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.

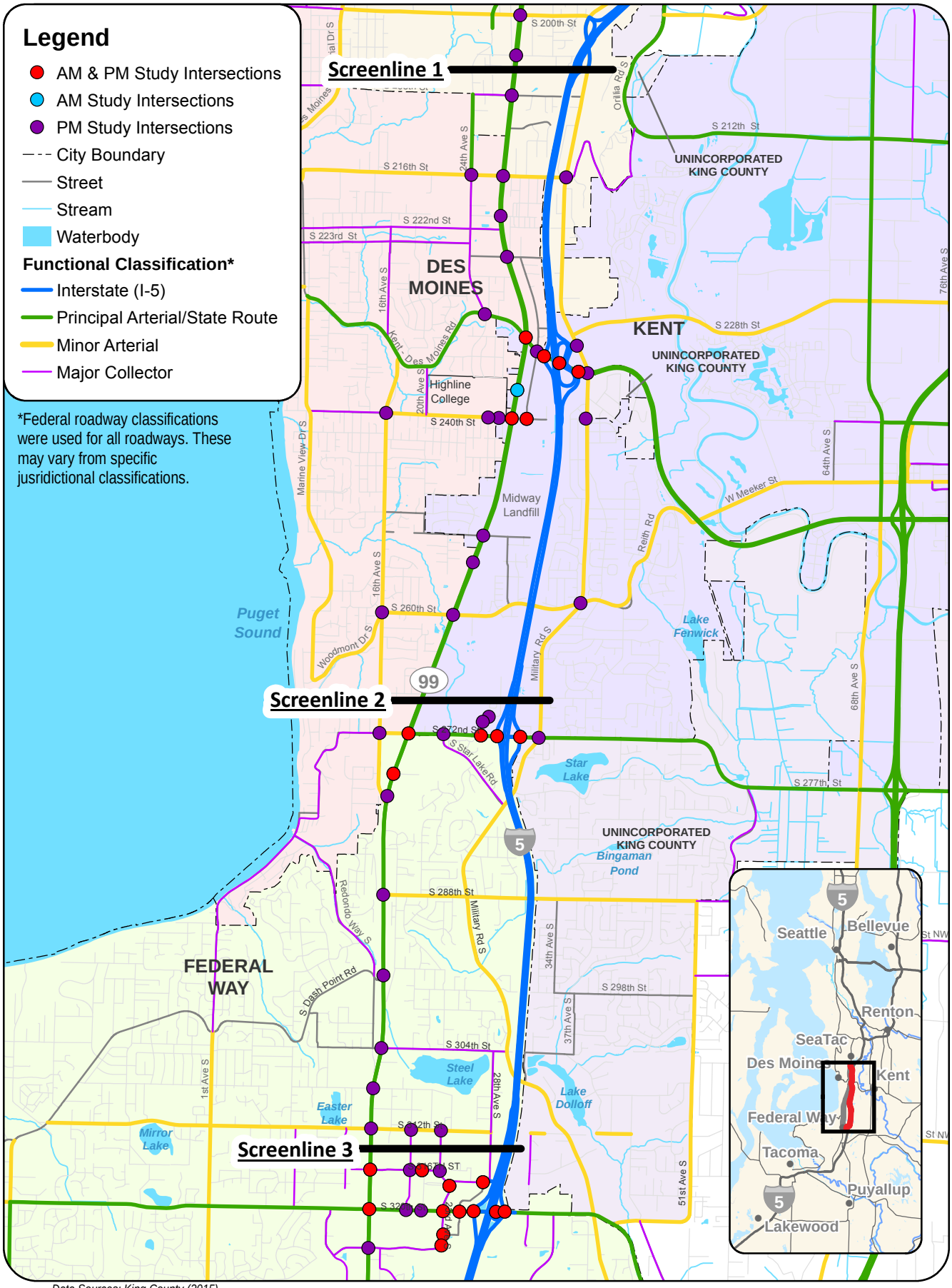
Exhibit 3-1 shows the study area, major roadways, and intersections studied.

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

Federal Way Link Extension

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.

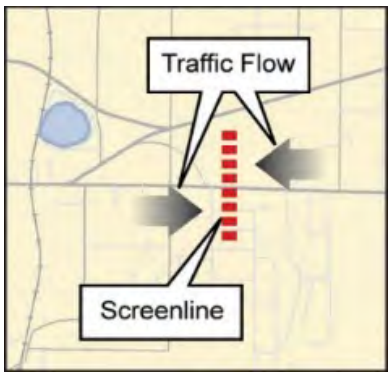
3.3 Methodology and Assumptions

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.

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



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
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.

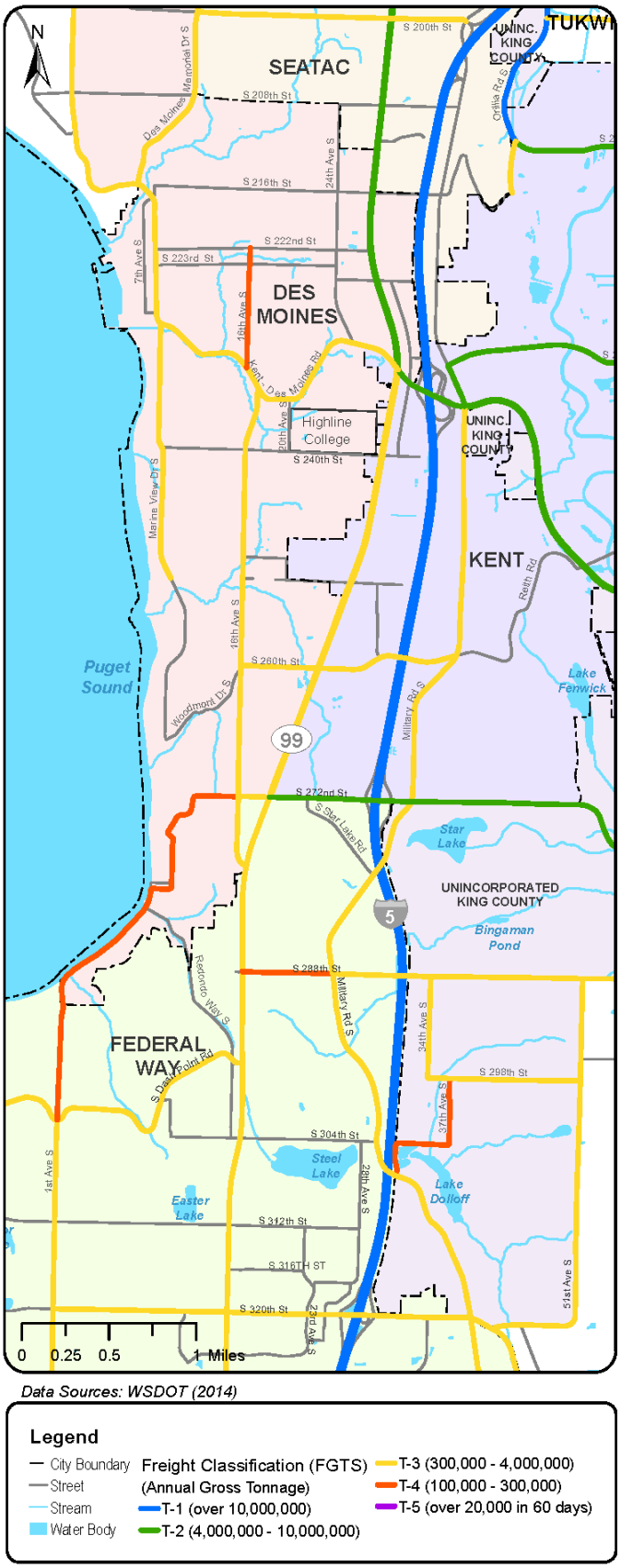


EXHIBIT 3-2
Existing Freight

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.

