under each condition listed below are near the interim terminus station areas.

Kent/Des Moines Interim Terminus

Station area traffic from the Kent/Des Moines interim terminus would further degrade three intersections that already would not meet jurisdictional LOS standards with the No Build Alternative:

- SR 99/Kent-Des Moines Road
- SR 99/S 240th Street
- Military Road S/259th Place S/S Reith Road

S 272nd Street Interim Terminus

The three intersections not meeting LOS standards with the Kent/Des Moines interim terminus condition would also be degraded compared with 2035 No Build conditions with either of the S 272nd Star Lake or Redondo stations as an interim terminus.

Station area traffic with the S 272nd Street interim terminus condition (both station locations) would further degrade four additional intersections that already would not meet jurisdictional LOS standards under the 2035 No Build condition:

- SR 99/S 272nd Street
- I-5 southbound ramps/S 272nd Street I-5 northbound ramps/S 272nd Street
- Military Road S/S 272nd Street

The S 272nd Street interim terminus would also cause one intersection that would have an acceptable LOS under 2035 No Build conditions to degrade to below jurisdictional LOS standards:

- S Star Lake Road/S 272nd Street

The S 272nd Redondo Station would also cause one additional intersection that would have an acceptable LOS under 2035 No Build conditions to degrade to below jurisdictional LOS standards:

- SR 99/S 276th Street

The SR 99/S 276th Street intersection would be the main S 272nd Redondo Station access point. This intersection would not be affected under the full-length SR 99 Alternative but would be under the S 272nd Redondo Station interim terminus condition.

3.5.3.4 I-5 Ramp Terminal Operations

Sound Transit assessed intersections at the following I-5 interchanges close to FWLE station locations for changes in vehicle queue lengths on the off-ramps compared with the No Build Alternative:

- Kent-Des Moines Road
- S 272nd Street
- S 320th Street

Compared with the No Build Alternative, year 2035 vehicle queue lengths on I-5 southbound and northbound off-ramps at Kent-Des Moines Road, Veterans Drive, S 272nd Street, and S 320th Street would be similar to queue lengths with all of the full-length build alternatives and interim terminus conditions.

3.5.4 Safety

Sound Transit assessed transportation system user safety for the build alternatives and station and alignment options. Overall, when compared with the No Build Alternative, safety with the build alternatives is expected to be minimally affected because the light rail would be grade-separated and operate in an exclusive right-of-way with no direct conflicts with vehicles, pedestrians, or bicyclists. To minimize potential effects, the design would adhere to both light rail and roadway standards. Design of walls, columns, and other infrastructure would comply with current standards for fixed objects, clearances, and other related safety elements.

Sound Transit would replace or upgrade transportation infrastructure (such as mid-block U-turns, medians, and intersection sizing) modified

by the FWLE to ensure that the transportation system would operate similar to or better than under No Build conditions.

3.5.4.1 Preferred Alternative

The Preferred Alternative would overall have a minimal effect on traffic safety in the study area. More vehicles and non-motorized activity around the station areas could increase the potential for conflicts between travel modes, but this is not expected to appreciably affect safety. In some locations (e.g., I-5), a slight increase in the number of crashes (one or two per year) could occur due to project traffic volumes.

Vehicle queues at I-5 ramp terminals are not expected to back up to the I-5 or SR 509 mainline or affect how vehicles decelerate from freeway to ramp speeds except at the I-5 southbound off-ramp to S 272nd Street. Queues at the S 272nd Street southbound off-ramp are expected to spill back onto the mainline under the No Build Alternative but would not worsen (i.e., increase in length) under the Preferred Alternative.

The Preferred Alternative would allow for an adequate clear zone along most of the I-5 mainline and be shielded by guardrails or barriers in all other places, as part of the SR 509 Extension Project. This alternative has the same potential for future clear zones as the No Build Alternative. The Preferred Alternative alignment would be located at least 30 feet away from the existing edge of traveled way in all locations. The alignment would be either located entirely outside of the potential future I-5 clear zone, or, where located in the clear zone, would be shielded by barriers or guardrails.

The I-5 clear zone safety analysis is further discussed in Section 4.4.2 of Appendix G1. In addition, as described in Section 3.5.2.4, the project would shift up to 9,000 people per day from driving or taking another non-transit mode to using transit and reduce the amount of VMT in the region by up to 160,000. A shift of mode where people use transit and travel less has an inherent safety benefit, as fewer crashes would be expected.

Station and Alignment Options

All Preferred Alternative station options would have a minimal effect on traffic safety for all modes in the study area. Increases in vehicle and non-motorized activity around the stations would be similar to the Preferred 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 alignment option would place guideway columns in the median without altering the existing travel lanes or median width. If approved by FHWA and WSDOT, Sound Transit would include a barrier along the inside shoulder of I-5 southbound and northbound mainlines to prevent errant vehicles from colliding with the guideway columns. As the guideway transitions to and from the I-5 median, a barrier would also be required along the southbound I-5 outside shoulder to shield the guideway. The *Highway Safety Manual* suggests that adding a median guardrail barrier through this section of both directions of I-5 and along the southbound I-5 outside shoulder could lead to an increase of up to one crash per year (American Association of State Highway and Transportation Officials, 2014).

3.5.4.2 SR 99 Alternative

The SR 99 Alternative's increased vehicle and non-motorized activity around the station areas could increase potential for conflicts between vehicles, pedestrians, and bicycles. These conflicts are not expected to noticeably affect crash rates or appreciably affect safety.

The SR 99 Alternative would widen SR 99 at some intersections, thus increasing pedestrian crossing distances and the potential for vehicle-pedestrian crashes. Many passengers transferring between RapidRide A Line and the station platform at the Kent/Des Moines SR 99 West Station and the S 272nd Redondo Station would be required to cross at least part of SR 99, thus increasing the risk of pedestrian/vehicle collisions. At the Federal Way Transit Center Station, the level of increased non-motorized activity around the station area could increase the potential for conflicts with cars and buses.

Station Options

Potential impacts would not change for the SR 99 Alternative station options, except for the Kent/Des Moines SR 99 Median Station Option. This option would widen SR 99, increasing the pedestrian crossing distances. The potential additional S 216th and S 260th stations, with no parking, would have less potential for congestion-related crashes than stations with park-and-ride facilities because fewer vehicles would access these stations.

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 Preferred Alternative (south of the Kent/Des Moines Station). There would be no additional safety 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 Preferred Alternative (north of the Kent/Des Moines Station) and the SR 99 Alternative (south of the Kent/Des Moines Station). There would be no additional safety impacts associated with the Kent/Des Moines 30th Avenue West Station.

3.5.4.5 Interim Terminus Conditions

The Kent/Des Moines interim terminus condition for all build alternatives would have similar safety impacts as the Preferred Alternative north of the Kent/Des Moines Station. The only difference would be at the Kent/Des Moines Road/I-5 interchange ramps and ramp terminals, where the increase in vehicular and non-motorized activity due to increased park-and-ride capacity could result in over two crashes per year. However, the expected crash frequency at the S 272nd Street/I-5 and S 320th Street/I-5 interchanges would not be expected to change from the No Build Alternative.

The S 272nd Street interim terminus condition for all build alternatives would have the same safety conditions as the Preferred Alternative north of the S 272nd Star Lake Station, and would have one crash per year more than the No Build Alternative at the Kent-Des Moines Road/I-5 interchange. Increased traffic volumes at the S 272nd Street/I-5 interchange ramps and ramp terminals could result in an increase of less than two crashes per year. The expected crash frequency at the S 320th Street/I-5 interchange is not expected to be different than under the No Build Alternative.

