2 ALTERNATIVES CONSIDERED

This chapter describes the alternatives defined and evaluated for the West Seattle and Ballard Link Extensions (WSBLE) Project. It explains how the alternatives were developed for the Draft Environmental Impact Statement, and it summarizes the alternatives eliminated from further consideration. This chapter is organized into the following sections:

- 2.1 Build Alternatives
- 2.2 No Build Alternative
- 2.3 Operations and Maintenance
- 2.4 Interim Terminus and Minimum Operable Segments
- 2.5 Alternatives Development and Scoping
- 2.6 Construction Approach
- 2.7 Environmental Practices and Commitments
- 2.8 Project Funding and Cost Comparison

The project purpose and need described in Chapter 1 served as the basis for developing the WSBLE Project alternatives. Prior to the Draft Environmental Impact Statement, Sound Transit conducted an Alternatives Development process to define and evaluate a wide range of alternatives. The Sound Transit Board of Directors (Board) then identified alternatives for study in the Draft Environmental Impact Statement in May and October 2019 (refer to Section 2.5.3, Alternatives Carried Forward).

The Draft Environmental Impact Statement evaluates multiple Build Alternatives in the project corridor, including different design options for alignments and stations. The Draft Environmental Impact Statement also evaluates a No Build Alternative. This allows an analysis of the potential impacts of not building the WSBLE Project and provides a basis for comparing the Build Alternatives to a future baseline condition.

In 2019, the Board identified preferred alternatives for the majority of the West Seattle Link Extension and the Ballard Link Extension. The Board did not identify a preferred alternative in the Chinatown/International District segment. The Board is not bound by its identification of a preferred alternative. After completion of the Draft Environmental Impact Statement and public comment, the Board will identify the preferred alternatives for evaluation in the Final Environmental Impact Statement. However, the Board will not make a final decision on the project to be built until after completion of the Final Environmental Impact Statement. At that time, the Board can select from any of the alternatives or design options in the Environmental Impact Statement.

Definitions

Preferred Alternative: A statement of preference for alternatives based on currently available information. It is not a decision on the project to build.

Other Alternatives: Alternatives or options that are not identified by the Board as preferred.

Design Option: An alternate location for a station area or an alternative route along a portion of an alternative.

Asterisk (*) Use: At the time the Sound Transit Board identified alternatives for study in the Draft Environmental Impact Statement some alternatives were anticipated to require third-party funding based on early cost estimates. The asterisk (*) identifies these alternatives and the alternatives that would only connect to these alternatives in adjacent segments. Example: the Preferred Dakota Street Station Lower Height Alternative* (Preferred Alternative DEL-2a*).

When the Sound Transit Board identified alternatives for study in the Draft Environmental Impact Statement, early cost estimates indicated that some alternatives could require additional funding; that is, funding beyond what was assumed in the Sound Transit 3 financing plan. Alternatives requiring additional funding incorporate enhancements to the scope of the Sound

Transit 3 Representative Project identified in the Sound Transit 3 Plan, such as tunnels in West Seattle and alternatives in the Chinatown/International District that require replacement of the 4th Avenue South Viaduct. The additional funding for these alternatives would need to come from contributions from partner agencies outside of Sound Transit, such as the City of Seattle or others. These alternatives anticipated to require "third-party" funding are identified with an asterisk (*) throughout the Draft Environmental Impact Statement.

In identifying preferred alternatives for evaluation in the Draft Environmental Impact Statement, the Board sometimes identified both a "preferred alternative" and "a preferred alternative with third-party funding." The preferred alternative is within the scope of the Sound Transit 3 Representative Project that initial cost estimates indicated could be built with the funding package approved by voters. The "preferred alternative with third-party funding" (denoted with "Preferred" before the alternative name and an asterisk* following) require contributions from partner agencies. Some other alternatives and design options evaluated in the Draft Environmental Impact Statement could require third-party funding, and they are also denoted with an asterisk after the alternative or option name. For the Final Environmental Impact Statement, Board identification of a preferred alternative that requires third-party funding based on current cost estimates would be contingent on identifying additional funding to cover the gap in cost compared to the preferred alternatives within the scope of the Sound Transit 3 Plan. As part of the Draft Environmental Impact Statement analysis, Sound Transit developed cost estimates for the alternatives and options. In many cases, these updated cost estimates confirm gaps between the cost of delivering the preferred alternative and alternatives requiring third-party funding, although the gaps are less than anticipated during the alternatives development process.

These updated estimates reflect increased project costs due to steeply rising real estate prices and other construction expenses, and costs resulting from more advanced design that provides a better understanding of project scope and potential mitigation. To ensure that funding remains available to complete all voter-approved projects, the Board conducted a "realignment" process that established a schedule that is affordable, utilizing current financial projections and cost estimates to set the general order in which projects will advance. This "affordable" schedule established an approach to prioritize, fund, and manage program work over time (Resolution 2021-05). In addition, the Board adopted a "target" schedule as close to the Sound Transit 3 Plan schedules as possible for priority projects, reliant upon reductions in the affordability gap. To reduce the affordability gap, Sound Transit will pursue expanded financial capacity (Motion M2020-37); develop and implement a cost savings plan; identify cost savings for the Sound Transit budget outside of the capital program; identify opportunities to reduce cost and planning delays; and engage project stakeholders in discussions to address the trade-offs between project scope, schedule, and new financial resources to inform Board decision-making on project schedule.

Based on realignment, the West Seattle Link Extension would begin operations in 2032 under both the affordable and the target schedule. The Ballard Link Extension is anticipated to begin operations in 2037 under the target schedule. Under the affordable schedule, the Ballard Link Extension from SODO to Smith Cove Station is anticipated to begin operation in 2037, and from Smith Cove Station to Ballard Station in 2039. The affordable schedule would implement the West Seattle and Ballard Link Extensions Minimum Operable Segment (M.O.S.), as described in Section 2.4.2.1, West Seattle and Ballard Link Extensions Minimum Operable Segment.

2.1 Build Alternatives

This section describes the Build Alternatives and design options for the West Seattle Link Extension and the Ballard Link Extension. When complete, the West Seattle Link Extension and the Ballard Link Extension would operate as separate lines in the light rail system, with transfer points among lines at SODO, International District/Chinatown, and Westlake stations (see Figure 1-2 in Chapter 1, Purpose and Need for West Seattle and Ballard Link Extensions). As the two extensions would operate as separate lines, they are standalone projects with independent utility from each other. This Draft Environmental Impact Statement evaluates both extensions because they have overlapping project areas and have the same environmental review timeline.

The West Seattle Link Extension would start service in 2032, initially providing service between an Alaska Junction Station and a new SODO Station (see Section 2.4.1, SODO Station as Interim Terminus for West Seattle Link Extension). In 2037 the West Seattle Link Extension is planned to connect to the existing downtown tunnel north of the new SODO Station, with service continuing north to the University of Washington, Northgate (2021), Lynnwood (2024), and Everett (2037) (Figure 2-1). The Ballard Link Extension would start service in 2037 and include a new downtown tunnel. It would connect to the existing Central Link light rail line north of the existing SODO Station and continue south to Angle Lake, Federal Way (2024), and Tacoma Dome (2032).

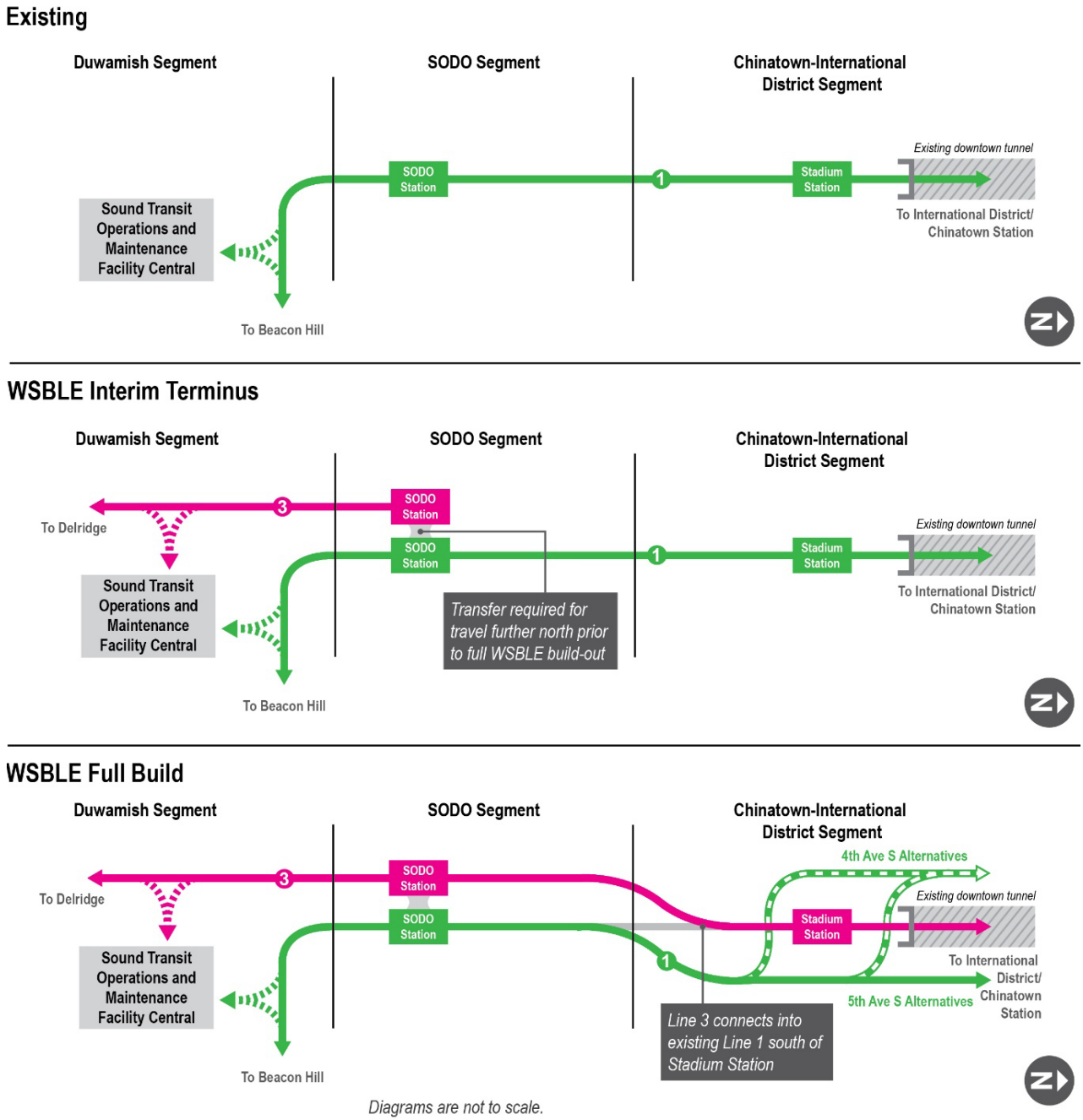
Riders on the West Seattle to Everett Link light rail line would have a direct connection through Downtown Seattle between Everett and West Seattle, but would need to transfer at either the Westlake, International District/Chinatown, or SODO Station to travel south on the Tacoma to Ballard line. Similarly, riders on the Tacoma to Ballard line would have a direct connection through Downtown Seattle between Tacoma Dome and Ballard but would need to transfer at one of those three stations to get to West Seattle or continue to points north of Westlake Station on the West Seattle to Everett line. The Tacoma to Ballard line would not serve the existing Stadium Station, and riders on that line would need to transfer to the West Seattle to Everett line to reach the Stadium Station.

2.1.1 Components of Build Alternatives

This section describes the general components common to the Build Alternatives and design options, and describes the alignments and the stations associated with each alternative and option.

The light rail would operate on a fixed guideway in exclusive right-of-way, outside of traffic, to maintain reliable operations and provide the fast and frequent service needed to serve the WSBLE Project corridor. Trains would arrive as frequently as every 5 minutes and travel at speeds of up to 55 miles per hour (see Table 2-3 in Section 2.3, Operations and Maintenance, for the operating plan). The guideway right-of-way would generally be 30 to 40 feet wide, with two sets of tracks. This includes room for the poles that support the overhead catenary system, the contact wires needed to power the trains. Many sections would be wider approaching stations that have platforms in the center, to allow emergency access and to accommodate walls or barriers to restrict unauthorized access. Emergency access points would also be located at stations. In addition to the space required (described above), above-ground profiles would require a zone about 11 feet wide free of overhanging vegetation on both sides of the guideway tracks. Depending on the profile type and site conditions, the width of this zone might vary. Sound Transit would allow shrubs and groundcover within this zone.

Figure 2-1. Connecting WSBLE to Regional Light Rail



In order to design the project for resilience to increased localized flood risk and sea level rise due to climate change, Sound Transit has updated its 2013 Puget Sound Climate Change Science white paper to reflect the most recent scientific data available for the region. Sound Transit is also assessing how flood risk and sea level rise may effect resilience of proposed designs and design standards for the project alternatives. By assessing climate-related changes and vulnerabilities in the project planning stages, Sound Transit can prepare for them and include adaptation measures to support resilient infrastructure and operations. Examples of potential adaptations include installing sensors to monitor track temperature, including air conditioning or shading around signal boxes, and raising ground level infrastructure in flood prone areas.

2.1.1.1 Profiles

Light rail has four main profile types: elevated, at-grade, retained cut, and tunnel.

2.1.1.1.1 Elevated

Sound Transit uses elevated structures to cross over geographic or physical barriers and in areas of varying topography. An elevated guideway must have a minimum clearance of at least 16.5 feet over roadways and 23.5 feet over railways, but topography and other considerations can result in higher profiles. An elevated guideway can travel within road rights-of-way or in off-street corridors.

Pier supports holding up the guideway are typically about 10 feet by 10 feet square at the ground, although the underground support structure might be wider. Piers can be single guideway columns, side-by-side double guideway columns, or straddle bents.

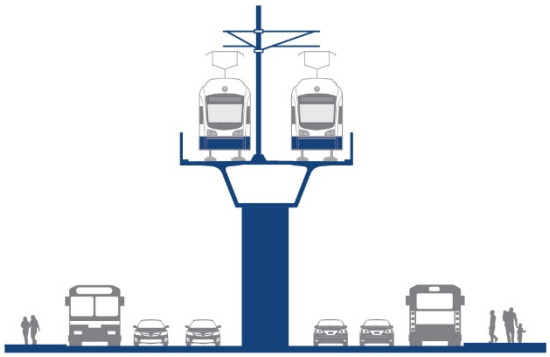
A straddle bent is a structure that spans a roadway or another structure either partially or completely. Where straddle bents span a roadway completely, guideway columns are on each side, so a conventional pier is not required in the middle of a roadway. Guideway columns include the pier, pile cap, and the drilled shaft.

Bridges are a specific type of elevated structure used where slopes are steep (more than 5 to 6 percent) and physical barriers must be crossed. Bridges are typically used to cross large waterways and highways. Bridge height depends on the surrounding topography and the required clearances underneath. A bridge over navigable waterways must have vertical and horizontal clearance sufficient to meet the navigational requirements of the waterway as determined by the United States Coast Guard. The type of bridge and support structure is determined by the required carrying load of the bridge, operational requirements, and environmental conditions such as geotechnical conditions, wind, and water flow. Depending on the type of bridge, piers might be required in the water to support the structure but would be outside navigation channels.

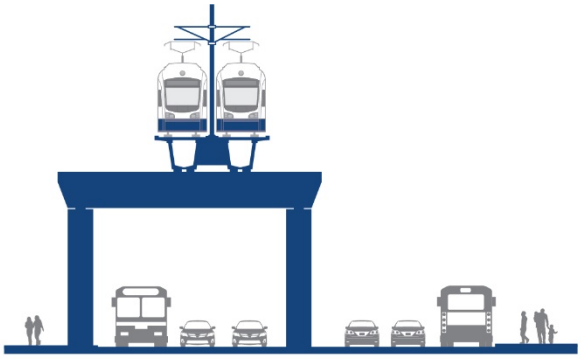
2.1.1.1.2 At-Grade

“At-grade” means that the rail track is at the same grade (ground level) as the surrounding terrain. At-grade light rail operates best in areas with less than 6 percent grade and in areas with adequate space within reserved street rights-of-way or off-street corridors. No new at-grade crossings of roadways are proposed. Transitions between at-grade and elevated profiles are typically compacted fill between retaining walls. An at-grade profile is shown on Figure 2-2.

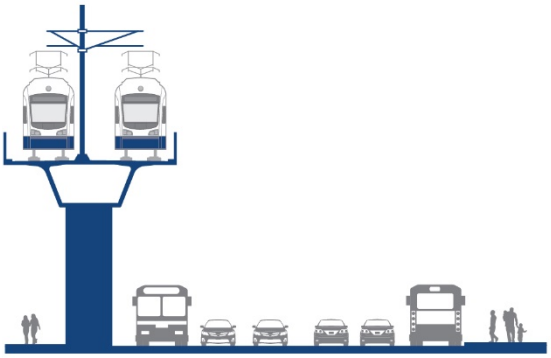
Figure 2-2. Typical Elevated, At-Grade, and Retained-Cut Guideway



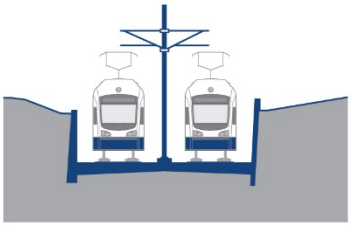
Elevated Guideway (Single Column) in Road Right-of-Way



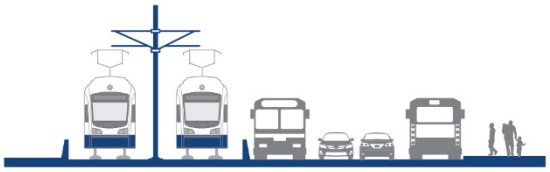
Elevated Guideway (Straddle Bent) over Road Right-of-Way



Elevated Guideway Adjacent to Road Right-of-Way



Retained-Cut Guideway



At-Grade Guideway

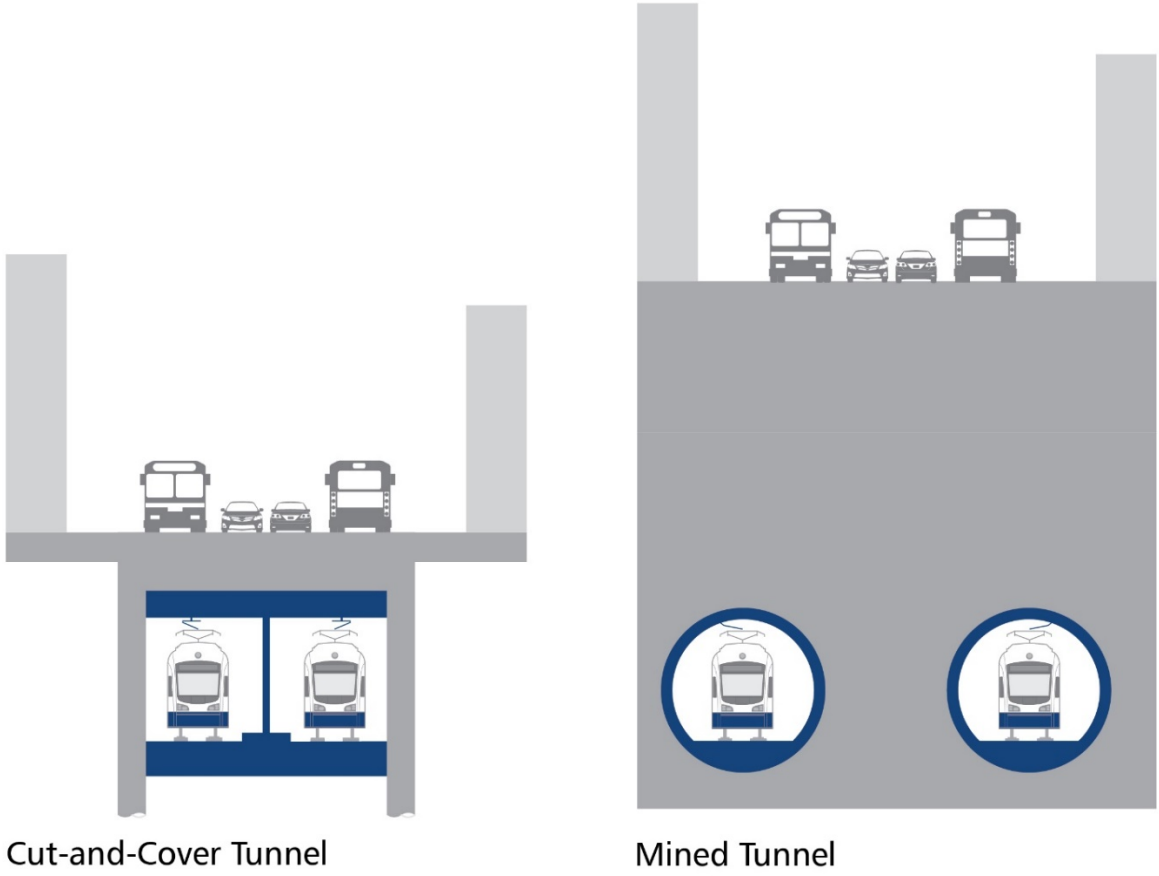
2.1.1.1.3 Retained-Cut

With a retained-cut profile, the trackway is cut into the ground with a retaining wall on one or both sides (Figure 2-2). Portions of the WSBLE guideway would include retained-cut profiles due to topography.

2.1.1.1.4 Tunnel

Sound Transit uses tunnels where slopes are steep (more than 5 to 6 percent), physical barriers must be crossed, right-of-way is inadequate for at-grade or elevated profiles, and/or the density of development is high. The two most common construction methods are cut-and-cover and mined tunnels. Cut-and-cover construction is excavated from the surface, while mined tunnels are constructed with limited surface disturbance beyond entering and exiting the tunnel at portals and entrances for stations. Mined tunnels can be constructed with a tunnel boring machine or sequential excavation mining technique. Tunnels can be constructed as twin tunnels, one large tunnel, or stacked tunnels. Cut-and-cover and mined tunnel cross sections are shown on Figure 2-3.

Figure 2-3. Typical Cut-and-Cover and Mined Tunnel Sections



2.1.1.2 Stations

The project includes 13 new light rail stations. The stations would be elevated, at-grade, in a retained cut, or in a tunnel, depending on the site conditions, guideway profile, and the engineering requirements of the guideway.

Figures 2-4a and 2-4b show the various station types. Some deep tunnel stations may be designed with elevator and stair access only. All stations would meet Americans with Disabilities Act, public access, fire code, and safety requirements. Sound Transit operates its own security force at its facilities. This includes Sound Transit-contracted security personnel and/or contracted law enforcement officers who function as transit police and monitor all stations. Security personnel are stationed at some facilities throughout the day, and some roam and patrol transit facilities and respond to incidents in coordination with local law enforcement. Most station areas would accommodate a traction power substation and/or a signal bungalow (see Section 2.1.1.3, Other Facilities and Structures). They would also include ticket vending machines, closed-circuit television cameras, a public address system, emergency phones, and variable-message signage.

Boarding Platforms

Boarding platforms would be about 380 feet long and would serve four-car trains. At stations with center platforms, the platform would be between the two tracks. While most project alternatives assume center platform stations, side platforms could be used in some locations based on final design. At side platform stations, the two tracks would have station platforms on either side. Some tunnel stations could have stacked platforms, with one platform and one track above the other. Escalators, elevators, and stairs would provide access to the elevated, retained-cut, or tunnel platforms.

Link riders could access stations by bus transit and in some areas other rail transit, automobile drop-off/pick-up, bicycle, and walking. Sound Transit and King County Metro Transit (Metro) routes would provide service as described in the Transportation Technical Report in Appendix N.1. All stations would have paratransit stops and accessible stops for riders with disabilities. Each station would include bus stops on adjacent streets for riders to transfer to or from buses. Depending on the projected level of future bus service, some stations would have bus layover on adjacent streets or dedicated facilities for bus layover within the station area. Paratransit and bus facilities at stations were developed in coordination with Metro and will continue to evolve during the station planning process. Sound Transit could make, or partner with other local agencies on, road improvements (such as sidewalks, bike lanes, or widening) or road realignments at some stations.

Figure 2-4a. Typical Stations – Elevated, At-Grade, Retained Cut

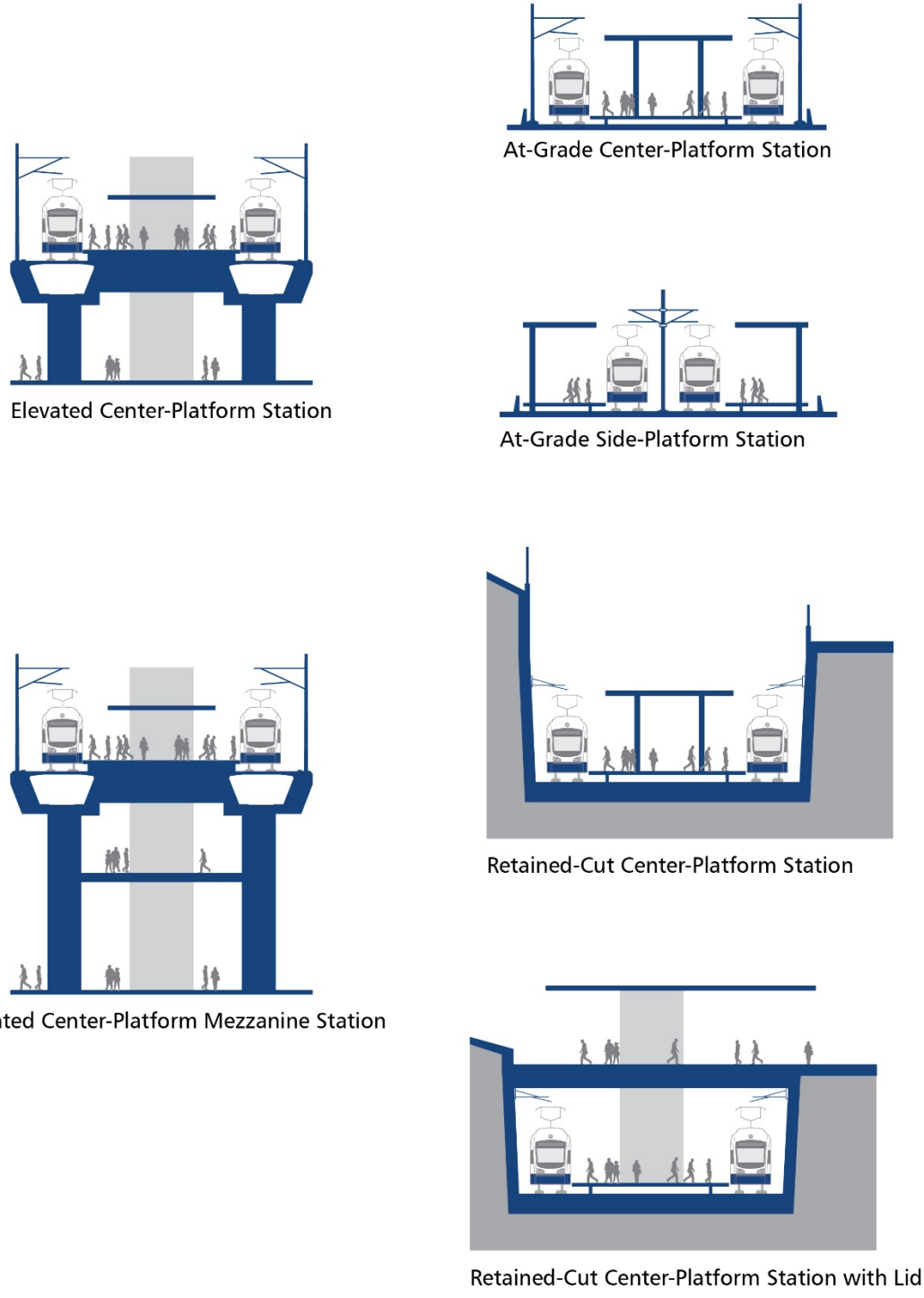
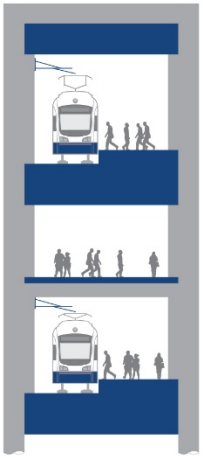
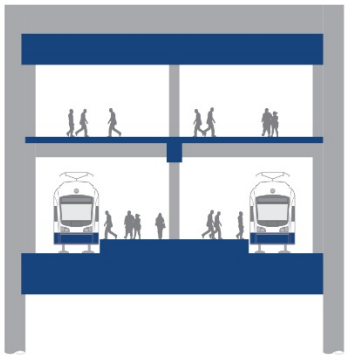


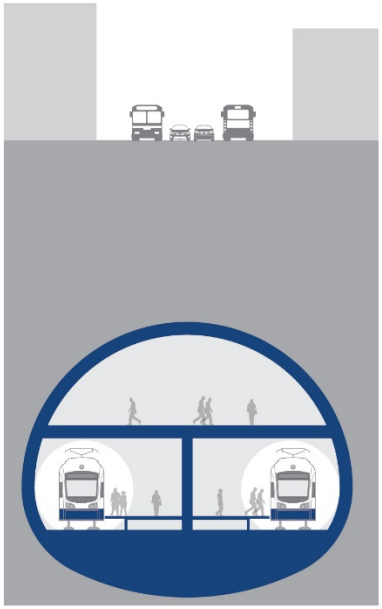
Figure 2-4b. Typical Stations – Tunnel



Tunnel Stacked-Platform Station



Cut-and-Cover Tunnel Center-Platform Station



Mined Tunnel Center-Platform Station

Private vehicle parking for riders would not be provided by Sound Transit at any WSBLE stations. Each station, with the exception of Midtown Station in the Downtown Segment, would have a dedicated bicycle storage area. Sound Transit determined that due to the constrained environment around Midtown Station, there is insufficient space available to meet the City of Seattle's code requirements for bicycle storage without substantial additional property acquisitions or changes in surface land use or siting the storage facility in an inconvenient location. Sound Transit will investigate possible incorporation of bicycle storage space within a building in close proximity to one of the Midtown Station entrances.

Where appropriate, Sound Transit would facilitate transit-oriented development (TOD) with local jurisdictions and potential development partners in accordance with Sound Transit's Equitable Transit Oriented Development Policy (Resolution R2018-10). TOD is discussed further in Sections 4.2.2.5 and 4.3.2.5 (Indirect Impacts).

Equitable Transit-Oriented Development

Sound Transit's Equitable Transit Oriented Development Policy (Resolution R2018-10) directs Sound Transit to consider TOD potential in the planning, design, and delivery of its transit projects, including identifying agency and community TOD opportunities and strategies as well as opportunities for partnerships with public and private interests. TOD in station areas could include joint development of station facilities with residential and/or commercial structures by others, or redevelopment of property surplus to the project's need when construction is complete.

2.1.1.3 Other Facilities and Structures

The project would require other facilities and structures described in this section and shown in conceptual design drawings included in Appendix J, Conceptual Design Drawings. Specific locations of these facilities and structures could be modified during final design based on project needs.

2.1.1.3.1 Overhead Catenary System

The overhead catenary system delivers the electricity that powers the light rail vehicles. It supplies two wires for each track, supported on 15- to 23-foot-high steel poles about 150 to 200 feet apart (Figure 2-5). Poles may be as close as 50 feet apart where the guideway curves. The poles are typically between the two tracks.

Figure 2-5. Typical Overhead Catenary System

2.1.1.3.2 Traction Power Substation

Traction power substations boost the power to the overhead catenary system. The traction power substations are metal buildings about 20 feet wide by 60 feet long, with an additional 10 to 20 feet of clearance required around each unit, screened by a wall or fence (Figure 2-6). Traction power substations would typically be at light rail stations, but they are also needed along the guideway approximately every 1 to 1.25 miles. They would likely be placed in the footprint of the station or beneath the guideway; however, some traction power substations may be outside but a short distance from these areas.

Figure 2-6. Typical Traction Power Substation

2.1.1.3.3 Signal Bungalows

Signal bungalows contain signal system equipment and provide power to track switch machines and track circuits for train speed control and separation.

They can be a separate prefabricated structure or a room integrated within a station building. Standalone signal bungalows are about 32 feet long by 10 feet wide and include parking and security fencing (Figure 2-7).

Figure 2-7. Signal Bungalow

2.1.1.3.4 Special Trackwork

Special trackwork, including crossovers, pocket tracks, and tail tracks, is used along alignments to serve special purposes as described below.

Crossover tracks connect two parallel tracks and allow trains to change from one track to the other (Figure 2-8). WSBLE would include crossovers in various locations to allow for maintenance that requires removing one track from service, to bypass a stalled train, to reverse direction, or to operate in the event of emergencies or blockages. Crossover tracks require special signaling control equipment under or adjacent to the guideway.

Figure 2-8. Crossover Tracks

Pocket tracks are tracks between two parallel tracks that allow trains to move off the mainline (Figure 2-9). WSBLE would include pocket tracks in various locations to allow trains to reverse direction, to allow disabled trains to pull off the mainline, to allow trains to be stored until placed in service, and to allow for the staging of track equipment during maintenance and repair activities if needed.

Figure 2-9. Pocket Tracks

Tail tracks extend past a terminus station for the temporary layover of one four-car train—typically 500 feet beyond the end of the station platform. The tail tracks may be longer if they include crossover tracks, which are required to allow trains to switch tracks at the terminus station. Crossover tracks may be either before or after the station platform. Tail tracks would be included at all WSBLE terminus stations, including interim ones.

2.1.1.3.5 Hi-Rail Access and Maintenance Roads

Hi-rail vehicles used for track inspection and maintenance (Figure 2-10) can operate on both rail tracks and conventional roads. Hi-rail vehicle access would be provided in various locations along the project corridor, generally where the guideway would be close to or at-grade to enable a connection from a maintenance access road onto the rail tracks. However, there are some instances where the length of elevated track would require a hi-rail access to the elevated guideway. In these cases, a hi-rail access road would start at-grade and transition to an elevated profile (on retained fill or guideway columns) to reach the height of the guideway. General maintenance roads (not specific to hi-rail access) would also be provided to allow for maintenance of other elements of the project (such as bridge structures and retaining walls). The maintenance roads would be accessed from public street right-of-way.

Figure 2-10. Hi-Rail Vehicle

2.1.1.3.6 Tunnel Vents

Ventilation structures provide ventilation and climate control for alternatives and design options that are in a tunnel or are lidded. They include a set of ventilation shafts, typically at or close to stations. The surface building enclosing the shaft would include an exhaust and intake in the roof, a fan room, and space for electrical and communications equipment. These may be integrated with the structures for station access from the surface. Ventilation would also be provided at the tunnel portals by large fans housed in a building. Ventilation fans are typically designed for use during tunnel or underground station emergencies and are occasionally tested for operations and maintenance purposes.

2.1.1.3.7 Stormwater Facilities

Stormwater facilities for the project would include flow-control and water quality treatment facilities as necessary. Stormwater vaults would be provided in areas of roadway improvements,

near the guideway, and at stations for runoff flow control. The flow-control vaults would control the volume, rate, frequency, and flow duration of stormwater runoff. Stormwater vaults consist of concrete boxes sited below ground level, with access covers or grates at the surface. Water quality treatment would be provided when roadway and/or station runoff discharges into a storm drain. If these areas discharge to a combined sewer system, water quality treatment is not required as the runoff collected in these systems is directed to a wastewater treatment plant. Light rail guideway is considered a non-pollution-generating surface, so water quality treatment would not be provided for runoff from these surfaces.