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

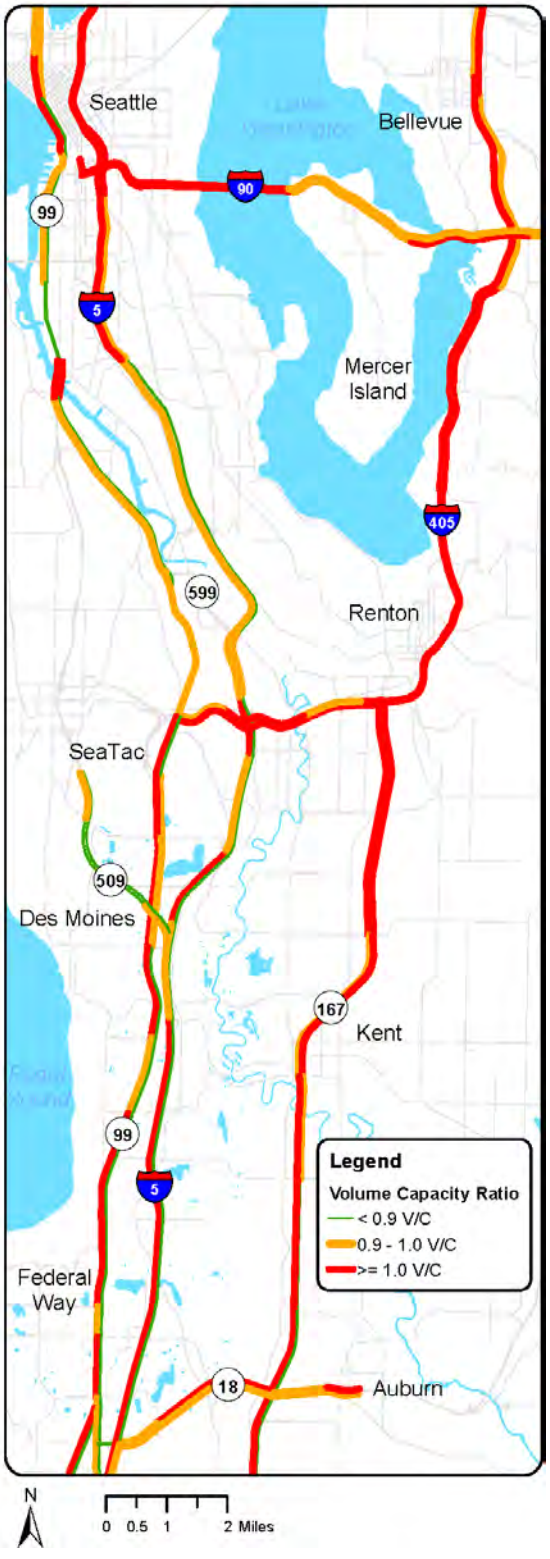


EXHIBIT 3-3
2035 No Build PM Highway Volume-to-Capacity Ratios

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.