3.5.5 Parking

With the build alternatives, additional parking spaces would be added to existing park-and-rides in the station areas. The parking assessment evaluated the following:

- Whether the build alternatives would remove public (on-street) and private (off-street) parking along the FWLE alignment and at the stations

- If the demand for station parking could potentially exceed the available park-and-ride capacity

Either circumstance could cause spillover to nearby on-street parking surrounding the stations.

3.5.5.1 Parking Impacts

Public off-street parking would not be removed with the build alternatives and any station or alignment options. The build alternatives would have minimal impact on on-street parking compared with the No Build Alternative (assumed to be similar to existing conditions), with 20 spaces removed with the Preferred and I-5 to SR 99 alternatives. Each build alternative would remove some private parking. Table 3-10 summarizes the number of public (on-street) and private parking spaces that would be removed by each alternative.

TABLE 3-10
Summary of Parking Impacts by FWLE Alternative

Alternative	Removed On-Street Public Parking	Removed Private Parking[a]	Total
Preferred Alternative	**20**	**140** (20–140)	**160**
SR 99 Alternative	**0**	**410** (340–1,200)	**410**
SR 99 to I-5 Alternative	**0**	**170** (100–290)	**170**
I-5 to SR 99 Alternative	**20**	**470** (450–580)	**490**

Note: Parking numbers are rounded up to the nearest 10 stalls.
[a] The number in bold represents impacts associated with each alternative station (not station options), and the 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.

The amount of private parking removed under the build alternatives would range between 140 and 470 stalls. (Private parking spaces in properties expected to be entirely acquired by Sound Transit for a build alternative are not counted because there would be no demand for these spaces when the existing use is displaced.)

Without the station and alignment options, the SR 99 and the I-5 to SR 99 alternatives would have more parking impacts than the Preferred and the SR 99 to I-5 alternatives. The Preferred Alternative would affect the fewest total parking spaces.

Depending on alignment and station options, the project would remove between 20 and 1,200 parking spaces. None of the Preferred Alternative station or alignment options would have more parking impacts than the Preferred Alternative. The Federal Way City Center

station options would have the greatest reduction in the number of parking spaces under the Preferred Alternative, with 110 fewer spaces.

For the SR 99 Alternative, the Kent/Des Moines HC Campus Station Option from S 216th W Station Option would remove 580 parking spaces. This would be the greatest parking impact of all of the station and alignment options for any alternative.

3.5.5.2 Station Area Parking

All light rail station areas with existing park-and-rides would have additional parking to accommodate the forecasted parking demand with the FWLE. For full-length build alternatives, there would be about 1,600 additional station park-and-ride stalls.

Additional parking would be provided as follows:

- Kent/Des Moines Station, 500-space parking garage
- S 272nd Star Lake Station or S 272nd Redondo Station, up to 700 spaces for a total of 1,397 spaces at the S 272nd Redondo Station or 1,240 spaces at the S 272nd Star Lake Station
- Federal Way Transit Center stations, 400-space parking garage adjacent to the light rail station (1,190 current spaces to remain at the existing Federal Way Transit Center, and 877 existing spaces would remain at the S 320th Park-and-Ride)
- Kent/Des Moines Station interim terminus condition, 500 additional spaces (for a total of 1,000 parking spaces), likely on a surface lot

The potential additional S 216th and S 260th (West or East) station options would not include parking. The S 272nd Star Lake Station or S 272nd Redondo Station would not need any additional spaces in either interim terminus condition.

The potential for hide-and-ride activity at the stations was considered in the analysis. The findings are as follows:

- **Potential Additional Stations:** The potential additional S 216th and S 260th Street (West or East) station options could have hide-and-ride activity because they don't include parking. Limited on-street parking near most station options locations, however, would minimize the hide-and-ride potential. The S 216th East Station Option would be adjacent to residential

Hide-and-Ride

This describes transit users parking in neighborhoods near transit stations. It is generally caused by parking demand that exceeds supply at the transit station combined with available unrestricted parking spaces nearby.

neighborhoods to the south and east that have available on-street parking where hide-and-ride activity might occur.

- **Kent/Des Moines:** The proposed design for 30th Avenue S with the Kent/Des Moines Station would not preclude on-street parking; however, the City could implement parking controls to restrict the potential for hide-and-ride usage. Currently, Highline College charges students a fee to park on campus. This could cause some students to park in nearby park-and-ride lot(s), thus reducing the available capacity of the park-and-ride for transit users.
- **S 272nd Street:** Parking demand is not forecasted to exceed the parking supply at the S 272nd Street stations with any build alternatives, so hide-and-ride activity is not expected at any of the S 272nd Street station alternatives.
- **Federal Way:** The Preferred Federal Way Transit Center Station would not likely see hide-and-ride activity. The total parking demand is expected to be about 2,200 vehicles; about 1,600 park-and-ride spaces would be available within a 1/8-mile walking distance from the station platform, and 900 more would be within a 1/4-mile walk at the S 320th Street Park-and-Ride (which also offers frequent transit service that would serve both the park-and-ride and the light rail station). Furthermore, there is limited on-street parking near the Federal Way Transit Center Station location, and there would be park-and-ride spaces at the Kent/Des Moines and S 272nd Star Lake stations.

  For the same reasons, the potential for hide-and-ride activity would be low at the Federal Way City Center station locations with the other build alternatives and station options.
- **Kent/Des Moines Station Interim Terminus Condition:** For this condition, parking supply (1,000 spaces) would satisfy the forecasted demand; hide-and-ride activity is not expected.
- **S 272nd Station Interim Terminus Condition**: In this condition, the S 272nd Redondo and Star Lake stations are forecasted to have slightly more parking demand than supply. For both station locations under this interim terminus condition, the hide-and-ride potential is low because of the limited amount of accessible on-street public parking spaces. In addition, there would also be parking at the Kent/Des Moines Station.