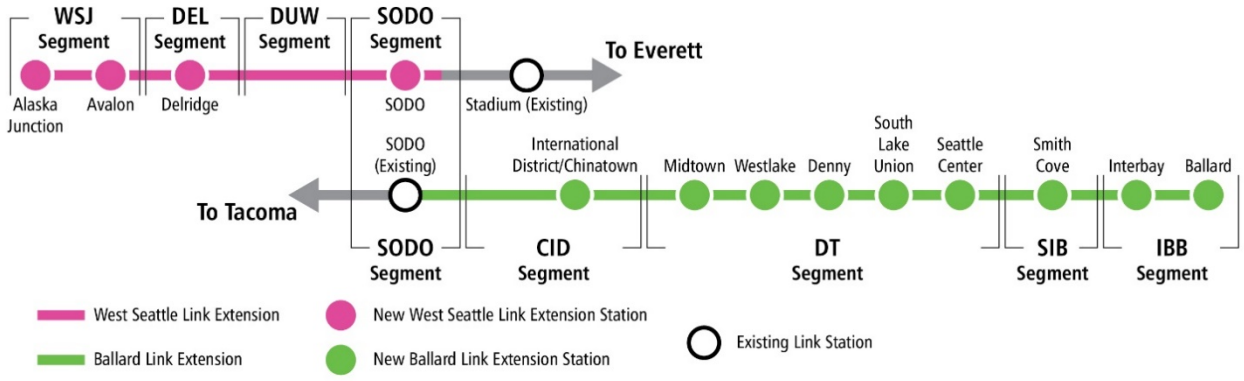
Numbering WSBLE Project Alternatives and Design Options

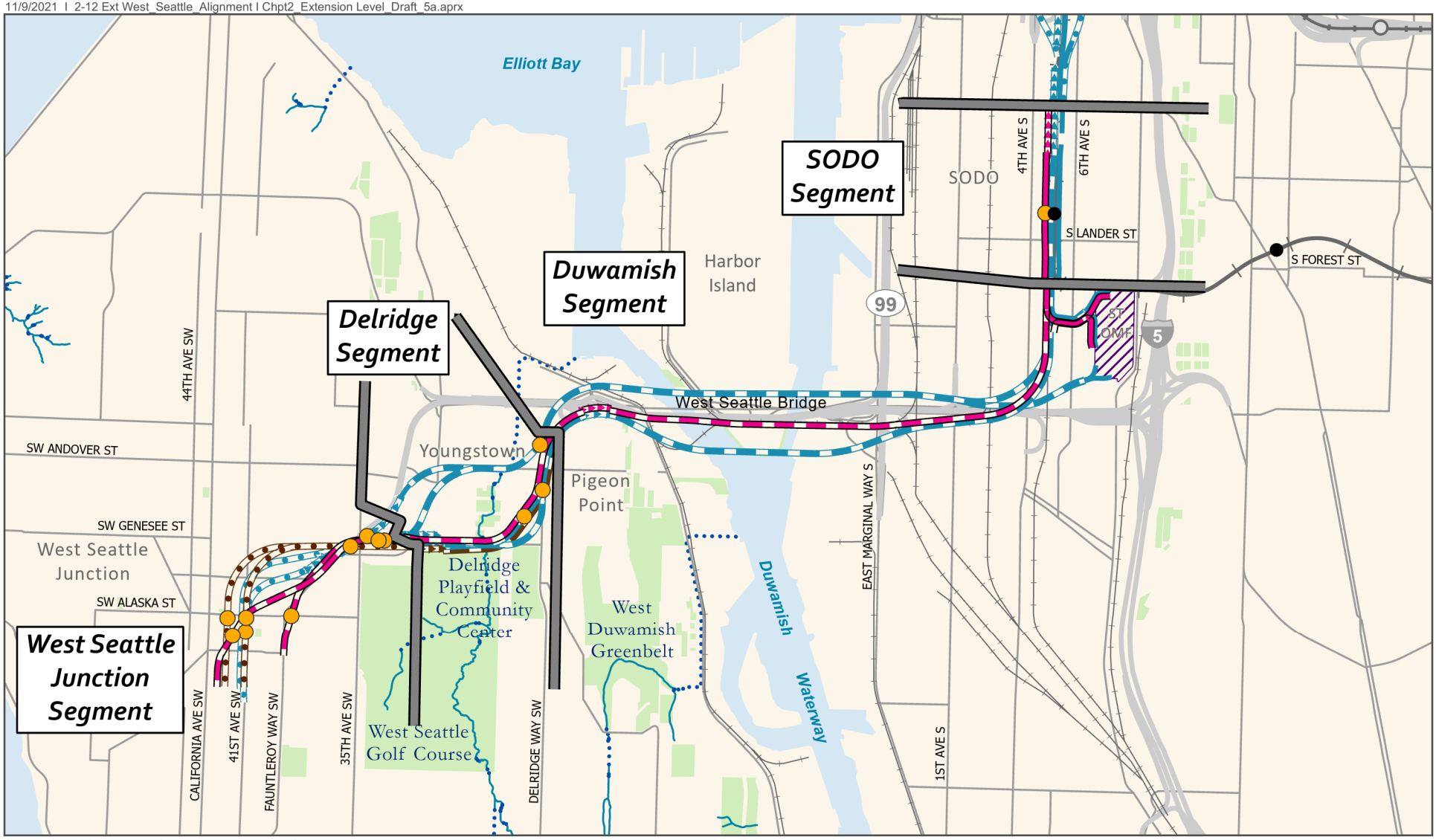
WSBLE Project alternatives are designated by segment. The West Seattle Link Extension has four segments and corresponding abbreviations: SODO (SODO), Duwamish (DUW), Delridge (DEL), and West Seattle Junction (WSJ). The Ballard Link Extension has five segments and abbreviations: SODO (SODO), Chinatown-International District (CID), Downtown (DT), South Interbay (SIB), and Interbay/Ballard (IBB). A portion of the SODO Segment occurs in both extensions. Each alternative is designated by segment, name, and number, which describe the location and nature of the alternative. Some alternatives have design options and use the letter "a" to identify the alternative and the letter "b" to identify the design option. For example, the At-Grade Alternative (SODO-1a) is the alternative, and the At-Grade South Station Option (SODO-1b) is the design option for that alternative. The project includes design options for alignments and stations. An alignment option refers to a different profile or location of a portion of the alternative. Station options include alternative locations for stations, but the options for a station generally would have the same station characteristics and serve the same population. This chapter distinguishes between alternatives and design options but other chapters of the Draft Environmental Impact Statement use the general term "alternatives" which includes alternatives and design options unless referring to a specific alternative or option.

2.1.2 Build Alternatives and Design Options

This section describes the Build Alternatives and design options for the WSBLE Project. The WSBLE Project consists of two extensions: the West Seattle Link Extension and the Ballard Link Extension. The alternatives and options for the West Seattle Link Extension and the Ballard Link Extension are described in separate sections. Each extension is broken into smaller geographic areas called segments. The West Seattle Link Extension has four segments (SODO, Duwamish, Delridge, and West Seattle Junction) (Figures 2-11 and 2-12). The Ballard Link Extension has five segments (SODO, Chinatown-International District, Downtown, South Interbay, and Interbay/Ballard) (Figures 2-11 and 2-13). Both Link extensions include the SODO Segment, as described in this section and in Section 2.3, Operations and Maintenance.

Figure 2-11. West Seattle and Ballard Link Extensions Segments and Stations





Source: City of Seattle, King County (2019, 2020, 2021).

Alternatives
- Preferred Alternative
- Preferred Alternative with Third-party Funding
- Other Alternatives

Alternative Profile
- Elevated
- Tunnel
- At-Grade
- Retained Cut

Station
- New
- Existing

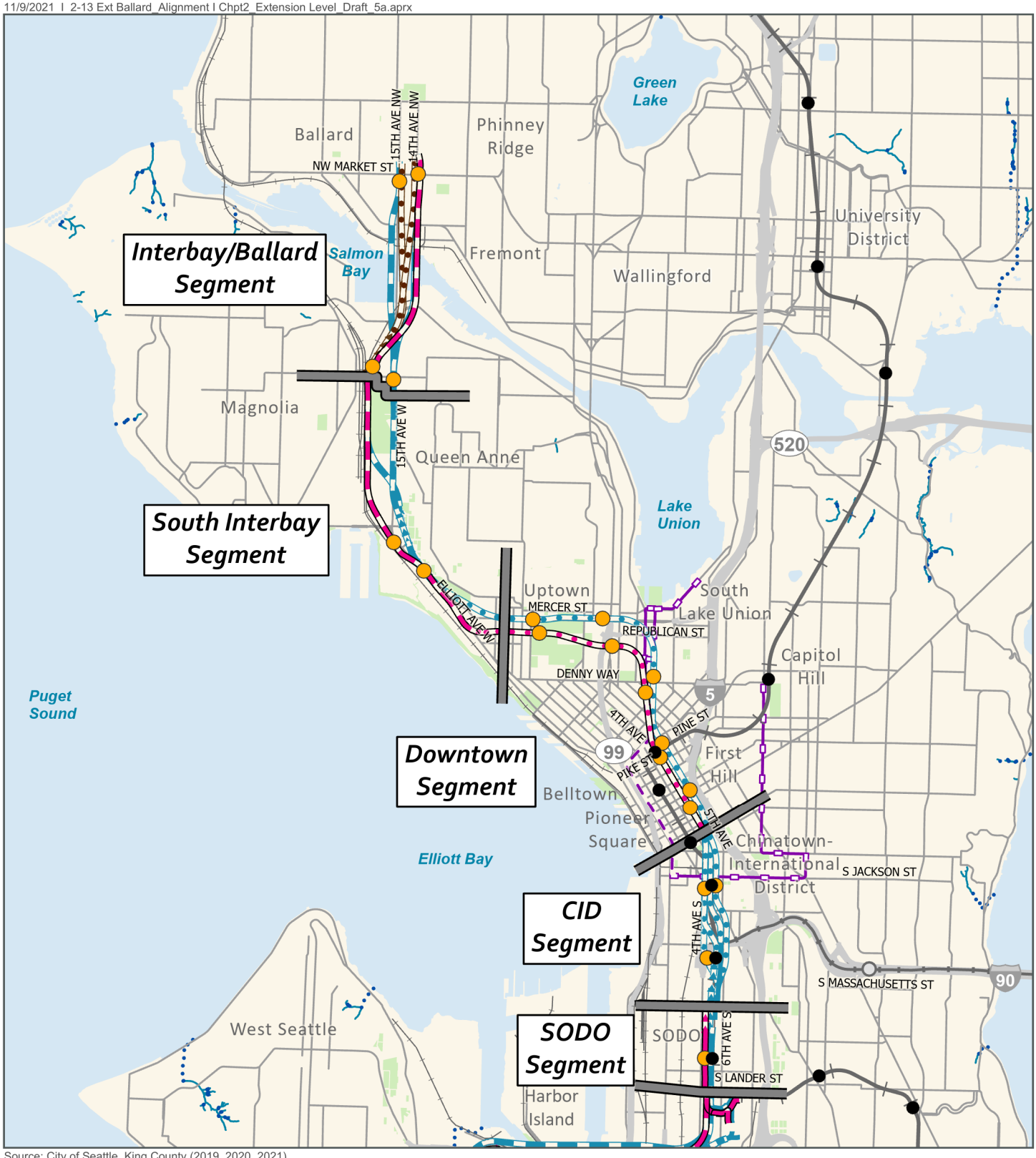
- Segment Line
- Sound Transit Operations and Maintenance Facility (ST OMF)
- Existing Link Light Rail
- East Link Light Rail (Under Construction)
- Railroad
- Stream
- Piped Stream
- Park

0 0.5 1 Mile

N

FIGURE 2-12
Alternatives
West Seattle Link Extension

West Seattle and Ballard Link Extensions



Source: City of Seattle, King County (2019, 2020, 2021).

Alternatives
- Preferred Alternative
- Preferred Alternative with Third-party Funding
- Other Alternatives

Alternative Profile
- Elevated
- Tunnel
- At-Grade
- Retained Cut

Station
- New
- Existing

- Segment Line
- Existing Link Light Rail
- East Link Light Rail (Under Construction)
- Existing Streetcar
- Center City Connector Streetcar (Construction Paused)
- Railroad
- Stream
- Piped Stream
- Park

FIGURE 2-13
Alternatives
Ballard Link Extension

West Seattle and Ballard Link Extensions

0 0.5 1 Mile

N

Both Link extensions are shown graphically on Figure 2-11. There are three categories of Build Alternatives and design options: preferred alternatives, preferred alternatives that could require third-party funding, and other alternatives. The Build Alternatives and options are shown in the conceptual design drawings included in Appendix J; however, it is important to note that alternatives and options could be modified during final design based on project needs.

The SODO Segment has improvements in both the West Seattle and Ballard Link extensions. The two Link extensions would result in the following distinct improvements in the SODO Segment.

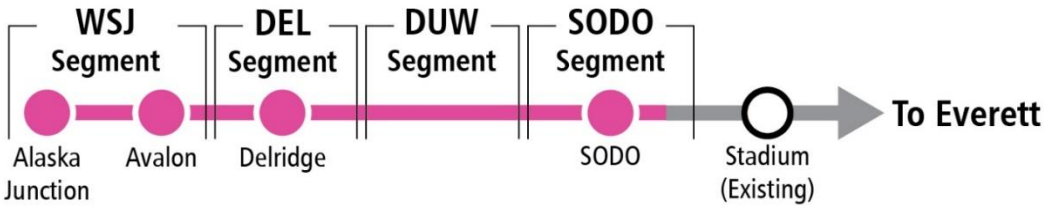
- West Seattle Link Extension:
  - A new SODO Station for all alternatives and option.
  - Relocation of the existing SODO Station with one alternative and option.
  - New roadway overpass at South Lander Street with one alternative and option.
  - Tail tracks north of the new SODO Station would be constructed for all of the alternatives and option for the interim condition before completion of the Ballard Link Extension. In the interim condition, to travel north or south of SODO on light rail, riders would need to disembark at the SODO Station and transfer to the existing Link line.
- Ballard Link Extension:
  - Tail tracks north of the new SODO Station (that are part of the West Seattle Link Extension) would be connected to the existing Downtown Seattle Transit Tunnel as part of construction of the Ballard Link Extension. This would allow the West Seattle Link Extension line to continue north on the existing Central Link line to Lynnwood and Everett Station.
  - A new roadway overpass at South Holgate Street is included for all alternatives and options.
  - Track improvements north of the SODO Station on the existing light rail line would connect this station to the Ballard Link Extension alternatives and options in the Chinatown-International District in a new downtown transit tunnel.

These improvements are discussed in detail in Section 2.1.2.1, West Seattle Link Extension, and in Section 2.1.2.2, Ballard Link Extension.

2.1.2.1 West Seattle Link Extension

The West Seattle Link Extension (Figure 2-14) would temporarily terminate at a new SODO Station and would include tail tracks north of SODO Station (south of South Holgate Street). In 2037, the Ballard Link Extension would permanently connect the West Seattle Link Extension tail tracks to the existing Central Link light rail line, allowing it to continue north to Everett, which would open in 2037 (2037 to southwest Everett and 2041 to Everett full build under the realignment affordable schedule). The West Seattle Link Extension would begin south of South Holgate Street and north of a new SODO Station that would allow for transfers with the existing SODO Station on the existing light rail line.

Figure 2-14. West Seattle Link Extension Segments and Stations



The West Seattle Link Extension would travel south from the SODO Station across South Lander Street either at-grade or on an elevated guideway and would travel south from south of South Lander Street toward South Spokane Street on an elevated guideway. In the vicinity of South Spokane Street, it would turn west on an elevated guideway either on the north or south side of the West Seattle Bridge, where it would cross the Duwamish Waterway (also known as the Duwamish River) on a light-rail-only, high-level fixed bridge structure. On the west side of the Duwamish Waterway, the guideway would remain mostly elevated to the west side of the Delridge valley. In the West Seattle Junction area, the guideway could be elevated or below ground. A tunnel in West Seattle was not included in the Sound Transit 3 Plan (Sound Transit 2016) and, therefore, third-party funding could be required for alternatives and design options that include tunnels. Three stations would be constructed in West Seattle: Delridge, Avalon, and Alaska Junction. The Delridge Station would be elevated, and the Avalon and Alaska Junction stations could be elevated or below ground.

The West Seattle Link Extension project corridor is shown on Figure 1-1 in Chapter 1, Purpose and Need for West Seattle and Ballard Link Extensions. The following sections describe the preferred alternatives, preferred alternatives with third-party funding, and the other alternatives for the extension by segment. The West Seattle Link Extension has a total of 15 alternatives (several of which have design options), 5 of the alternatives are preferred and 2 of the alternatives and one of the design options are preferred with third-party funding. Table 2-1 summarizes the alternatives and design options and the connections between the alternatives and options in each segment. Not all alternatives and options can connect to every alternative and option in adjacent segments due to variations in alignment and profile. In Table 2-1 and the figures in this section that show the alternatives and design options, the pink color is for preferred alternatives, the brown color for preferred alternatives with third-party funding, and the blue color for other alternatives. The Build Alternatives and options are shown in the conceptual design drawings included in Appendix J.

Table 2-1. Summary of West Seattle Link Extension Alternatives and Design Options Evaluated in the Draft Environmental Impact Statement

Segment	Alternative or Design Option	Abbreviation	Stations (and Station Profile)	Connections
SODO	**Preferred At-Grade**	**SODO-1a**	**SODO (At-Grade) or Staggered Station Configuration (At-Grade)**	**All DUW Segment alternatives.**
	At-Grade South Station Option	SODO-1b	SODO (At-Grade)	All DUW Segment alternatives.
	Mixed Profile	SODO-2	SODO (Elevated)	All DUW Segment alternatives.

Segment	Alternative or Design Option	Abbreviation	Stations (and Station Profile)	Connections
Duwamish (DUW)	**Preferred South Crossing**	**DUW-1a**	**None**	**All SODO Segment alternatives. All DEL Segment alternatives.**
	South Crossing South Edge Crossing Alignment Option	DUW-1b	None	All SODO Segment alternatives. All DEL Segment alternatives.
	North Crossing	DUW-2	None	All SODO Segment alternatives. All DEL Segment alternatives.
Delridge (DEL)	**Preferred Dakota Street Station**	**DEL-1a**	**Delridge (Elevated)**	**All DUW Segment alternatives. Connects to WSJ-1, WSJ-2, and WSJ-4*.**
	Dakota Street Station North Alignment Option	DEL-1b	Delridge (Elevated)	All DUW Segment alternatives. Connects to WSJ-1, WSJ-2, and WSJ-4*.
	Preferred Dakota Street Station Lower Height*	**DEL-2a***	**Delridge (Elevated)**	**All DUW Segment alternatives. Connects to WSJ-3a* and WSJ-3b*.**
	Dakota Street Station Lower Height North Alignment Option*	DEL-2b*	Delridge (Elevated)	All DUW Segment alternatives. Connects to WSJ-3a* and WSJ-3b*.
	Delridge Way Station	DEL-3	Delridge (Elevated)	All DUW Segment alternatives. Connects to WSJ-1, WSJ-2, and WSJ-4*.
	Delridge Way Station Lower Height*	DEL-4*	Delridge (Elevated)	All DUW Segment alternatives. Connects to WSJ-3a* and WSJ-3b*.
	Andover Street Station	DEL-5	Delridge (Elevated)	All DUW Segment alternatives. Connects to WSJ-1, WSJ-2, and WSJ-4*.
	Andover Street Station Lower Height*	DEL-6*	Delridge (Elevated)	All DUW Segment alternatives. Connects to WSJ-5*.
West Seattle Junction (WSJ)	**Preferred Elevated 41st/42nd Avenue Station**	**WSJ-1**	**Avalon (Elevated), West Seattle Junction (Elevated)**	**Connects to DEL-1a, DEL-1b, DEL-3, and DEL-5.**
	Preferred Elevated Fauntleroy Way Station	**WSJ-2**	**Avalon (Elevated), West Seattle Junction (Elevated)**	**Connects to DEL-1a, DEL-1b, DEL-3, and DEL-5.**
	Preferred Tunnel 41st Avenue Station*	**WSJ-3a***	**Avalon (Tunnel), West Seattle Junction (Tunnel)**	**Connects to DEL-2a*, DEL-2b*, and DEL-4*.**
	Preferred Tunnel 42nd Avenue Station Option*	**WSJ-3b***	**Avalon (Tunnel), West Seattle Junction (Tunnel)**	**Connects to DEL-2a*, DEL-2b*, and DEL-4*.**
	Short Tunnel 41st Avenue Station*	WSJ-4*	Avalon (Elevated), West Seattle Junction (Tunnel)	Connects to DEL-1a, DEL-1b, DEL-3, and DEL-5.
	Medium Tunnel 41st Avenue Station*	WSJ-5*	Avalon (Retained Cut), West Seattle Junction (Tunnel)	Connects to DEL-6*.

* As described in the introduction to Chapter 2, Alternatives Considered, at the time the Sound Transit Board identified alternatives for study in the Draft Environmental Impact Statement some alternatives were anticipated to

2.1.2.1.1 SODO Segment

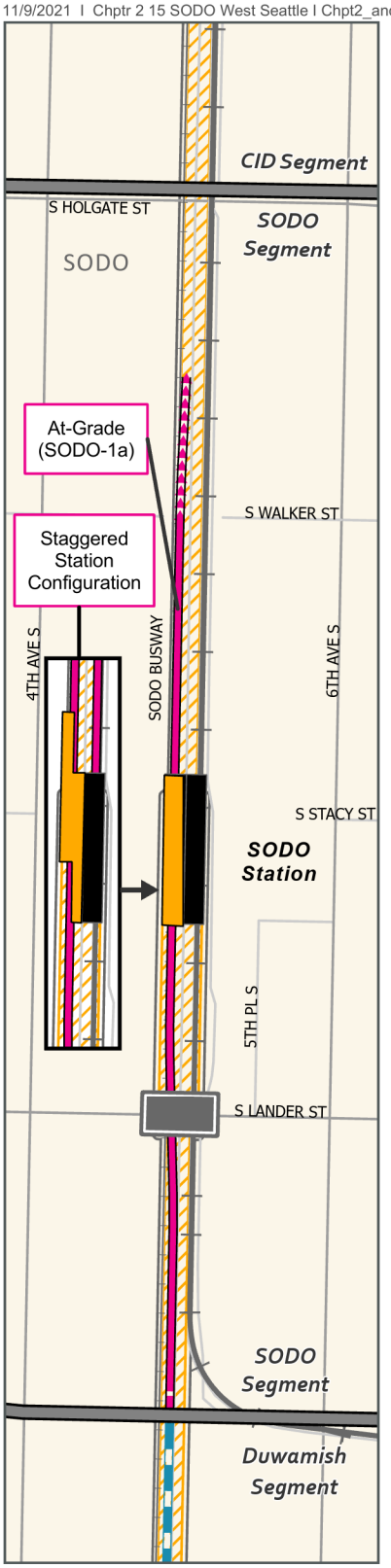
The SODO Segment includes the area between approximately South Holgate Street and South Forest Street in the SODO neighborhood. The SODO Station is the only station in this segment. There is an existing SODO light rail station, and a new SODO station is proposed as part of the West Seattle Link Extension. The new SODO Station on the West Seattle Link Extension would provide a transfer point to/from the Ballard to Tacoma light rail line via the existing SODO Station, and the two stations would therefore function as one SODO Station. One alternative and one design option include the relocation of the existing SODO Station as explained under the descriptions below. The SODO Segment alternatives and design option are shown on Figure 2-15.

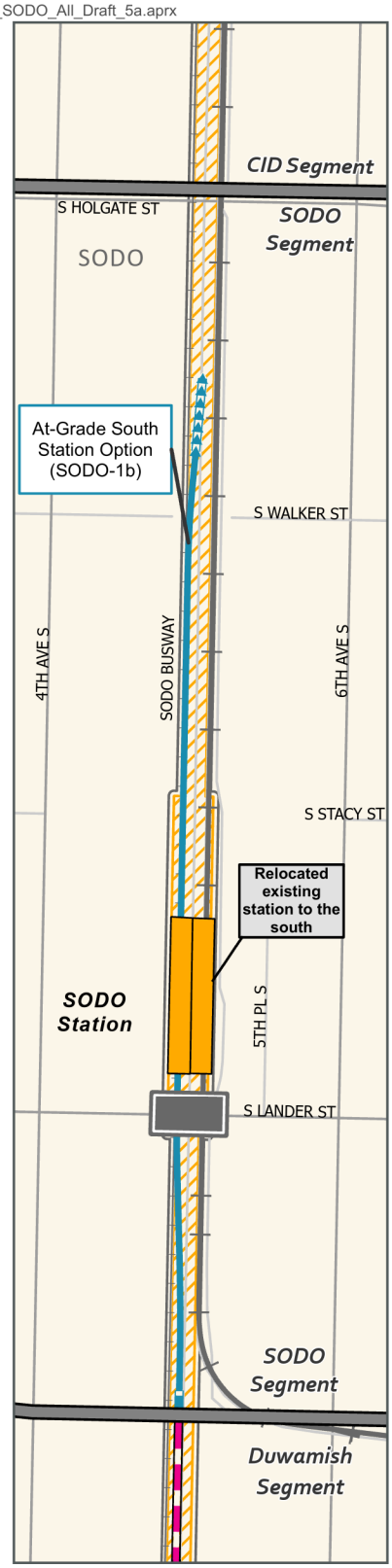
Preferred Alternative

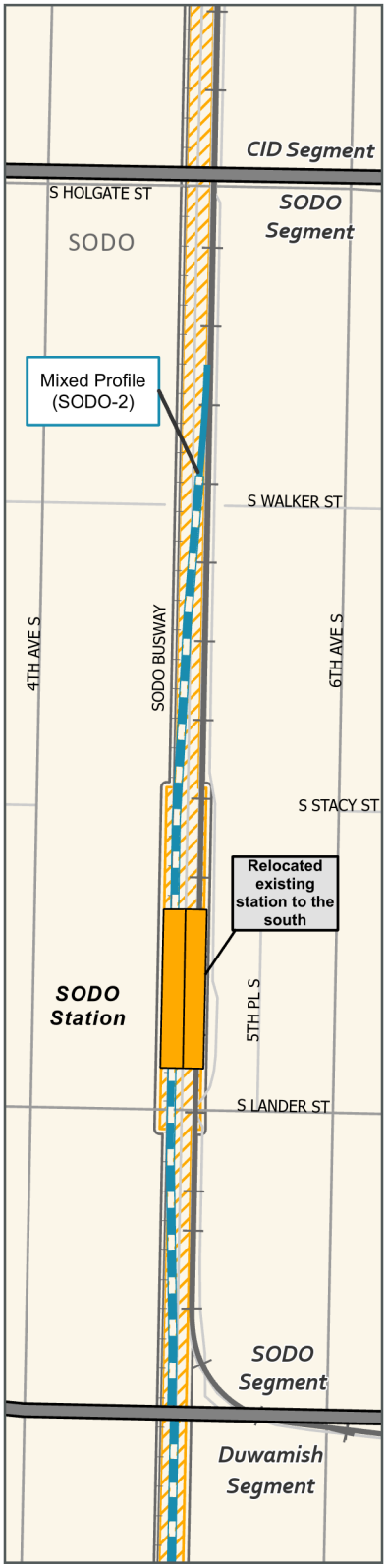
At-Grade Alternative (SODO-1a)

Heading south, Alternative SODO-1a would begin north of the existing SODO Station and travel at-grade west of and parallel to the existing Link light rail line in the SODO Busway. The height of the guideway would range between a retained cut and approximately 20 feet high and would mostly be at-grade. The plan and profile for this alternative is shown on Figure 2-16.

The new SODO Station on the West Seattle Link Extension would be at-grade, immediately west of the existing SODO Station, north of South Lander Street. The top of the station structure would be approximately 40 feet high. Station platforms would be side platforms, one of which would be shared between the northbound West Seattle Link Extension and the southbound Ballard Link Extension, which would continue south along the existing Link line. Preferred Alternative SODO-1a also has a staggered station configuration that was developed in order to avoid property owned by the United States Postal Service at 4th Avenue South and South Lander Street. This property is the location of the Carrier Annex and Distribution Center/Terminal Post Office (Carrier Annex/Terminal Post Office). The staggered station configuration features a narrowed center platform and staggered side platforms, with the southbound platform shifted slightly north (see inset in Figure 2-15) so that it is not on the Carrier Annex/Terminal Post Office property. The existing driveway at the Carrier Annex/Terminal Post Office facility's southern access point would be connected under the new South Lander Street overpass to 4th Avenue South, which then maintains access to South Lander Street.







Source: City of Seattle, King County (2019, 2020, 2021).

Alternatives
- Preferred Alternative
- Preferred Alternative with Third-party Funding
- Other Alternatives

Alternative Profile
- Elevated
- Tunnel
- At-Grade
- Retained Cut

Station
- New
- Existing

- Segment Line
- Existing Link Light Rail
- Railroad
- SODO Busway
- Proposed Overpass

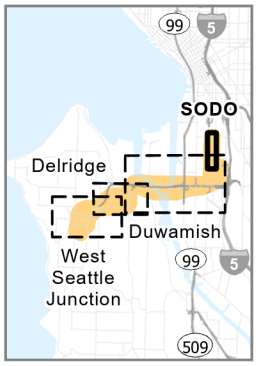


FIGURE 2-15
SODO Segment Alternatives
West Seattle Link Extension - SODO Segment

West Seattle and Ballard Link Extensions

0 300 600 Feet

N

Figure 2-16. Plan and Profile for At-Grade Alternative (SODO-1a)

Diagrams are not to scale and all measurements are approximate for illustration purposes only.

The existing at-grade pedestrian crossing of the light rail tracks at SODO Station would be closed, and a new pedestrian grade-separated crossing of both existing and new tracks would be used to access both stations. South Stacy Street would be extended from 4th Avenue South to a cul-de-sac on the west side of the station. A new bus turnaround would be created from 6th Avenue South, east of the station. The SODO Trail would be relocated east of the station area, adjacent to the existing light rail line.

This alternative would continue south at-grade under South Lander Street, which would be reconstructed as an overpass of the light rail tracks. The overpass would remove the need for traffic to stop for light rail trains, the frequency of which would increase with the combination of both the existing and new light rail lines. The light rail would transition to an elevated guideway within the SODO Busway south of South Lander Street. Buses would be displaced from the SODO Busway.

For a description of the operation of SODO Station and the two SODO light rail lines in SODO, see the discussion in Section 2.3, Operations and Maintenance.

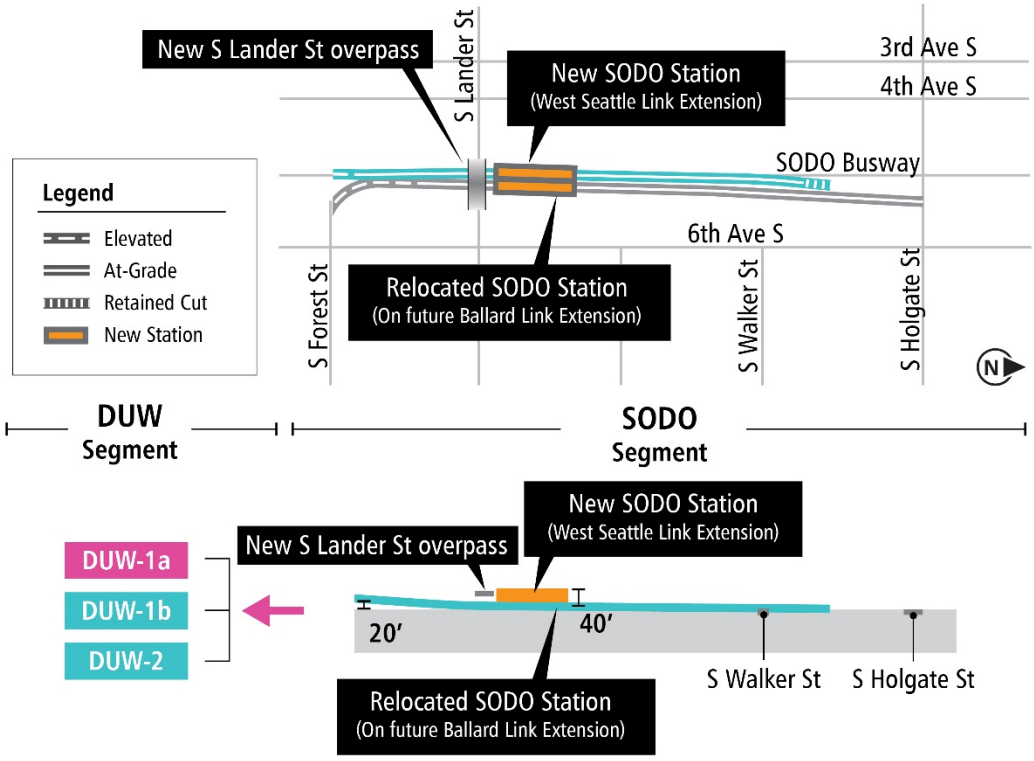
Other Build Alternatives and Design Options

At-Grade South Station Option (SODO-1b)

Option SODO-1b would be the same as Alternative SODO-1a except for the SODO Station location. The plan and profile for this option is shown on Figure 2-17. A new at-grade station on the West Seattle Link Extension would be west of and approximately 200 feet south of the existing SODO Station, just north of South Lander Street. The top of the station structure would be approximately 40 feet high. The existing SODO Station would be relocated 200 feet south of

its current location to be next to the new SODO Station. Pedestrian access would be from a new South Lander Street overcrossing. Station platforms would be side platforms, one of which would be shared between the northbound West Seattle Link Extension and the southbound Ballard Link Extension. A new bus turnaround would be created off 4th Avenue South, west of the station. For a description of the operation of SODO Station and the two SODO light rail lines in SODO, see the discussion in Section 2.3. As with Preferred Alternative SODO-1a, buses would be displaced from the SODO busway.