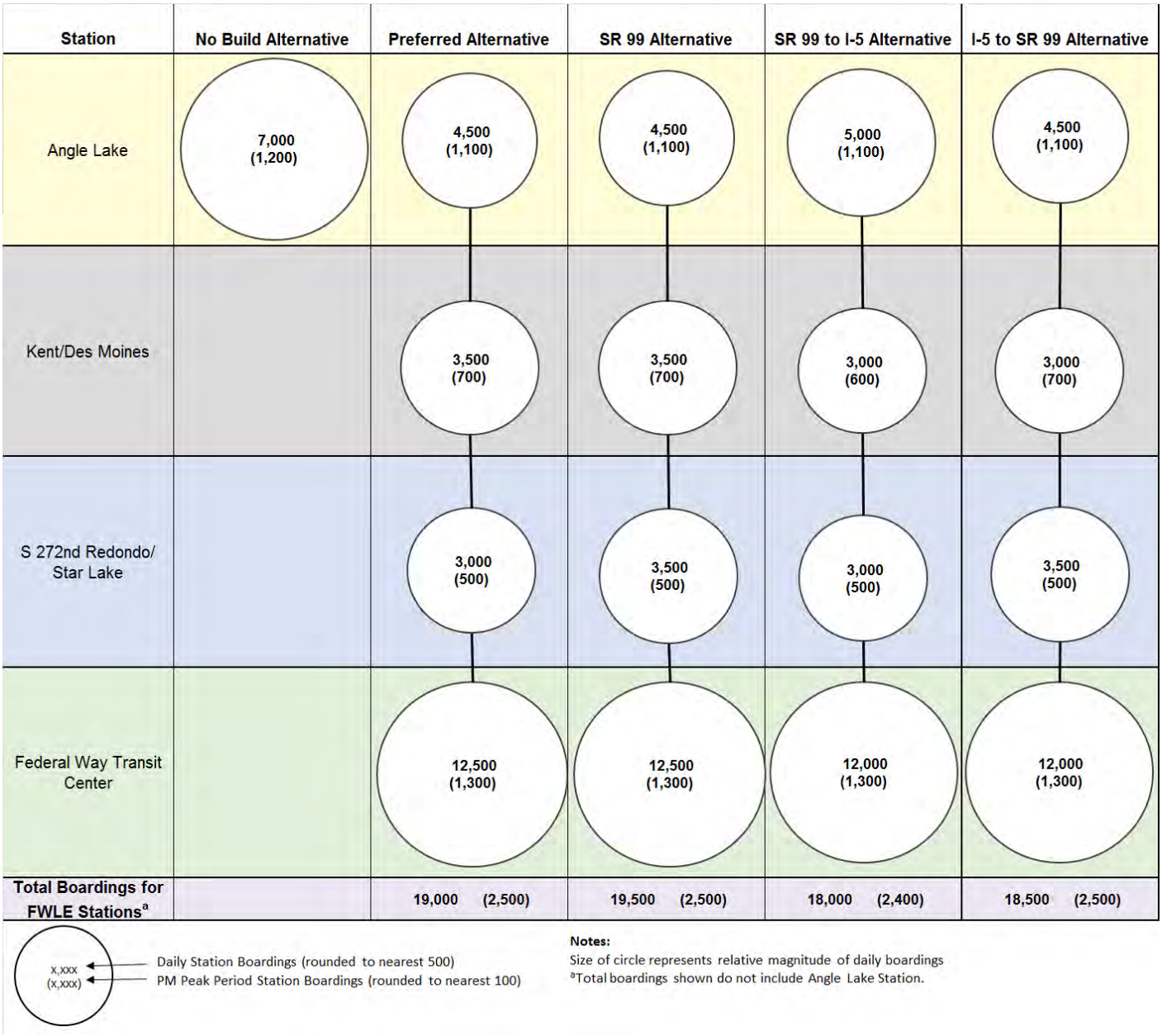


EXHIBIT 3-4
2035 FWLE Build Alternatives Weekday Station Boardings

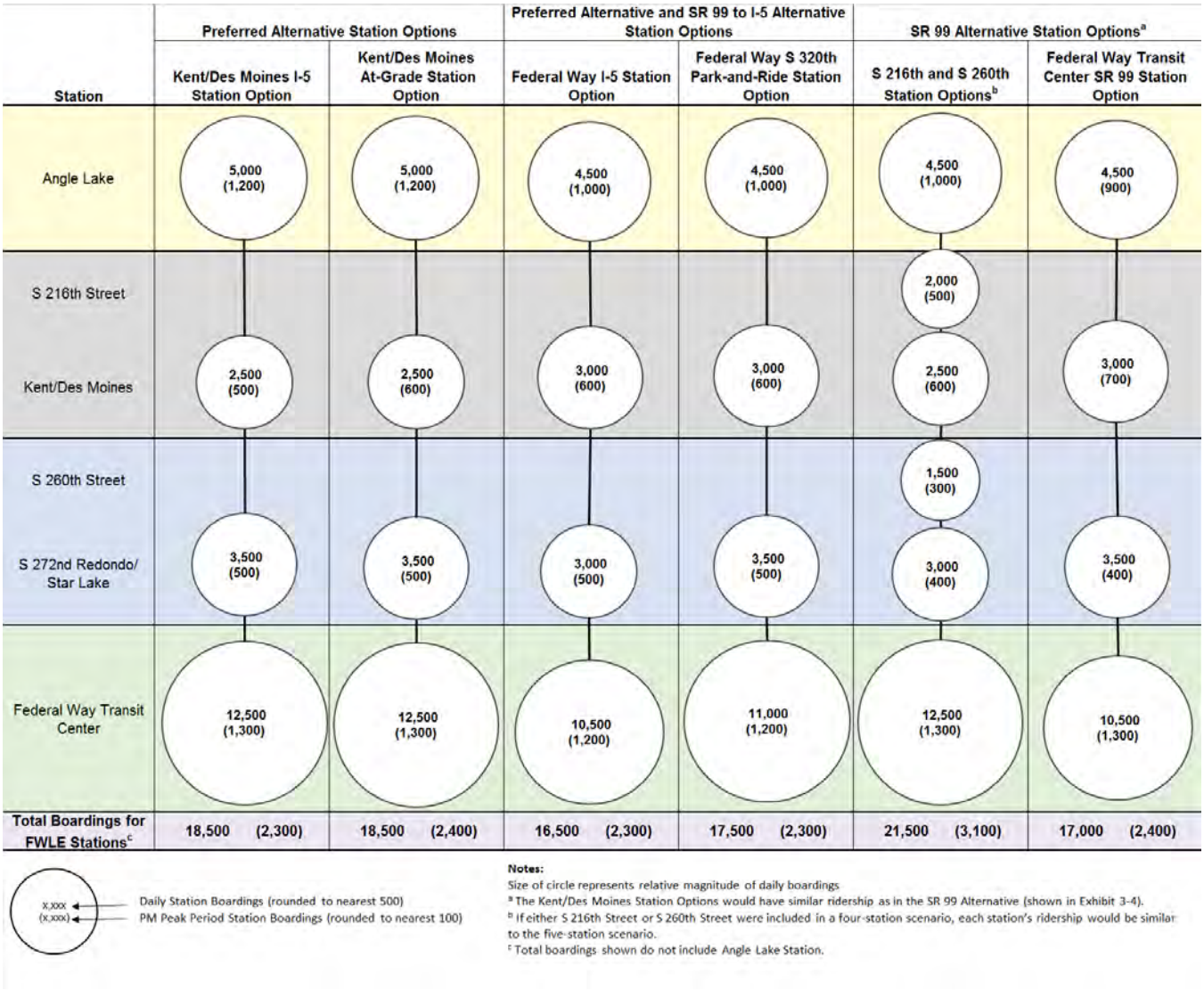


EXHIBIT 3-5
2035 FWLE Light Rail Station Options Weekday Station Boardings

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.