3.5.6 Non-motorized Facilities

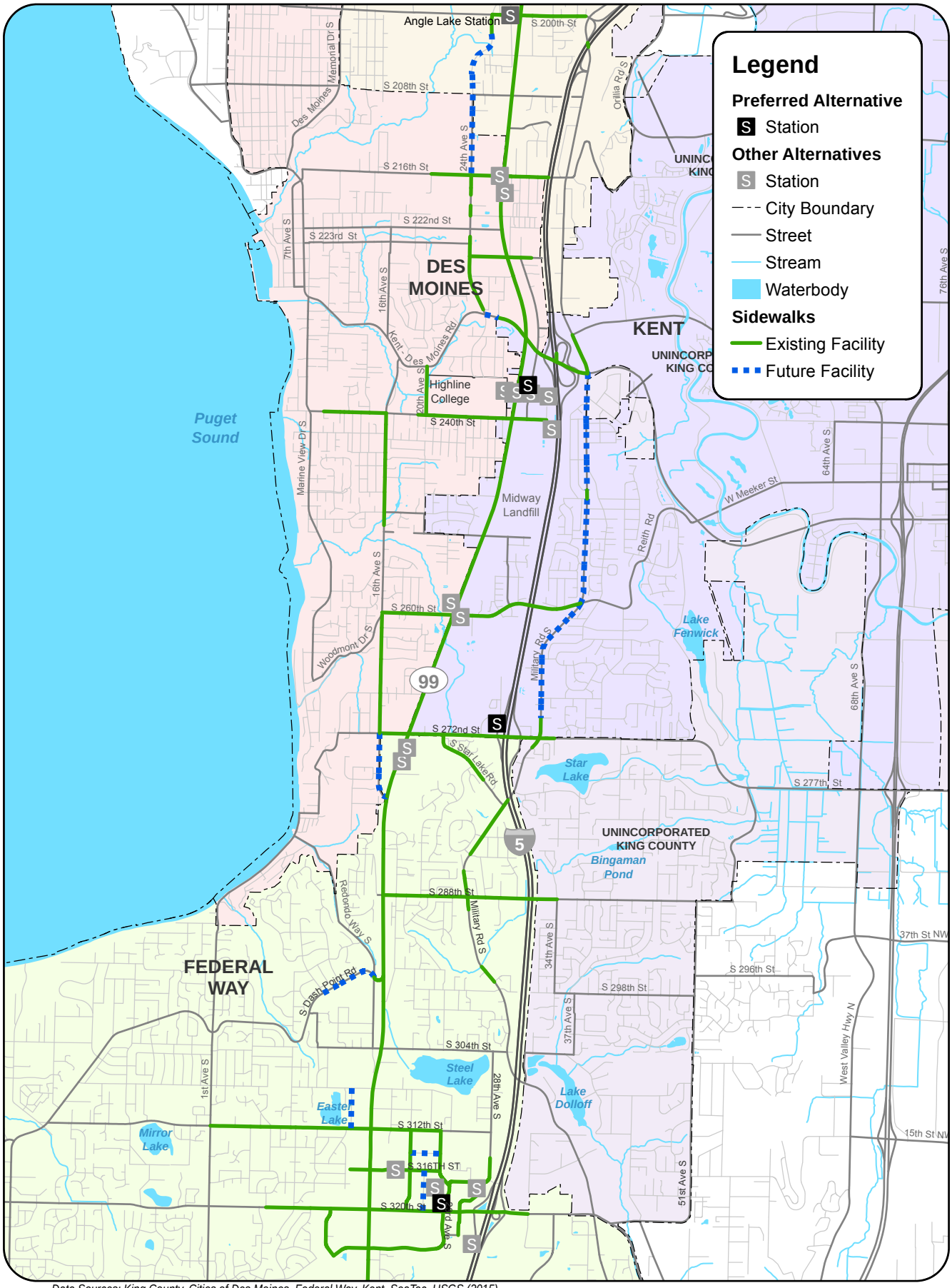
The FWLE station layout, location, and surrounding land uses and transit services would affect how people get to and navigate around each station. Existing and year 2035 pedestrian and bicycle facilities in the FWLE corridor are shown in Exhibits 3-10 and 3-11, respectively. Planned new facilities with identified funding were assumed to be part of the No Build Alternative. Generally, these facilities would not be near the FWLE stations.

Sound Transit inventoried and evaluated non-motorized facilities in the walk- and bikeshed around each FWLE station area. The analysis looked at the same areas to assess the potential population and employment that could directly access the light rail without requiring motorized travel. Key findings include:

- **Kent/Des Moines:** All of the Kent/Des Moines stations and station options would have similar population and employment in their respective walksheds. Employment would range between 2,200 and 2,700 persons, and population would range between 2,100 to 2,600 persons.
- **S 272nd Street**: The S 272nd stations and station options would have the lowest walkshed employment of all FWLE stations (about 200 jobs). Within the bikeshed, the S 272nd Redondo Station would provide greater accessibility to nearby businesses (with access to approximately 3,400 jobs) than the S 272nd Star Lake Station (about 600 jobs).
- **Federal Way:** The Federal Way Transit Center would have the most employment and population (3,600 and 3,200 persons, respectively) within the walkshed, while the Federal Way SR 99 Station Option bikeshed would have the highest population and employment (both 8,100 persons).

Walkshed and Bikeshed

These terms refer to walkable (or bikeable) areas 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 to a station via streets and non-motorized use trails. Natural barriers, such as topography, were not considered as part of the walk- and bikeshed analysis; such barriers could make non-motorized travel less attractive.

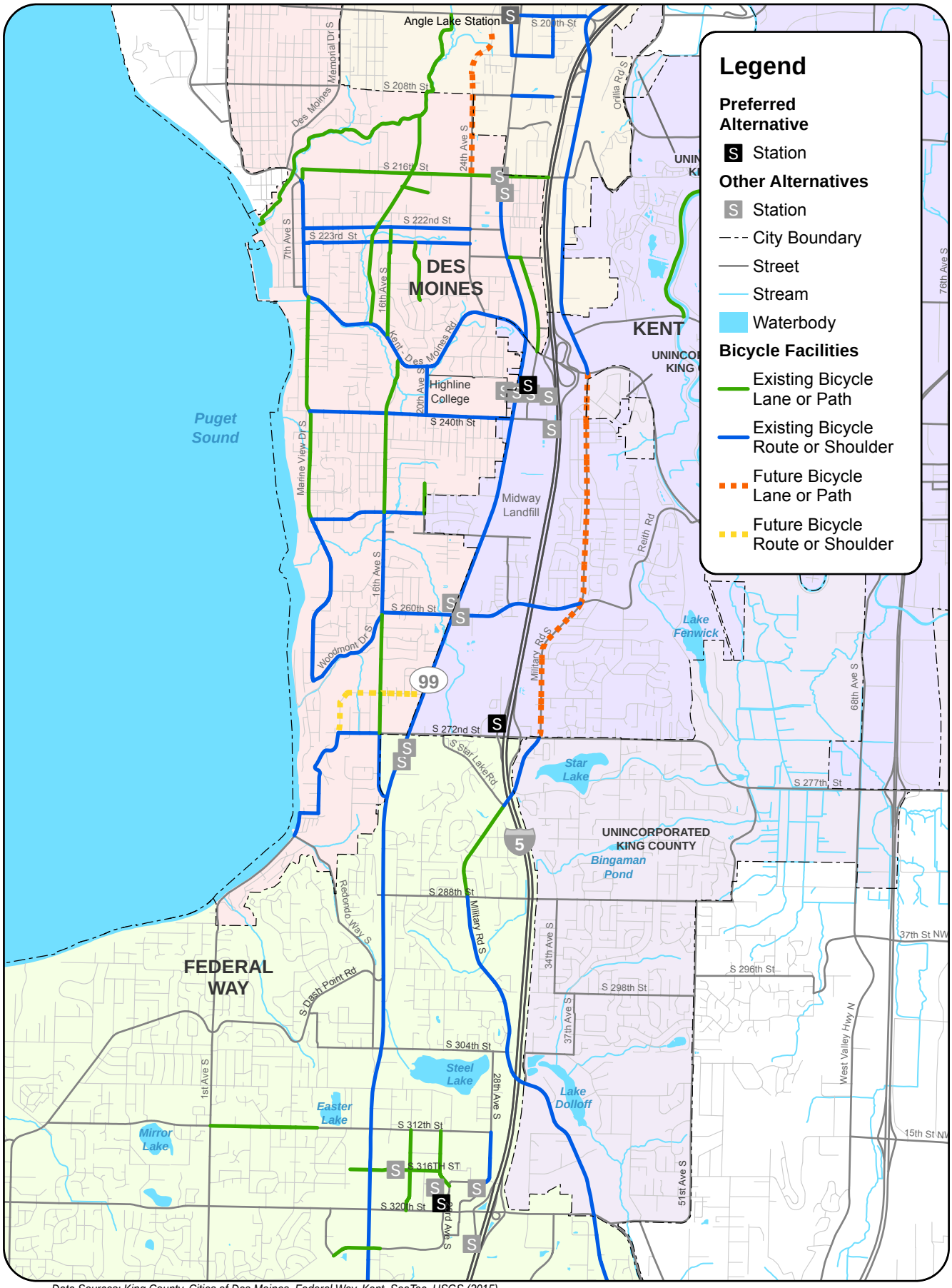


Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac, USGS (2015).