Figure 2-17. Plan and Profile for At-Grade South Station Option (SODO-1b)



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

Mixed Profile Alternative (SODO-2)

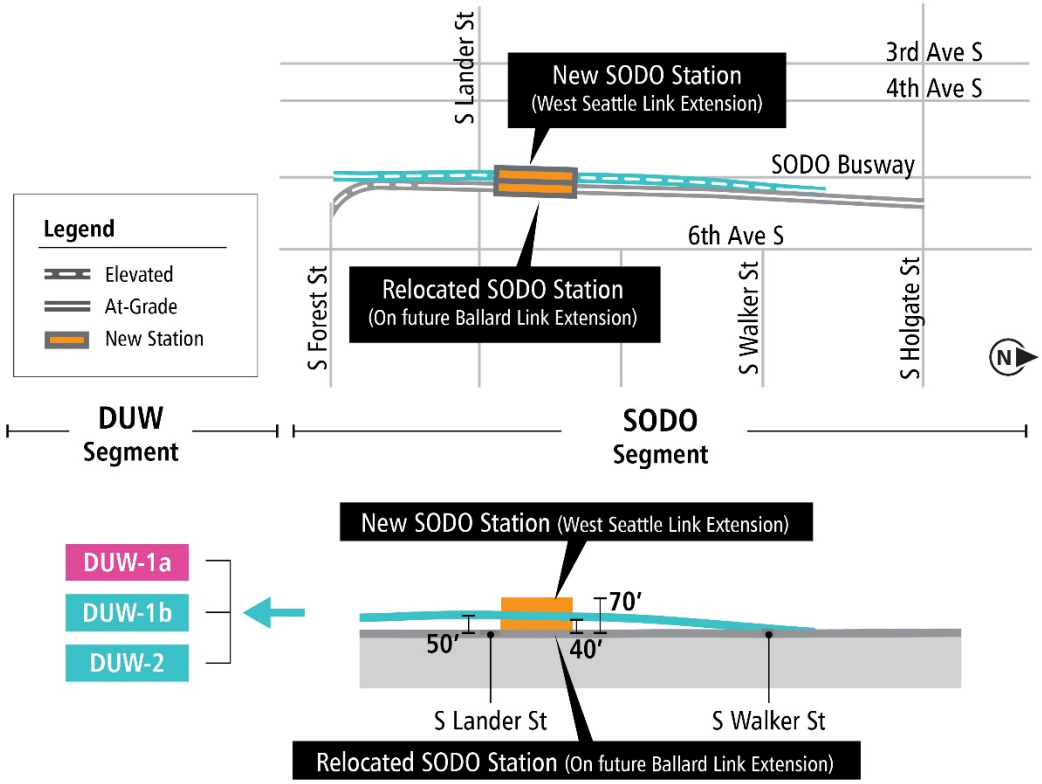
Alternative SODO-2 for the West Seattle Link Extension would range between ground level and approximately 50 feet high. It would begin at-grade north of the existing SODO Station, west of and parallel to the existing Link light rail line in the existing SODO Busway. At South Walker Street, the alignment would transition to an elevated profile and would continue south over South Lander Street. The plan and profile for this alternative is shown on Figure 2-18. The SODO Busway would be relocated to the west of the new rail line and new station and would be operational for buses after construction.

A new SODO Station on the West Seattle Link Extension would be in an elevated profile north of South Lander Street. The top of the station structure would be approximately 70 feet high. Because this alternative would be elevated over South Lander Street, the street would remain as it is today, with a gated at-grade crossing of the existing light rail line. The existing SODO Station would be relocated as described for Option SODO-1b) and would be at-grade adjacent to the new elevated station. Pedestrian access would be on the north side of South Lander Street and from 4th Avenue South and 6th Avenue South. A new pedestrian grade-separated

crossing of both existing and new tracks would be used to access both the new and relocated station. The SODO Trail would be relocated east of the station area, adjacent to the existing light rail line.

For a description of the operation of SODO Station and the two SODO light rail lines in SODO, see the discussion in Section 2.3.

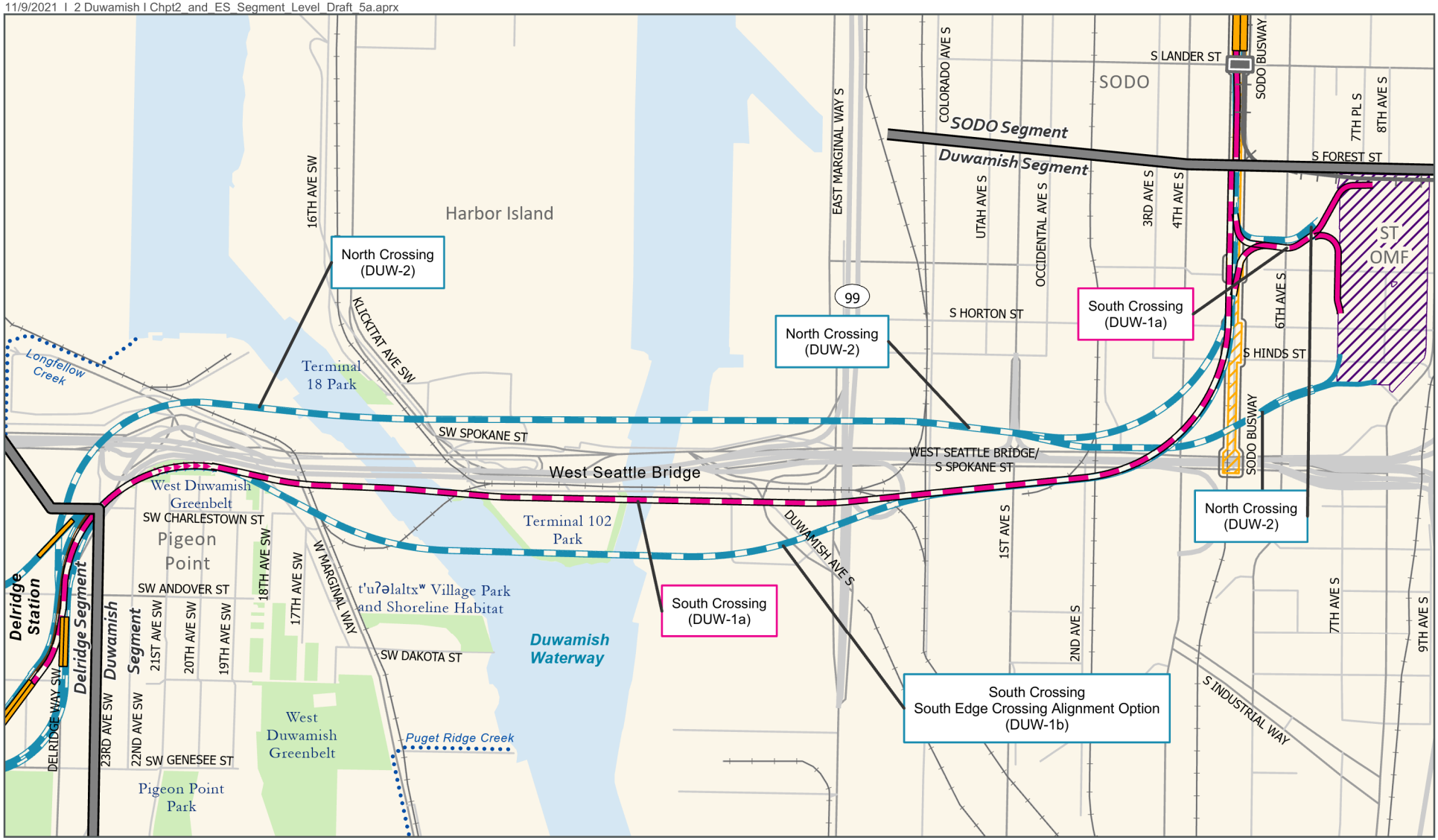
Figure 2-18. Plan and Profile for Mixed Profile Alternative (SODO-2)



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

2.1.2.1.2 Duwamish Segment

The Duwamish Segment includes the area between South Forest Street in the SODO neighborhood and the intersection of Southwest Charlestown Street and Delridge Way Southwest in the North Delridge neighborhood. This segment does not include a station but does include a connection to the existing Operations and Maintenance Facility Central. The Duwamish Segment alternatives and design option are shown on Figure 2-19.



Source: City of Seattle, King County (2019, 2020, 2021).

Alternatives
- Preferred Alternative
- Preferred Alternative with Third-party Funding
- Other Alternatives

Alternative Profile
- Elevated
- Tunnel
- At-Grade
- Retained Cut

Station
- New

- Segment Line
- Existing Link Light Rail
- Railroad
- SODO Busway
- Proposed Overpass
- Sound Transit Operations and Maintenance Facility (ST OMF)
- Piped Stream
- Park

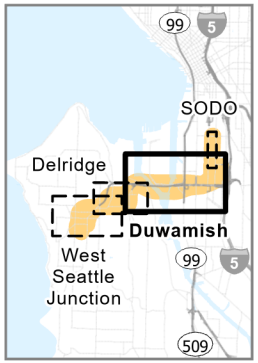


FIGURE 2-19
Duwamish Segment Alternatives
West Seattle Link Extension - Duwamish Segment

West Seattle and Ballard Link Extensions

0 800 1,600 Feet

N

Preferred Alternative

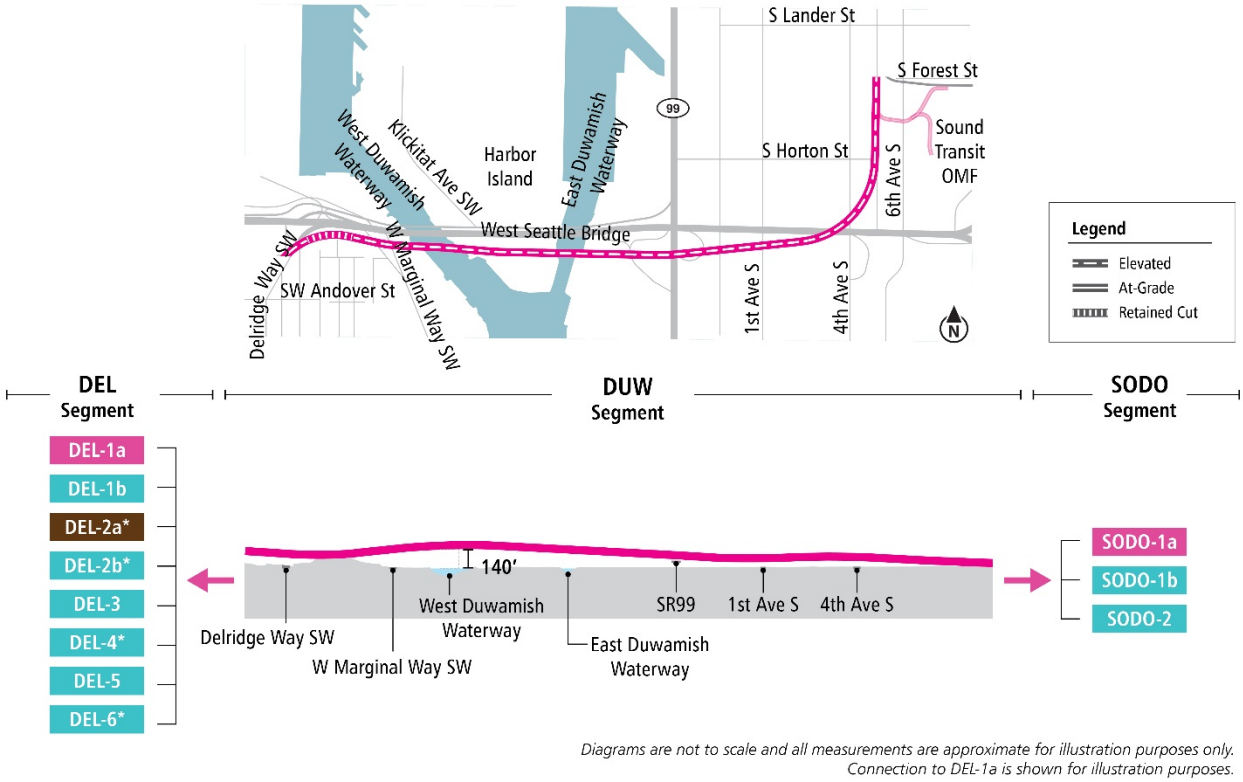
South Crossing Alternative (DUW-1a)

Alternative DUW-1a would continue south from South Forest Street along the west side of the existing light rail line on an elevated guideway, past the Operations and Maintenance Facility Central before heading southwest to cross over to the south side of the Spokane Street Bridge and the West Seattle Bridge.

The alternative would continue west and to the south side of the West Seattle Bridge. It crosses State Route 99, and would gradually increase in height as it travels west, since light rail cannot travel on grades as steep as automobiles can. The alternative would cross over the East Duwamish Waterway, Harbor Island, and the West Duwamish Waterway on a fixed, light-rail-only bridge. The height of the guideway in this segment would range between a retained cut and approximately 170 feet high. It would be at its highest when crossing the West Duwamish Waterway, where it would be at approximately the same height as the West Seattle Bridge. The bridge over the West Duwamish Waterway would have a clearance of approximately 140 feet over the navigation channel.

West of the Duwamish Waterway crossing, the alternative would cross the northern edge of Pigeon Point in a combination of elevated guideway and retained-cut and fill before turning southwest on an elevated guideway that follows Delridge Way Southwest. The plan and profile for this alternative is shown on Figure 2-20.

Figure 2-20. Plan and Profile for South Crossing Alternative (DUW-1a)



Diagrams are not to scale and all measurements are approximate for illustration purposes only. Connection to DEL-1a is shown for illustration purposes.

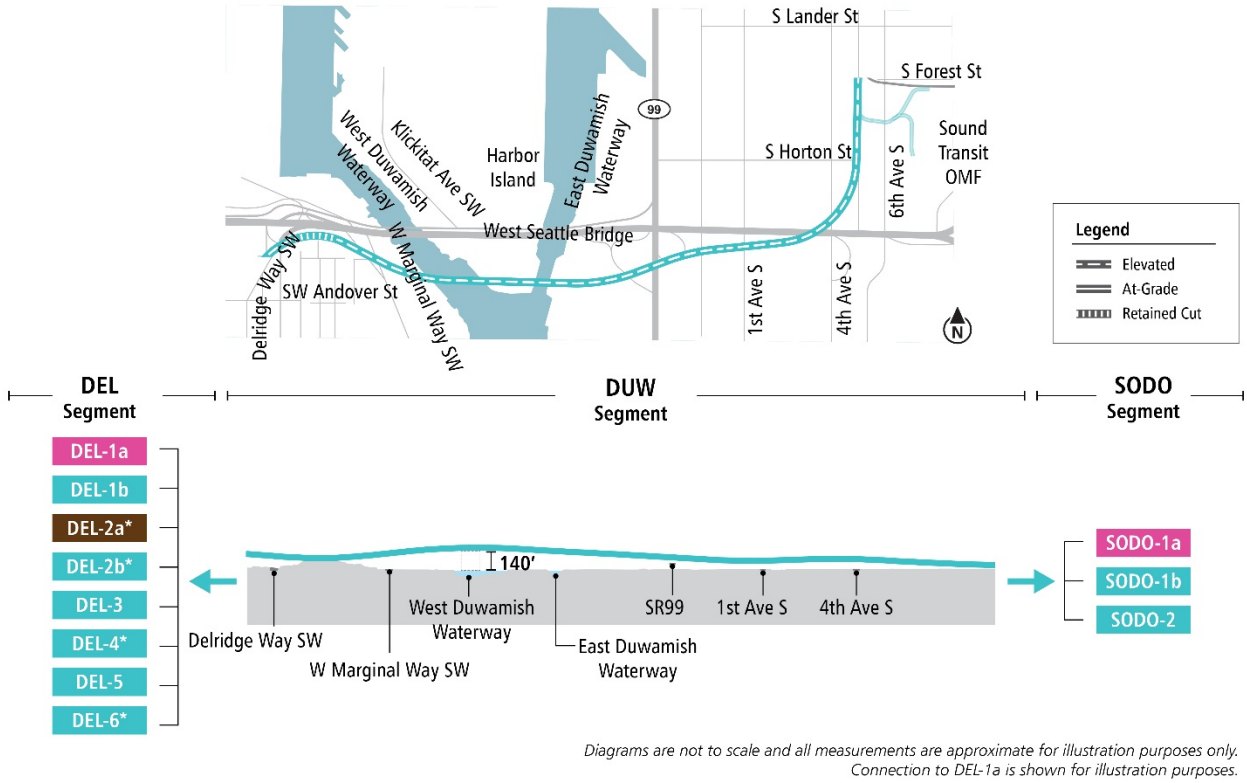
A connection to the Operations and Maintenance Facility Central would be provided from tracks between South Forest Street and Spokane Street. The northbound and southbound access tracks would be parallel to each other and would span over the BNSF Railway tracks and 6th Avenue South, then transition to at-grade to enter the operations and maintenance facility.

Other Build Alternatives and Design Options

South Crossing South Edge Crossing Alignment Option (DUW-1b)

Option DUW-1b would be the same as Alternative DUW-1a except it would cross the East and West Duwamish Waterways on the south edge of Harbor Island. The height of this option would be the same as Alternative DUW-1a. The plan and profile for this option is shown on Figure 2-21.

Figure 2-21. Plan and Profile for South Edge Crossing Alignment Option (DUW-1b)



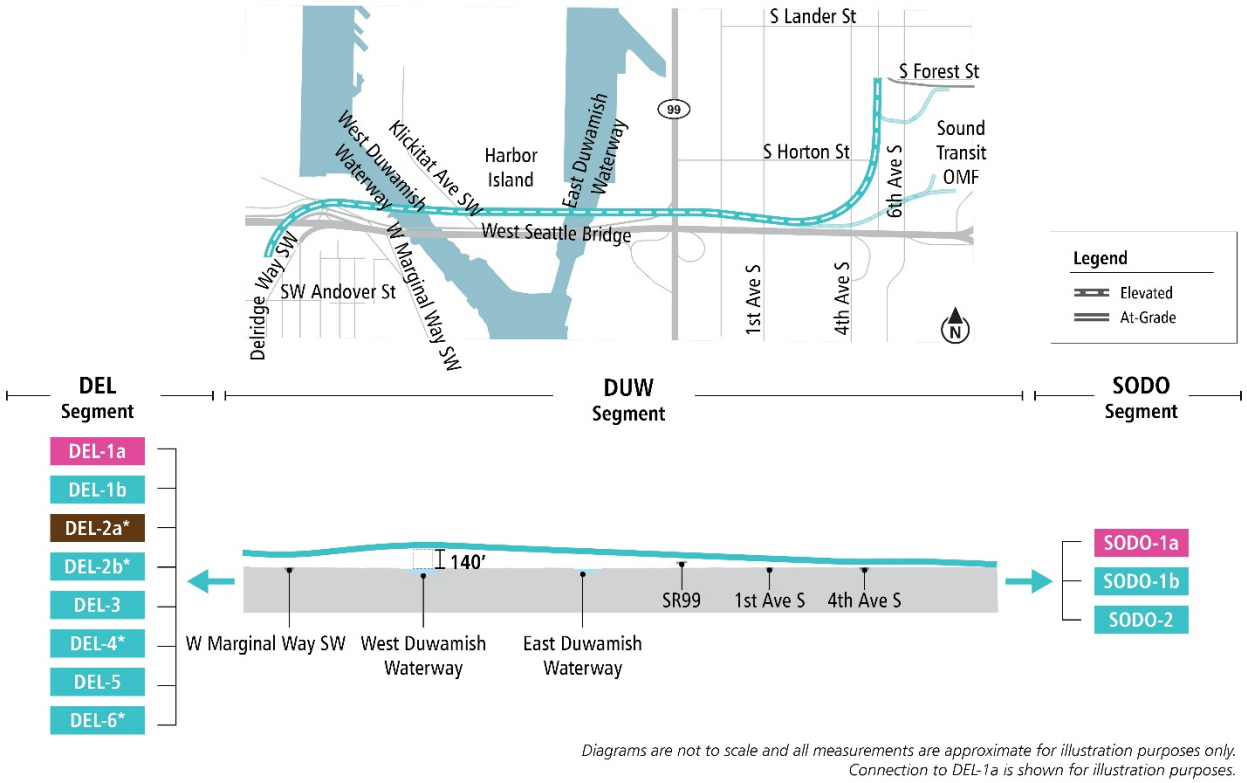
Diagrams are not to scale and all measurements are approximate for illustration purposes only. Connection to DEL-1a is shown for illustration purposes.

North Crossing Alternative (DUW-2)

Alternative DUW-2 would continue south from South Forest Street along the west side of the existing light rail line on an elevated guideway, before heading west on a new fixed, light-rail-only bridge north of the existing West Seattle Bridge. The height of the guideway would range between approximately 30 feet and 170 feet high. It would be at its highest when crossing the West Duwamish Waterway. The bridge over the West Duwamish Waterway would have a clearance of approximately 140 feet over the navigation channel.

Where it crosses State Route 99, the alignment would gradually increase in height as it travels west. At the West Duwamish Waterway, the bridge would be about the same height as the West Seattle Bridge. After crossing the West Duwamish Waterway, the alternative would cross over the West Seattle Bridge to run south on the west side of Delridge Way Southwest. The plan and profile for this alternative is shown on Figure 2-22.

Figure 2-22. Plan and Profile for North Crossing Alternative (DUW-2)

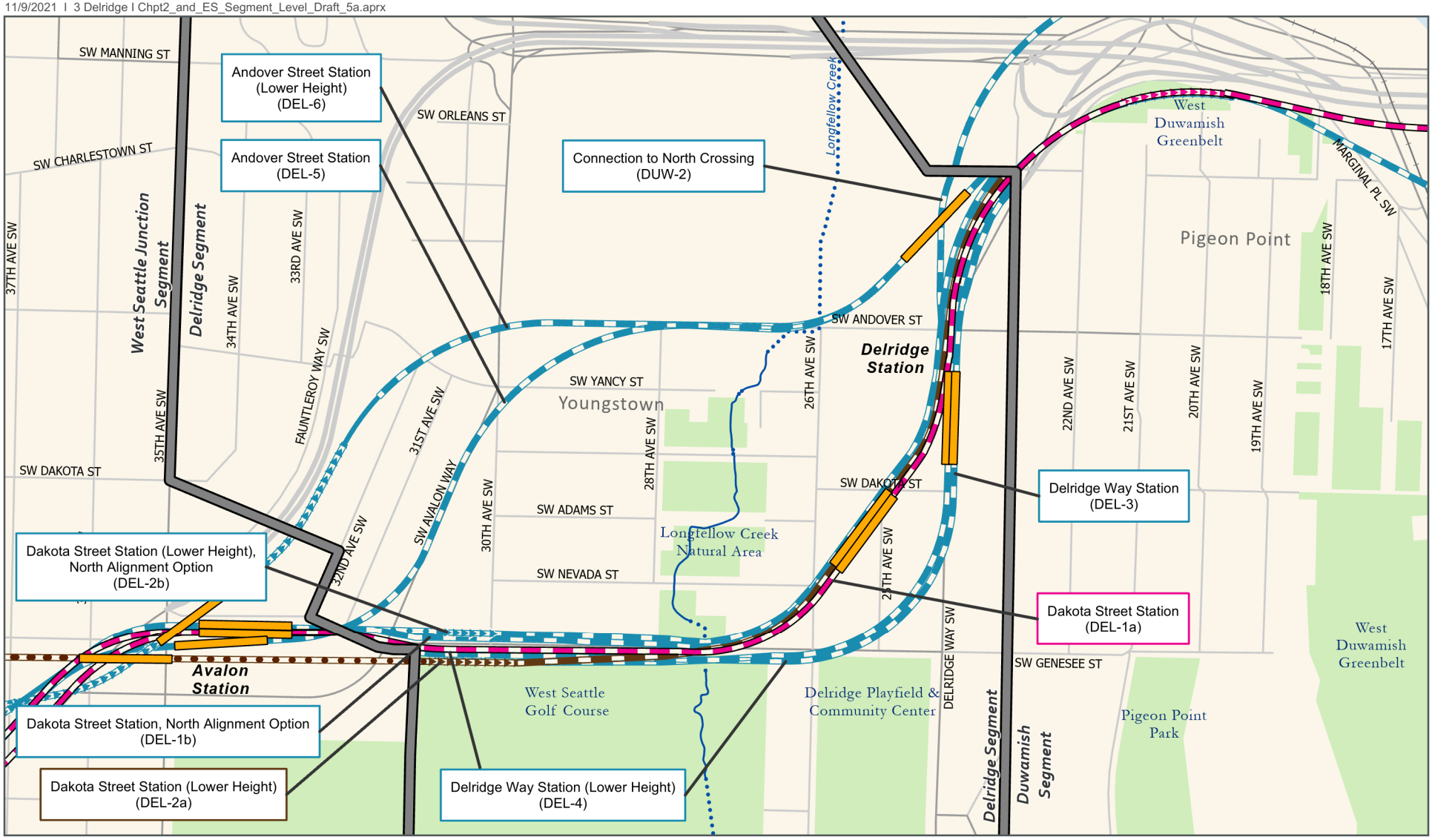


Diagrams are not to scale and all measurements are approximate for illustration purposes only. Connection to DEL-1a is shown for illustration purposes.

A connection to the Operations and Maintenance Facility Central would be provided from north and south access tracks between South Forest Street and South Spokane Street. Unlike the south crossing alternative and option, the access tracks would not be parallel to each other because of the curve of the main alignment and the distance to the operations and maintenance facility. The northern access tracks south of South Forest Street would span 6th Avenue South and then transition to at-grade to enter the operations and maintenance facility. The southern access tracks would be elevated north of South Spokane Street and continue east from about 1st Avenue South to 6th Avenue South, and then transition to at-grade to enter the operations and maintenance facility.

2.1.2.1.3 Delridge Segment

The Delridge Segment includes the area between Southwest Charlestown Street and a boundary line between 31st Avenue Southwest and Fauntleroy Way Southwest (Figure 2-23). This segment includes one station, the Delridge Station. Some alternatives in this segment only connect to tunnel alternatives in the adjacent West Seattle Junction Segment. A tunnel in West Seattle was not included in the Sound Transit 3 Plan (Sound Transit 2016); therefore, third-party funding could be required for the tunnel alternatives to which these alternatives connect. The Delridge Segment alternatives and design options are shown on Figure 2-23.



Source: City of Seattle, King County (2019, 2020, 2021).

Alternatives
- Preferred Alternative
- Preferred Alternative with Third-party Funding
- Other Alternatives

Alternative Profile
- Elevated
- Tunnel
- At-Grade
- Retained Cut

Station
- New

- Segment Line
- Railroad
- Stream
- Piped Stream
- Park

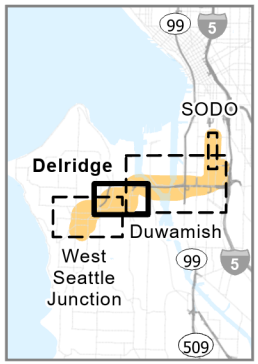


FIGURE 2-23
Delridge Segment Alternatives
West Seattle Link Extension - Delridge Segment

West Seattle and Ballard Link Extensions

0 400 800 Feet

N

Preferred Alternative

Dakota Street Station Alternative (DEL-1a)

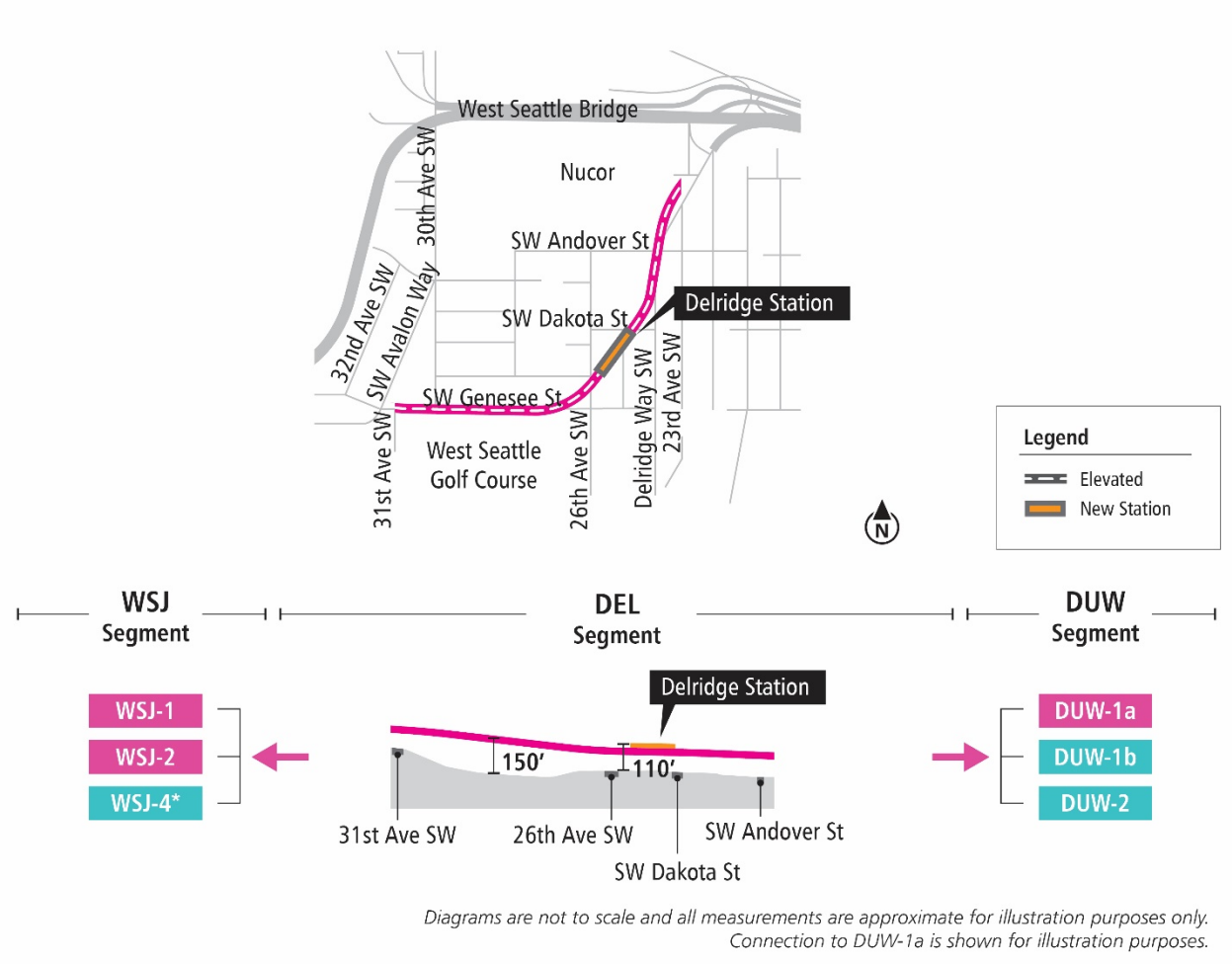
Alternative DEL-1a would follow Delridge Way Southwest south on an elevated guideway to an elevated station. The guideway would be on the west side of Delridge Way except for in the vicinity of Southwest Andover Street, where it would be over Delridge Way Southwest.

The height of the guideway would range between approximately 70 feet and 150 feet high. The highest portion would be where the alignment climbs from the station in the Delridge valley up to the West Seattle Junction.

The station would be elevated between Delridge Way Southwest and 26th Avenue Southwest, south of Southwest Dakota Street, and oriented southwest-northeast. The top of the station structure would be approximately 110 feet high.

South of the station, the alternative would curve west and cross to the south side of the Southwest Genesee Street right-of-way, north of the West Seattle Golf Course. The guideway would continue west along the south edge of Southwest Genesee Street and connect to an elevated guideway in the West Seattle Junction Segment. The plan and profile for this alternative is shown on Figure 2-24.

Figure 2-24. Plan and Profile for Dakota Street Station Alternative (DEL-1a)



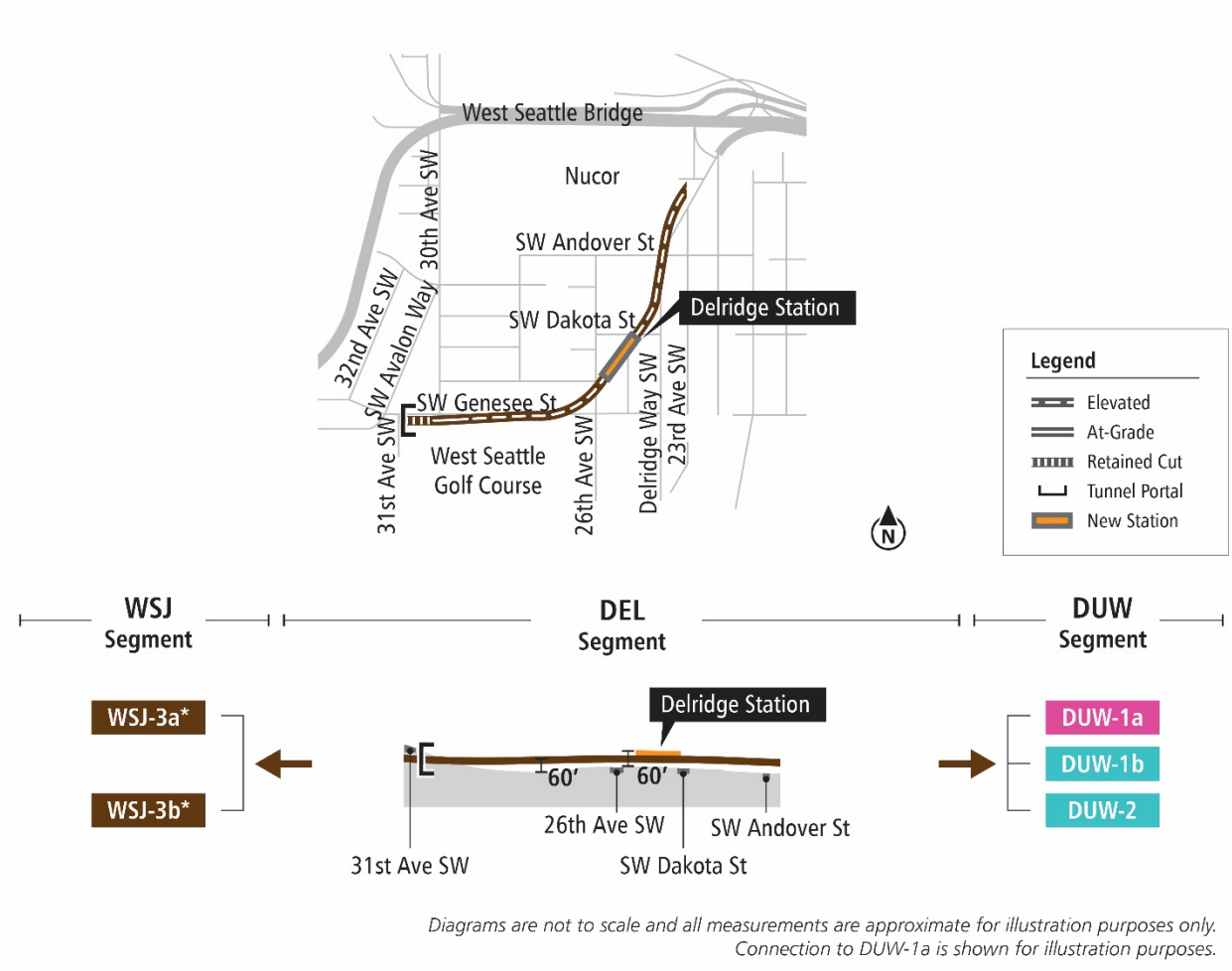
Preferred Alternative with Third-Party Funding

Dakota Street Station Lower Height Alternative (DEL-2a)*

Alternative DEL-2a* would follow the same alignment as Alternative DEL-1a to the station but would be at a lower elevation to connect to tunnel alternatives in the West Seattle Junction Segment. The height of the guideway would range between a tunnel and approximately 60 feet high. The top of the station structure would be approximately 60 feet high.

To accommodate the station, 25th Avenue Southwest would be permanently closed between Southwest Dakota Street and Southwest Genesee Street. From the station, the alternative would continue south to cross Southwest Genesee Street and would run along the northern edge of the West Seattle Golf Course. A tunnel portal for connecting to tunnel alternatives in the West Seattle Junction Segment would be in the northwest corner of the West Seattle Golf Course, south of Southwest Genesee Street and east of 31st Avenue Southwest. The plan and profile for this alternative is shown on Figure 2-25.