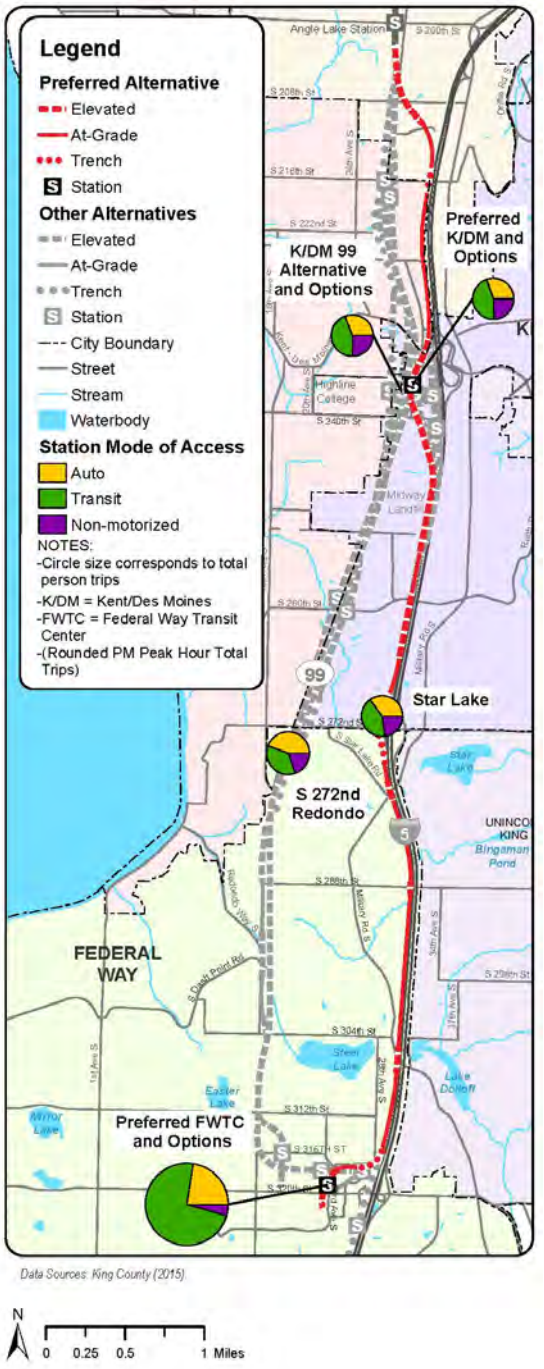


EXHIBIT 3-6
2035 Build Alternatives PM Peak Hour Station Mode of Access

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

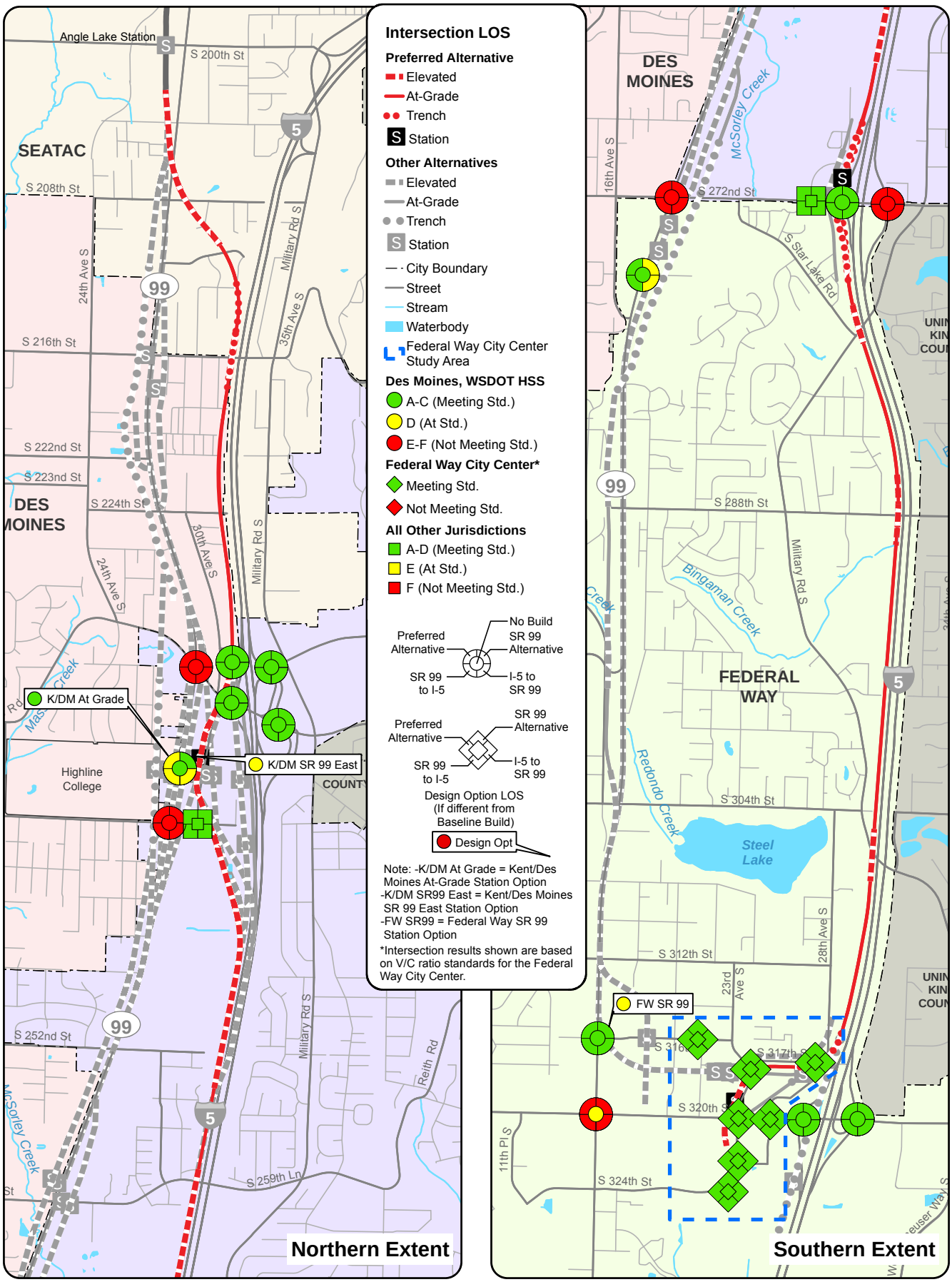
Station area traffic from the Preferred Alternative would further degrade seven intersections that already do not meet jurisdictional LOS standards under the No Build Alternative:

- 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.