N

0 0.5 1 2 Miles

EXHIBIT 3-10
Existing and Future Sidewalk Locations
Federal Way Link Extension



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac, USGS (2015).

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0 0.5 1 2 Miles

EXHIBIT 3-11
Existing and Future Bicycle Facilities and Routes
Federal Way Link Extension

Appendix G1 includes more detail on the population and employment in these walk- and bikesheds and the methodology used for assessing impacts, including pedestrian trip generation and pedestrian LOS, on non-motorized facilities.

Sound Transit assessed pedestrian LOS for signalized intersections less than 300 feet from the FWLE station areas for the 2035 PM peak hour. The No Build Alternative would have an overall LOS between A and D at pedestrian facilities near the FWLE light rail station locations. Most LOS C and LOS D crosswalks are across SR 99 and other major arterials, which require longer crossing distances because of the width of these streets.

For the build alternatives, ease of access to the station areas would be a major contributor to the non-motorized activity at the stations. Sidewalks, bicycle lanes, and other non-motorized facilities would enable the transit system to connect with the surrounding land uses. Locations for crossings, bus stops, drop-off/pick-up areas, and park-and-ride lots are design elements that would also affect the way pedestrians circulate in the station areas.

Pedestrian activity for a station area was classified into two categories: outside and within. Pedestrians outside the station area include all walk and bike trips to or from the station. Depending on the station site configuration, people outside the station area could include park-and-ride users and people transferring between transit services—in particular RapidRide A Line transfers that require crossing a street to access the station platform. The number of people within the station area includes all light rail riders, including park-and-ride users, people transferring between transit services, and passenger drop-off/pick-up trips. Findings of the pedestrian activity analysis include the following:

- Of the three main stations, the Kent/Des Moines Station would have the most people walking or biking between the station and the surrounding area. However, the number of people walking or biking to and from the surrounding area would be even higher if any of the potential additional stations (S 216th or S 260th, West or East options) were selected. With the Kent/Des Moines interim terminus, the total number of people at the station would increase, compared with the full-length alternatives, because the

Pedestrian LOS

The FWLE analysis focused on three components of the pedestrian experience: (1) holding areas while waiting to cross an intersection, (2) the circulation area in crosswalks, and (3) the overall pedestrian experience. As the volume of pedestrians increases, the area available for maneuverability and comfort is decreased. At LOS C or better, 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 frequent.

System Access

Sound Transit's System Access Policy establishes a framework for Sound Transit's support and management of, and investment in, infrastructure and facilities to provide customer access to its transit services.

Sound Transit will facilitate access to its transit services on its properties and work cooperatively with local jurisdictions to promote access from surrounding communities.

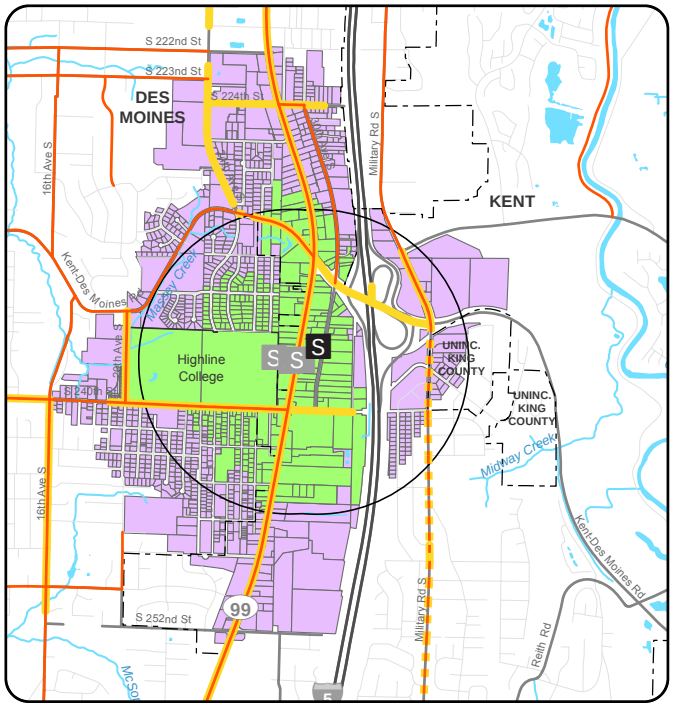
park-and-ride capacity and people transferring by bus would both be higher.

- The S 272nd Star Lake or Redondo stations would have the most people walking between the station and their automobiles. It would have even more under the interim terminus condition.
- The Federal Way Transit Center Station and station options would generally have the most pedestrian activity. This includes people walking/bicycling between the station and their vehicles, buses, and surrounding land uses. The Federal Way S 320th Park-and-Ride Station Option would have the most pedestrians because the walk- and bikeshed would include a larger share of the land uses south of S 320th, including the Federal Way Commons shopping mall. The Federal Way I-5 and the Federal Way SR 99 station options would have fewer people walking between the station and other transit.

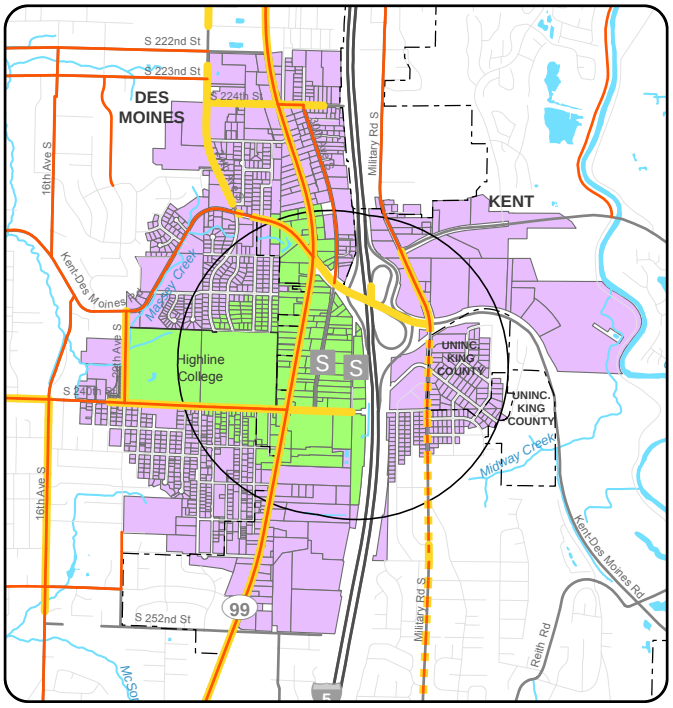
The pedestrian LOS for the FWLE build alternatives would generally range between A and D. For most intersections, a lower LOS rating would result from a noticeable increase in pedestrian volume (e.g., where the park-and-ride facilities or transit stops are not adjacent to light rail stations). Because of the higher pedestrian volumes, some sidewalks and crosswalks would be wider than design standards. A discussion of the non-motorized elements and pedestrian LOS for each station area is presented in the following subsections.