Figure 2-25. Plan and Profile for Dakota Street Station Lower Height Alternative (DEL-2a)*



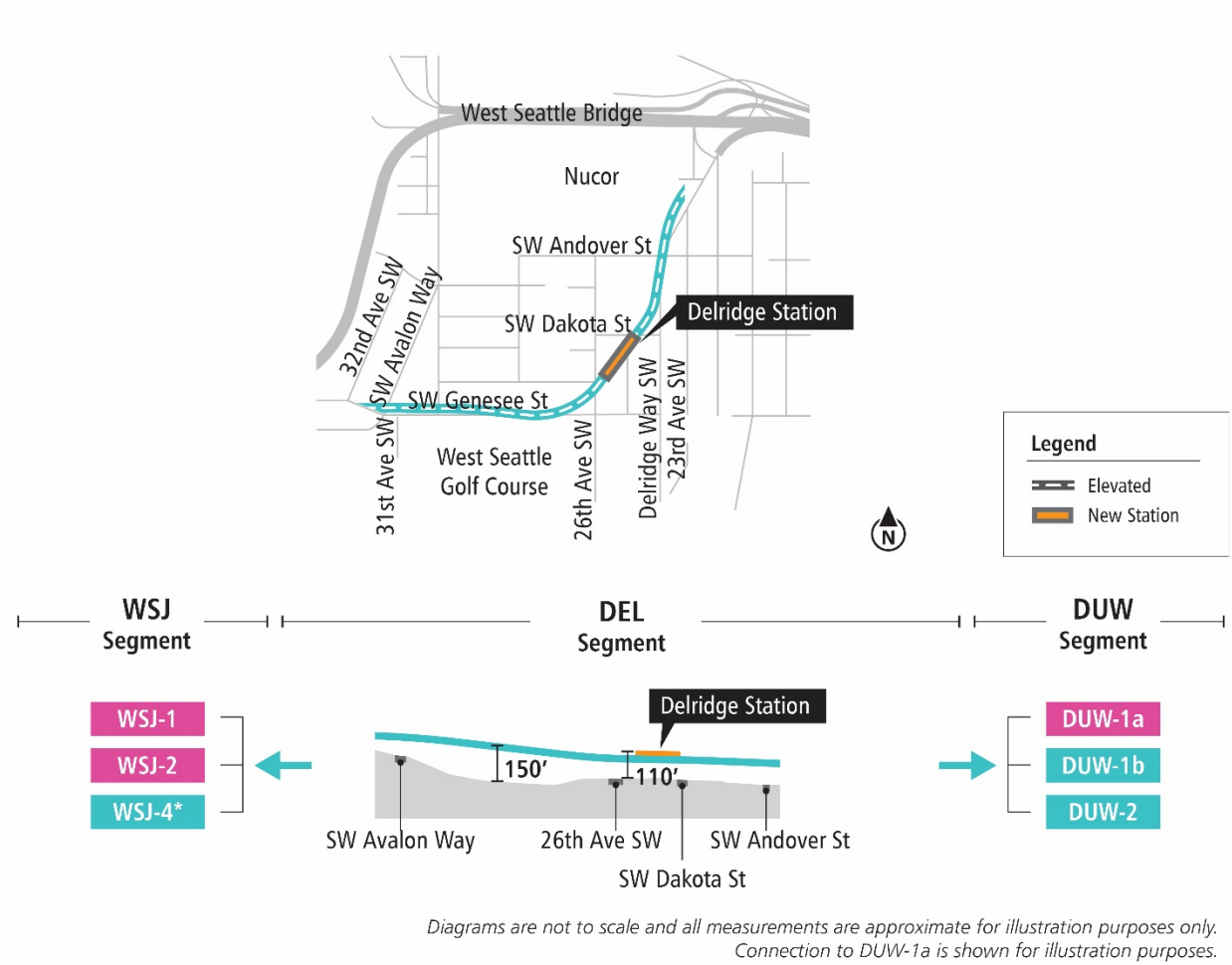
Diagrams are not to scale and all measurements are approximate for illustration purposes only. Connection to DUW-1a is shown for illustration purposes.

Other Build Alternatives and Design Options

Dakota Street Station North Alignment Option (DEL-1b)

Option DEL-1b would be similar to Alternative DEL-1a except it would be within the Southwest Genesee Street right-of-way between the West Seattle Golf Course and the Longfellow Creek Natural Area, then shift to the north side of Southwest Genesee Street west of 28th Avenue Southwest. The plan and profile for this option is shown on Figure 2-26. The height of the guideway would range between approximately 60 feet and 150 feet high. The highest portion would be where the alignment climbs from the station in the Delridge valley up to the West Seattle Junction. The top of the station structure would be approximately 110 feet high.

Figure 2-26. Plan and Profile for Dakota Street Station North Alignment Option (DEL-1b)



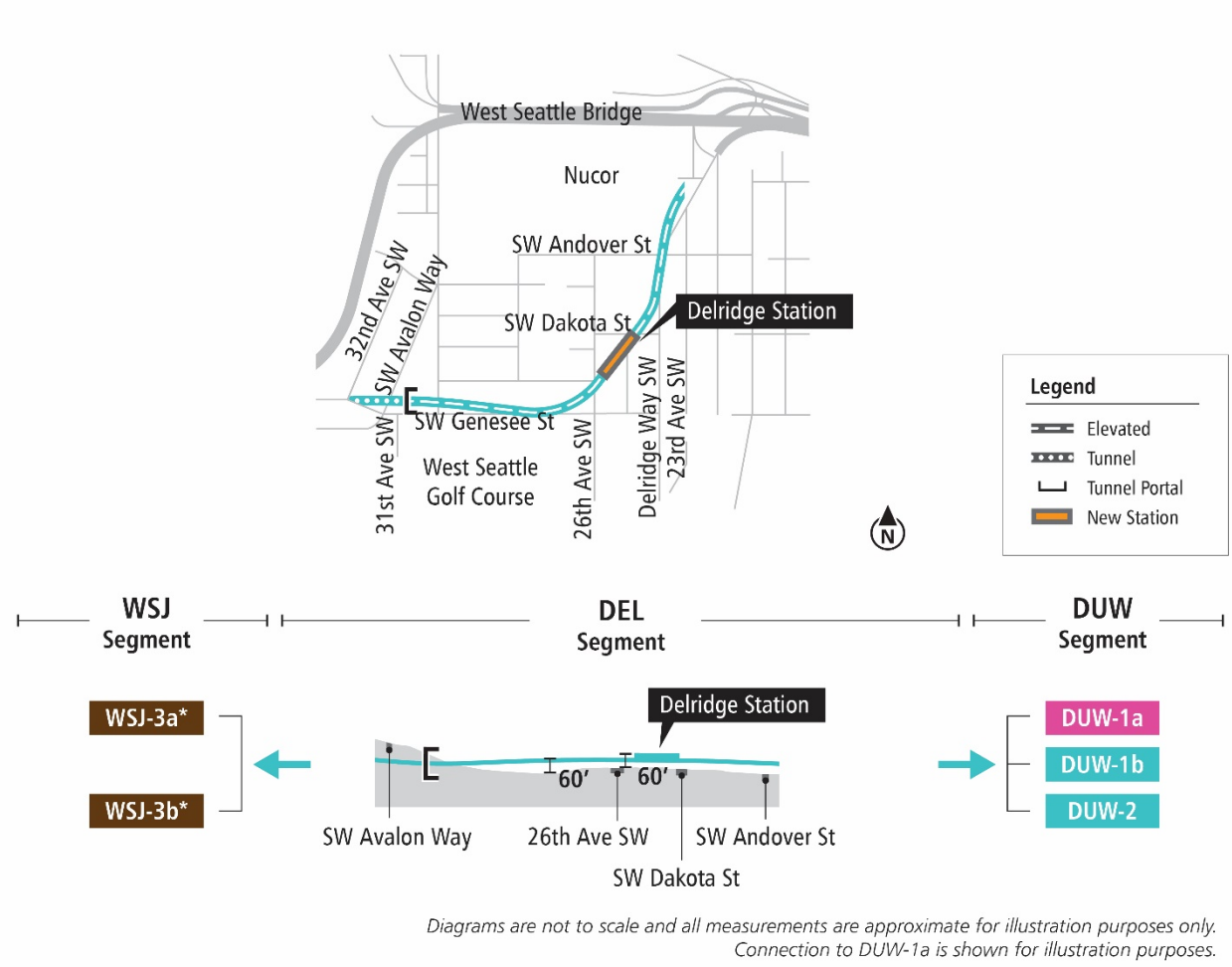
Dakota Street Station Lower Height North Alignment Option (DEL-2b)*

Option DEL-2b* would be similar to Preferred Alternative DEL-2a*, except it would shift to the north side of Southwest Genesee Street west of 28th Avenue Southwest. The plan and profile for this option is shown on Figure 2-27. The height of the guideway would range between a tunnel and approximately 60 feet high. The top of the station structure would be approximately 60 feet high.

To accommodate the station, 25th Avenue Southwest would be permanently closed between Southwest Dakota Street and Southwest Genesee Street. Access to Southwest Genesee Street from 30th Avenue Southwest would be permanently closed with a turnaround at the south end

of the road. The tunnel portal to enter a tunnel in the West Seattle Junction Segment would be north of Southwest Genesee Street, between Southwest Avalon Way and 30th Avenue Southwest.

Figure 2-27. Plan and Profile for Dakota Street Station Lower Height North Alignment Option (DEL-2b)*

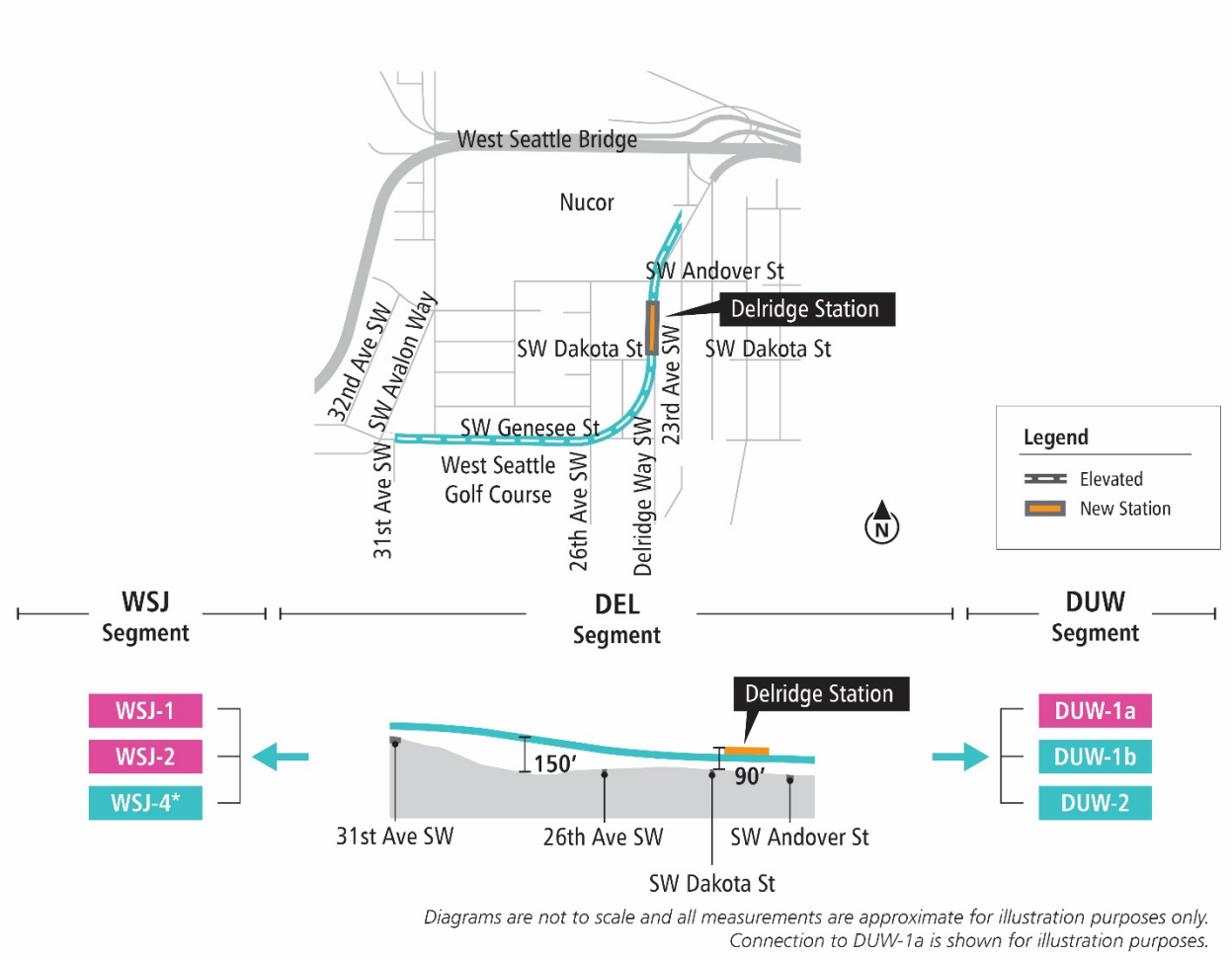


Delridge Way Station Alternative (DEL-3)

Alternative DEL-3 would follow Delridge Way Southwest south on an elevated guideway to the Delridge Station. The station would be in the middle of Delridge Way Southwest, north of Southwest Dakota Street, and the top of the station structure would be approximately 90 feet high. Station access would be from adjacent streets, including both sides of Delridge Way Southwest.

South of the station, the alternative would curve west and cross to the south side of the Southwest Genesee Street right-of-way, north of the West Seattle Golf Course. The guideway would continue west along the south edge of Southwest Genesee Street and connect to an elevated guideway in the West Seattle Junction Segment. The plan and profile for this alternative is shown on Figure 2-28. The height of the guideway would range between approximately 50 feet and 150 feet high. The highest portion would be where the alignment climbs from the station in the Delridge valley up to the West Seattle Junction.

Figure 2-28. Plan and Profile for Delridge Way Station Alternative (DEL-3)

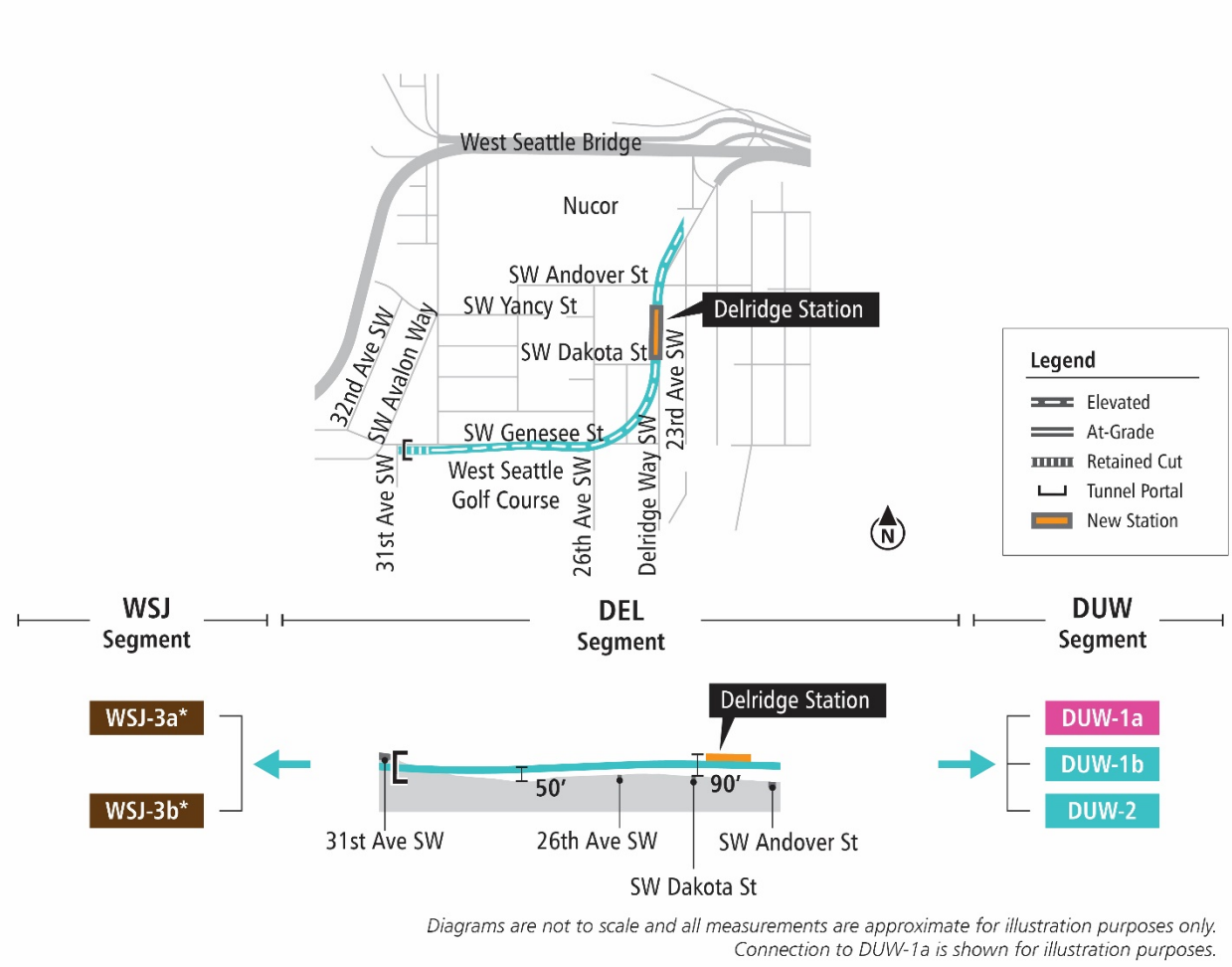


Delridge Way Station Lower Height Alternative (DEL-4)*

Alternative DEL-4* would follow the same alignment as Alternative DEL-3 to the station but would be at a lower elevation to connect to tunnel alternatives in the West Seattle Junction Segment. The height of the guideway would range between a tunnel and approximately 60 feet high. The top of the station would be approximately 90 feet high. Station access would be the same as Alternative DEL-3.

From the station, the alternative would continue south on the west side of Delridge Way Southwest and then turn west at Southwest Genesee Street, crossing Southwest Genesee Street to run along the northern edge of the West Seattle Golf Course. A tunnel portal for connecting to tunnel alternatives in the West Seattle Junction Segment would be in the northwest corner of the West Seattle Golf Course, south of Southwest Genesee Street and east of 31st Avenue Southwest. The plan and profile for this alternative is shown on Figure 2-29.

Figure 2-29. Plan and Profile for Delridge Way Station Lower Height Alternative (DEL-4)*

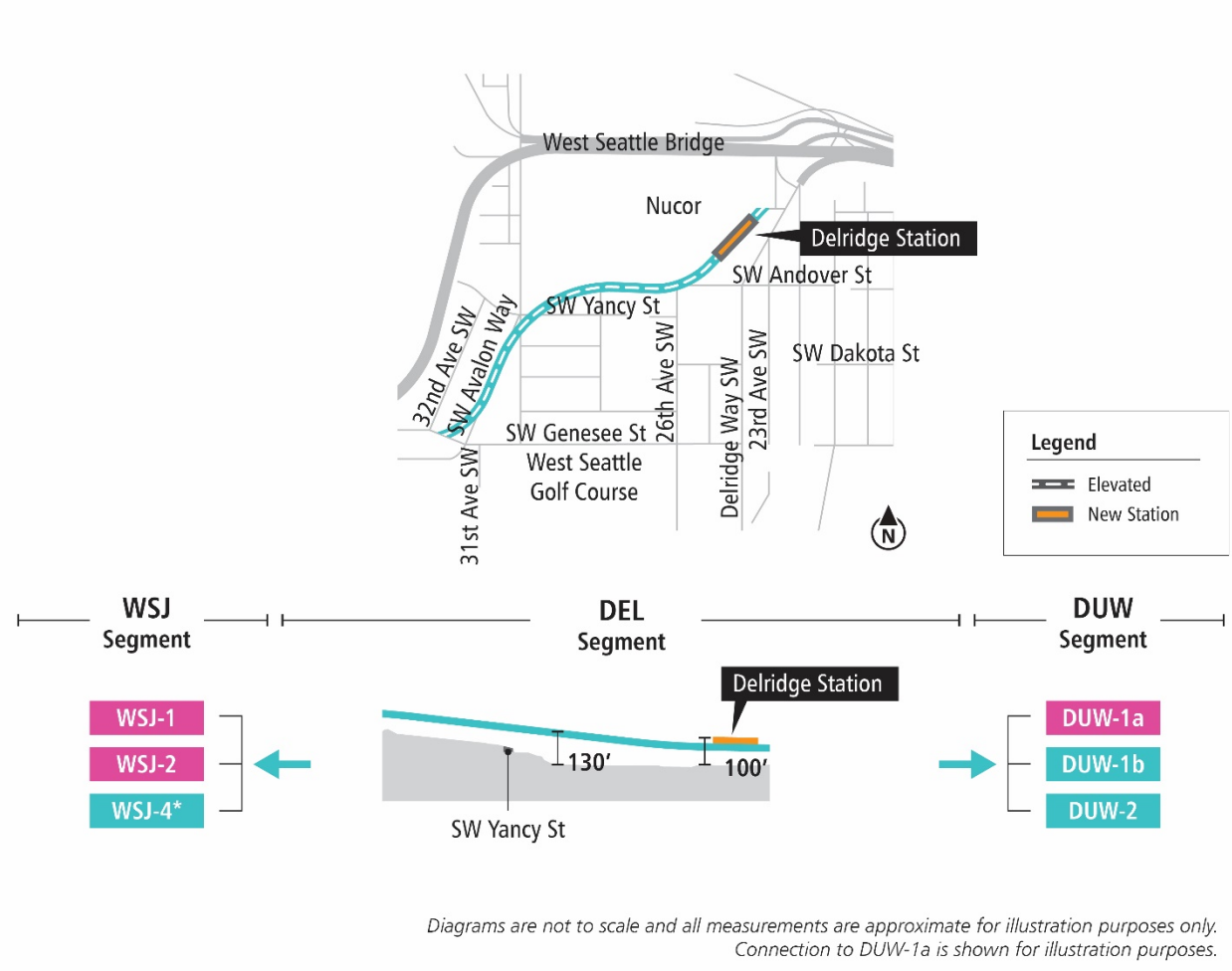


Andover Street Station Alternative (DEL-5)

Alternative DEL-5 would be on an elevated guideway on the west side of Delridge Way Southwest, north of Southwest Andover Street. The height of the guideway would range between approximately 50 feet and 130 feet high. The alignment would travel west along Southwest Andover Street on an elevated guideway then south along Southwest Avalon Way in the vicinity of Southwest Yancy Street. The guideway would continue south along Southwest Avalon Way and turn west on the north side of Southwest Genesee Street. The highest portion of the guideway would be where the alignment climbs from the station in the Delridge valley up to the West Seattle Junction.

The station would be elevated, north of Southwest Andover Street and west of Delridge Way Southwest, in a northeast-southwest orientation. The plan and profile for this alternative is shown on Figure 2-30. The top of the station structure would be approximately 100 feet high.

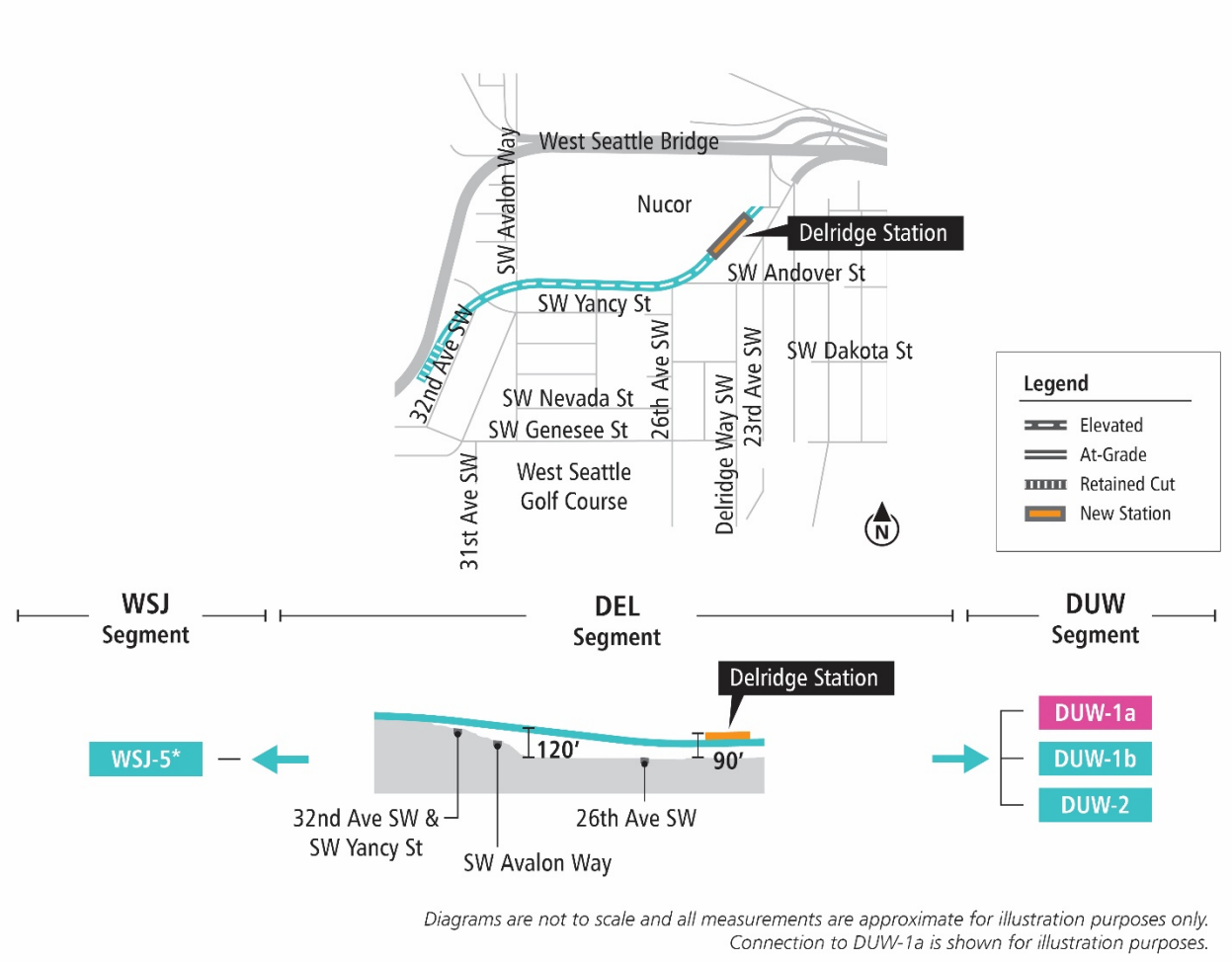
Figure 2-30. Plan and Profile for Andover Street Station Alternative (DEL-5)



Andover Street Station Lower Height Alternative (DEL-6)*

Alternative DEL-6* would be similar to Alternative DEL-5 up to and including the station. The top of the station structure would be approximately 90 feet high. The height of the guideway would range between a retained cut and approximately 120 feet high. The elevated guideway would cross over Southwest Avalon Way and then turn south in the vicinity of 32nd Avenue Southwest to travel south along the east side of the West Seattle Bridge connection to Fauntleroy Way Southwest, transitioning from elevated into a retained cut. The alignment would turn west in the vicinity of Southwest Genesee Street in a retained cut, passing below Southwest Genesee Street. The plan and profile for this alternative is shown on Figure 2-31.

Figure 2-31. Plan and Profile for Andover Street Station Lower Height Alternative (DEL-6)*



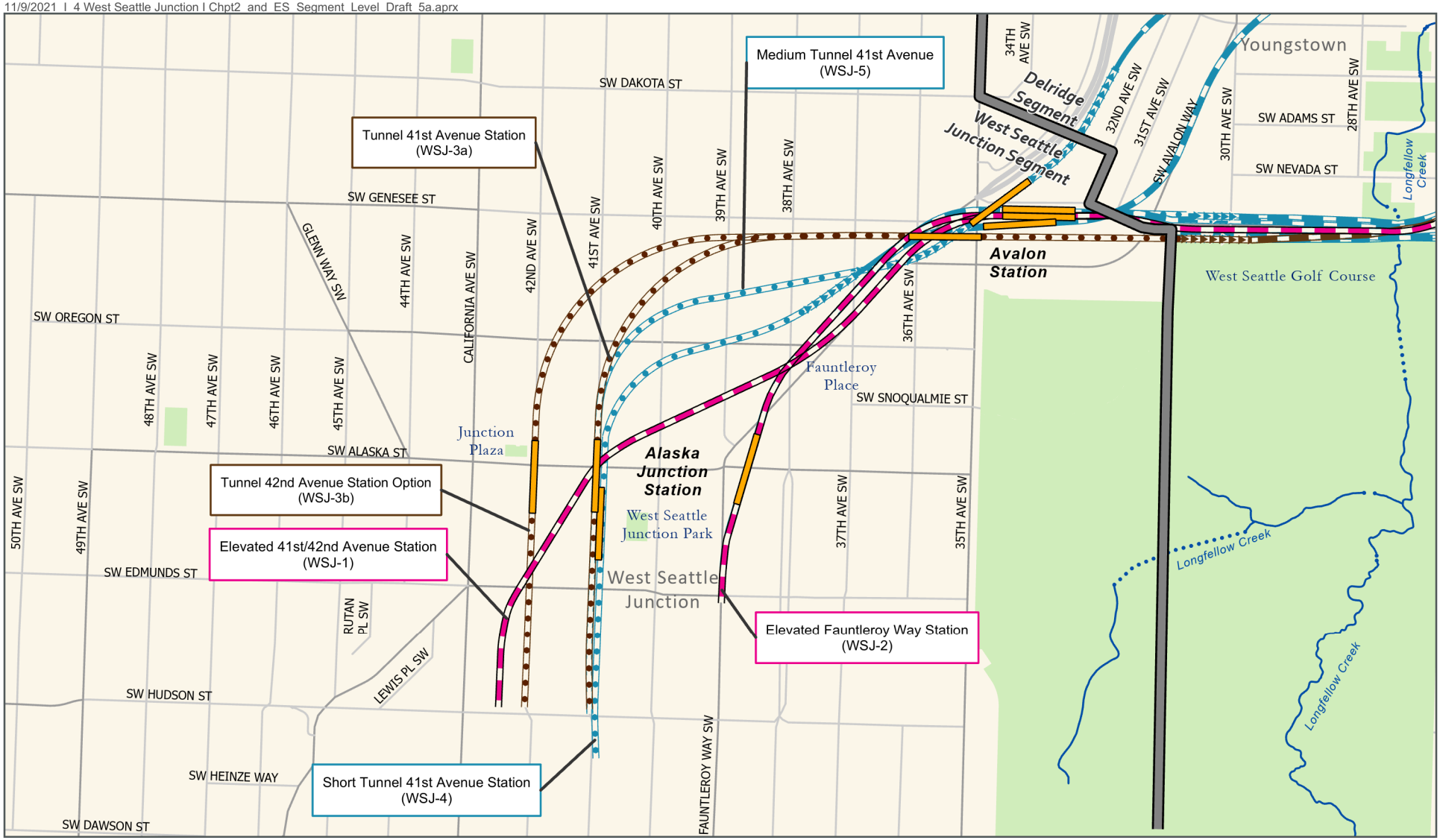
2.1.2.1.4 West Seattle Junction Segment

The West Seattle Junction Segment includes the area generally west of 31st Avenue Southwest, between Southwest Charleston Street, and Southwest Hudson Street. All alternatives and design options would have two stations: Avalon and Alaska Junction. Although tunnel alternatives and options are considered in the environmental review for this segment, a tunnel in West Seattle was not included in the Sound Transit 3 Plan (Sound Transit 2016); therefore, third-party funding could be required for the tunnel alternatives and options. The West Seattle Junction Segment alternatives and design options are shown on Figure 2-32.

Preferred Alternatives

Elevated 41st/42nd Avenue Station Alternative (WSJ-1)

Alternative WSJ-1 would be elevated along the south side of Southwest Genesee Street between 31st Avenue Southwest and Fauntleroy Way Southwest. The height of the guideway would range between approximately 30 feet and 80 feet high. The alternative would turn southwest to the west side of Fauntleroy Way Southwest. The guideway would turn south in the vicinity of 41st Avenue Southwest and Southwest Alaska Street and continue south to Southwest Hudson Street.



Source: City of Seattle, King County (2019, 2020, 2021).

Alternatives
- Preferred Alternative
- Preferred Alternative with Third-party Funding
- Other Alternatives

Alternative Profile
- Elevated
- Tunnel
- At-Grade
- Retained Cut

Station
- New

- Segment Line
- Stream
- Piped Stream
- Park

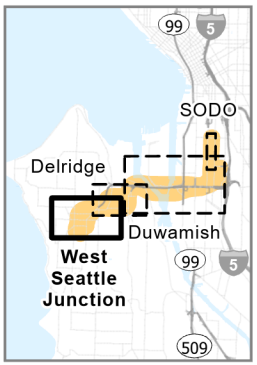


FIGURE 2-32
West Seattle Junction Segment Alternatives
West Seattle Link Extension - West Seattle Junction Segment

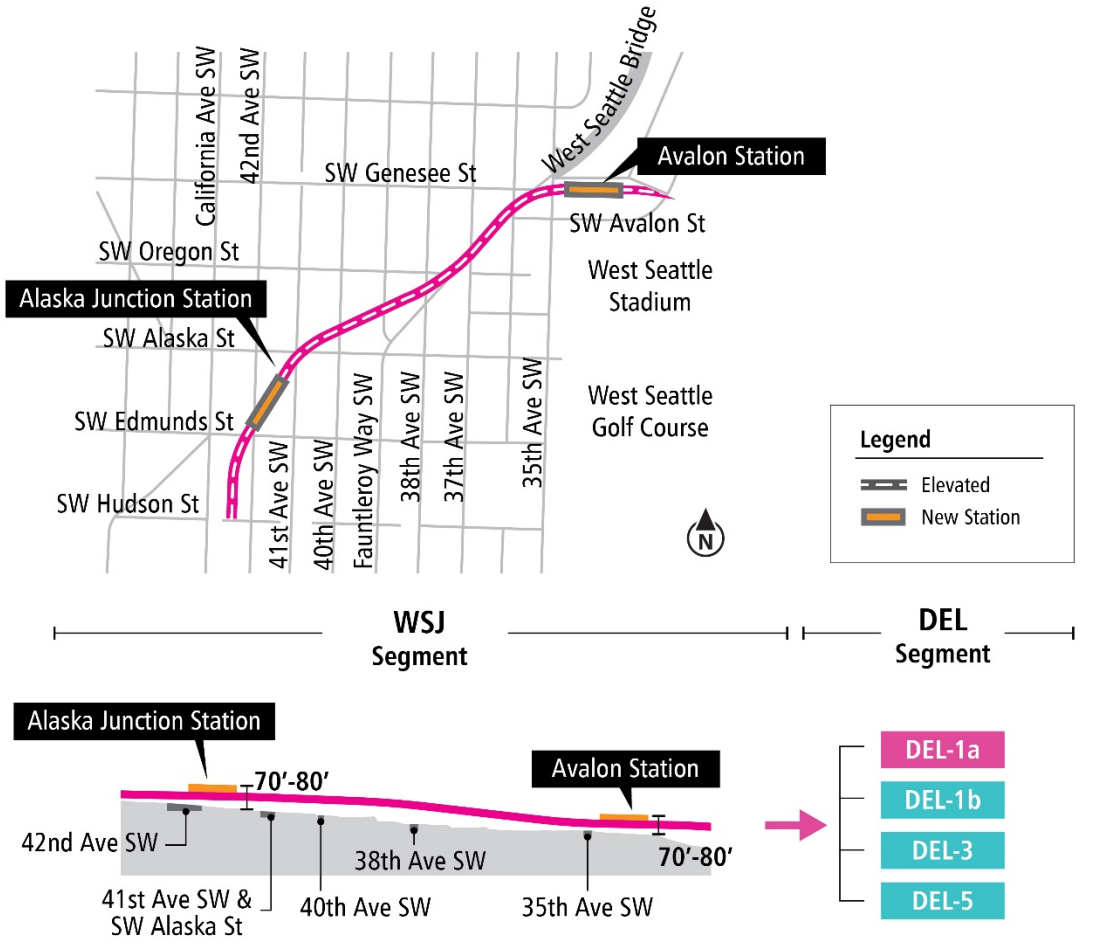
West Seattle and Ballard Link Extensions

0 500 1,000 Feet
N

The guideway would end on the west side of 42nd Avenue Southwest and would include a tail track south of the Alaska Junction Station. The plan and profile for this alternative is shown on Figure 2-33. Stations would be located as follows:

- **Avalon Station:** Avalon Station would be elevated along the south side of Southwest Genesee Street, east of 35th Avenue Southwest. The top of the station structure would depend on which alternative it connects with in the Delridge Segment but would be approximately 70 to 80 feet high.
- **Alaska Junction:** The Alaska Junction Station would be elevated between 41st Avenue Southwest and 42nd Avenue Southwest, south of Southwest Alaska Street. The top of the station structure would depend on which alternative it connects with in the Delridge Segment, but it would be approximately 70 to 80 feet high.