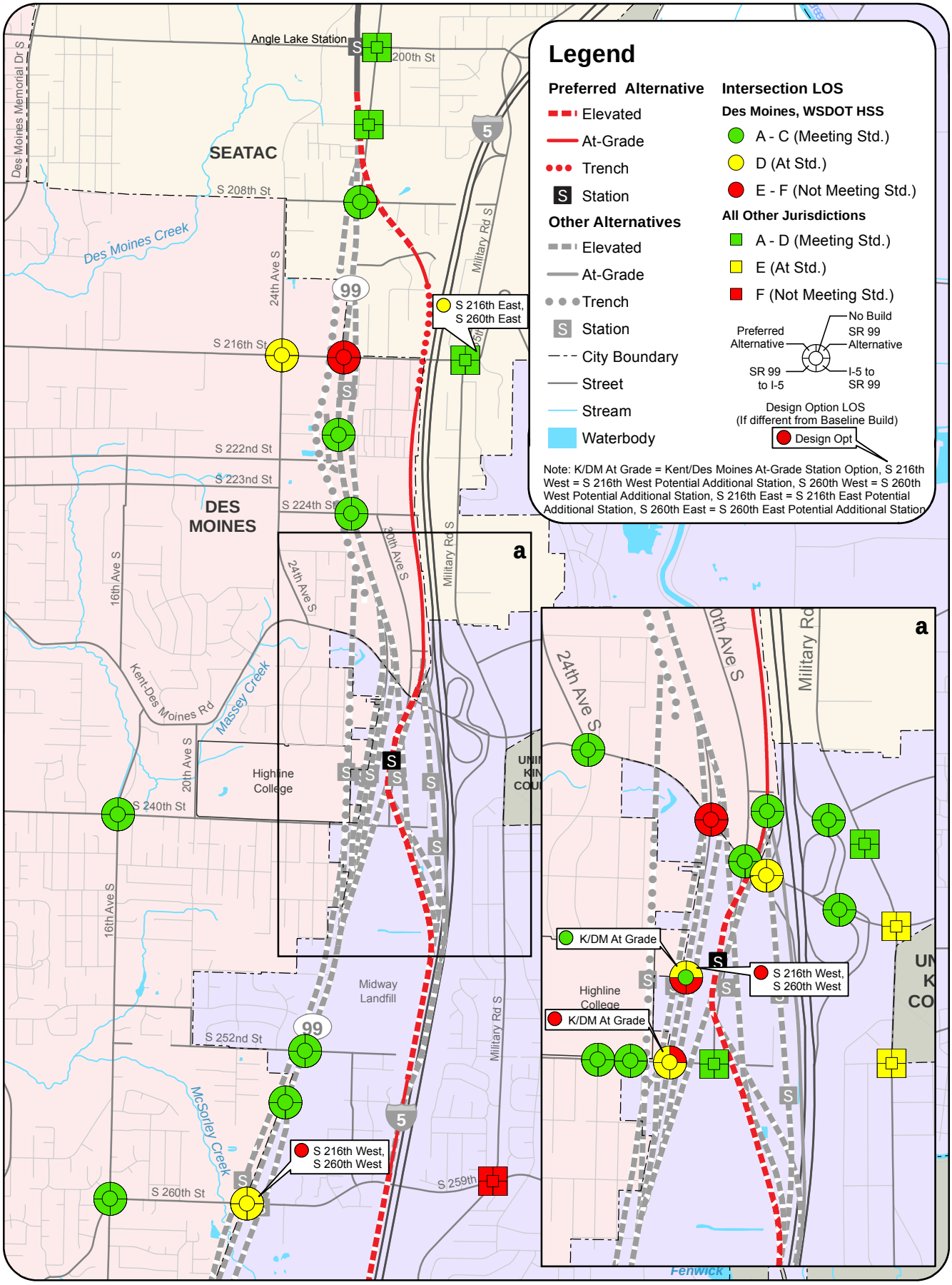
SR 99 Alternative

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

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

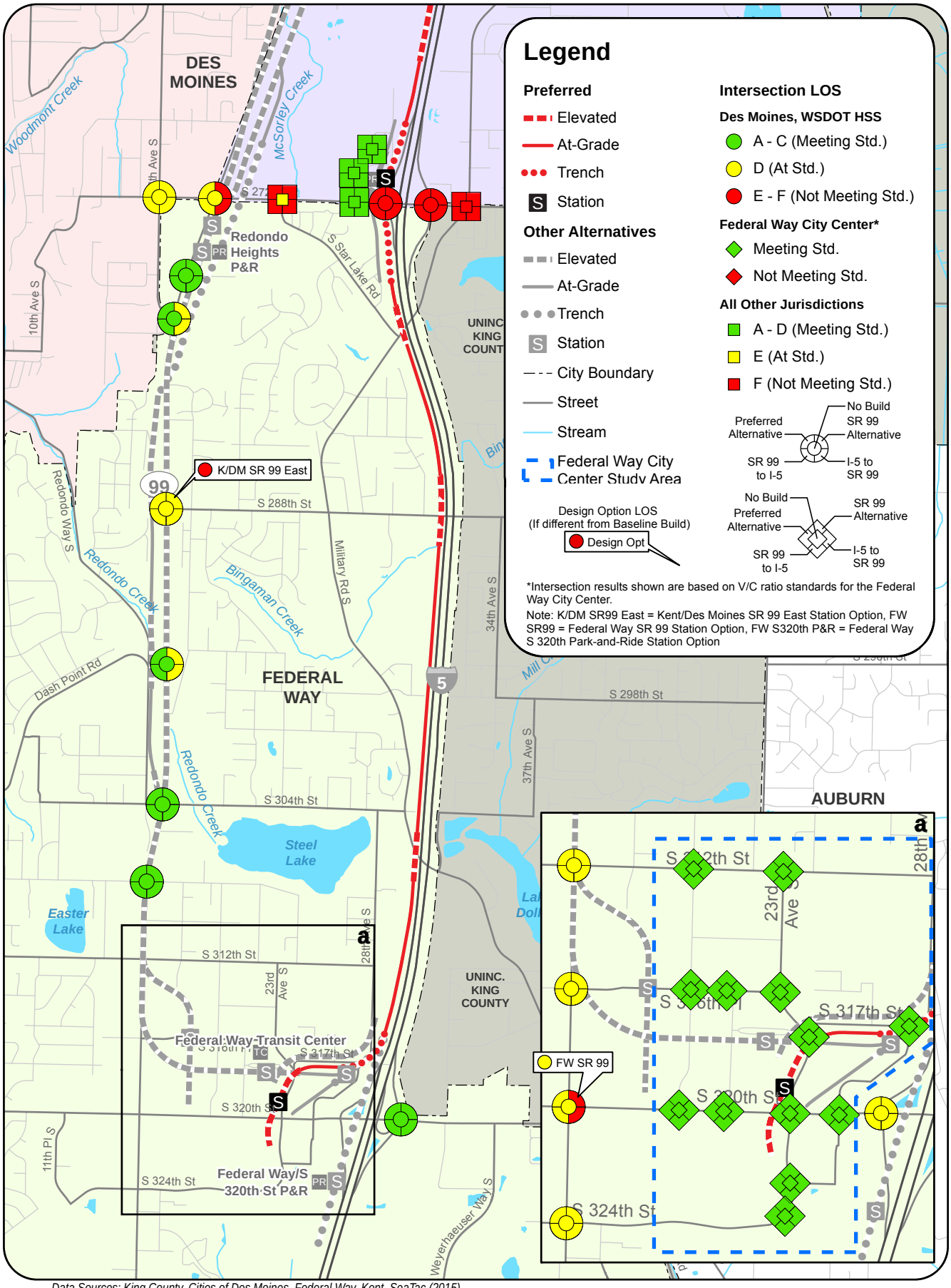


Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).
HSS = Highway of Statewide Significance

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

N

0 0.25 0.5 1 Miles

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.

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.

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

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

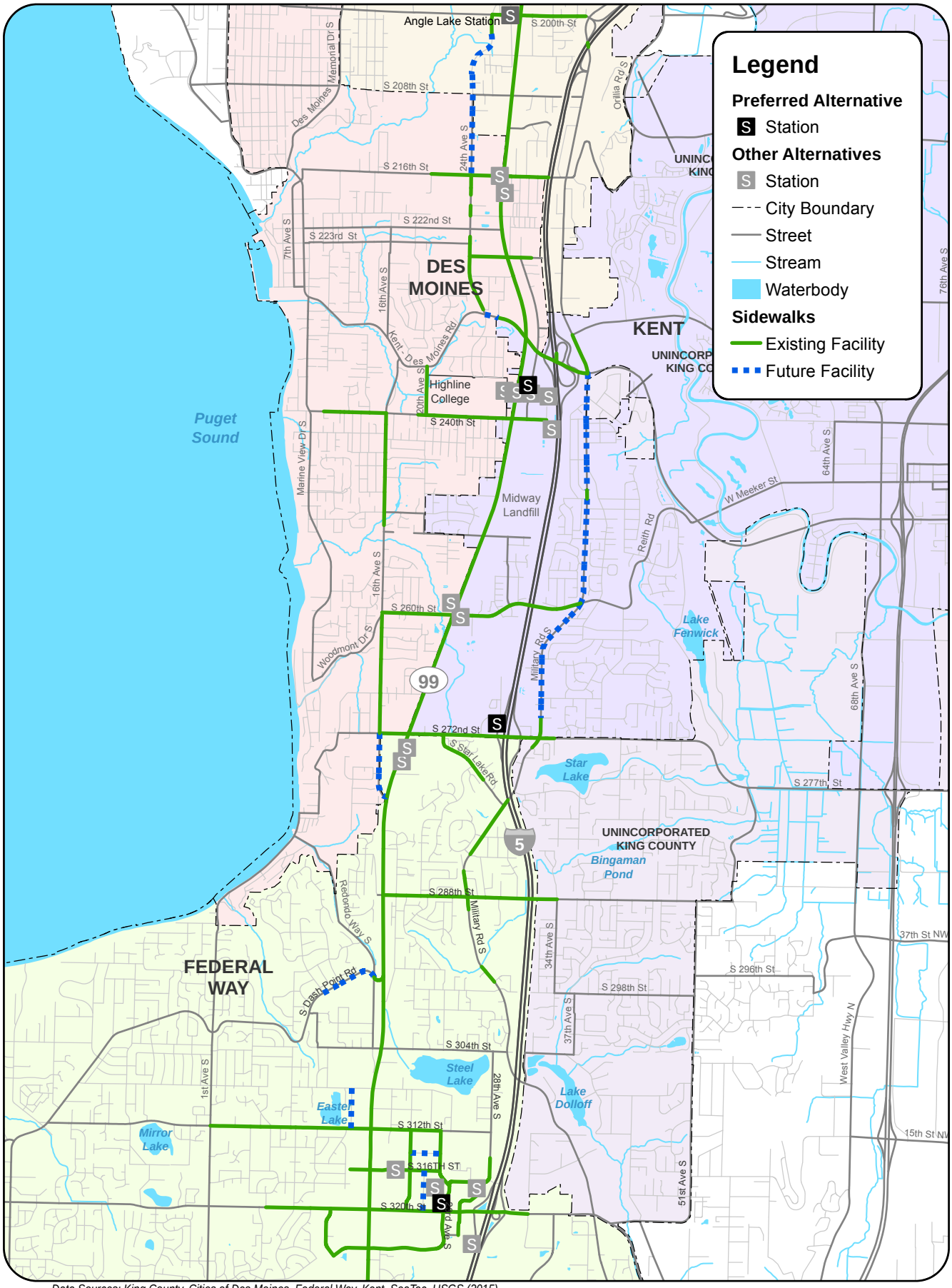
The FWLE station layout, location, and surrounding land uses and transit services would affect how people get to and navigate around each station. Existing and year 2035 pedestrian and bicycle facilities in the FWLE corridor are shown in Exhibits 3-10 and 3-11, respectively. Planned new facilities with 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:

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.

- **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).