3.5.6.1 Kent/Des Moines Station

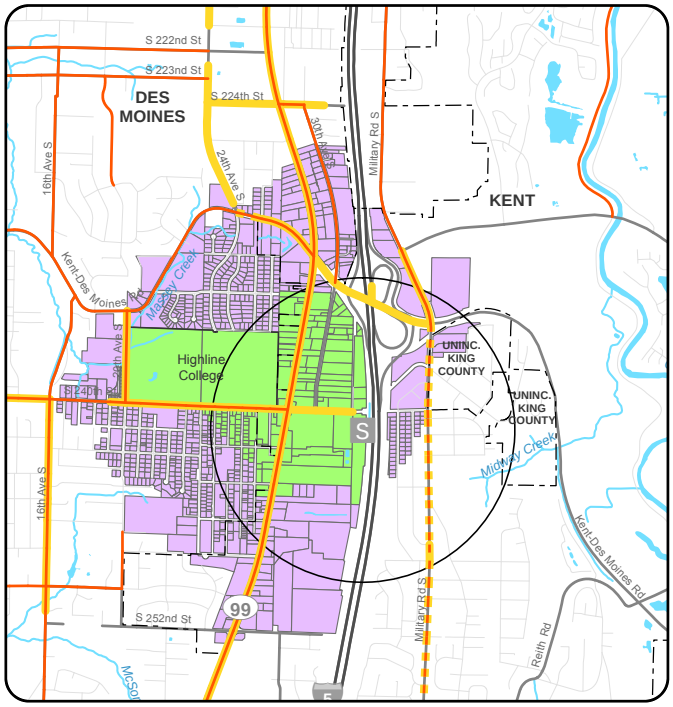
In general, all the Kent/Des Moines build alternatives and station options would have a fairly similar walk- and bikeshed (see Exhibit 3-12). In the Kent/Des Moines station area, I-5 is a major barrier to walking and bicycle trips east of I-5. There would be pedestrian crossings along SR 99 at the S 240th Street and Kent-Des Moines Road signalized intersections. The signalized intersection on SR 99 at S 236th Street would also have crosswalks on all approaches for all the FWLE alternatives, except with the Kent/Des Moines At-Grade Station Option under the Preferred Alternative. For all alternatives, most pedestrian trips at the station would be riders transferring between light rail and bus transit, including the RapidRide A Line. Station options farther east of SR 99 (Kent/Des Moines I-5 and At-Grade station options) would have fewer such transfers because of the longer walking distance between the station and SR 99.



Kent/Des Moines Station, SR 99 West Station, 30th Avenue West Station, and SR 99 East, SR 99 Median, and HC Campus Station Options



30th Avenue East Station and I-5 Station Option



At-Grade Station Option

Legend

Stations

- S — Station Preferred Alternative
- S — Station Other Alignments
- 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

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

N

EXHIBIT 3-12
Kent/Des Moines Station Area
Walksheds and Bikesheds
Federal Way Link Extension

The overall pedestrian LOS is expected to be LOS D or better at the SR 99/S 236th Street intersection and the SR 99/S 240th Street intersection near the Kent/Des Moines Station. Due to the longer crossing distances, an LOS C or D is expected for crosswalks across SR 99. Side street crossings are expected to be LOS B.

3.5.6.2 S 272nd Star Lake Station

The Preferred 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 north and south of S 272nd Street. I-5 is a barrier that would prevent walk and bicycle trips between the station and areas east of I-5 (Exhibit 3-13).

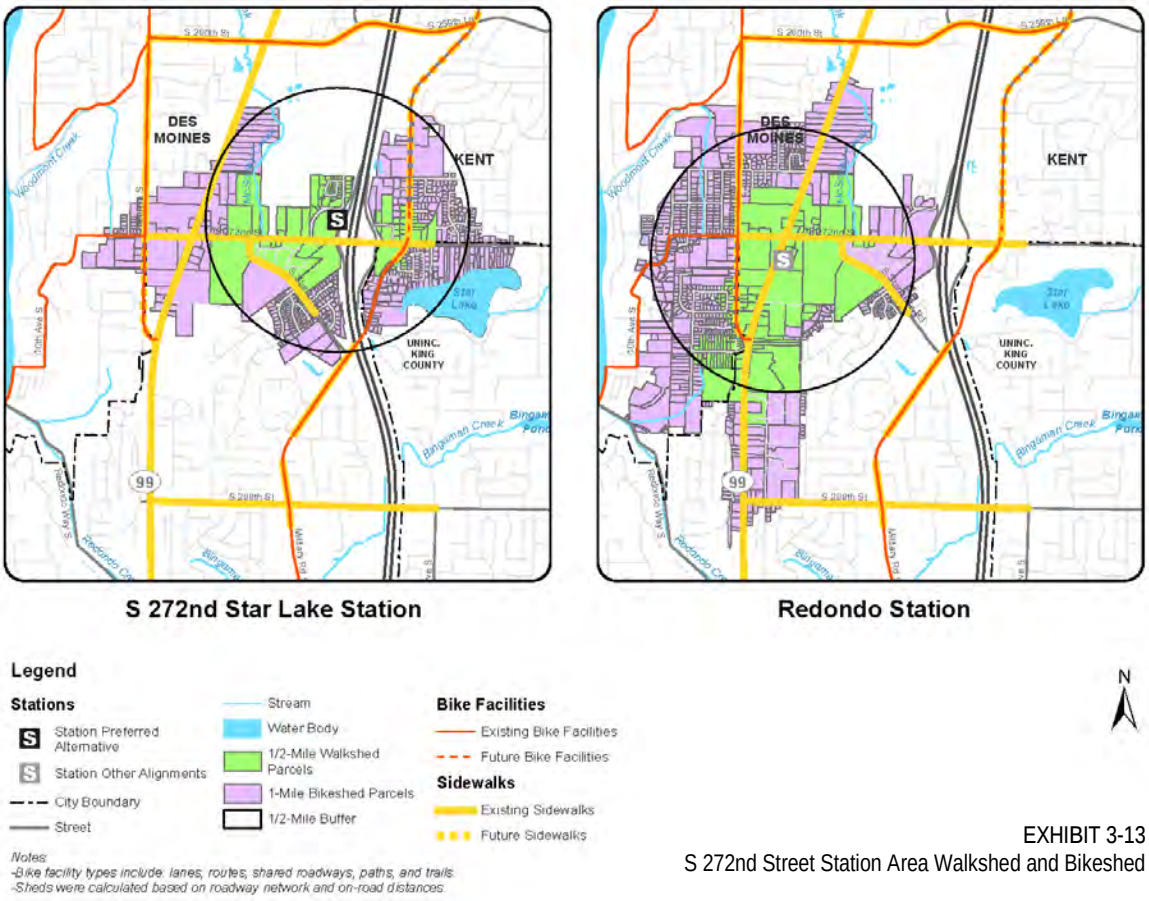


EXHIBIT 3-13
S 272nd Street Station Area Walkshed and Bikeshed

Most pedestrian activity at this station would be people walking to or from their vehicle at the park-and-ride, and would be contained within the station area. The overall pedestrian LOS would range between B and C at the S 272nd Street/26th Avenue S intersection under the No Build, Preferred, and SR 99 to I-5 alternatives.

3.5.6.3 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 (Exhibit 3-13). Pedestrian crossings of SR 99 would occur at the existing signalized intersections of S 276th Street and S 272nd Street. For all the build alternatives and station options, the overall pedestrian LOS would be between B and D. With the SR 99 or I-5 to SR 99 alternatives, a few approaches at these two intersections are expected to be at LOS D because of a noticeable increase in pedestrian volumes and an increase in conflicting vehicle volumes (northbound right turns and westbound left turns).