Figure 2-33. Plan and Profile for Elevated 41st/42nd Avenue Station Alternative (WSJ-1)



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

Elevated Fauntleroy Way Station Alternative (WSJ-2)

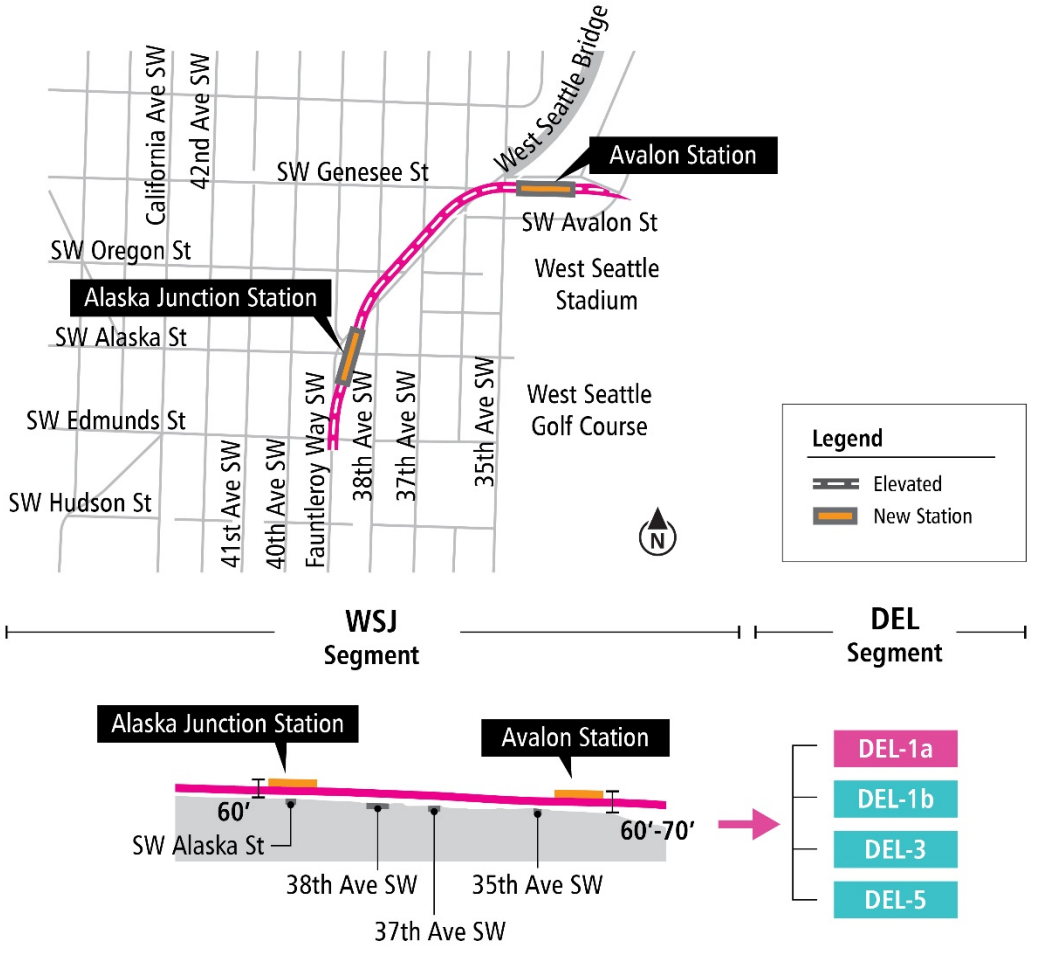
Alternative WSJ-2 would be elevated along the south side of Southwest Genesee Street between 31st Avenue Southwest and Fauntleroy Way Southwest. The height of the guideway would range between approximately 30 feet and 70 feet high.

The alignment would head southwest on Fauntleroy Way Southwest and continue along the west side of Fauntleroy Way Southwest. The guideway would cross to the east side of Fauntleroy Way Southwest south of Southwest Oregon Street.

Elevated tail tracks would begin south of the Alaska Junction Station and end within the Fauntleroy Way Southwest right-of-way just past Southwest Edmunds Street. The plan and profile for this alternative is shown on Figure 2-34. Stations would be located as follows:

- **Avalon Station:** Avalon Station would be elevated along the south side of Southwest Genesee Street and east of 35th Avenue Southwest. The top of the station structure would depend on which alternative it connects with in the Delridge Segment, but it would be approximately 60 to 70 feet high.
- **Alaska Junction Station:** This station would be elevated southeast of Fauntleroy Way Southwest straddling Southwest Alaska Street. The top of the station structure would be approximately 60 feet high.

Figure 2-34. Plan and Profile for Elevated Fauntleroy Way Station Alternative (WSJ-2)



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

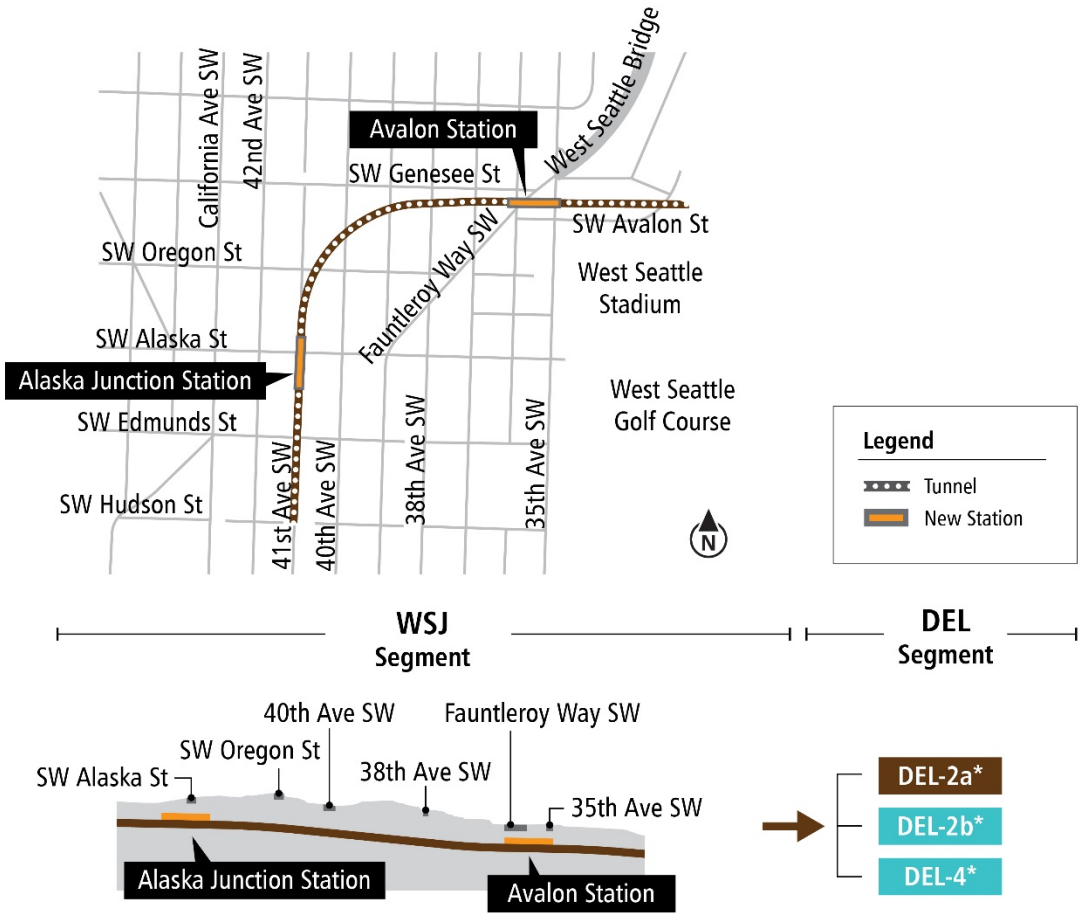
Preferred Alternatives with Third-Party Funding

Tunnel 41st Avenue Station Alternative (WSJ-3a)*

Alternative WSJ-3a* would be in a tunnel under Southwest Genesee Street heading west from 31st Avenue Southwest then curve to the southwest between 37th Avenue Southwest and 41st Avenue Southwest. The tunnel would end in the vicinity of Southwest Hudson Street, with the tail track in a north-south orientation under 41st Avenue Southwest. The guideway would be entirely in a tunnel. The plan and profile for this alternative is shown on Figure 2-35. Stations would be located as follows:

- **Avalon Station:** The Avalon Station would be beneath Fauntleroy Way Southwest. Station entrances would be on the west side of Fauntleroy Way Southwest and on the east side of 35th Avenue Southwest.
- **Alaska Junction Station:** The Alaska Junction Station would be beneath 41st Avenue Southwest and Southwest Alaska Street. Station entrances would be on either side of Southwest Alaska Street along the east side of 41st Avenue Southwest.

Figure 2-35. Plan and Profile for Tunnel 41st Avenue Station Alternative (WSJ-3a)*

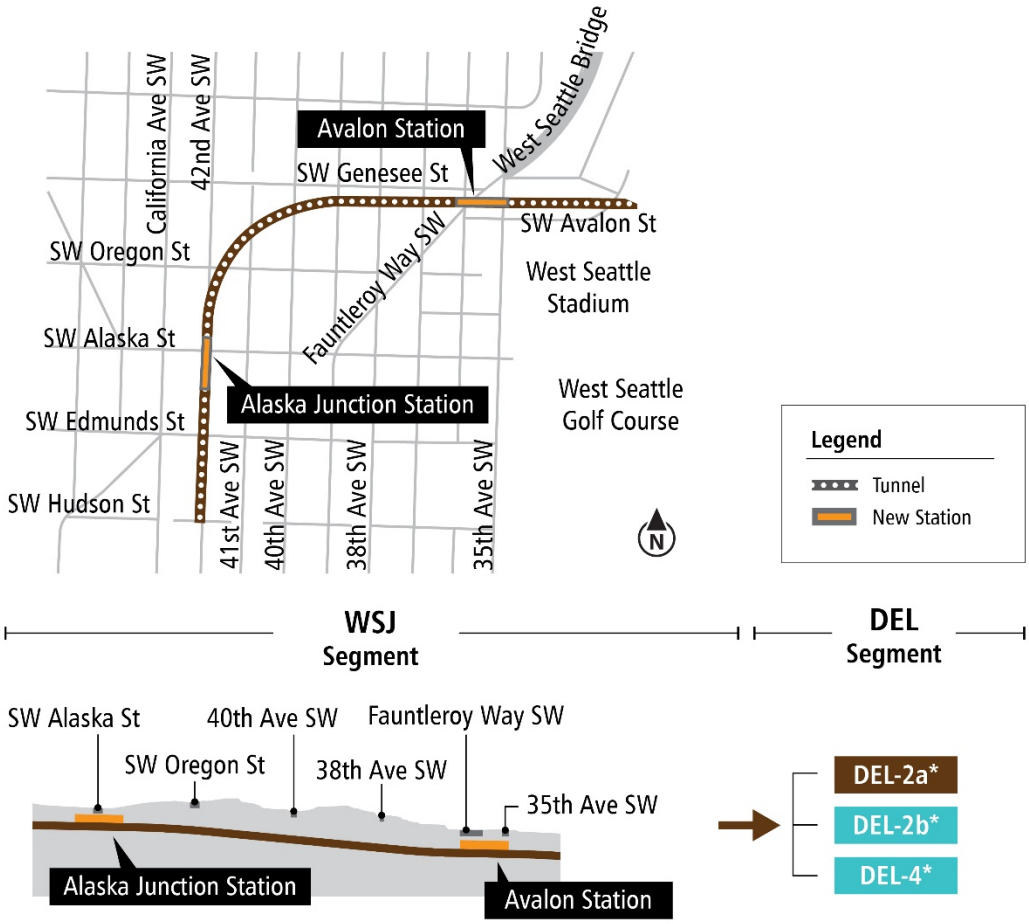


Diagrams are not to scale and all measurements are approximate for illustration purposes only.

Tunnel 42nd Avenue Station Option (WSJ-3b)*

Option WSJ-3b* would be the same as Alternative WSJ-3a*, except the tunnel would extend to 42nd Avenue Southwest instead of 41st Avenue Southwest. The tunnel would end in the vicinity of Southwest Hudson Street, with a tail track in a north-south orientation under 42nd Avenue Southwest. The Avalon Station would be the same as described for the Tunnel 41st Avenue Alternative. The Alaska Junction Station would be in a tunnel beneath 42nd Avenue Southwest and Southwest Alaska Street. Station entrances would be on either side of Southwest Alaska Street, with one on the east side and one on the west side of 42nd Avenue Southwest. The plan and profile for this option is shown on Figure 2-36.

Figure 2-36. Plan and Profile for Tunnel 42nd Avenue Station Option (WSJ-3b)*



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

Other Build Alternatives

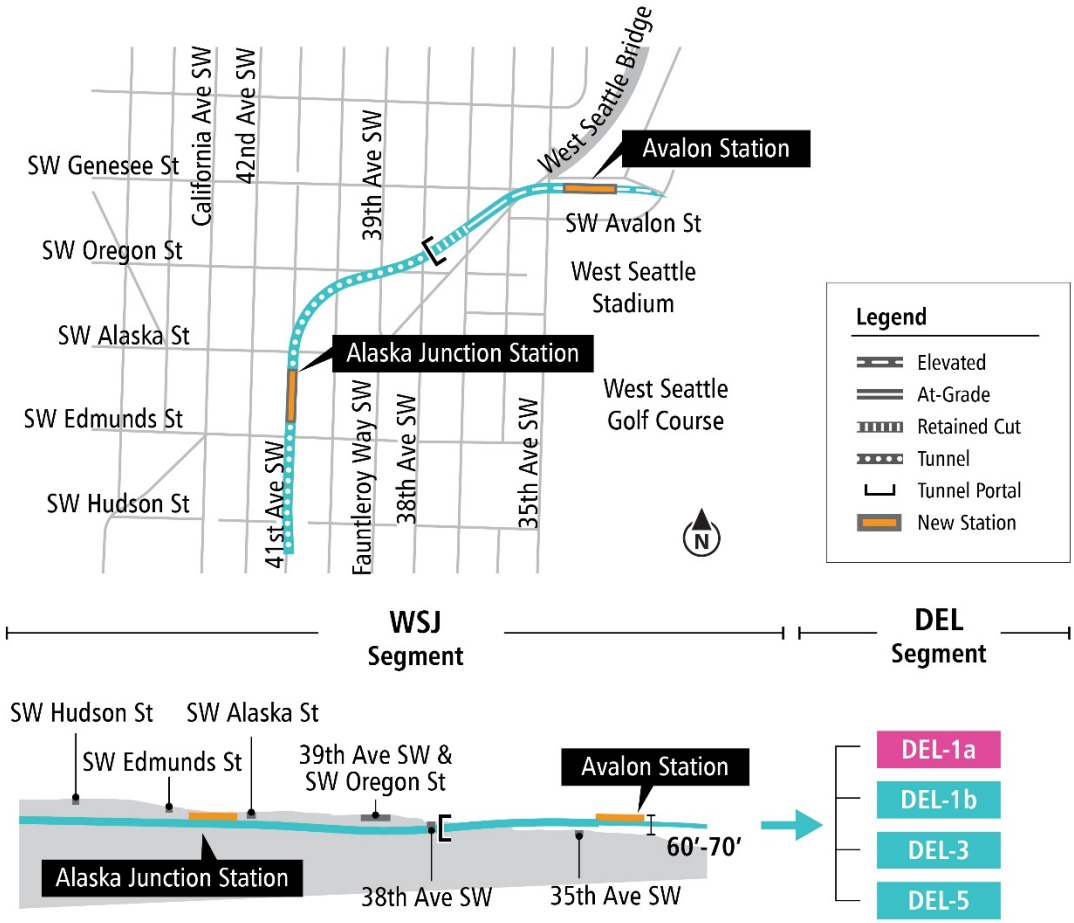
Short Tunnel 41st Avenue Station Alternative (WSJ-4)*

Alternative WSJ-4* would be on elevated guideway along the south side of Southwest Genesee Street from 31st Avenue Southwest to the west side of Fauntleroy Way Southwest. It would continue along the west side of Fauntleroy Way Southwest on elevated guideway before transitioning to at-grade near 37th Avenue Southwest. 37th Avenue Southwest and 38th Avenue Southwest would be modified to end in a turnaround between Southwest Genesee

Street and Fauntleroy Way Southwest. The guideway would turn west near Southwest Oregon Street and transition into a tunnel with a portal in the vicinity of Southwest Oregon Street and 38th Avenue Southwest. The tunnel would turn south and end south of Southwest Hudson Street, with a tail track in a north-south orientation along and under 41st Avenue Southwest. The height of the guideway would range between a tunnel and approximately 40 feet high. The plan and profile for this option is shown on Figure 2-37. Stations would be located as follows:

- **Avalon Station:** Avalon Station would be elevated along the south side of Southwest Genesee Street and east of 35th Avenue Southwest. The top of the station structure would be approximately 60 to 70 feet high.
- **Alaska Junction Station:** The Alaska Junction Station would be in a tunnel beneath 41st Avenue Southwest and south of Southwest Alaska Street. Station entrances would be on Southwest Alaska Street and Southwest Edmunds Street.

Figure 2-37. Plan and Profile for Short Tunnel 41st Avenue Station Alternative (WSJ-4)*



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

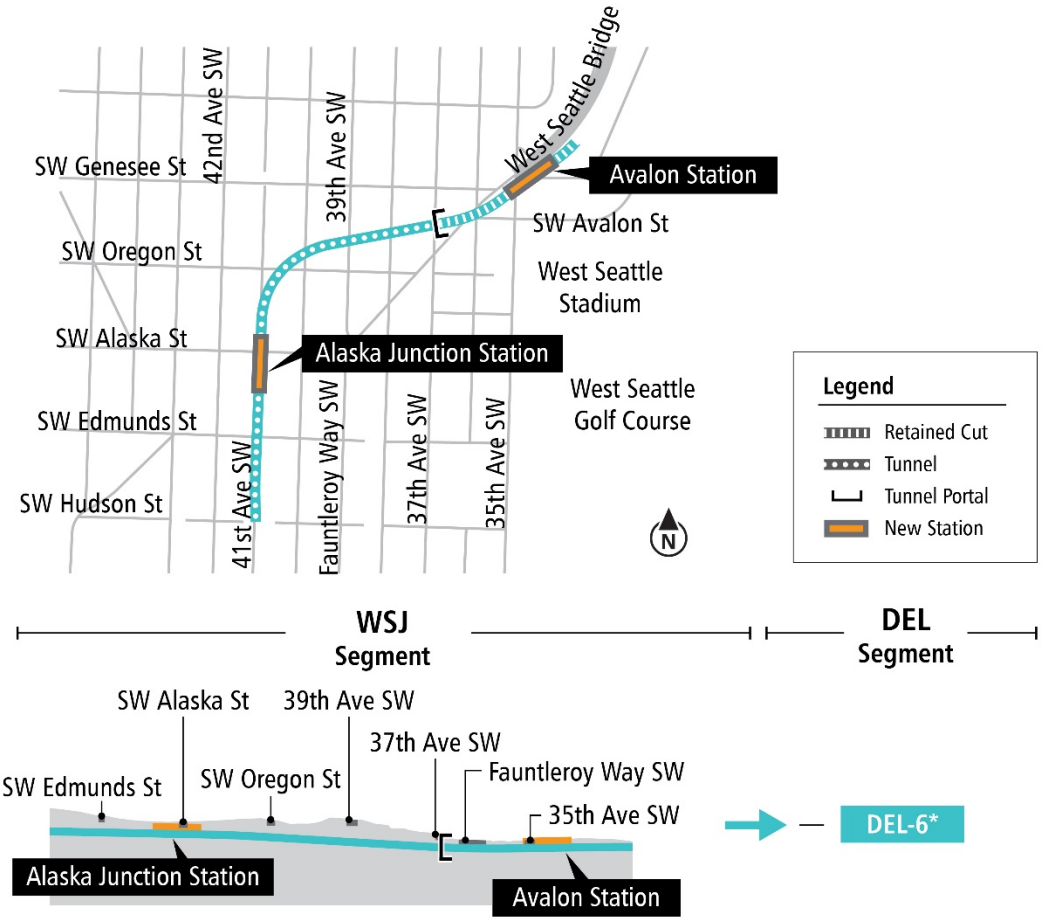
Medium Tunnel 41st Avenue Station Alternative (WSJ-5)*

Alternative WSJ-5* begins in a retained cut south of Southwest Yancy Street and follows the east side of the West Seattle Bridge connection to Southwest Genesee Street. Southwest Genesee Street would be permanently closed approaching 35th Avenue Southwest. This

alignment enters a tunnel at Southwest Genesee Street and 37th Avenue Southwest. The alignment then curves southwest west of 37th Avenue Southwest to 41st Avenue Southwest. It terminates at Southwest Hudson Street, with tail track in a north-south orientation under 41st Avenue Southwest. The plan and profile for this alternative is shown on Figure 2-38. Stations would be located as follows:

- **Avalon Station:** Avalon Station would be in a retained cut south of Southwest Genesee Street, beneath Fauntleroy Way Southwest with the top of the station structure approximately 30 feet above the existing ground surface. Station entrances would be on either side of 35th Avenue Southwest.
- **Alaska Junction Station:** The Alaska Junction Station would be in a tunnel beneath 41st Avenue Southwest and Southwest Alaska Street. Station entrances would be on either side of Southwest Alaska Street along the east side of 41st Avenue Southwest.

Figure 2-38. Plan and Profile for Medium Tunnel 41st Avenue Station Alternative (WSJ-5)*

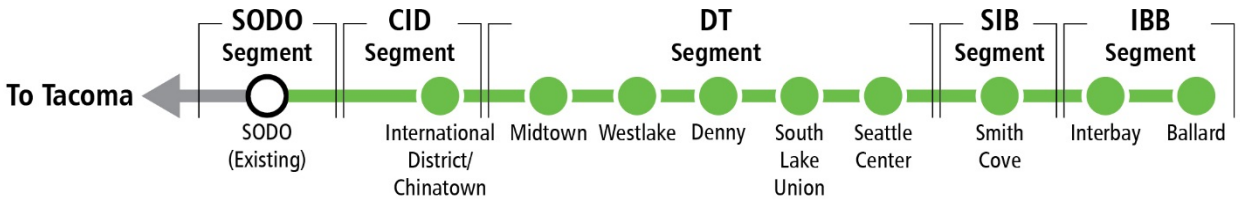


Diagrams are not to scale and all measurements are approximate for illustration purposes only.

2.1.2.2 Ballard Link Extension

Both the West Seattle Link Extension and Ballard Link Extension would include improvements in SODO, as described in Section 2.3. The Ballard Link Extension (Figure 2-39) would begin near the existing SODO Station and proceed north to enter a new tunnel under Downtown Seattle. It would pass through the Chinatown-International District and have a new International District/Chinatown Station connected to the existing station. While the Ballard Link Extension would not serve the existing Stadium Station on the Central Link line, one of the alternatives in the Chinatown-International District would rebuild it because of the profile and alignment curvature needed to reach the International District/Chinatown Station depths.

Figure 2-39. Ballard Link Extension Segments and Stations



The Ballard Link Extension would generally follow the corridor of 5th Avenue or 6th Avenue and Westlake Avenue north through Downtown Seattle to South Lake Union. In South Lake Union, the tunnel would turn west toward Uptown. Five underground stations—Midtown, Westlake, Denny, South Lake Union, and Seattle Center—would be included. Passengers would be able to transfer from the Ballard Link Extension to the existing Central Link line at SODO, International District/Chinatown, and Westlake stations. Passengers currently traveling directly between south Seattle and points north of Westlake Station on the Central Link line (including the existing Capitol Hill, University of Washington, University District, Roosevelt Station, and Northgate) would be required to transfer at the SODO, International District/Chinatown, or Westlake stations when the Ballard Link Extension is built. The Tacoma to Ballard line would not serve the existing Stadium Station, and riders on that line would need to transfer to the West Seattle to Everett line to reach the Stadium Station.

The Ballard Link Extension would exit the tunnel at a portal near Elliott Avenue West and continue either elevated, at-grade, or in a retained cut along Elliott Avenue West. It would then travel through Interbay either elevated along 15th Avenue West or elevated on the west side of Interbay Golf Center. It would cross over or under Salmon Bay near 15th Avenue West with a bridge or in a tunnel and continue north to a terminus near Northwest Market Street. Stations would be constructed at Smith Cove, Interbay, and Ballard. The Ballard Link Extension project corridor is shown on Figure 1-1 in Chapter 1, Purpose and Need for West Seattle and Ballard Link Extensions.

The following sections describe the preferred alternatives, preferred alternatives with third-party funding, and other Build Alternatives for the extension by segment. The Ballard Link Extension has a total of 12 alternatives (several of which have design options), four of the alternatives are preferred and one of the alternatives and one of the design options are preferred with third-party funding. Third party-funding could be required for tunnels under Salmon Bay and for Alternative CID-1a* and Option CID-1b* that require replacement of the 4th Avenue South Viaduct. Table 2-2 summarizes the alternatives and options and the connections between the alternatives and options in each segment. Not all alternatives and options could connect to every alternative and option in adjacent segments due to variations in the alignment and profile. In Table 2-2 and the figures in this section that show the alternatives and design options, the pink color is for

preferred alternatives, the brown color for preferred alternatives with third-party funding, and the blue color for other alternatives.

Table 2-2. Summary of Ballard Link Extension Alternatives and Design Options Evaluated in the Draft Environmental Impact Statement

Segment	Alternative or Design Option	Abbreviation	Stations (and Station Profile)	Connections
SODO	**Preferred At-Grade**	**SODO-1a**	**Not applicable [a]**	**Connects to CID-1a*, CID-2a, and CID-2b.**
	At-Grade South Station Option	SODO-1b	Not applicable [a]	All Chinatown-International District Segment alternatives.
	Mixed Profile	SODO-2	Not applicable [a]	Connects to CID-1a* and CID-2a.
Chinatown-International District (CID)	4th Avenue Shallow*	CID-1a*	Stadium (existing station would be rebuilt) [b] and International District/Chinatown (Tunnel)	All SODO Segment alternatives. All Downtown Segment alternatives.
	4th Avenue Deep Station Option*	CID-1b*	International District/Chinatown (Tunnel)	Connects to SODO-1b. Connects to DT-1.
	5th Avenue Shallow	CID-2a	International District/Chinatown (Tunnel) or International District/Chinatown Diagonal Station Configuration (Tunnel)	All SODO Segment alternatives. All Downtown Segment alternatives.
	5th Avenue Deep Station Option	CID-2b	International District/Chinatown (Tunnel)	Connects to SODO-1a and SODO-1b. Connects to DT-1.
Downtown (DT)	**Preferred 5th Avenue/Harrison Street**	**DT-1**	**Midtown, Westlake, Denny, South Lake Union, and Seattle Center (Tunnel)**	**All Chinatown-International District Segment alternatives. Connects to SIB-1 and SIB-2.**
	6th Avenue/Mercer Street	DT-2	Midtown, Westlake, Denny, South Lake Union, and Seattle Center (Tunnel)	Connects to CID-1a* and CID-2a. Connects to SIB-3.
South Interbay (SIB)	**Preferred Galer Street Station/Central Interbay**	**SIB-1**	**Smith Cove (Elevated)**	**Connects to DT-1. Connects to IBB-1a, IBB-2a*, and IBB-2b*.**
	Prospect Street Station/15th Avenue	SIB-2	Smith Cove (Elevated)	Connects to DT-1. Connects to IBB-3 and IBB-1b.
	Prospect Street Station/Central Interbay	SIB-3	Smith Cove (Retained cut)	Connects to DT-2. Connects to IBB-1a, IBB-2a*, and IBB-2b*.
Interbay/Ballard (IBB)	**Preferred Elevated 14th Avenue**	**IBB-1a**	**Interbay (Elevated) Ballard (Elevated)**	**Connects to SIB-1 and SIB-3.**
	Elevated 14th Avenue Alignment Option (from	IBB-1b	Interbay (Elevated) Ballard (Elevated)	Connects to SIB-2.

Segment	Alternative or Design Option	Abbreviation	Stations (and Station Profile)	Connections
	Prospect Street Station/15th Avenue)			
	Preferred Tunnel 14th Avenue*	**IBB-2a***	**Interbay (Retained cut) Ballard (Tunnel)**	**Connects to SIB-1 and SIB-3.**
	Preferred Tunnel 15th Avenue Station Option*	**IBB-2b***	**Interbay (Retained cut) Ballard (Tunnel)**	**Connects to SIB-1 and SIB-3.**
	Elevated 15th Avenue	IBB-3	Interbay (Elevated) Ballard (Elevated)	Connects to SIB-2.

* As described in the introduction to Chapter 2, Alternatives Considered, at the time the Sound Transit Board identified alternatives for study in the Draft Environmental Impact Statement some alternatives were anticipated to require third-party funding based on early cost estimates. The asterisk identifies these alternatives and the alternatives that would only connect to these alternatives in adjacent segments.

[a] The Ballard Link Extension would serve SODO on the existing Link line. Details about the new SODO Station is provided in the West Seattle Link Extension description and in Table 2-1.

[b] Alternative CID-1a* would require the existing Stadium Station to be rebuilt to the west of its current location due to the tunnel portal, although the Ballard Link Extension would not connect to Stadium Station.

2.1.2.2.1 SODO Segment

The SODO Segment includes the area between approximately South Forest Street in the SODO neighborhood and South Holgate Street at the north end. The West Seattle Link Extension also includes improvements in the SODO Segment. The SODO alternatives and design option for the Ballard Link Extension are continuations of the SODO alignments in West Seattle Link Extension and would connect to the SODO alignments in West Seattle Link Extension with the same alternative or option name.

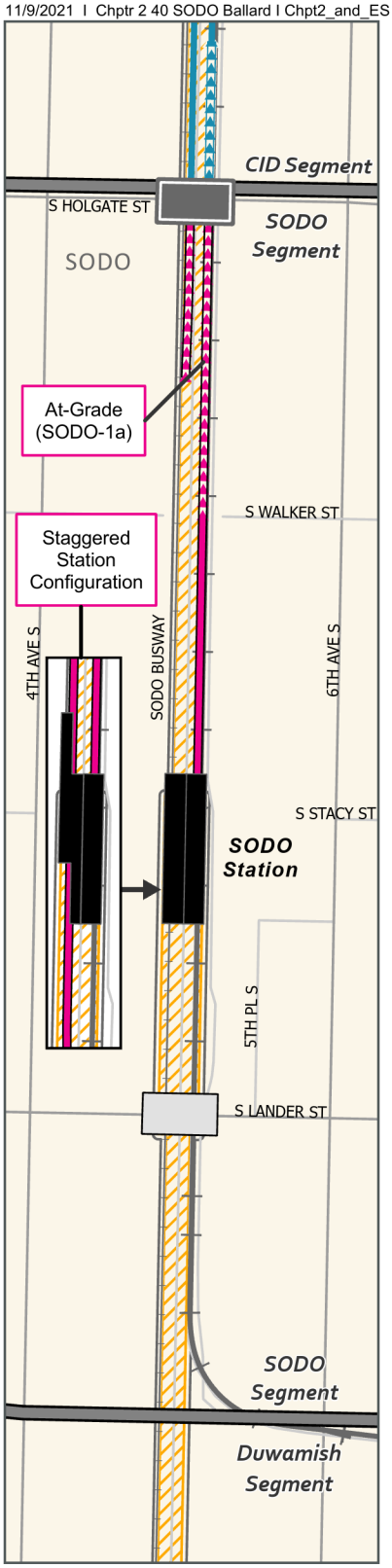
The West Seattle Link Extension improvements would be operational in 2032, while the Ballard Link Extension would be operational 5 years later. Therefore, the Ballard Link Extension assumes the West Seattle Link Extension improvements are in place.

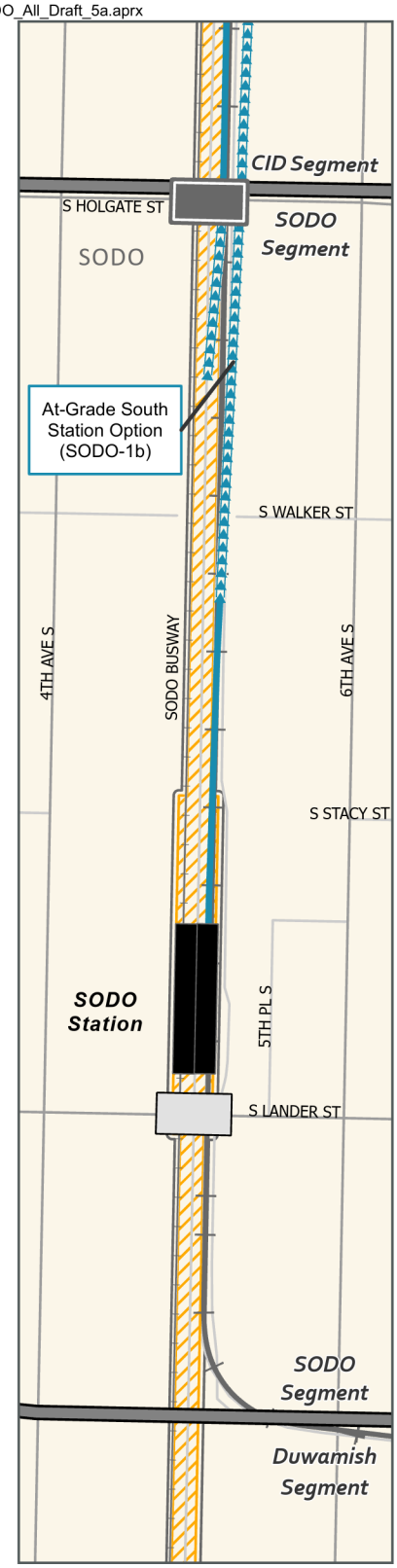
As described in Section 2.1.2, Build Alternatives and Design Options, the SODO Segment includes the existing SODO Station and the new SODO Station constructed as part of the West Seattle Link Extension. The Ballard Link Extension would not include any additional station construction in SODO.