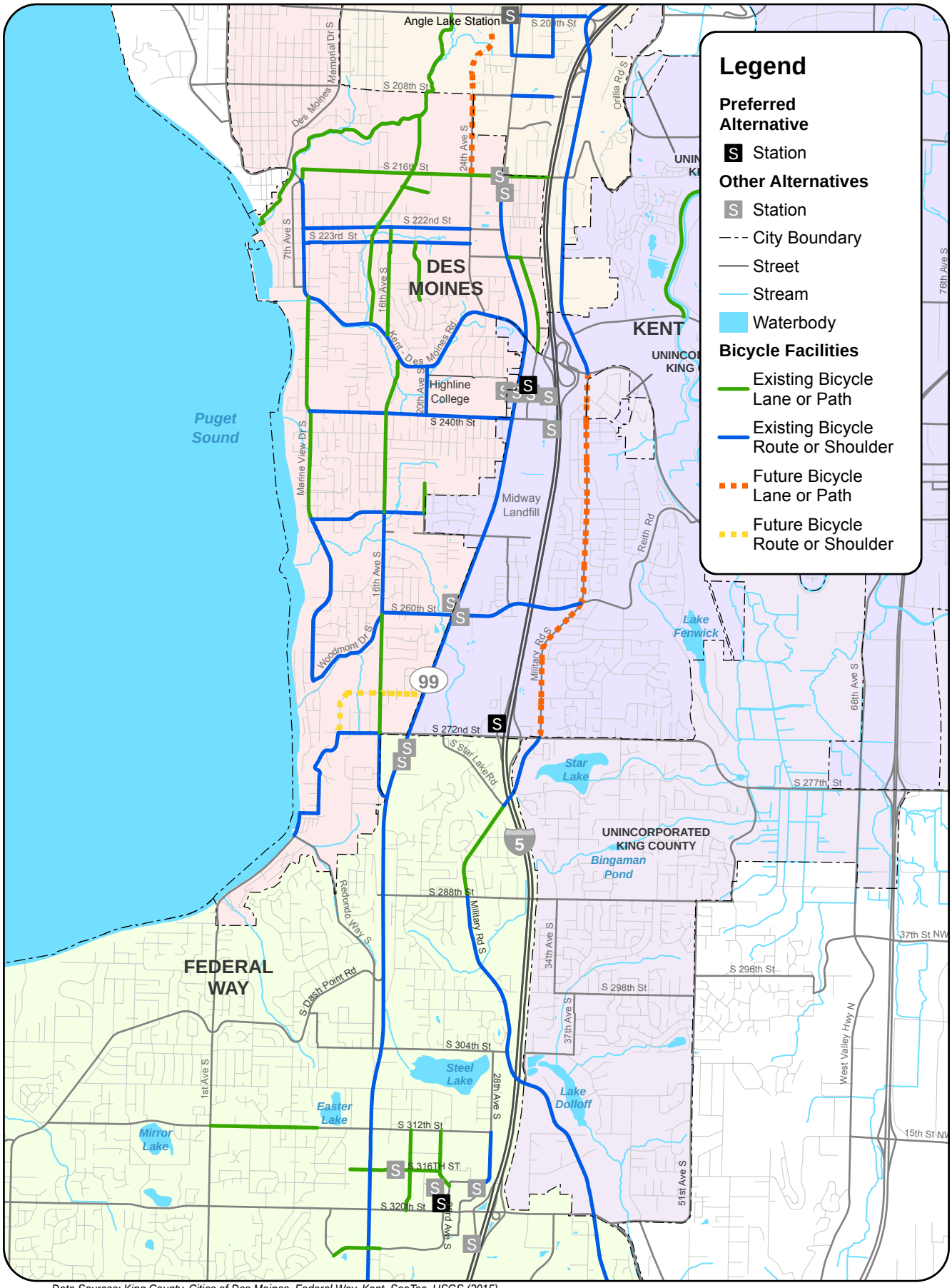


Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac, USGS (2015).

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).

N

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.

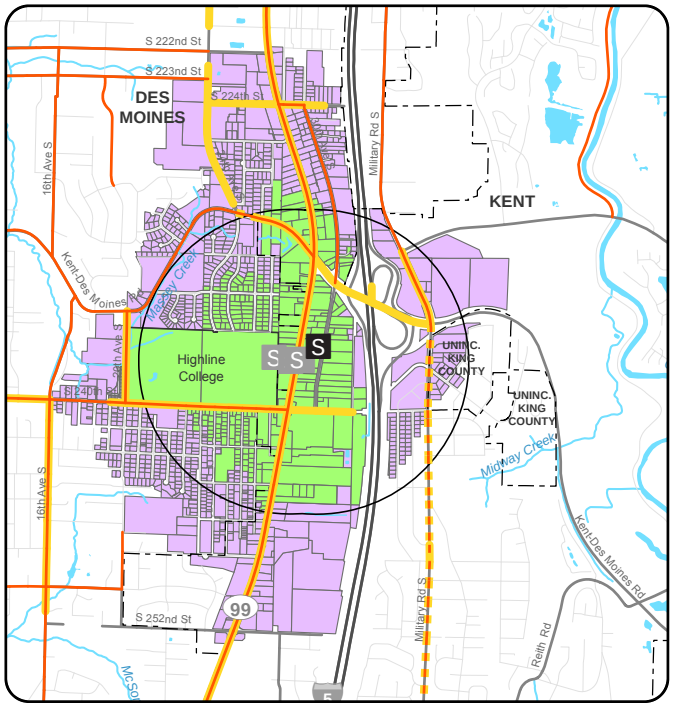
park-and-ride capacity and people transferring by bus would both be higher.

- 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.

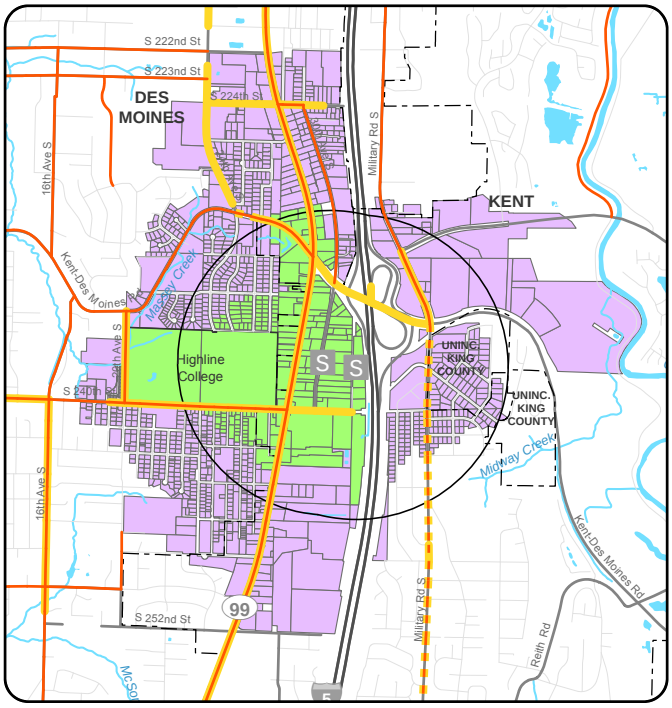
The pedestrian LOS for the FWLE build alternatives would generally range between A and D. For most intersections, a lower LOS rating would result from a noticeable increase in pedestrian volume (e.g., where the park-and-ride facilities or transit stops are not adjacent to light rail stations). Because 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

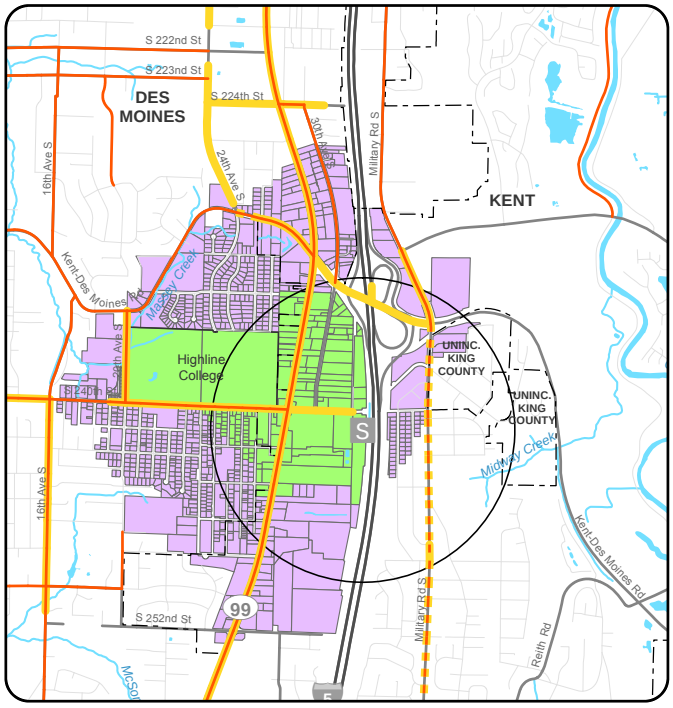
In general, all the Kent/Des Moines build alternatives and station options would have a fairly similar walk- and bikeshed (see Exhibit 3-12). In the Kent/Des Moines station area, I-5 is a major barrier to walking and bicycle trips east of I-5. There would be pedestrian crossings along SR 99 at the S 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).