3.5.6.4 Federal Way Transit Center Station

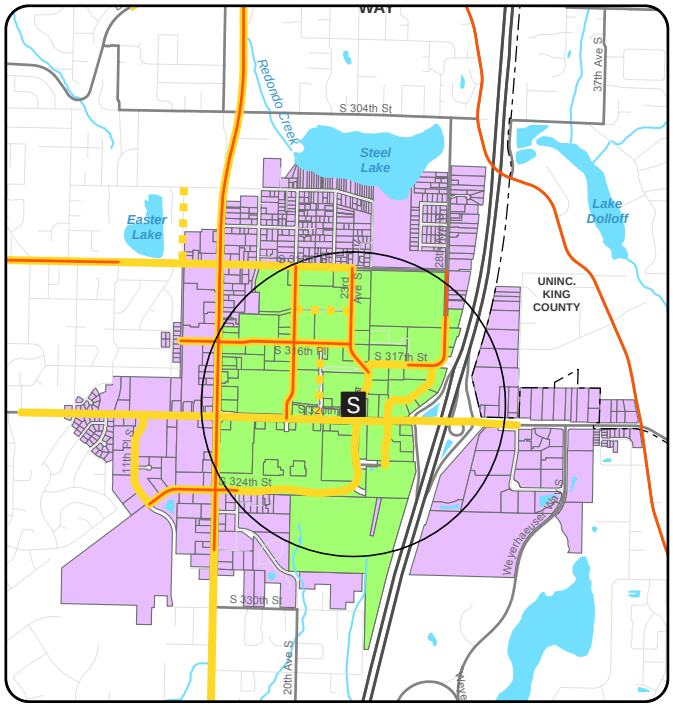
The majority of commercial development surrounding the existing Federal Way Transit Center station area is accessible by sidewalks, but the area lacks bicycle facilities. The location of the station area between SR 99 and I-5 generally limits the walk- and bikesheds between those two regional highway facilities (Exhibit 3-14).

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

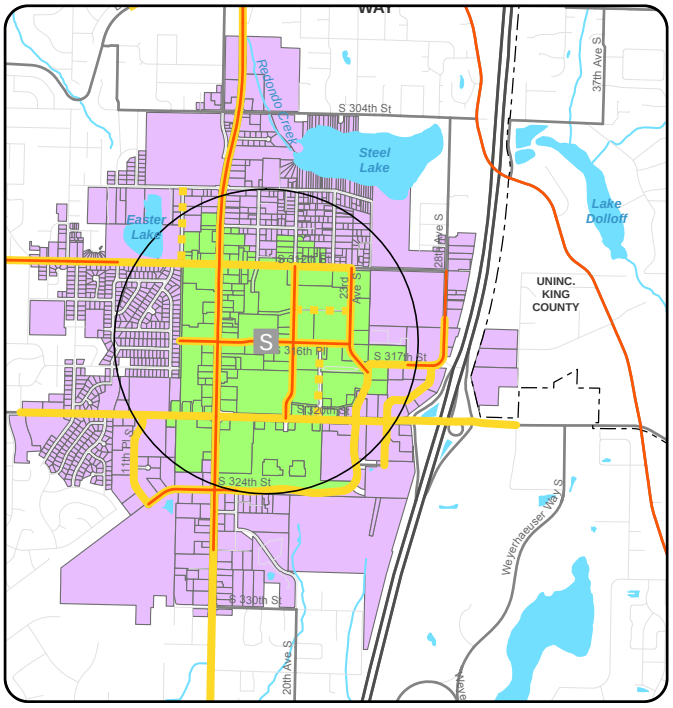
3.5.6.5 S 216th Station and S 260th Station Options

Potential additional stations at S 216th Street and S 260th Street (West or East) would have connections to non-motorized facilities with access in all directions. Exhibit 3-15 shows the walk- and bikesheds for these areas.

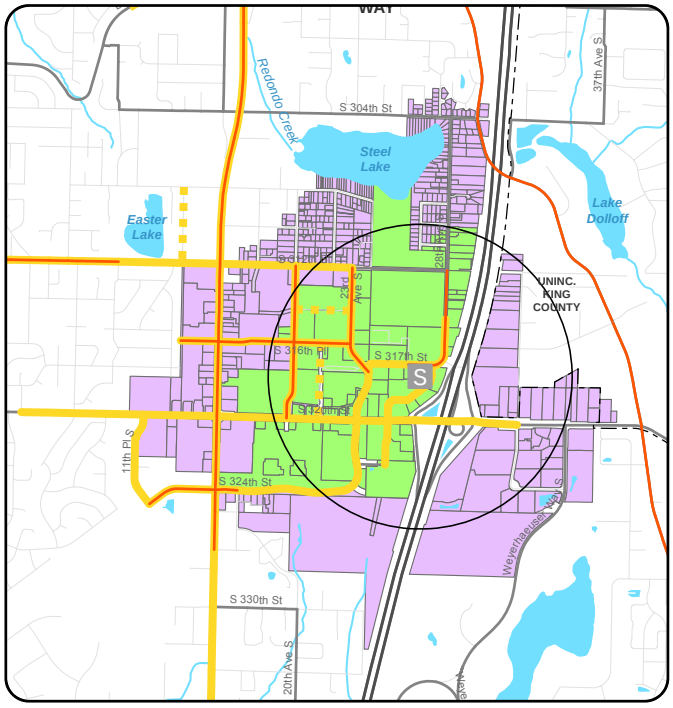
The pedestrian LOS with these station options would be the same as with the No Build Alternative (LOS A to C) for crosswalks at signalized intersections, except for the north leg of the S 216th Street/SR 99 intersection with the S 216th Street station options (West or East), where the overall pedestrian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



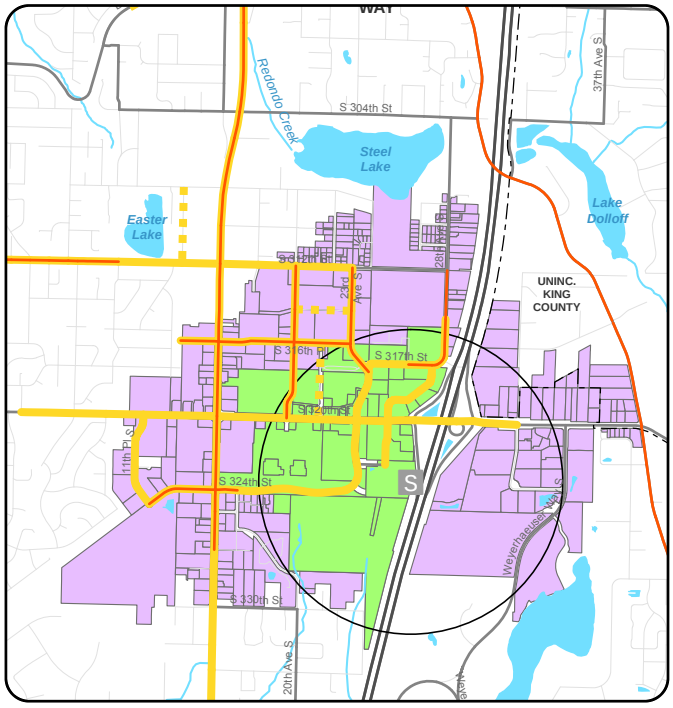
Federal Way Transit Center Station



SR 99 Station Option



I-5 Station Option



S 320th Park-and-Ride Station Option

Legend

Stations

- S — Station Preferred Alternative
- S — Station Other Alignments
- 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 3-14
Federal Way Transit Center Station Area Walksheds and Bikesheds
Federal Way Link Extension