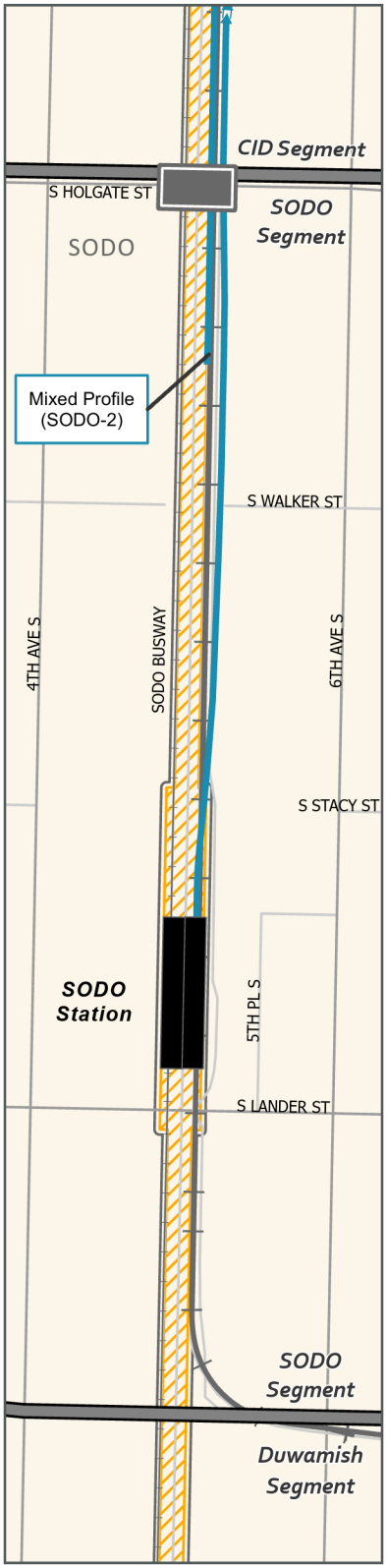
The Ballard Link Extension would include track north of the existing SODO Station to connect it to the existing Central Link line that continues south to Tacoma Dome.

Because the West Seattle Link Extension would temporarily terminate the line with tail tracks north of the SODO Station, the Ballard Link Extension would permanently connect the West Seattle Link Extension tail tracks to the existing Link light rail line traveling north to Everett. The new SODO Station and associated tail tracks are part of the West Seattle Link Extension (refer to Section 2.1.2.1, West Seattle Link Extension). The connection would begin at the tail tracks north of the new SODO Station (which is part of the West Seattle Link Extension) and continue north, at-grade or in a retained cut. It would connect to the existing Link light rail line in the vicinity of South Holgate Street. For a description of the operation of the SODO Station and the two light rail lines in SODO, see the discussion in Section 2.3, Operations and Maintenance.

The SODO Segment, alternatives and design option are shown on Figure 2-40.







Source: City of Seattle, King County (2019, 2020, 2021).

Alternatives
- Preferred Alternative
- Preferred Alternative with Third-party Funding
- Other Alternatives

Alternative Profile
- Elevated
- Tunnel
- At-Grade
- Retained Cut

Station
- Existing

- Segment Line
- Existing Link Light Rail
- Railroad
- SODO Busway
- Existing Overpass
- Proposed Overpass

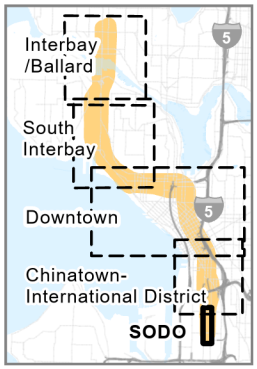


FIGURE 2-40
SODO Segment Alternatives
Ballard Link Extension - SODO Segment

West Seattle and Ballard Link Extensions

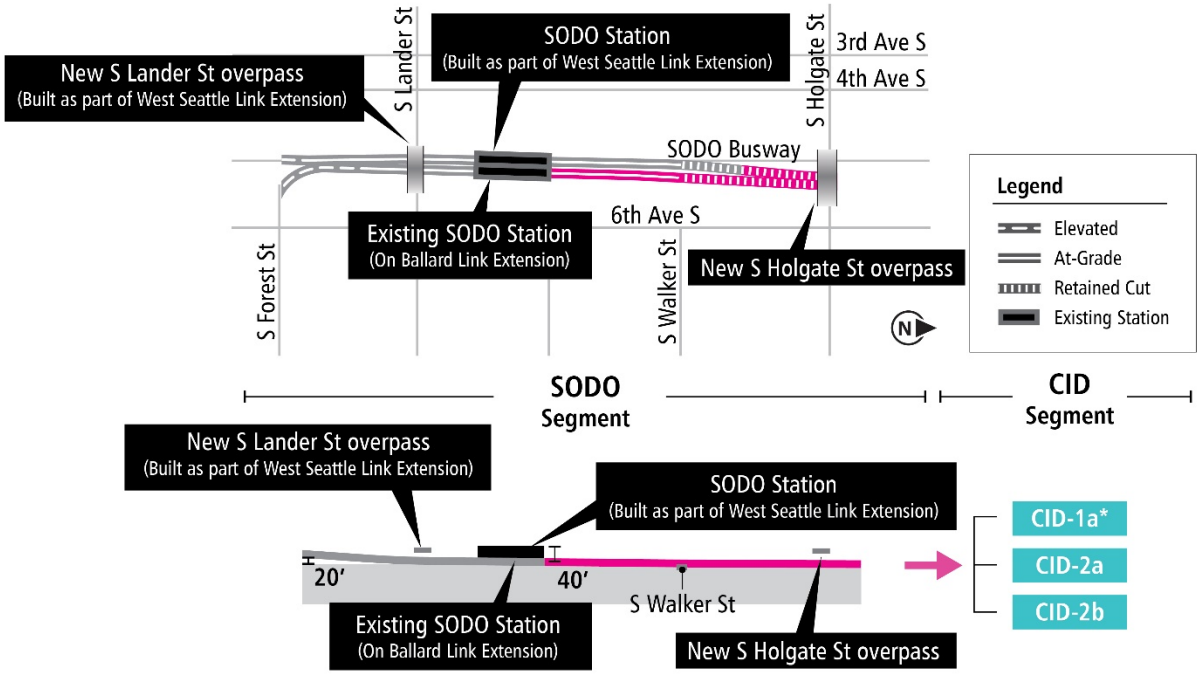
0 300 600 Feet
N

Preferred Alternative

At-Grade Alternative (SODO-1a)

Alternative SODO-1a would begin at the existing Link light rail line near South Lander Street. The alternative would continue north at-grade immediately east of the West Seattle Link Extension line (which would already be constructed) and would include the existing SODO Station. It would continue north under the new grade separation of South Holgate Street, which would be constructed as part of the Ballard Link Extension. The new roadway overpass would remove the need for traffic to stop for light rail trains, the frequency of which would increase with the combination of both the existing and new light rail lines. The plan and profile for this alternative is shown on Figure 2-41. This alternative would only connect to Alternative CID-1a*, Alternative CID-2a, and Option CID-2b in the Chinatown-International District Segment. The Board did not identify a preferred alternative in the Chinatown-International District Segment.

Figure 2-41. Plan and Profile for At-Grade Alternative (SODO-1a)



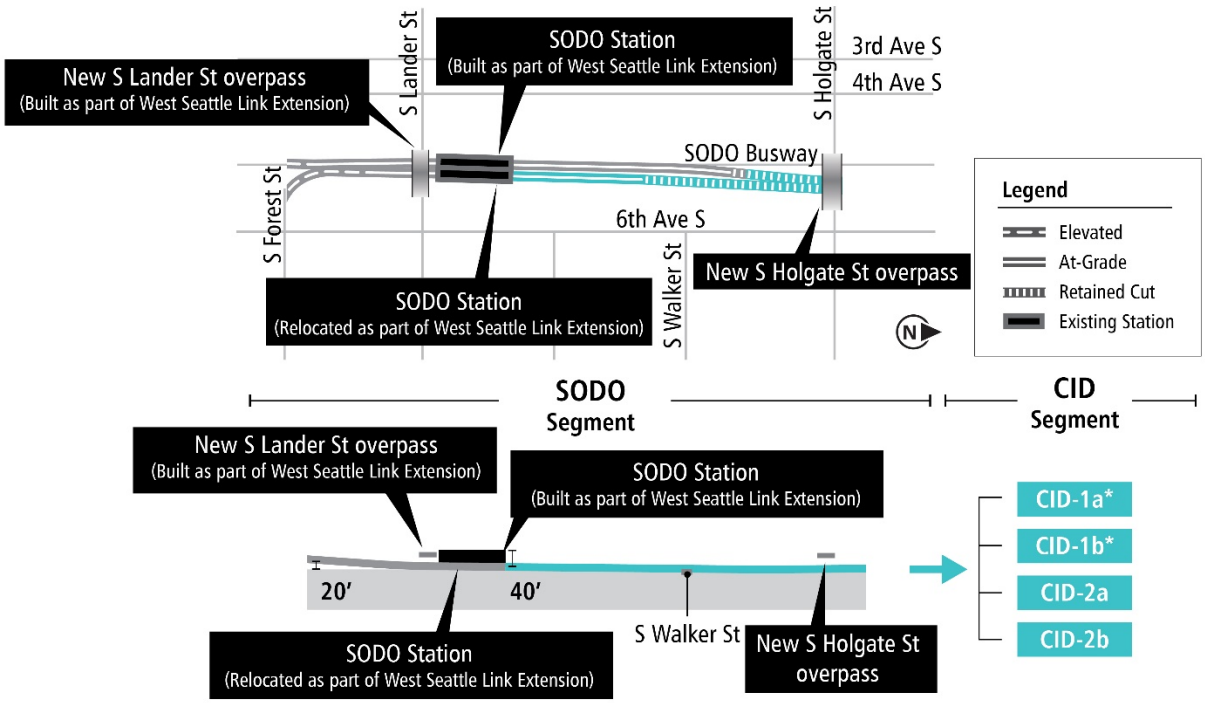
Diagrams are not to scale and all measurements are approximate for illustration purposes only.

Other Build Alternatives and Design Options

At-Grade South Station Option (SODO-1b)

Option SODO 1b would be the same as Alternative SODO-1a, except for the SODO Station location. The plan and profile for this option is shown on Figure 2-42. The existing SODO Station would be moved south as part of the West Seattle Link Extension (refer to Section 2.1.2.1, West Seattle Link Extension), and the Ballard Link Extension would begin at the existing Link light rail line north of South Lander Street at the relocated SODO Station. This option would connect to all the alternatives and design options in the Chinatown-International District Segment.

Figure 2-42. Plan and Profile for At-Grade South Station Option (SODO-1b)

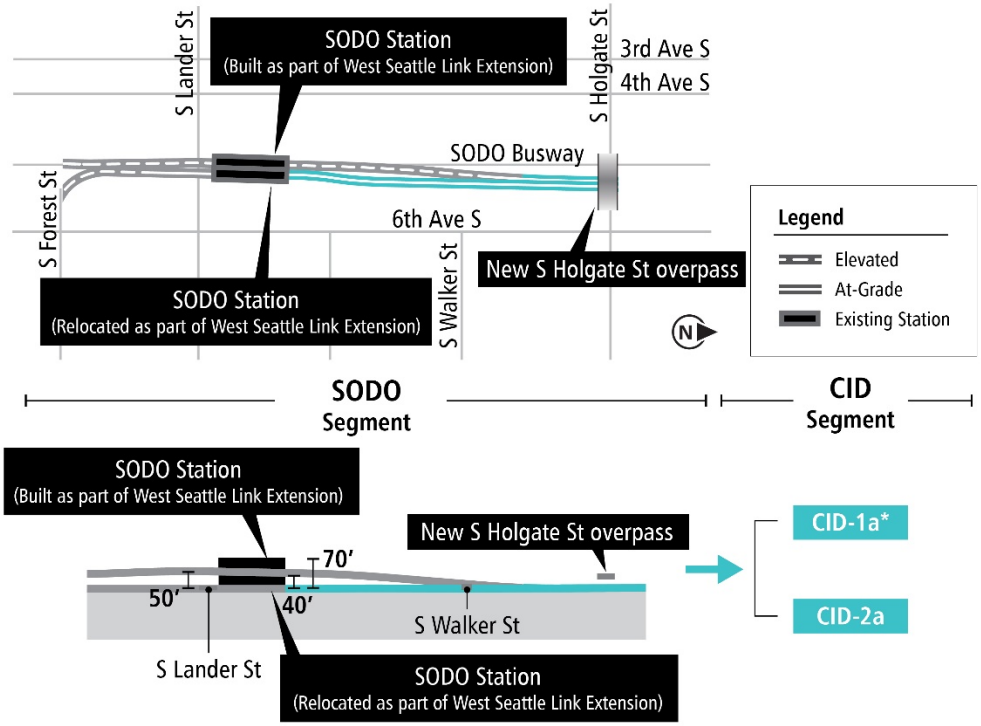


Diagrams are not to scale and all measurements are approximate for illustration purposes only.

Mixed Profile Alternative (SODO-2)

For the Ballard Link Extension, Alternative SODO-2 would be similar to Option SODO-1b and would begin at the existing Central Link line near South Lander Street and continue north at-grade immediately east of the West Seattle Link Extension (which would already be constructed). The plan and profile for this alternative is shown on Figure 2-43. The Ballard Link Extension line would connect to the existing SODO Station (that would be moved south as part of the West Seattle Link Extension). Similar to the other Ballard Link Extension SODO alternatives, South Holgate Street would be constructed as a new roadway overcrossing. The overpass would remove the need for traffic to stop for light rail trains, the frequency of which would increase with the combination of both the existing and new light rail lines. This alternative would only connect to Alternative CID-1a* and Alternative CID-2a in the Chinatown-International District Segment.

Figure 2-43. Plan and Profile for Mixed Profile Alternative (SODO-2)



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

2.1.2.2.2 Chinatown-International District Segment

The Chinatown-International District Segment would include the area from South Holgate Street to James Street and includes one station (International District/Chinatown Station).[1] The Board did not identify a preferred alternative in this segment. The alternative and design option on 4th Avenue South (Alternative CID-1a* and Option CID-1b*) would provide a pedestrian undercrossing for direct underground passenger transfer to the southbound line of the existing International District/Chinatown Station. Passenger transfer to the northbound line would require passengers to go up to street level and then go down to the existing station platform. The alternative and option on 5th Avenue South (Alternative CID-2a and Option CID-2b) would provide a pedestrian undercrossing for direct underground passenger transfer to the northbound line of the existing International District/Chinatown Station. Passenger transfer to the southbound line would require passengers to go up to street level and then go down to the existing station platform. Direct underground passenger transfer to the other direction of travel could be provided at these stations but would require mining under the existing Central Link line, which would have engineering and operational challenges. The Chinatown-International District Segment alternatives and design options are shown on Figure 2-44.

[1] Chinatown-International District is the name for this neighborhood according to City Ordinance 119297 (1999), and the existing light rail station in this neighborhood is named the International District/Chinatown Station. Due to this, Chinatown-International District is used when referring to the neighborhood and the segment and International District/Chinatown Station is used when referring to the station.

Source: City of Seattle, King County (2019, 2020, 2021).

Alternatives
- Preferred Alternative
- Preferred Alternative with Third-party Funding
- Other Alternatives

Alternative Profile
- Elevated
- Tunnel
- At-Grade
- Retained Cut

Station
- New
- Existing

- Segment Line
- Existing Link Light Rail
- East Link Light Rail (Under Construction)
- Existing Streetcar
- Center City Connector Streetcar (Construction Paused)
- Railroad
- SODO Busway
- Proposed Overpass
- Park

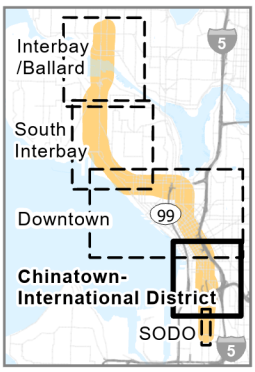


FIGURE 2-44
Chinatown-International District Segment Alternatives
Ballard Link Extension - Chinatown-International District Segment
West Seattle and Ballard Link Extensions

0 700 1,400 Feet N

Alternative CID-1a* and Option CID-1b* would both require reconstruction of the 4th Avenue South Viaduct. Such reconstruction was not included in the Sound Transit 3 Plan (Sound Transit 2016); therefore, third-party funding could be required for this alternative and option. Based on assessments to date, the construction duration in this segment could take longer for Alternative CID-1a* and Option CID-1b* (primarily due to reconstruction of the 4th Avenue South Viaduct) compared to Alternative CID-2a and Option CID-2b. Construction in the area of the station (generally between Seattle Boulevard South and James Street) for Alternative CID-1a* would take approximately 9 to 11 years and Option CID-1b* would take approximately 8 to 10 years. Construction in the station area for Alternative CID-2a would take approximately 8 to 9 years and Option CID-2b would take approximately 6.5 to 7.5 years. The construction duration for the Alternative CID-2a diagonal station configuration would be shorter. It is anticipated that construction in the station area of the diagonal station configuration would take approximately 5 to 6 years.

The 4th Avenue South Viaduct rebuild could lengthen the overall schedule of the Ballard Link Extension, but whether there is a delay, and the extent of that delay, would not be known until final design and construction sequencing is determined.

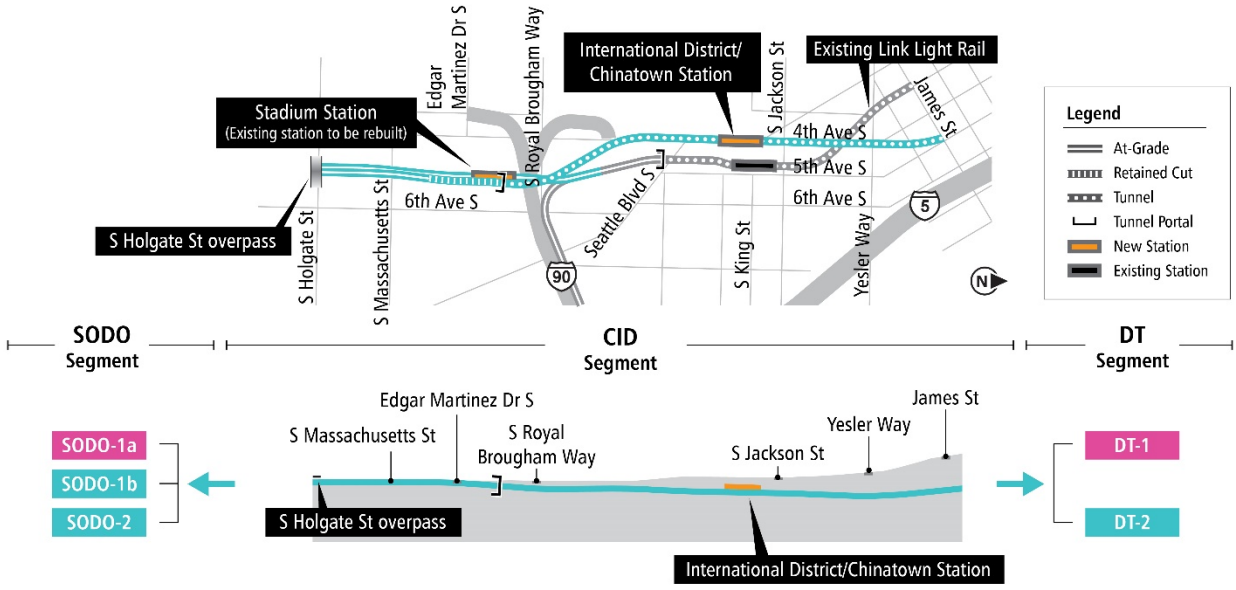
*4th Avenue Shallow Alternative (CID-1a)**

Alternative CID-1a* would begin at-grade east of the existing Link light rail line and extend north from South Holgate Street. The Stadium Station on the existing light rail line would be removed and rebuilt to accommodate the tunnel portal for the Ballard Link Extension and realignment of the existing light rail line. The station would be closed for up to 2 years while it is being rebuilt. However, the Ballard Link Extension would not connect to this existing light rail line and Stadium Station.

The alternative would enter a tunnel between Edgar Martinez Drive South and South Royal Brougham Way. The tunnel would continue to the northwest under the existing Link light rail line at South Royal Brougham Way and then north under 4th Avenue South. A new International District/Chinatown Station would be under 4th Avenue South, west of the existing International District/Chinatown Station. The 4th Avenue South Viaduct would be demolished and reconstructed to accommodate construction of this station. The station platform would be approximately 80 feet deep. Station entrances would be on the west and east side of 4th Avenue South, and the eastern station entrance would also be accessible from the existing International District/Chinatown Station plaza at South King Street.

From the station, the tunnel alignment would continue north under 4th Avenue South to Yesler Way, at which point it would begin transitioning to follow 5th Avenue or 6th Avenue in the Downtown Segment. The plan and profile for this alternative is shown on Figure 2-45.

Figure 2-45. Plan and Profile for 4th Avenue Shallow Alternative (CID-1a)*

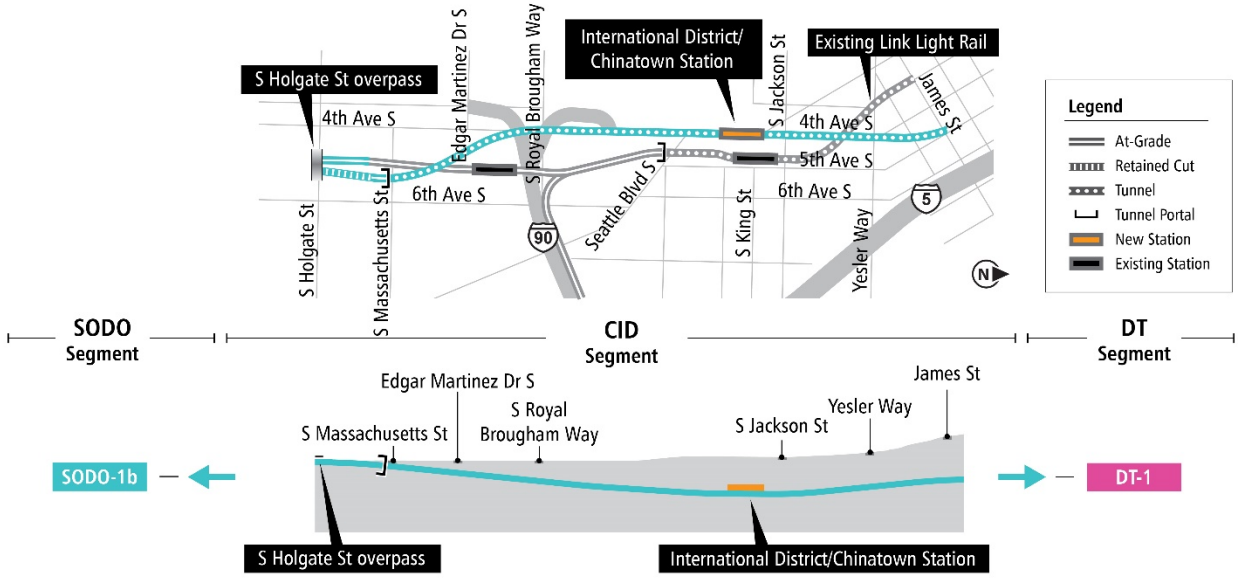


Diagrams are not to scale and all measurements are approximate for illustration purposes only. Connection to DT-1 is shown for illustration purposes.

*4th Avenue Deep Station Option (CID-1b)**

Option CID-1b* would begin at-grade slightly farther east of the existing Link light rail line than Alternative CID-1a* and extend north from South Holgate Street. The tunnel portal would be in the vicinity of South Massachusetts Street and the tunnel alignment would begin transitioning to follow 4th Avenue South farther south than Alternative CID-1a*. From Seattle Boulevard South to James Street, the alignment and station location would be similar Alternative CID-1a* but would be deeper. Station entrances would be the same as Alternative CID-1a*. The plan and profile for this option is shown on Figure 2-46. The International District/Chinatown Station platform would be approximately 190 feet deep, approximately 110 feet deeper than Alternative CID-1a*. The deeper tunnel and station would allow the station to be mined rather than constructed using cut-and-cover methods and would reduce surface disturbance during construction. The 4th Avenue South Viaduct would be demolished and reconstructed to accommodate construction of this station. This option would only connect to Alternative DT-1 in the Downtown Segment.

Figure 2-46. Plan and Profile for 4th Avenue Deep Station Option (CID-1b)*

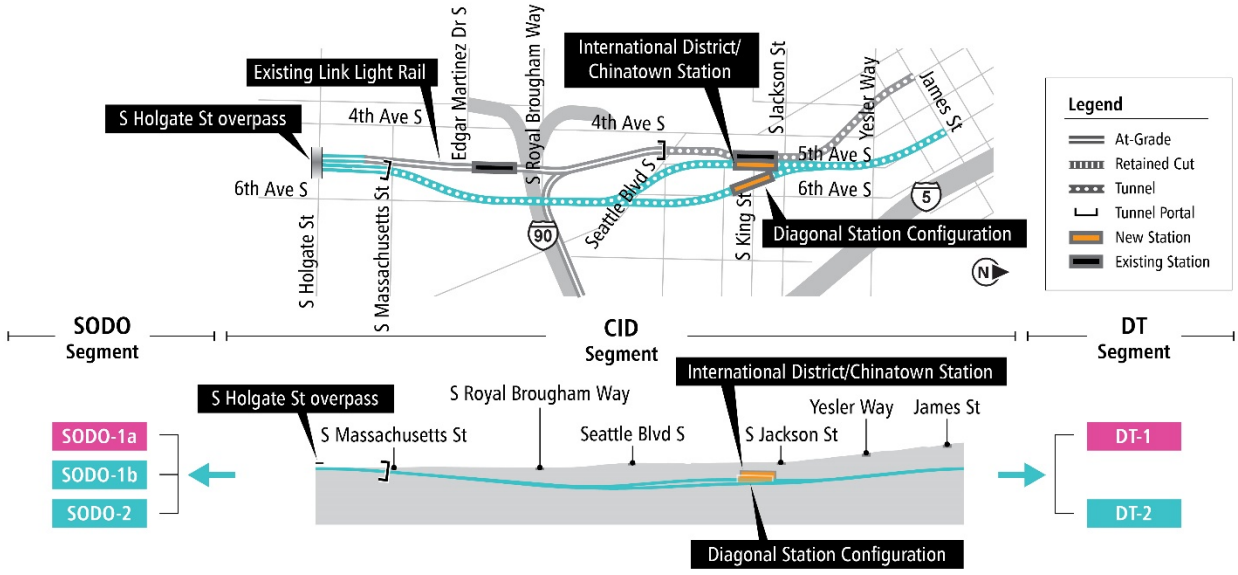


Diagrams are not to scale and all measurements are approximate for illustration purposes only.

5th Avenue Shallow Alternative (CID-2a)

Alternative CID-2a would begin at-grade east of the existing Link light rail line and extend north from South Holgate Street. The alternative would enter a tunnel in the vicinity of South Massachusetts Street and would continue north beneath 6th Avenue South. The tunnel would transition to be under 5th Avenue South near Seattle Boulevard South. The International District/Chinatown Station would be under 5th Avenue South, east of the existing International District/Chinatown Station. The plan and profile for this alternative is shown on Figure 2-47. The northbound station platform would be stacked over the southbound station platform and would be approximately 90 feet deep (to the lower platform). There is also a diagonal station configuration where the tunnel would be under 6th Avenue South and transition to 5th Avenue South between South Weller Street and South Jackson Street. The station platform for the diagonal station configuration would be between 5th Avenue South and 6th Avenue South, and would be approximately 25 feet deeper, with a depth of approximately 115 feet. In both configurations, the station entrance would be on the east side of 5th Avenue South, at the corner of South King Street. From the station, the tunnel alignment would continue north to James Street, either staying under 5th Avenue or transitioning to be under 6th Avenue.

Figure 2-47. Plan and Profile for 5th Avenue Shallow Alternative (CID-2a)

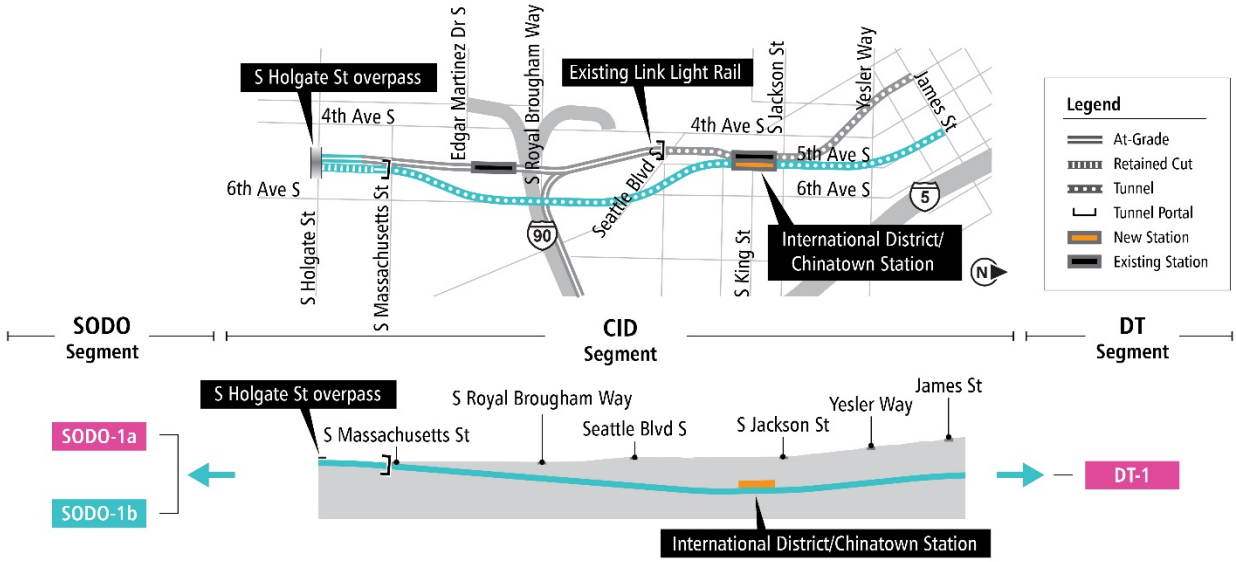


Diagrams are not to scale and all measurements are approximate for illustration purposes only. Connection to DT-1 is shown for illustration purposes.

5th Avenue Deep Station Option (CID-2b)

Option CID-2b would be the same as Alternative CID-2a except that the tunnel and the station would be deeper, and the station platforms would not be stacked. Station entrances would be the same as Alternative CID-2a. The plan and profile for this option is shown on Figure 2-48. The deeper tunnel and station would allow the station to be mined rather than constructed using cut-and-cover methods and would reduce surface disturbance during construction. The International District/Chinatown Station platform would be about 180 feet deep, approximately 90 feet deeper than Alternative CID-2a. This option would only connect to Alternative DT-1 in the Downtown Segment.

Figure 2-48. Plan and Profile for 5th Avenue Deep Station Option (CID-2b)



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

2.1.2.2.3 Downtown Segment

The Downtown Segment includes the area between James Street in Downtown and 2nd Avenue West in Uptown. The segment includes five stations: Midtown, Westlake, Denny, South Lake Union, and Seattle Center. The Downtown Segment and alternatives are shown on Figure 2-49. In addition, alternatives in this segment could include modification or addition of emergency egress, ventilation or other ancillary facilities needed for the ongoing operations and maintenance of the existing Downtown Seattle Transit Tunnel and stations.

Preferred Alternative

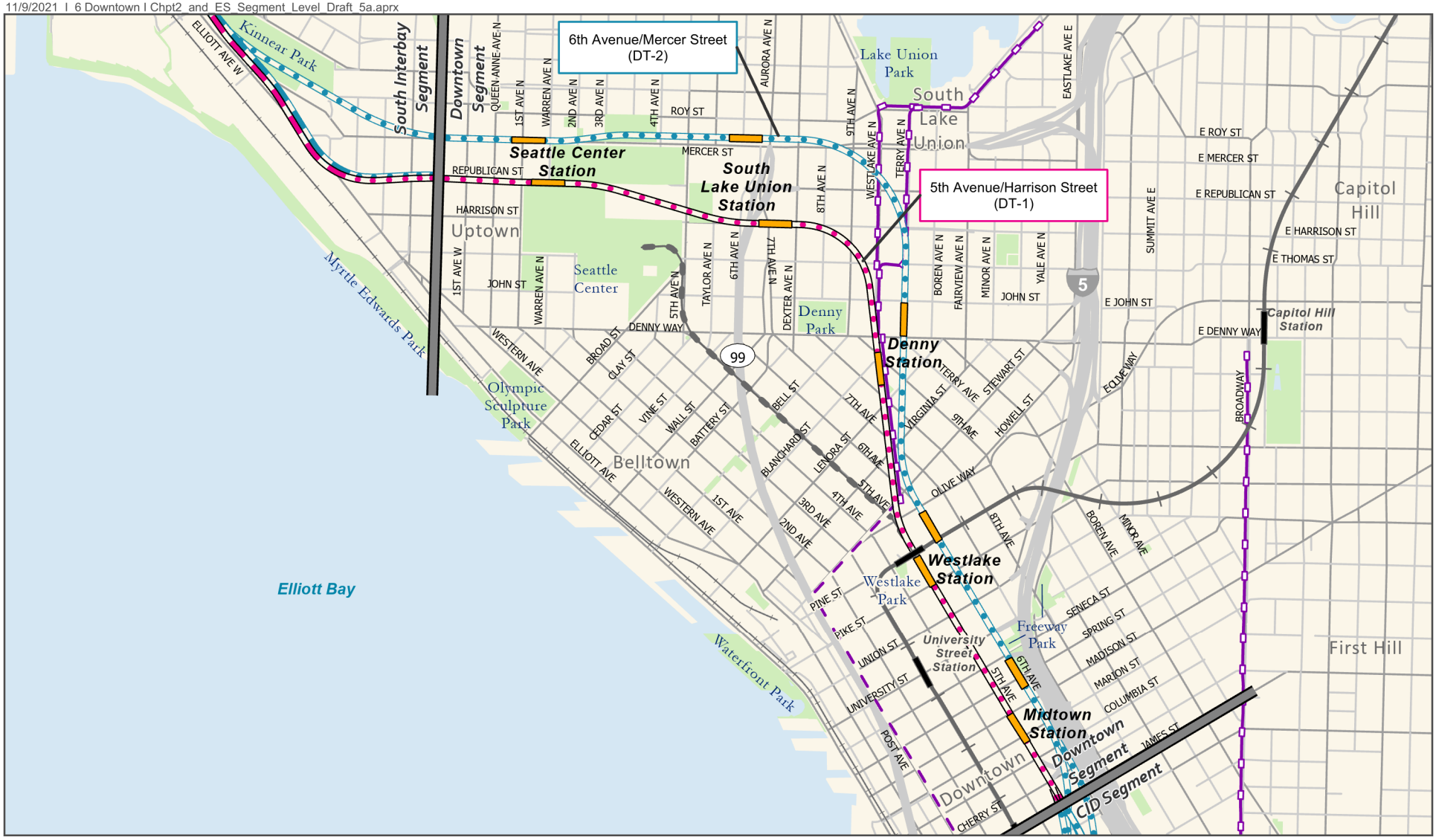
5th Avenue/Harrison Street Alternative (DT-1)

Alternative DT-1 would be in a tunnel generally heading north under 5th Avenue and Westlake Avenue and then heading west under Harrison Street and Republican Street. The plan and profile for this alternative is shown on Figures 2-50 and 2-51. Stations would be located as follows:

- **Midtown Station.** The station would be beneath 5th Avenue between Columbia Street and Madison Street. One station entrance would be on the corner of 5th Avenue and Columbia Street and the other on the corner of 4th Avenue and Madison Street. The station entrance on 4th Avenue would connect to the station via a pedestrian undercrossing beneath Madison Street. For this alternative to connect to Alternative CID-1a*, Option CID-1b*, and Option CID-2b in the Chinatown-International District Segment, the alignment between the Chinatown-International District Segment and Midtown Station and the station platform would need to be deeper.
- **Westlake Station.** The station would be beneath 5th Avenue between Pike Street and Pine Street, and would have three entrances. Two station entrances would be provided on 5th Avenue at the corners of Pike Street and Pine Street, and one station entrance would be on Pine Street between 4th Avenue and 5th Avenue. The station platform would connect to the existing Westlake Station at Pine Street via pedestrian undercrossings.