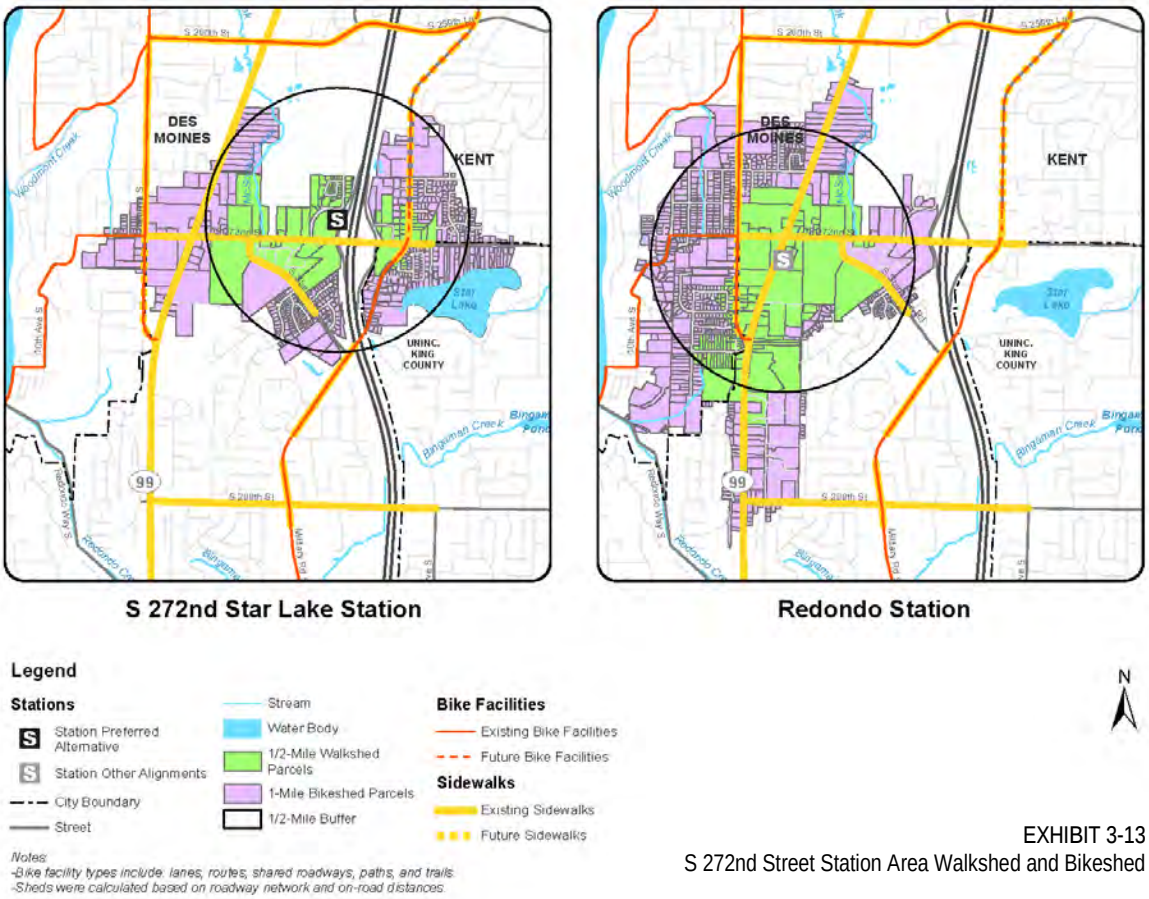


EXHIBIT 3-13
S 272nd Street Station Area Walkshed and Bikeshed

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

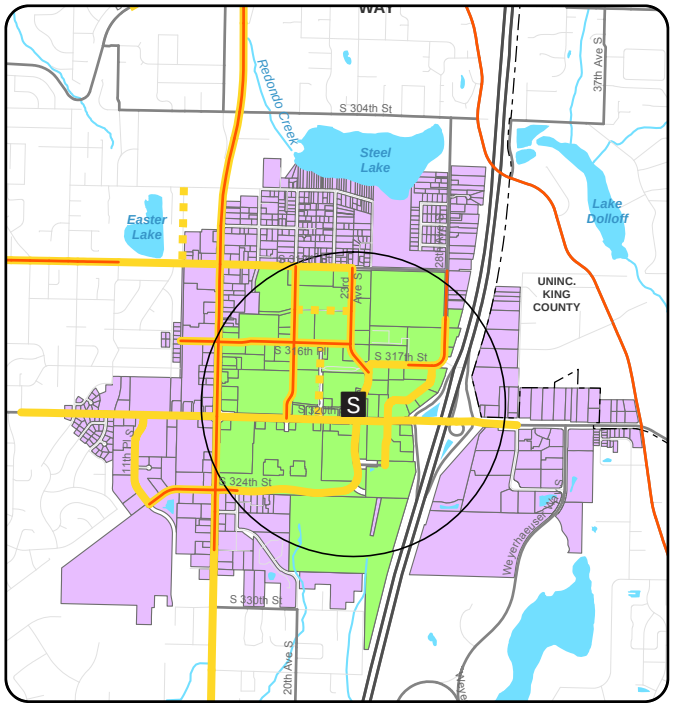
The majority of commercial development surrounding the existing Federal Way Transit Center station area is accessible by sidewalks, but the area lacks bicycle facilities. The location of the station area between SR 99 and I-5 generally limits the walk- and bikesheds between those two regional highway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

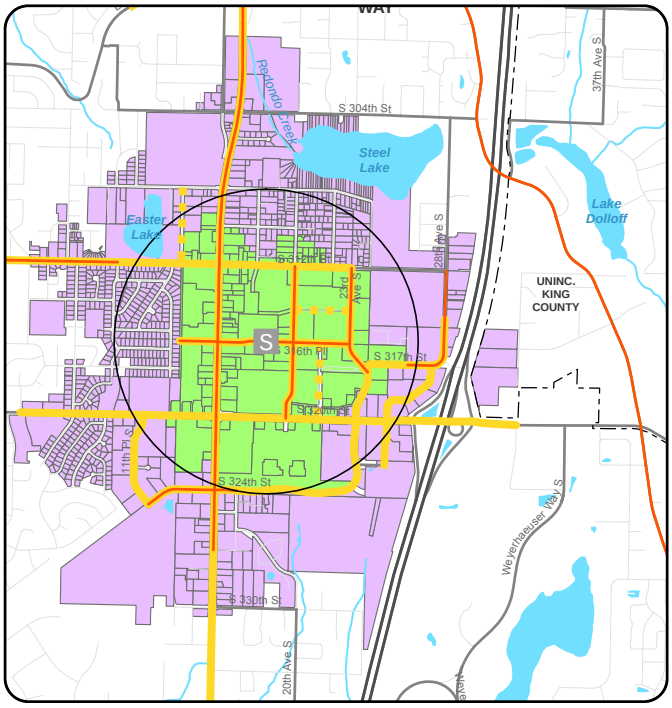
3.5.6.5 S 216th Station and S 260th Station Options

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.