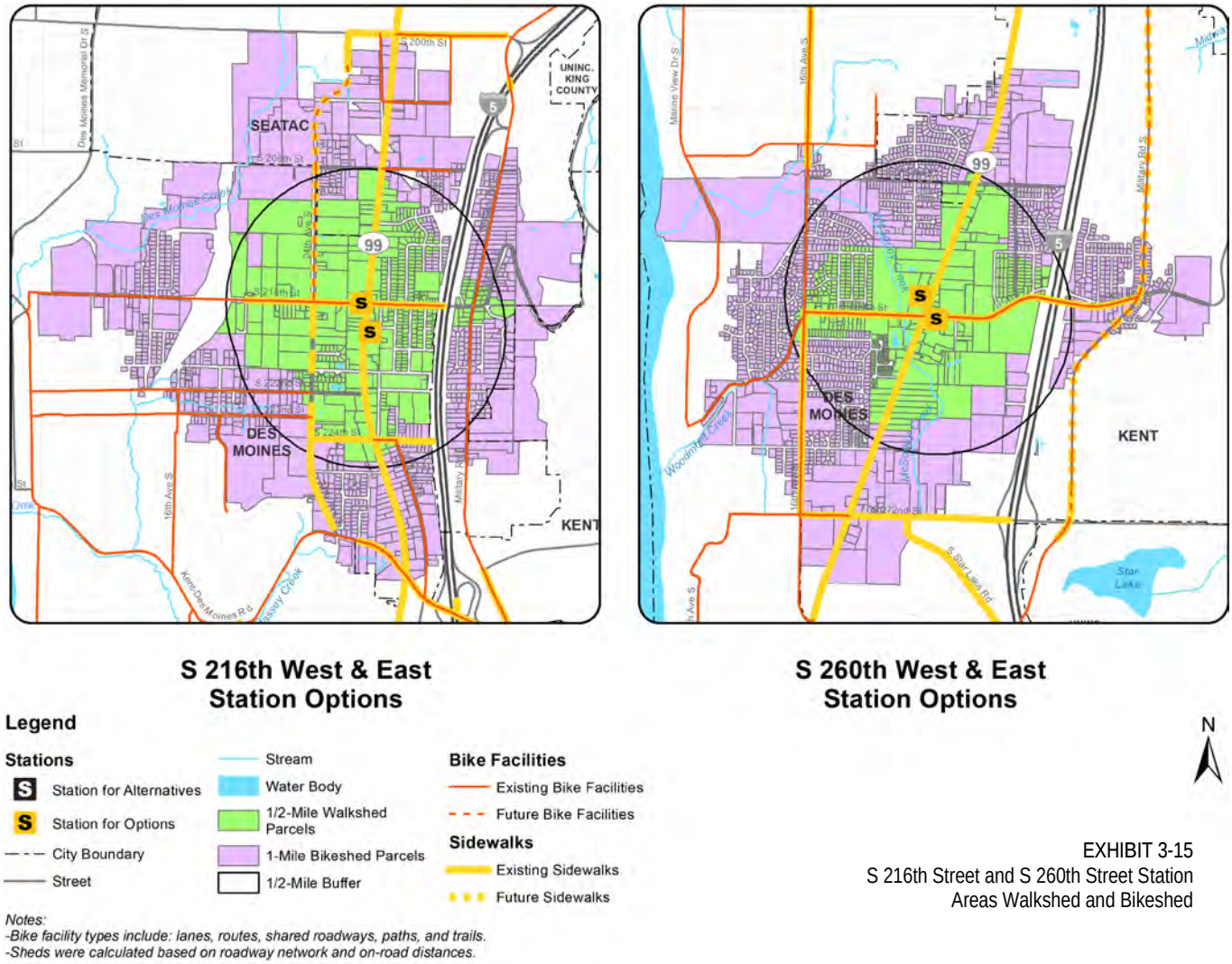


EXHIBIT 3-15
S 216th Street and S 260th Street Station Areas Walkshed and Bikeshed

3.5.6.6 Kent/Des Moines Interim Terminus Conditions

Non-motorized facilities under the Kent/Des Moines interim terminus condition would be the same as with the full-length build alternatives and station options (see Section 3.5.6.1).

The Kent/Des Moines SR 99 East and SR 99 Median station options on the west side of SR 99 or in the SR 99 median would have a pedestrian LOS of D or better at the SR 99/S 236th Street intersection for the east and south crosswalk legs. This would be the result of more pedestrian trips transferring between bus service and the park-and-ride across SR 99 compared with the full-length alternatives. Sound Transit would provide a sidewalk and crosswalk with widths greater than typical standards to achieve an acceptable LOS at this location.

3.5.6.7 S 272nd Street Interim Terminus Conditions

The non-motorized facilities with the S 272nd Star Lake and S 272nd Redondo stations interim terminus conditions would be the same as with the full-length build alternatives and station options (Sections 3.5.6.2 and 3.5.6.3, respectively).

Pedestrian LOS for signalized intersections around either S 272nd station in the interim terminus conditions would be similar to the full-length alternatives. There would be more pedestrians under the interim terminus conditions, but sufficient pedestrian capacity.

3.5.7 Freight Mobility and Access

Freight mobility and access are expected to improve under the No Build Alternative compared with existing conditions because the SR 509 and SR 167 extension projects will create new regional highway connections to I-5. The 28th/24th Avenue S Extension Project in SeaTac and Des Moines will be another freight corridor in the study area. Still, roadway congestion with the No Build Alternative would continue as traffic volumes increase.

With any of the build alternatives, trucks would still use designated freight roadway facilities. The distribution of trucks on SR 99, SR 509, and I-5 would be similar to the No Build Alternative conditions. As the build alternatives would be either grade-separated or travel in an exclusive guideway outside the roadway travel lanes, freight mobility and access would be similar to automobile mobility and access. Isolated freight movements could benefit from the FWLE at some locations through project improvements and/or mitigation (see Chapter 2, Alternatives Considered, and Section 3.7, Potential Mitigation Measures). Modifications to the roadway system are not anticipated to affect truck circulation or change truck route designations on the regional and local street system. There would be no at-grade crossings of freight rail tracks with the FWLE.

3.6 Indirect Impacts

FWLE light rail service would help facilitate potential residential and business growth around the stations. This would lead to changes in regional and local travel patterns as trips to and from these areas increase for all travel modes, thus increasing congestion that could affect transit, intersection operations, parking, freight, and non-motorized users. This growth around

Indirect Impacts

Indirect impacts are caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect impacts 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.

the stations is planned and accounted for in regional forecasts used in the previous direct impacts analysis.

Land uses assumed in the transit ridership model were based on local planned development capacities and regional policies adopted in VISION 2040. Light rail service could attract increased residential and commercial land uses (i.e., transit-oriented development [TOD]), surrounding the stations. This would be consistent with adopted changes in the study area cities' land use plans. Because the Sound Transit and PSRC models already account for such land uses around station areas, TOD is not expected to substantially change overall FWLE ridership. However, increased population and employment density in the immediate station areas (the walk- and bikesheds) would likely increase non-motorized access to and from stations and decrease automobile access.

Development greater than anticipated in 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 transit operations, freight mobility and access, or regional facilities and travel; therefore, no mitigation would be needed. Potential impacts on I-5 ramp terminal intersections and safety are described in Sections 3.7.2 and 3.7.3, respectively.

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 Arterial and Local Street Operations

Mitigation could be required at intersections where the intersection LOS would be worse than with the No Build Alternative and would not meet the applicable LOS standard. Where an intersection is not expected to meet a jurisdiction's LOS standards with the No Build Alternative, mitigation would still be required if the FWLE substantially degrades the intersection performance further. Table 3-11 summarizes potential mitigation measures at 10 intersections.