- **Denny Station.** The station would be beneath Westlake Avenue between Denny Way and Lenora Street. Station entrances would be on Westlake Avenue near the Denny Way intersection and south of Blanchard Street.
- **South Lake Union Station.** The station would be beneath Harrison Street, between Dexter Avenue North and just west of Aurora Avenue North. Station entrances would be on Harrison Street at the corners of Dexter Avenue North and Aurora Avenue North.
- **Seattle Center Station.** The station would be beneath Republican Street, east of 1st Avenue North. One station entrance would be on Republican Street at the corner of Queen Anne Avenue North, and the other entrance would be farther east at the corner of 2nd Avenue North (now a pedestrian walkway and campus maintenance and delivery access roadway within Seattle Center).

Alternative DT-1 would only connect to Alternative SIB-1 and Alternative SIB-2 in the South Interbay Segment.



Source: City of Seattle, King County (2019, 2020, 2021).

Alternatives
- Preferred Alternative
- Preferred Alternative with Third-party Funding
- Other Alternatives

Alternative Profile
- Elevated
- Tunnel
- At-Grade
- Retained Cut

Station
- New
- Existing

- Segment Line
- Existing Link Light Rail
- Monorail
- Existing Streetcar
- Center City Connector Streetcar (Construction Paused)
- Railroad
- Park

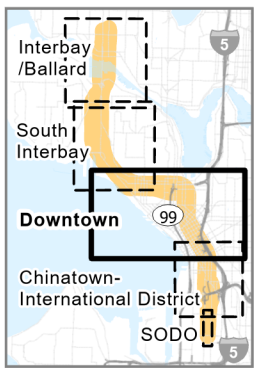


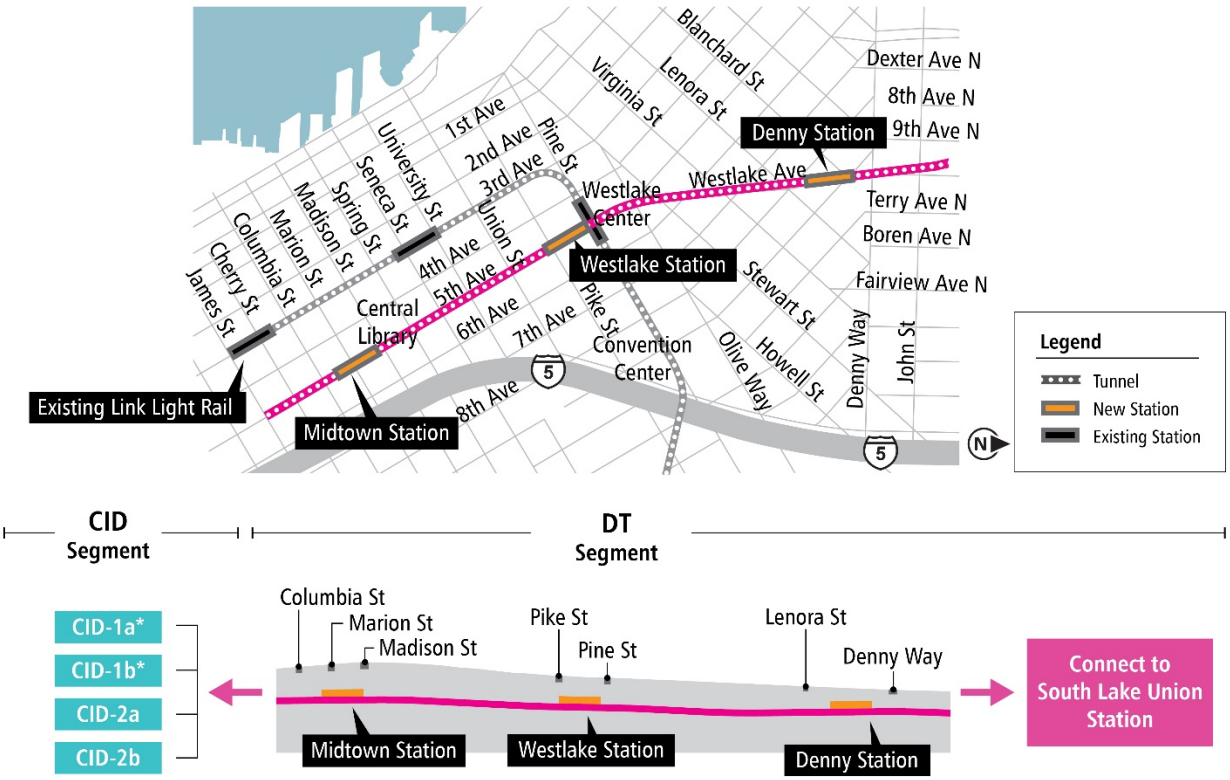
FIGURE 2-49
Downtown Segment Alternatives
Ballard Link Extension - Downtown Segment

West Seattle and Ballard Link Extensions

0 1,000 2,000 Feet

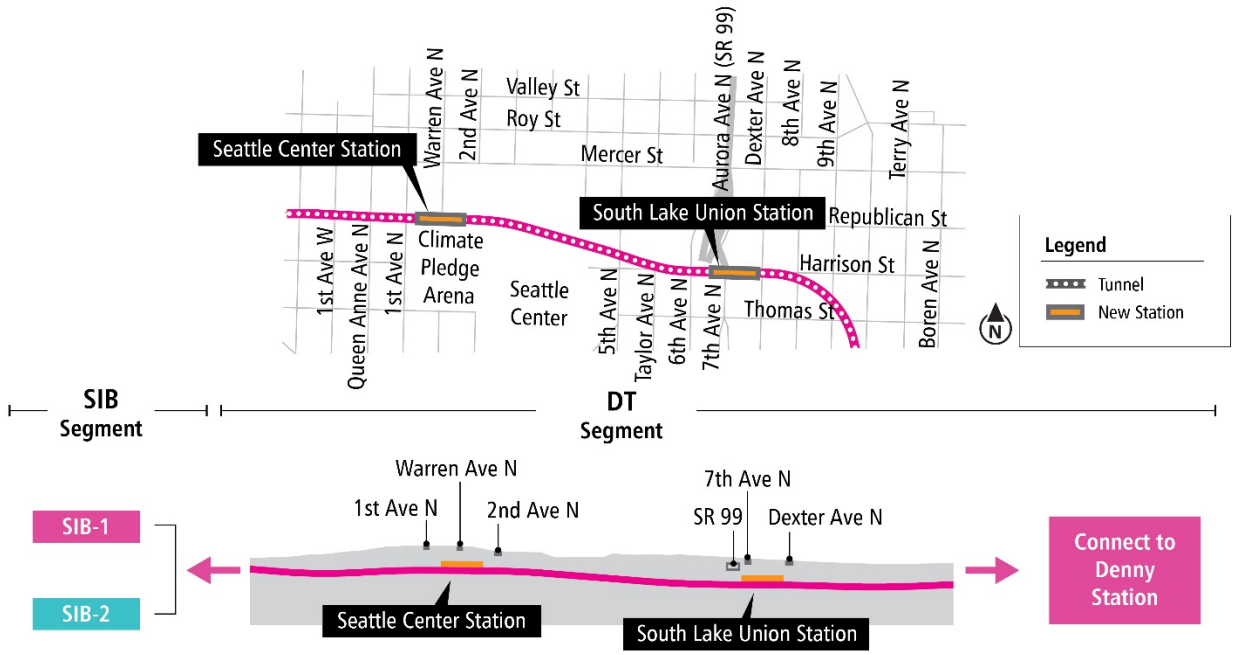
N

Figure 2-50. Plan and Profile for South Portion of Preferred 5th Avenue/Harrison Street Alternative (DT-1)



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

Figure 2-51. Plan and Profile for North Portion of Preferred 5th Avenue/Harrison Street Alternative (DT-1)



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

Other Build Alternative

6th Avenue/Mercer Street Alternative (DT-2)

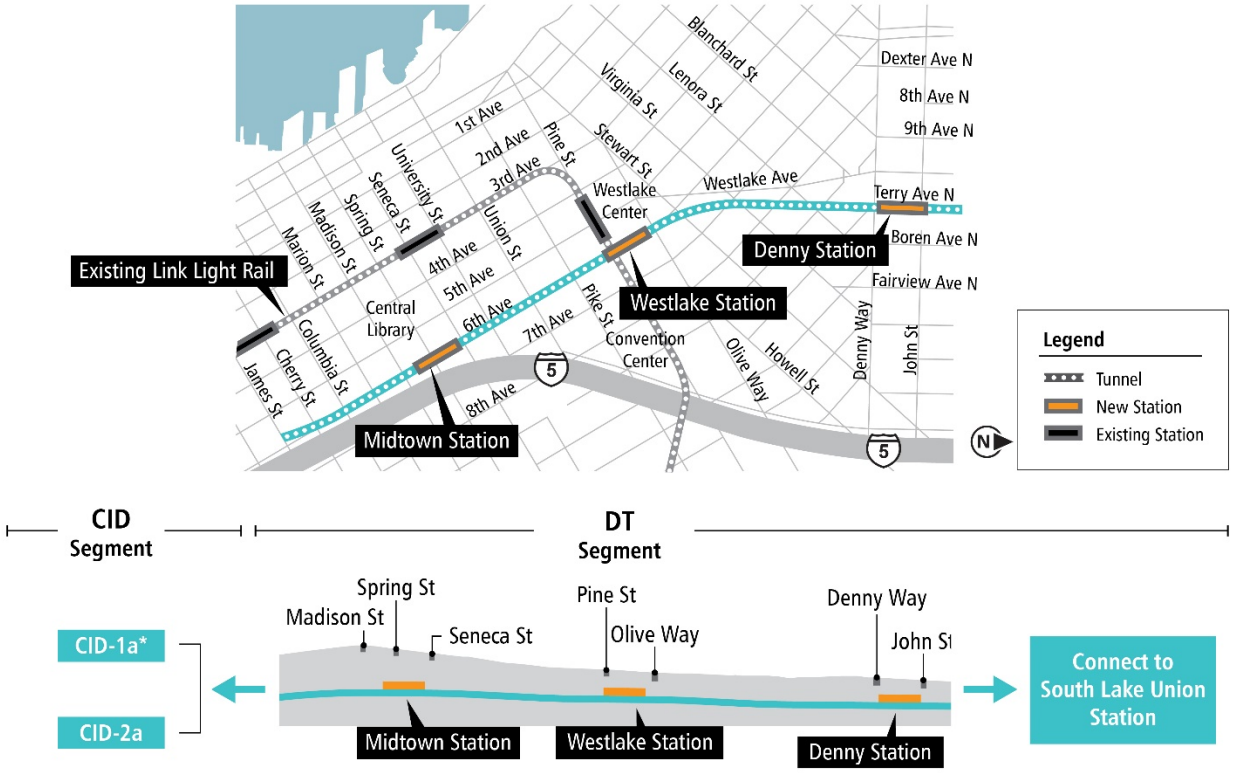
Alternative DT-2 would be in a tunnel generally heading north under 6th Avenue and Terry Avenue, and then west under Mercer Street. The plan and profile for this alternative is shown on Figures 2-52 and 2-53. Stations would be located as follows:

- **Midtown Station.** The station would be beneath 6th Avenue, between Madison Street and Seneca Street. Interstate 5 would be directly east of the station. One station entrance would be on 6th Avenue and the other on 5th Avenue, both between Spring Street and Seneca Street. The station entrance on 5th Avenue would connect to the station via a pedestrian undercrossing.
- **Westlake Station.** The station would be beneath 6th Avenue, between Pine Street and Olive Way. One station entrance would be at 6th Avenue and Olive Way, and the other entrance would be at 6th Avenue and Pine Street. The existing Westlake Station at Pine Street east of 5th Avenue would be modified to provide connection to the new station via a pedestrian undercrossing.
- **Denny Station.** The station would be beneath Terry Avenue North, between Denny Way and John Street. Both station entrances would be on Terry Avenue North, one at the corner of Denny Way and the other at John Street with a pedestrian connection to Boren Avenue.
- **South Lake Union Station.** The station would be north of Mercer Street between Aurora Avenue North and Taylor Avenue North. Both station entrances would be on Mercer Street one at the corner of Taylor Avenue North and the other at Aurora Avenue North with pedestrian connections at both Aurora Avenue North and Mercer Street.

- **Seattle Center Station.** The station would be beneath Mercer Street, between Warren Avenue North and Queen Anne Avenue North. Station entrances would be on Mercer Street at the corners of Warren Avenue North and 1st Avenue North.

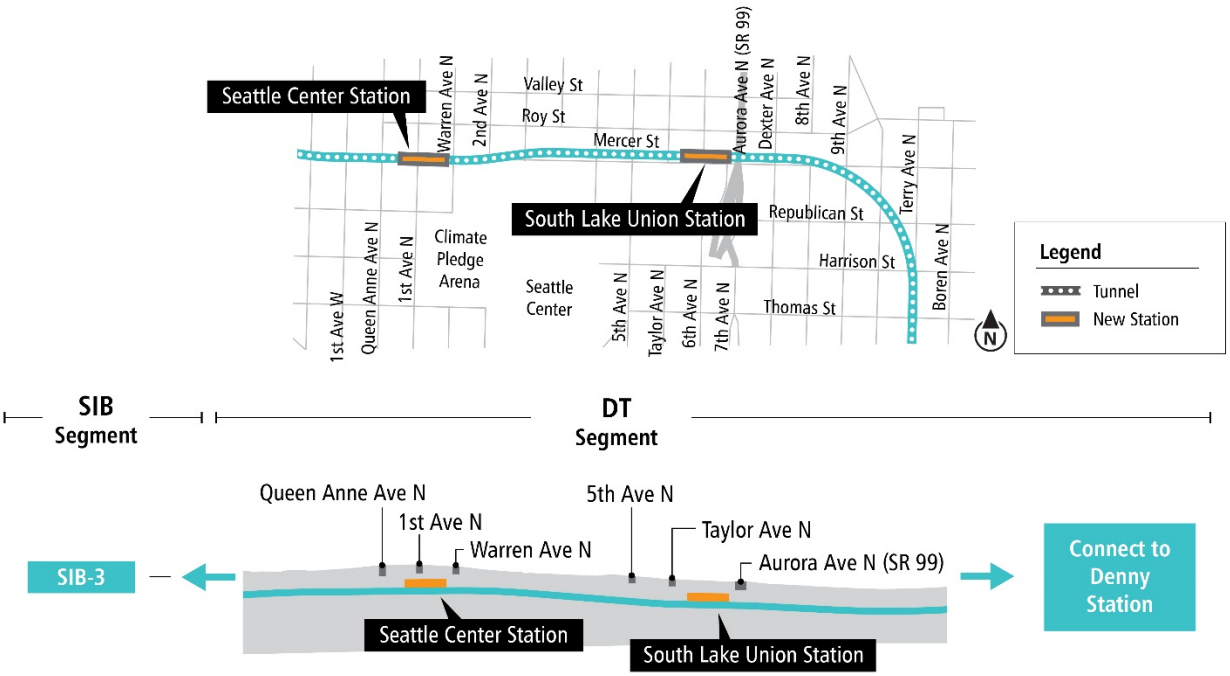
Alternative DT-2 would only connect to Alternative SIB-3 in the South Interbay Segment.

Figure 2-52. Plan and Profile for South Portion of 6th Avenue/Mercer Street Alternative (DT-2)



Diagrams are not to scale and all measurements are approximate for illustration purposes only. Connection to CID-2a is shown for illustration purposes.

Figure 2-53. Plan and Profile for North Portion of 6th Avenue/Mercer Street Alternative (DT-2)



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

2.1.2.2.4 South Interbay Segment

The South Interbay Segment includes the area between 2nd Avenue West in Uptown and West Dravus Street (west of 17th Avenue West) and West Barrett Street (east of 17th Avenue West) in Interbay. There would be one station in this segment, the Smith Cove Station. The South Interbay Segment and alternatives are shown on Figure 2-54.

Preferred Alternative

Galer Street Station/Central Interbay Alternative (SIB-1)

Alternative SIB-1 would continue the tunnel beneath Republican Street in the Downtown Segment from 2nd Avenue West to a tunnel portal on the east side of 5th Avenue West. From the tunnel portal, the alternative would become elevated and cross to the west side of Elliott Avenue West and continue northwest. The guideway would cross to the east side of Elliott Avenue West near West Mercer Place and would continue northwest between the east side of Elliott Avenue West and Kinnear Park. North of Kinnear Park, the alignment would transition to the west side of Elliott Avenue West to enter the Smith Cove Station.

Smith Cove Station would be elevated above the West Galer Street bridge, and the top of the station structure would be approximately 90 feet high. The station entrances would be on both sides of West Galer Street and accessed from Elliott Avenue West. The West Galer Street flyover pedestrian facility would be modified to maintain its function in approximately the same location, providing access to the station. In addition to bus stops, this alternative would include a bus layover facility at the station, with access from Elliott Avenue West.

Source: City of Seattle, King County (2019, 2020, 2021).

Alternatives
- Preferred Alternative
- Preferred Alternative with Third-party Funding
- Other Alternatives

Alternative Profile
- Elevated
- Tunnel
- At-Grade
- Retained Cut

Station
- New

- Segment Line
- Railroad
- Park

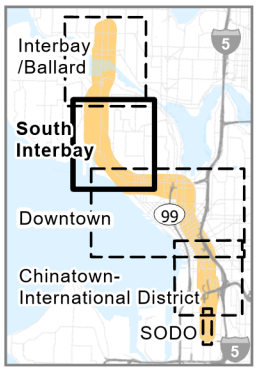
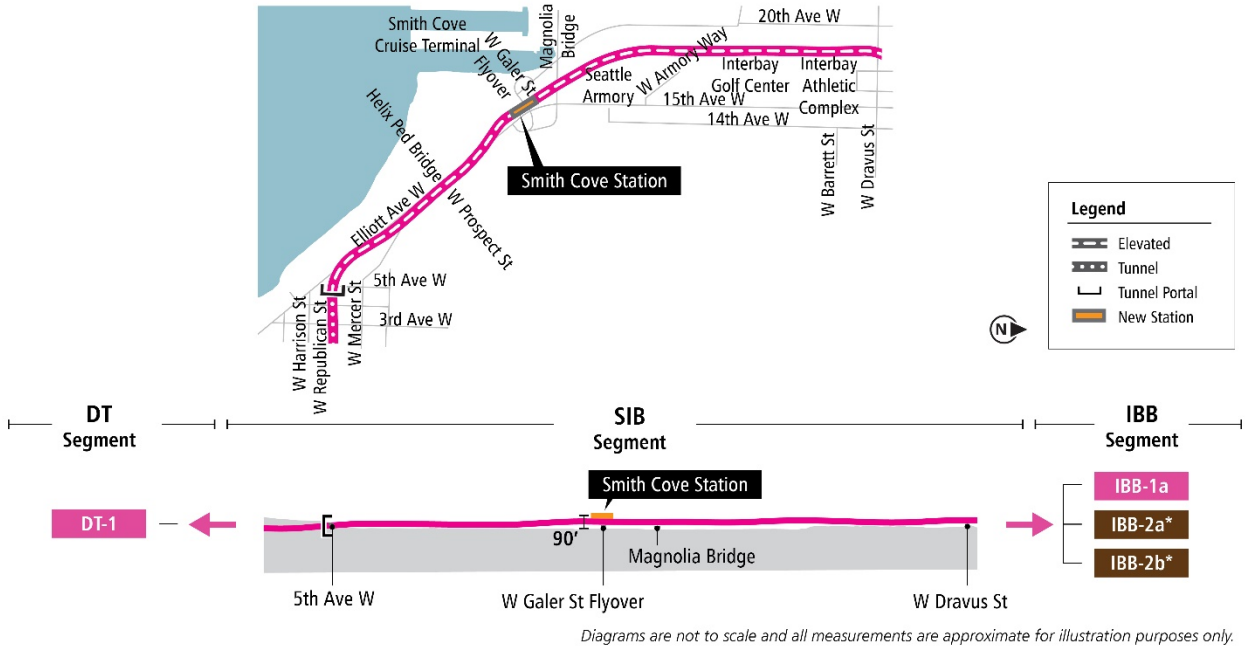


FIGURE 2-54
South Interbay Segment Alternatives
Ballard Link Extension - South Interbay Segment
West Seattle and Ballard Link Extensions

0 800 1,600 Feet
N

From the Smith Cove Station, the elevated guideway would cross over the Magnolia Bridge and continue north along the east side of the BNSF Railway tracks to West Armory Way. From West Armory Way, the alignment would continue north along the western edge of Interbay Golf Center and Interbay Athletic Complex. The elevated guideway would continue over West Dravus Street and connect to Alternative IBB-1a in the Interbay/Ballard Segment. The elevated guideway for this alternative would be between about 30 and 80 feet high and would be highest near West Armory Way to allow for a future bridge over the BNSF Railway tracks. The plan and profile for this alternative is shown on Figure 2-55. For this alternative to connect to the tunnel alternative and design option (Alternative IBB-2a* and Option IBB-2b*) in the Interbay/Ballard Segment, it would transition from elevated to at-grade along the Interbay Athletic Complex to continue under West Dravus Street.

Figure 2-55. Plan and Profile for Preferred Galer Street Station/Central Interbay Alternative (SIB-1)



Other Build Alternatives

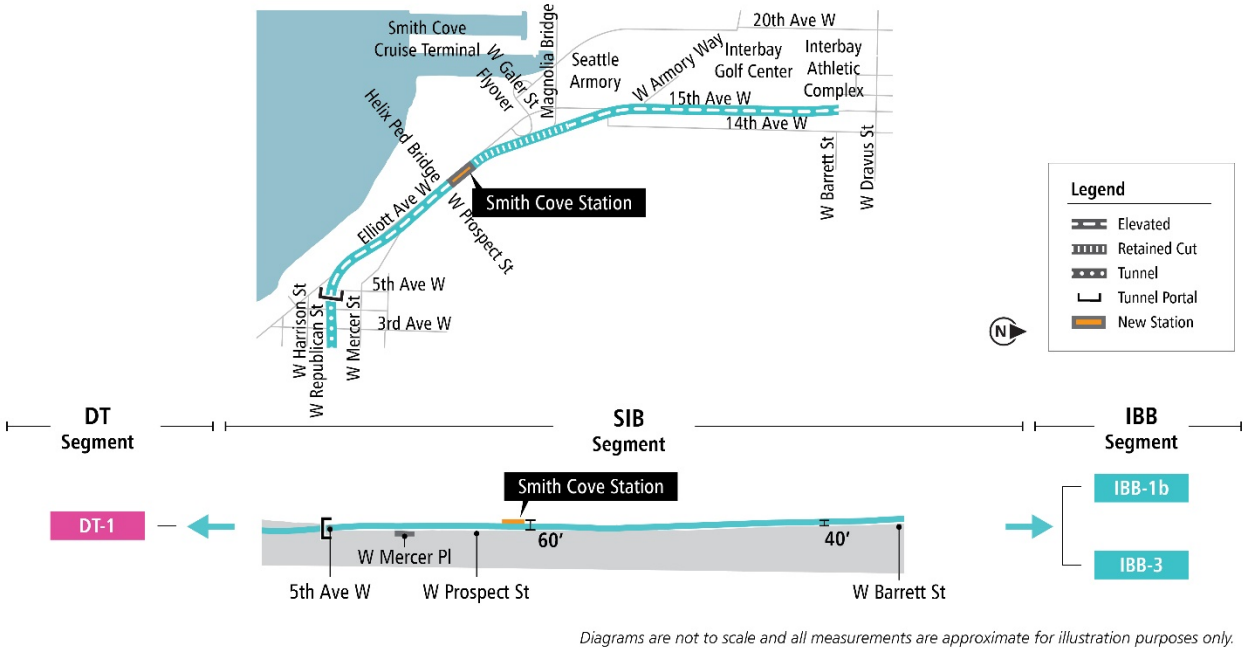
Prospect Street Station/15th Avenue Alternative (SIB-2)

Alternative SIB-2 would continue the tunnel beneath Republican Street in the Downtown Segment from 2nd Avenue West to a tunnel portal on the east side of 5th Avenue West. From the tunnel portal, the alternative would become elevated and cross to the west side of Elliott Avenue West and continue northwest. The guideway would cross to the east side of Elliott Avenue West near West Mercer Place and would continue northwest between the east side of Elliott Avenue West and Kinnear Park. It would enter an elevated Smith Cove Station north of Kinnear Park on the east side of Elliott Avenue West. The station would be north of West Prospect Street with station entrances and a bus layover facility in addition to bus stops, all accessed from Elliott Avenue West. The top of the station structure would be approximately 60 feet high. The station would have a retaining wall on the east side.

From the Smith Cove Station, the elevated guideway would continue northwest along the east side of Elliott Avenue West and then transition to a retained cut along the edge of the Southwest Queen Anne Greenbelt before turning north and transitioning to the center of 15th Avenue West near West Newton Street. It would continue on elevated guideway in the middle of 15th Avenue

West to West Barrett Street. The elevated guideway would be about 40 feet tall in this area. The plan and profile for this alternative is shown on Figure 2-56. This alternative would only connect to the bridge alternative and design option (Option IBB-1b and Alternative IBB-3) in the Interbay/Ballard Segment.

Figure 2-56. Plan and Profile for Prospect Street Station/15th Avenue Alternative (SIB-2)



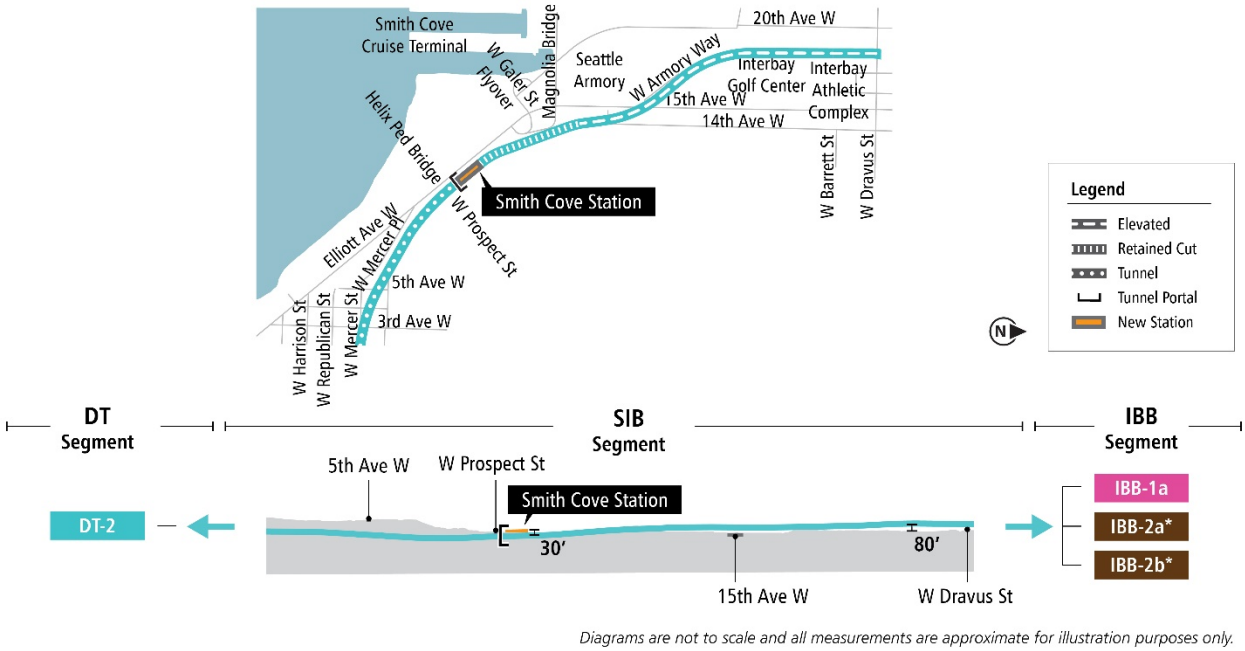
Diagrams are not to scale and all measurements are approximate for illustration purposes only.

Prospect Street Station/Central Interbay Alternative (SIB-3)

Alternative SIB-3 would continue the tunnel under West Mercer Street from the Downtown Segment from 2nd Avenue West to a tunnel portal east of Elliott Avenue West on the northwestern edge of Kinnear Park, south of West Prospect Street. The alternative would continue north from the tunnel portal in a retained cut to Smith Cove Station north of West Prospect Street with station entrances and a bus layover facility in addition to bus stops, all accessed from Elliott Avenue West. The station would be in a retained cut with the top of the station structure approximately 30 feet above the existing ground surface.

From the Smith Cove Station, the alternative would continue north in a retained cut along the edge of the Southwest Queen Anne Greenbelt. Most of the retained cut would have a retaining wall on the east side. The alternative would transition to elevated guideway near West Howe Street and cross 15th Avenue West at West Armory Way to travel northwest along the northern side of West Armory Way. From West Armory Way, it would continue north along the western edge of Interbay Golf Center and Interbay Athletic Complex and then continue over West Dravus Street to connect to Alternative IBB-1a. The elevated guideway would range in height from approximately 30 to 80 feet and would be highest at the Interbay Athletic Complex for it to pass over West Dravus Street. The plan and profile for this alternative is shown on Figure 2-57. For this alternative to connect to the tunnel alternative and design option (Alternative IBB-2a* and Option IBB-2b*) in the Interbay/Ballard Segment, it would transition from elevated to at-grade along the Interbay Athletic Complex and continue under West Dravus Street.

Figure 2-57. Plan and Profile for Prospect Street Station/Central Interbay Alternative (SIB-3)



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

2.1.2.2.5 Interbay/Ballard Segment

The Interbay/Ballard Segment includes the area between West Dravus Street (west of 17th Avenue West) and West Barrett Street (east of 17th Avenue West) in Interbay to Northwest 58th Street in Ballard. All alternatives and design options would have two stations: Interbay and Ballard. Although a tunnel alternative and option is considered in the environmental review for this segment, a tunnel in Interbay/Ballard was not included in the Sound Transit 3 Plan; therefore, third-party funding could be required for the tunnel alternative and option. The Interbay/Ballard Segment alternatives and design options are shown on Figure 2-58.

Preferred Alternative

Elevated 14th Avenue Alternative (IBB-1a)

Alternative IBB-1a would cross over West Dravus Street on elevated guideway parallel to the BNSF tracks and then curve northeast to Interbay Station. The station would be just north of West Dravus Street between the railroad tracks and 17th Avenue West. The top of the station structure would be approximately 80 to 90 feet high, depending on which alternative it connects with in the South Interbay Segment. Station access would be from West Dravus Street and 17th Avenue West. Thorndyke Avenue West and 17th Avenue West would provide roadway circulation underneath the station.

The alternative would continue on elevated guideway from Interbay Station northeast over the West Emerson Street interchange and then curve north to cross Salmon Bay on a fixed-span bridge on the east side of the Ballard Bridge (15th Avenue Bridge). The bridge over Salmon Bay would have a clearance of approximately 136 feet over the navigation channel in Salmon Bay. This height could be adjusted through coordination with the United States Coast Guard.

Source: City of Seattle, King County (2019, 2020, 2021).