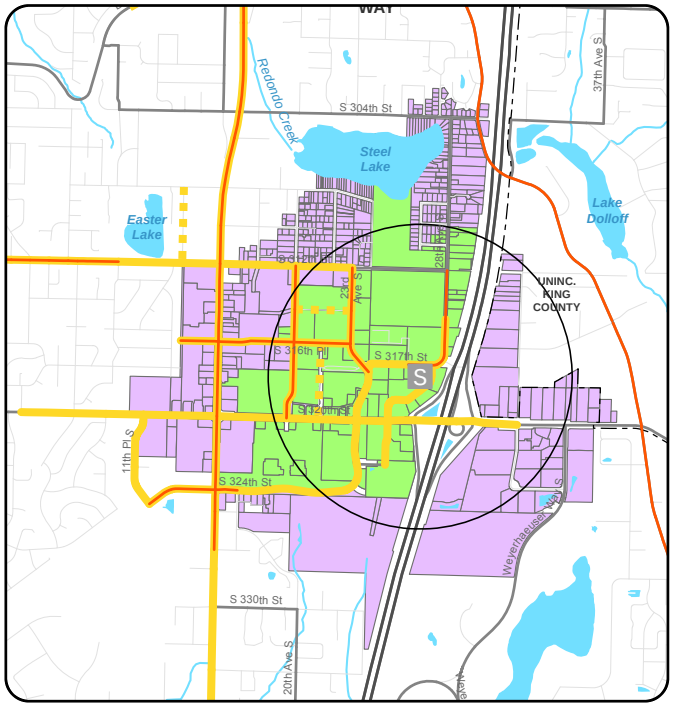
The pedestrian LOS with these station options would be the same as with the No Build Alternative (LOS A to C) for crosswalks at signalized intersections, except for the north leg of the S 216th Street/SR 99 intersection with the S 216th Street station options (West or East), where the overall pedestrian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



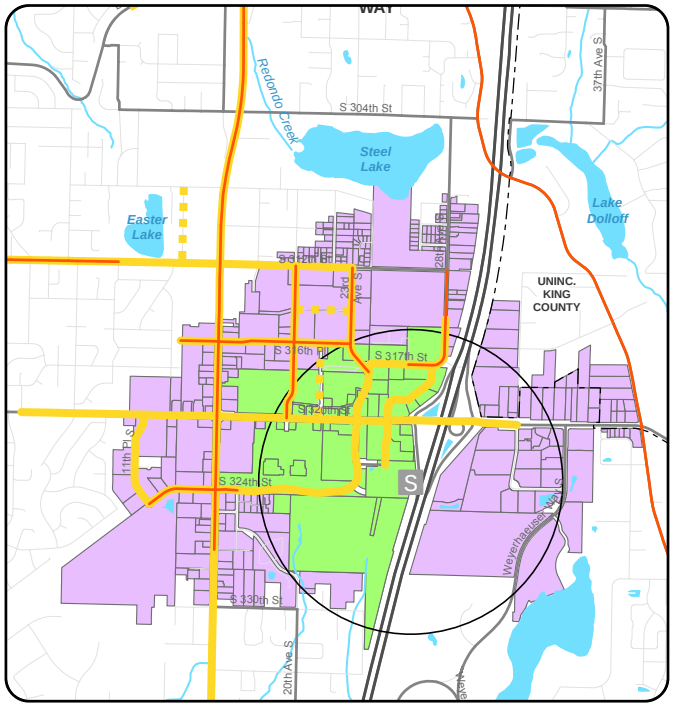
Federal Way Transit Center Station



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

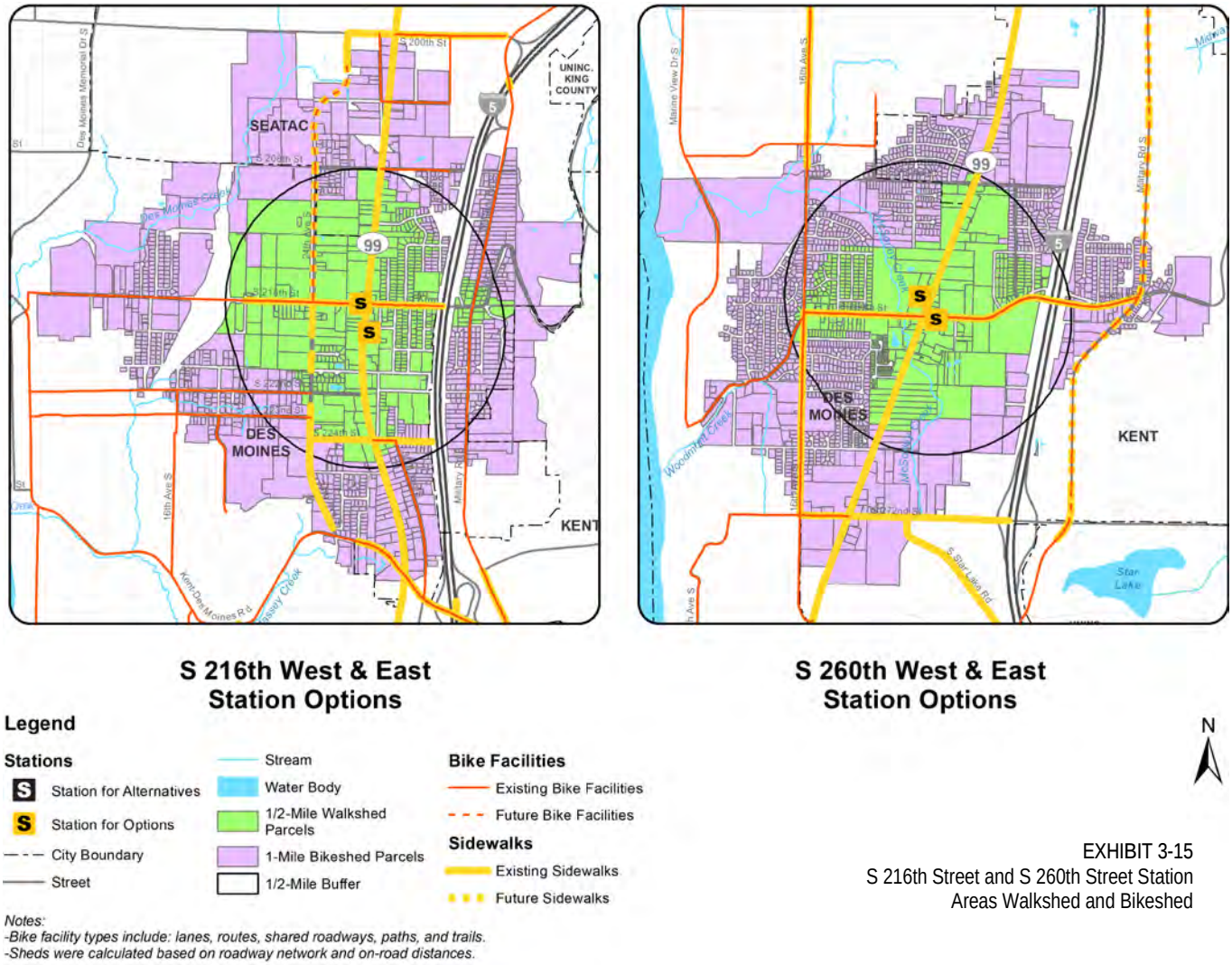


EXHIBIT 3-15
S 216th Street and S 260th Street Station Areas Walkshed and Bikeshed

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.