TABLE 3-11
Potential Transportation Mitigation

Intersection	FWLE Alternative/ Option Requiring Mitigation	Full-Length Condition	Kent/Des Moines Station Interim Terminus Condition	S 272nd Station Interim Terminus Condition
SR 99/Kent-Des Moines Road	All alternatives and Kent/Des Moines station options	Provide a second northbound right-turn and a left-turn pocket.	Provide a second northbound right-turn and a left-turn pocket. Provide a northbound right-turn signal overlap phase. Restrict the westbound U-turn movement.	Same as full-length condition.
SR 99/S 240th Street	All alternatives and Kent/Des Moines station options	Provide protected plus permissive signal phasing for eastbound and westbound approaches.	Same as full-length condition except with the Preferred Alternative Kent/Des Moines At-Grade Station Option, which proposes an additional southbound left-turn pocket and widening S 240th Street to provide an eastbound receiving lane. Also provide westbound and northbound right-turn pockets.	Same as full-length condition.
Military Road S/259th Place S/S Reith Road	All alternatives	Provide a westbound and a southbound right-turn pocket.	Same as full-length condition.	Same as full-length condition.
SR 99/S 272nd Street	All alternatives	Provide a northbound right-turn pocket. SR 99 Alternative requires an additional southbound right-turn pocket.	N/A	Same as full-length condition. SR 99 Alternative interim terminus condition requires an additional northbound and southbound right-turn signal overlap phasing.
I-5 Northbound Ramps/S 272nd Street	All alternatives	Provide a northbound left-turn pocket.	N/A	Same as full-length condition.
I-5 Southbound Ramps/S 272nd Street	All alternatives	Provide an additional southbound right-turn pocket. Re-channelize the southbound approach to a shared left/through and right-turn only lane.	N/A	Same as full-length condition.
Military Road S/S 272nd Street	All alternatives	Provide a southbound right-turn pocket.	N/A	Same as full-length condition.
Star Lake Road/S 272nd Street	All alternatives	Provide eastbound and westbound left-turn pockets.	N/A	Same as full-length condition.

TABLE 3-11
Potential Transportation Mitigation

Intersection	FWLE Alternative/ Option Requiring Mitigation	Full-Length Condition	Kent/Des Moines Station Interim Terminus Condition	S 272nd Station Interim Terminus Condition
SR 99/S 320th Street	All alternatives and Federal Way Transit Center Station Options	Provide a northbound right-turn pocket.	N/A	N/A
SR 99/S 276th Street	SR 99 and I-5 to SR 99 alternatives (S 272nd Station interim terminus condition only)	No mitigation required.	N/A	Provide a northbound right-turn pocket.

The full build-out of the 2003 design for the WSDOT SR 509 Extension is included in the No Build Alternative background list of projects. If WSDOT proposes design modifications to this project, those changes would be reviewed by Sound Transit and an updated analysis of the transportation system may be warranted. Based on the SR 509 Extension schedule, this is expected to occur during FWLE final design.

The mitigation measures would either 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 under the No Build Alternative. With mitigation, the vehicle queue lengths at the affected intersections are also expected to be similar or improved compared with the No Build Alternative. The SR 99/S 320th Street intersection would meet the City of Federal Way LOS standards but would be slightly below WSDOT's LOS/delay standard for the AM peak hour. 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.

Sound Transit performed additional analysis to validate the intersection operations and vehicle queue results near the I-5/Kent-Des Moines and I-5/S 272nd Street interchanges. This analysis was conducted for the No Build Alternative and Preferred Alternative Kent/Des Moines Station interim terminus and S 272nd Star Lake Station interim terminus conditions with the proposed intersection mitigation. The Preferred Alternative interim terminus conditions were used because they would have the most peak hour trips in these two areas.

With mitigation, the overall AM and PM peak hour queue lengths on the I-5 ramps in the I-5/Kent-Des Moines Road interchange area with

the FWLE would be shorter than with the No Build Alternative. The queues would not extend onto the I-5 mainline. In the I-5/S 272nd Street interchange area, overall AM and PM peak hour queue lengths on the I-5 ramps with the FWLE, including the potential mitigation measures, would be shorter than with the No Build Alternative. Only the PM peak hour queue on the I-5 southbound ramp would extend onto the I-5 mainline. However, the queue length under the Preferred Alternative would be shorter than with the No Build Alternative. Additional queue length information is included in Appendix E, I-5 Ramp Terminal Queue Length Results, of Appendix G1.

Local cities or WSDOT have jurisdiction over the intersections listed in Table 3-11. As the project design advances, Sound Transit will work with affected jurisdictions/agencies to evaluate mitigation strategies for safe, efficient operations and determine final mitigation. Sound Transit will work with affected jurisdictions/agencies during the permitting process to determine Sound Transit's contribution to develop, fund, and/or build improvements at these intersections. This may include contributing a proportionate share of costs to improve intersections affected by the FWLE.

This analysis assumed the full build-out of the 2003 design for the WSDOT SR 509 Extension as part of the 2035 No Build Alternative. WSDOT intends to modify the design of the SR 509 Extension; Sound Transit will review those changes and update its analysis of the transportation system if warranted. The changes could increase or reduce FWLE project impacts and affect mitigation measures described in this Final EIS.

3.7.2 Safety

The FWLE alternatives would have no effects on transportation safety that would require mitigation. Even though there would be a slight increase in the expected number of crashes at the I-5 interchanges due to increased volume of traffic accessing the light rail stations, the FWLE would shift up to 9,000 people per day from driving or taking another non-transit mode to using transit. This would result in a reduction of up to 160,000 VMT per day in the region. A mode shift where people use transit and travel less would have an inherent safety benefit because fewer crashes would be expected.

Project elements such as the placement of guideway columns would be designed to roadway standards, eliminating the need for safety-related mitigation. As noted in Appendix G1, the I-5 southbound

mainline in the FWLE study area has about 11,500 feet of existing guardrail, walls, or barriers that would shield vehicles from FWLE light rail columns.

The proposed operations mitigation measures outlined in Table 3-11 would not adversely affect transportation safety in the study area. In some cases, as a result of these measures, intersection safety could be improved. With the intersection mitigation defined for the Preferred Alternative in Table 3-11, interchange operations and queue lengths at the interchange ramps would be similar or less than with the No Build Alternative. Therefore, the FWLE would require no additional mitigation along I-5 to address safety.

3.7.3 Parking

Partial property acquisitions for off-street parking could reduce business opportunities. Sound Transit would work with private business owners to determine fair market value of the acquired spaces, based on quantity of spaces lost and business type.

The potential additional S 216th East Station Option has potential for hide-and-ride parking that may require mitigation. Sound Transit would work with local jurisdictions to evaluate and, if necessary, implement hide-and-ride mitigation around any of the stations. If requested by local jurisdictions, Sound Transit would inventory on-street parking around a station before and after the start of light rail revenue service, and would then determine where mitigation measures would be needed in coordination with the local jurisdiction. Potential parking control measures include parking meters, restricted parking, passenger and truck load zones, and residential parking zones (RPZs). For those agreed-to parking controls, Sound Transit would pay for signage or other parking-control installations for 1 year after the FWLE opening. The local jurisdictions would be responsible for monitoring 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 in their own lots.

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

3.7.4 Non-motorized Facilities

The FWLE would not result in any adverse impacts on existing non-motorized facilities because the related analysis indicates a pedestrian LOS of D or better near the stations. In accordance with the Sound Transit System Access Policy, Sound Transit would include pedestrian and bicycle improvements at stations to safely accommodate the projected increase in pedestrian and bicycle travel with the FWLE. Sound Transit would also work with local jurisdictions to determine the most appropriate pedestrian and bicycle improvements 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.