Alternatives
- Preferred Alternative
- Preferred Alternative with Third-party Funding
- Other Alternatives

Alternative Profile
- Elevated
- Tunnel
- At-Grade
- Retained Cut

Station
- New

- Segment Line
- Railroad
- Stream
- Park

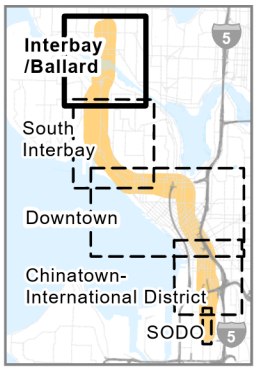


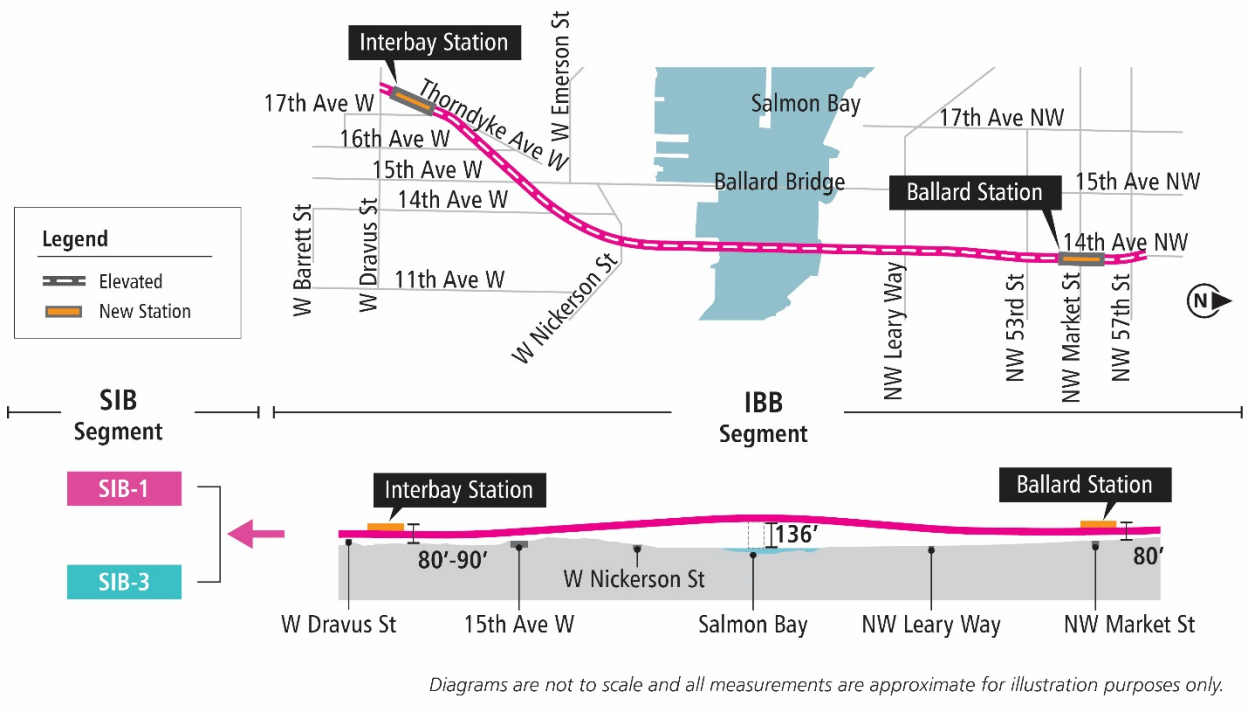
FIGURE 2-58
Interbay/Ballard Segment Alternatives
Ballard Link Extension - Interbay/Ballard Segment
West Seattle and Ballard Link Extensions

0 800 1,600 Feet

N

The alternative would continue north within the 14th Avenue Northwest right-of-way before transitioning to the east edge of the road south of Northwest Market Street. Ballard Station would be on the east side of 14th Avenue Northwest, straddling Northwest Market Street, with station entrances on both sides of Northwest Market Street. The top of the station structure would be approximately 80 feet high. Elevated tail tracks would extend north of the station along the east side of 14th Avenue Northwest and would then curve west to end above the center of the roadway. The elevated guideway for this alternative would range in height from approximately 30 to 140 feet and would be highest south and north of Salmon Bay where it transitions to the bridge. The plan and profile for this alternative is shown on Figure 2-59.

Figure 2-59. Plan and Profile for Preferred Elevated 14th Avenue Alternative (IBB-1a)



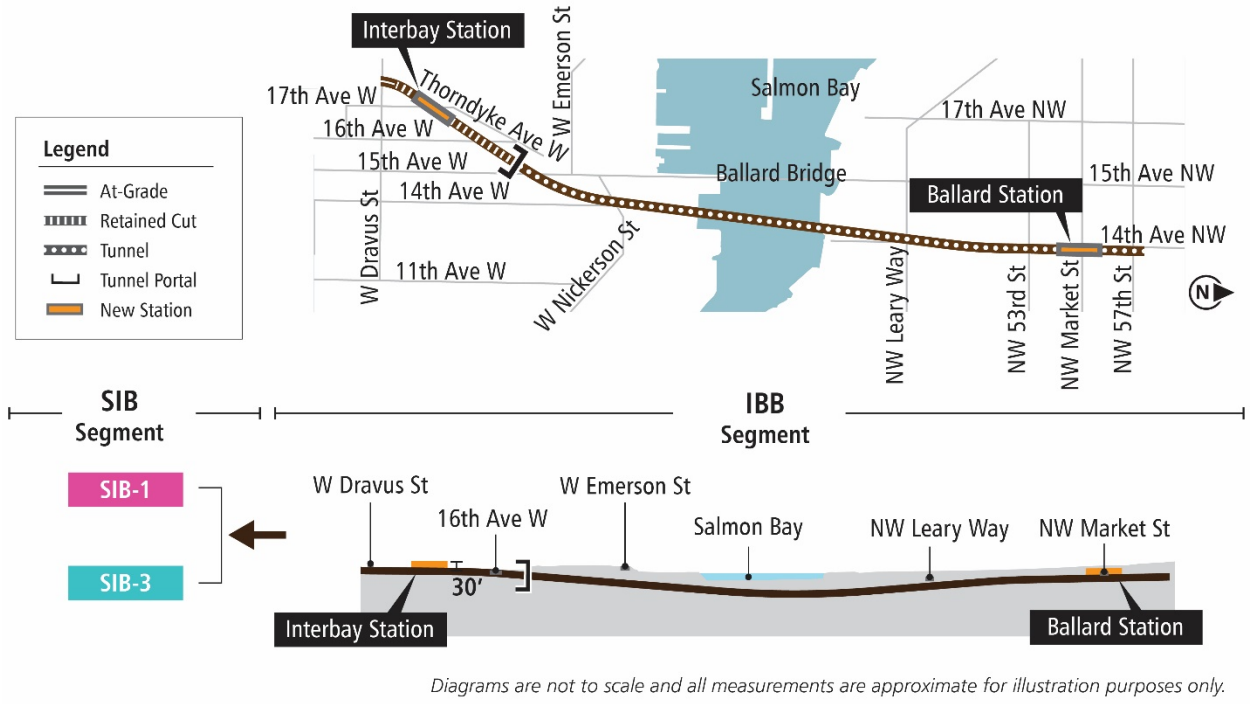
Preferred Alternatives with Third-party Funding

Tunnel 14th Avenue Alternative (IBB-2a)*

Alternative IBB-2a* would cross under West Dravus Street, enter in a retained cut parallel to the BNSF tracks, and then curve northeast to Interbay Station. The station would be in a retained cut north of West Dravus Street, between 17th Avenue West and Thorndyke Avenue West. The top of the station structure would be approximately 30 feet high. The station entrances would be on 17th Avenue West and West Bertona Street. The station would require realignment and reconstruction of the northern end of 17th Avenue West and Thorndyke Avenue West, and truncation of 16th Avenue West at West Bertona Street.

The alternative would continue in a retained cut from Interbay Station to a tunnel portal between 15th Avenue West and Thorndyke Avenue West. The tunnel would travel northeast under the West Emerson Street interchange, under Salmon Bay (east of Ballard Bridge), and then curve north beneath 14th Avenue Northwest to Northwest Market Street. The station would be under 14th Avenue Northwest and Northwest Market Street, with station entrances on both sides of Northwest Market Street. Tail tracks would extend beneath 14th Avenue Northwest north of the station. The plan and profile for this alternative is shown on Figure 2-60.

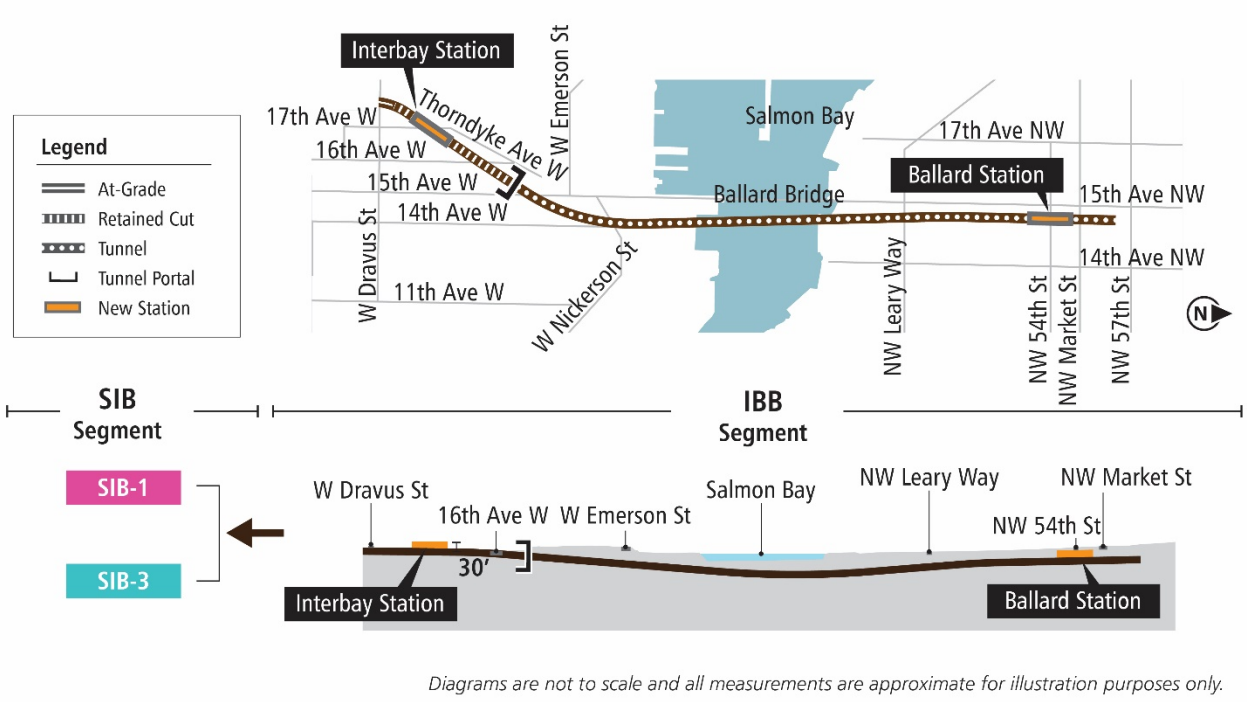
Figure 2-60. Plan and Profile for Preferred Tunnel 14th Avenue Alternative (IBB-2a)*



Tunnel 15th Avenue Station Option (IBB-2b)*

The Interbay Station and tunnel alignment for Option IBB-2b* would be the same as Alternative IBB-2a* until just north of West Nickerson Street, where it would head north under Salmon Bay and continue in a tunnel east of 15th Avenue Northwest to the Ballard Station. The station would be east of 15th Avenue Northwest and south of Northwest Market Street, with access from both sides of 15th Avenue Northwest. An underground walkway beneath 15th Avenue Northwest would provide access from the west side of the road. Tail tracks would extend north of the station underneath the east side of 15th Avenue Northwest. The plan and profile for this option is shown on Figure 2-61.

Figure 2-61. Plan and Profile for Preferred Tunnel 15th Avenue Station Option (IBB-2b)*



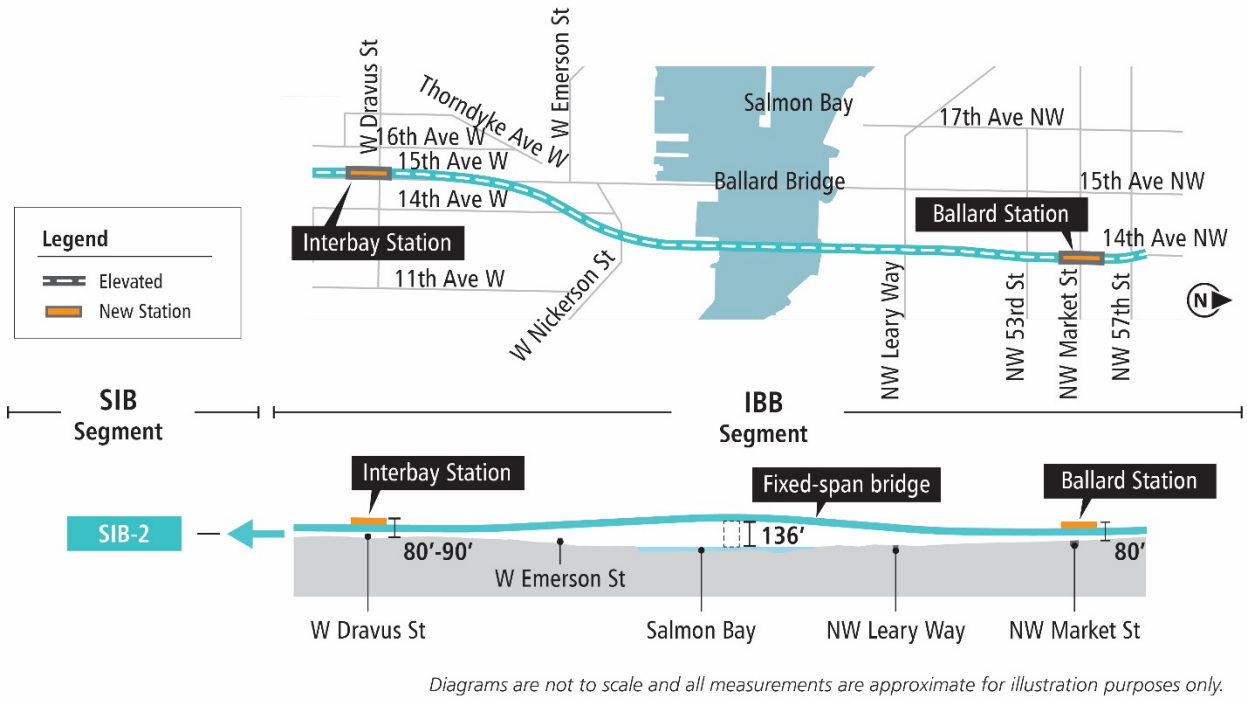
Diagrams are not to scale and all measurements are approximate for illustration purposes only.

Other Build Alternatives and Design Options

Elevated 14th Avenue Alignment Option (from Prospect Street Station/15th Avenue) (IBB-1b)

Option IBB-1b is a design option for connecting Alternative SIB-2 in the South Interbay Segment (refer to the South Interbay Segment "Other Build Alternatives" section) to the Alternative IBB-1a bridge over Salmon Bay. The alignment would start north of the Interbay Station on 15th Avenue West. It would extend to the northeast of the intersection of 15th Avenue West and West Emerson Street on elevated guideway and would connect to the 14th Avenue alignment bridge over Salmon Bay. The bridge over Salmon Bay and the elevated guideway to the north would be the same as for Alternative IBB-1a. The plan and profile for this option is shown on Figure 2-62.

Figure 2-62. Plan and Profile for Elevated 14th Avenue Alignment Option (from Prospect Street Station/15th Avenue) (IBB-1b)



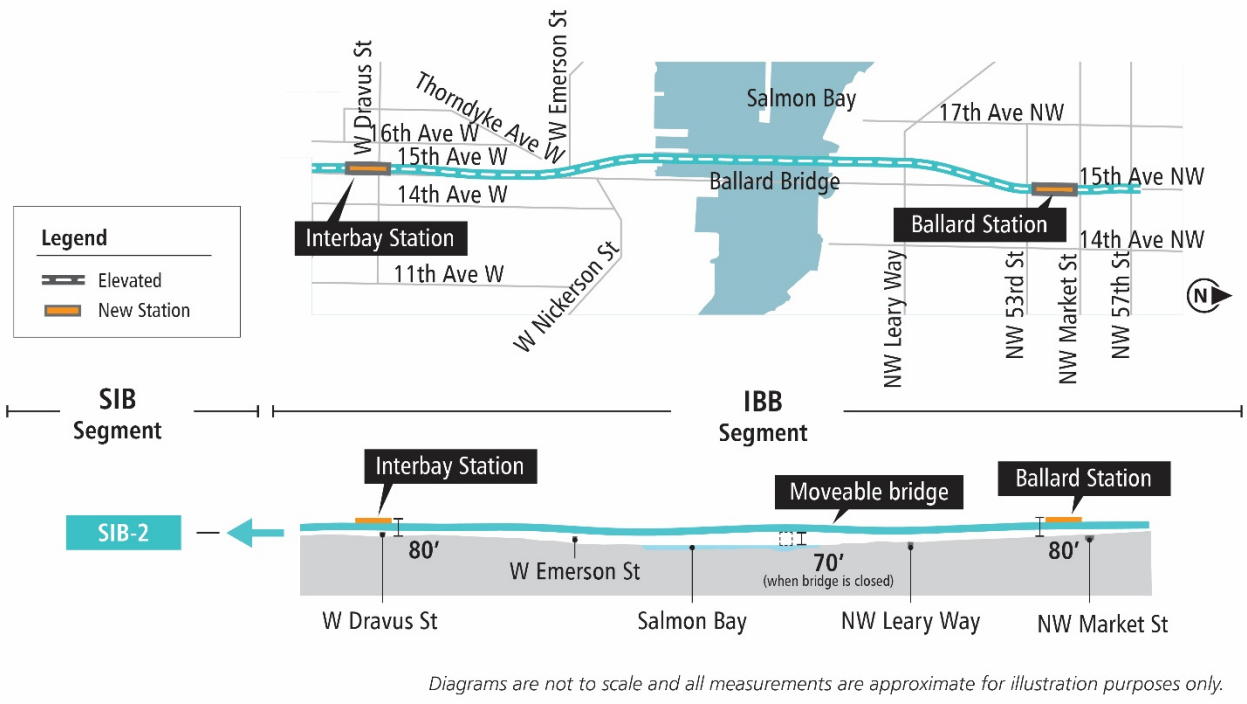
Elevated 15th Avenue Alternative (IBB-3)

Alternative IBB-3 would cross over West Dravus Street in the median of 15th Avenue West. Interbay Station would be elevated above 15th Avenue West, straddling West Dravus Street. Station entrances would be on West Dravus Street above 15th Avenue West on both the east and west sides of 15th Avenue West. The top of the station structure would be approximately 80 feet high.

The alternative would continue on elevated guideway from the Interbay Station on the west side of 15th Avenue West and climb to cross over the West Emerson Street interchange. From the interchange, the alternative would cross over the east side of Fishermen's Terminal west of the Ballard Bridge and cross Salmon Bay on a moveable bridge. The bridge would have a clearance of approximately 70 feet over the navigation channel in Salmon Bay when closed but would open to allow taller vessels to pass underneath. This height could be adjusted through coordination with the Coast Guard.

The alternative would continue north from the bridge on elevated guideway on the west side of 15th Avenue Northwest and transition to the east edge of 15th Avenue Northwest near Northwest 52nd Street. The Ballard Station would be elevated above the east edge of 15th Avenue Northwest, south of Northwest Market Street. The top of the station structure would be approximately 80 feet high. The station would have entrances on both sides of 15th Avenue Northwest. Elevated tail tracks would extend north of the station along the east edge of 15th Avenue Northwest within the road right-of-way. The elevated guideway for this alternative would range from approximately 50 to 80 feet high and would be highest south and north of Salmon Bay where it transitions to the bridge. The plan and profile for this alternative is shown on Figure 2-63. This alternative would only connect to Alternative SIB-2.

Figure 2-63. Plan and Profile for Elevated 15th Avenue Alternative (IBB-3)



Diagrams are not to scale and all measurements are approximate for illustration purposes only.

2.2 No Build Alternative

No Build Alternative

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

The No Build Alternative includes the transportation system and environment as they would exist in 2042 without the proposed project, and it provides a baseline condition for comparing impacts of the Build Alternatives and design options. The year 2042 is used as the analysis year because it is consistent with the Puget Sound Regional Council 2040 planning horizon year and aligns with full buildout of the light rail capital projects included in the Sound Transit 3 Plan under the realignment target schedule. Under the affordable schedule, only south Kirkland to Issaquah would not be complete by 2042. The No Build Alternative includes projects, funding packages, and proposals in the central Puget Sound region that are planned to occur with or without the WSBLE. No Build Alternative improvements include transit, roadway, and other transportation actions by state, regional, and local agencies that are currently funded or committed, and those that are likely to be implemented based on approved and committed funding.

The No Build Alternative for the West Seattle Link Extension and the Ballard Link Extension assumes the following major rail improvements by Sound Transit:

- Extension of the existing Central Link light rail spine north to Everett and south to Tacoma Dome
- Extension of East Link to downtown Redmond
- New Link light rail line from south Kirkland to Issaquah

- Infill Link stations at Northeast 130th Street, South Graham Street, and South Boeing Access Road in Seattle
- Sounder South Line capacity enhancements and extension to Tillicum and DuPont

The No Build Alternative includes regional highway improvements listed in the State Transportation Improvement Plan and Puget Sound Regional Council Regional Capacity Projects List, local improvements in the City of Seattle Capital Improvement Program (City of Seattle 2018), and bus service enhancements based on the METRO CONNECTS long-range plan (Metro 2016) and Sound Transit's Long-Range Plan (Sound Transit 2014a), with frequency upgrades and restructures along and near the project corridor. The No Build Alternative also includes redevelopment projects at Terminals 5, 18, 46, and 91 by the Port of Seattle. Appendix N.1, Transportation Technical Report, describes the major projects assumed in the No Build Alternative by jurisdiction.

2.3 Operations and Maintenance

2.3.1 Vehicles and Operation

Table 2-3 identifies the weekday service schedule for the overall WSBLE Project. Operating plans specific to each extension are further described below. The West Seattle Link Extension and Ballard Link Extension would typically operate 20 hours a day Monday through Saturday and 18 hours a day on Sundays and holidays. Preliminary operating plans have two trains deployed between approximately 4:30 a.m. and 5 a.m., to be staged for the beginning of morning service. Similarly, two trains may operate between approximately 1 a.m. and 1:30 a.m. as they return to the operations and maintenance facility or terminus stations at the close of service each day. Light rail trains would operate with up to four cars, although fewer cars could be used during off-peak periods.

Train frequencies are established based on ridership demand and other service standards and would be finalized in an updated Rail Fleet Management Plan. Table 2-3 shows the preliminary proposed operating plan, or service schedule, for weekdays. Weekend and holiday service would have the same train frequencies as the early/late frequencies shown in the table.

Table 2-3. Weekday Service Schedule

Service Period	Time Period	Service Level	Train Frequency (minutes) - West Seattle Link Extension	Train Frequency (minutes) - Ballard Link Extension
Early morning	5 a.m. to 6 a.m.	Early	10	10
Morning peak	6 a.m. to 8:30 a.m.	Peak	6	5
Midday	8:30 a.m. to 3 p.m.	Base	10	10
Afternoon peak	3 p.m. to 6:30 p.m.	Peak	6	5
Evening	6:30 p.m. to 10 p.m.	Base	10	10
Evening late night	10 p.m. to 1 a.m.	Late	15	15

Additional light rail vehicles would be required to operate the West Seattle and Ballard Link extensions. Conventional low-floor light rail vehicles would be used to provide level boarding for all passengers and would be easily accessible by people with disabilities. A typical light rail train is shown on Figure 2-64.

Figure 2-64. Link Light Rail Train

2.3.2 Maintenance

Light rail vehicles would be stored, deployed, maintained, inspected, and repaired primarily at operations and maintenance facilities. The Operations and Maintenance Facility Central, on South Forest Street in SODO, is the only such facility currently open. In 2021, Sound Transit completed construction of the Operations and Maintenance Facility East in Bellevue, and it will be fully in service in 2023 when East Link opens. Sound Transit will construct two additional facilities north and south of Seattle as part of the Sound Transit 3 system expansion program, with a total planned system capacity of 496 light rail vehicles upon completion. The Operations and Maintenance Facility South is planned to be operational by 2029, and the Operations and Maintenance Facility North is planned to be operational by 2034. The WSBLE Project has been designed to integrate into the system of existing and planned operations and maintenance facilities. The West Seattle and Ballard Link Extensions would both connect into the existing Operations and Maintenance Facility Central. Construction of the connection of the extensions to the facility would have only minimal temporary effects to the operation of the facility and would not impact the ability to maintain the light rail system or vehicles.

Terminus stations would have tail tracks and provisions for light maintenance activities such as cleaning the interiors of vehicles. The following sections describe the operations and maintenance facilities that would meet the operation, storage, and maintenance requirements for the WSBLE Project.

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

2.3.2.1 West Seattle Link Extension

Light rail vehicles operating on the West Seattle Link Extension would be stored, deployed, maintained, inspected, and repaired primarily at the Operations and Maintenance Facility Central. Capacity at the Operations and Maintenance Facility Central will be made available to meet these needs by shifting work to the Operation and Maintenance Facility South. When the West Seattle Link Extension is connected to the existing Downtown Seattle Transit Tunnel in 2037, light rail vehicles operating on the line between Alaska Junction Station and Everett Station would also be stored, deployed, maintained, inspected, and repaired at the new Operations and Maintenance Facility North.

2.3.2.2 Ballard Link Extension

With opening of the Ballard Link Extension, light rail vehicles operating on the line between Ballard Station and Tacoma Dome Station would primarily be stored, deployed, maintained, inspected, and repaired at the Operations and Maintenance Facility Central and Operations and Maintenance Facility South.

2.4 Interim Terminus and Minimum Operable Segments

Sound Transit would build the WSBLE Project in phases. The West Seattle Link Extension is anticipated to be completed and operational prior to the Ballard Link Extension, which would take longer to design and construct. Therefore, the West Seattle Link Extension new SODO Station would be an interim terminus. In addition, due to funding or other factors, Sound Transit could construct a smaller portion of the project, deferring completion of the full project to Alaska Junction or Ballard. Sound Transit has developed two potential scenarios, or minimum operable segments (M.O.S.) for analysis in the event the full project cannot be built at one time. The following sections describe the interim terminus and the M.O.S. for the WSBLE Project.

2.4.1 SODO Station as Interim Terminus for West Seattle Link Extension

Interim Terminus

An interim terminus is a station that temporarily serves as the "end of the line" when the project is constructed in phases. An interim terminus could successfully operate on an interim or long-term basis, if necessary, until the entire project is built.

As detailed at the beginning of this chapter, the West Seattle Link Extension and the Ballard Link Extension are expected to be operational by 2032 and 2037 (or 2039 depending on funding availability), respectively. The SODO Station for the West Seattle Link Extension would serve as an interim terminus station before completion of the Ballard Link Extension, which would permanently connect the West Seattle Link Extension to the existing Central Link line heading north to Everett. Until the Ballard Link Extension is complete, riders from West Seattle would need to disembark at the new SODO Station and transfer to the existing station and light rail system to travel north to Lynnwood or south to Tacoma Dome or use another mode to reach their destination. To serve as the interim terminus, the new SODO Station would have a tail track beyond the station platform, parking for operators, and office and storage space for light maintenance activities.

The Ballard Link Extension would construct a new downtown tunnel that would connect to the existing light rail line that travels south to Angle Lake and that will extend to Tacoma Dome. With completion of the Ballard Link Extension, riders on the West Seattle Link Extension would be able to continue north on the existing system connecting to Lynnwood and Everett, transfer at the International District/Chinatown Station to travel to Bellevue and Redmond on light rail, or transfer at SODO Station to continue south to Tacoma Dome.

2.4.2 Minimum Operable Segments for WSBLE

Minimum Operable Segment

A minimum operable segment (M.O.S.) is defined by the Federal Transit Administration (FTA) as "a segment of the Locally Preferred Alternative that provides the most cost-effective solution with the greatest benefits for the project." The M.O.S. must be able to function as a standalone project and not be dependent on any future segments being constructed (FTA 2008). The end-of-line station for an M.O.S is also considered an interim terminus because it is assumed that the project would be fully built out at a later date.

The project would have two potential minimum operable segments: a West Seattle and Ballard Link Extensions M.O.S. (SODO Station to Delridge Station and SODO Station to Smith Cove Station), and a Ballard Link Extension-only M.O.S. (SODO Station to Smith Cove Station). The M.O.S. are shown in Appendix J, Conceptual Design Drawings. A West Seattle Link Extension-only M.O.S. from SODO Station to Delridge Station was not identified for analysis as, absent the Ballard Link Extension, it would only consist of two stations, requiring most riders to transfer at either end. The Ballard Link Extension is necessary to tie the West Seattle Link Extension into the existing Central Link line. Without this tie-in, a West Seattle Link Extension-only M.O.S. would likely have low ridership and would not provide the most cost-effective solution with the greatest benefits for the project.

2.4.2.1 West Seattle and Ballard Link Extensions Minimum Operable Segment

The West Seattle and Ballard Link Extensions M.O.S. consists of the West Seattle Link Extension from just north of the proposed new SODO Station to the Delridge Station and the Ballard Link Extension from SODO Station to Smith Cove Station in Interbay. This M.O.S. can be applied to all of the West Seattle and Ballard Link Extensions alternatives and design options.

For the West Seattle Link Extension portion of this M.O.S. (SODO Station to Delridge Station), the tail track for the M.O.S. would extend approximately 500 feet southwest of Delridge Station. Additional bus stops and bus layover spaces would be needed at Delridge Station either onsite or on local streets to accommodate additional transit connections needed at the Delridge Station. A track connection to the existing Operations and Maintenance Facility Central in SODO is also assumed as part of the West Seattle and Ballard Link Extensions M.O.S. The Delridge Station was identified as the M.O.S. because it would be the first station in the West Seattle area and would provide an opportunity for transit integration to connect areas to the south (White Center and Burien) as well as the rest of the West Seattle peninsula. The Avalon Station is not a potential terminus, as it would have added cost for construction of the guideway and station without substantially increasing ridership.

The Ballard Link Extension portion of this M.O.S. (SODO Station to Smith Cove Station) would be expected to open in 2037. The portion in SODO would be as described for the Ballard Link Extension alternatives and option in Section 2.1.2.2.1, SODO Segment, and the northern tail track for the M.O.S. would extend approximately 500 feet north of Smith Cove Station. Additional bus layover spaces would be needed near Smith Cove Station to accommodate additional transit connections that would occur at the station. The Ballard Link Extension portion of the West Seattle and Ballard Link Extensions M.O.S. was identified for the following reasons:

- **System capacity.** Estimates of growth in future ridership suggest that the new downtown transit tunnel is necessary to meet future ridership capacity needs (refer to Chapter 1, Purpose and Need). In addition, the new tunnel would provide the operational flexibility and

reliability to support other light rail extensions to the north (Everett) and south (Tacoma) that will use these tunnels.

- **Tunnel construction.** The size and depth of the new 3.3-mile downtown transit tunnel with six underground stations would require a large construction staging area and tunnel spoils handling facility. These are planned to be near the north tunnel portal in the vicinity of the Smith Cove Station site. Because of the limited available construction staging sites along the new downtown tunnel route, it is preferable to complete the downtown tunnel at once rather than in phases, which would require multiple large staging areas and tunnel spoils handling facilities. Therefore, the M.O.S. includes the full length of the new tunnel. The Smith Cove Station would be the next station north of the northern tunnel portal and could provide turnback track facilities to accommodate service operations at that location.
- **Access from northwest Seattle.** The Smith Cove Station would provide better access to the Link system for Magnolia, Interbay, Ballard, and neighborhoods to the north than the next station south at Seattle Center. The Smith Cove Station provides good bicycle and vehicle access from these neighborhoods. It also provides opportunity for transit transfers with robust off-street facilities to accommodate direct transit transfers and onsite layover for buses. The layover and circulation for buses and other modes would be better accommodated at the Smith Cove Station than the Interbay Station to the north, which has limited on-street layover facilities. The Interbay Station would require substantially more on-street bus routing than is planned for the full-build alternative and would also require more than an additional mile of construction. It is less likely that ridership from these areas would access Link at Seattle Center Station due to topographical and roadway constraints between Elliott Avenue West and Uptown.

2.4.2.2 Ballard Link Extension-Only Minimum Operable Segment

The Ballard Link Extension-only M.O.S. (SODO Station to Smith Cove Station), would be from south of SODO Station to Smith Cove Station in Interbay. The northern tail track for this M.O.S. would extend approximately 500 feet north of Smith Cove Station. The Ballard Link Extension-only M.O.S. would also include a new station in SODO as described under the West Seattle Link Extension, and a track connection to the existing Operations and Maintenance Facility Central in the Duwamish Segment. Riders on the existing light rail line and future extensions coming from north of Westlake Station would need to transfer at Westlake Station, International District/Chinatown Station, or SODO Station to continue south toward Tacoma Dome. As with the full build out of the Ballard Link Extension, the Tacoma to Ballard line would not serve the existing Stadium Station, and riders on that line would need to transfer to the existing light rail line to reach the Stadium Station. This M.O.S. can be applied to all Ballard Link Extension alternatives and design options.

2.5 Alternatives Development and Scoping

As described in Chapter 1, Purpose and Need for the West Seattle and Ballard Link Extensions, the WSBLE Project is the result of a multi-year planning process. After voter approval for funding the Sound Transit 3 Plan, which includes the WSBLE Project, Sound Transit continued to build on past planning with the Alternatives Development process described below. The Federal Transit Administration (FTA) is relying on the local planning process to inform the environmental review process under the National Environmental Policy Act (NEPA), consistent with federal regulations (Code of Federal Regulations Title 23, Section 450.318) that allow for it,

and the Moving Ahead for Progress in the 21st Century Act and the Fixing America's Surface Transportation Act that encourage it.

2.5.1 Development of Draft Environmental Impact Statement Alternatives

WSBLE is an element of the Sound Transit 3 Plan, financing for which was approved by voters in November 2016. The Representative Project in the Sound Transit 3 Plan identified mode, corridor, and station areas. To identify alternatives to study in the WSBLE Environmental Impact Statement, Sound Transit completed an Alternatives Development process that included a three-level screening process. The Alternatives Development process began with early scoping under Washington's State Environmental Policy Act (SEPA) in February 2018. Sound Transit published an early scoping notice in the SEPA register on February 2, 2018, which initiated early scoping and started a 30-day comment period. Additional public notification was provided with mailed postcards, print and online advertisements, and social media notices. Three public open houses and an agency meeting were held during this comment period, as well as an online open house. During early scoping, Sound Transit requested comments on the preliminary purpose and need statement, potential refinements to the Sound Transit 3 Representative Project (see Appendix M, Summary of Alternatives Development and Initial Assessment Process, for a map of the Representative Project), and potential community benefits and impacts. Comments were accepted by mail, email, online comment forms, and on comment boards and maps at the open houses (both in person and online).

Comments received from government entities (agencies, advisory boards/commissions, and educational institutions), Tribes, businesses, and community organizations made specific recommendations on alternatives to the Sound Transit 3 Representative Project and issues to study, including local and regional mobility, freight mobility and infrastructure, transit integration, TOD, hazardous materials and contaminated sites, air quality, utilities, trails, vibration, and electromagnetic interference. Most of the public comments focused on elevated alignments in West Seattle and Interbay/Ballard, with many suggesting a variety of alternatives to these elevated alignments, including tunnels. Additional information on the early scoping process is described in Appendix F, Public Involvement and Agency Coordination.

Based on feedback received during early scoping, Sound Transit developed an initial set of alternatives. Sound Transit then conducted a three-level screening process (Level 1, Level 2, and Level 3) that analyzed and compared the alternatives using evaluation criteria developed from the project's preliminary purpose and need. For each evaluation criterion, measures and evaluation methods were developed and applied at each level of screening. The evaluation criteria are as follows:

- Reliable service and travel times
- Regional connectivity, transit capacity, and projected transit demand
- Regional centers served and regional plan consistency
- Sound Transit 3 Plan consistency, technical feasibility, and financial sustainability
- Historically underserved populations
- Station area land use plan consistency, modal integration, and environmental effects
- Station area development opportunities, traffic operations, and economic effects

After each screening analysis was complete, the results were presented to the Stakeholder Advisory Group. The Stakeholder Advisory Group consisted of transit riders, residents, key stakeholders, members of the public, and representatives from businesses and major institutional organizations. The Stakeholder Advisory Group recommended alternatives to carry

forward to the next level of screening to the Elected Leadership Group. The Elected Leadership Group included elected officials who represent the project corridor and/or Sound Transit Board. The Elected Leadership Group then made recommendations on which alternatives to carry forward to the next screening level. Appendix M lists the alternatives for each level of screening and why some alternatives were recommended to not be carried forward.

There were opportunities for public input between each screening level, which allowed community members to learn more about the alternatives and provide input to the Stakeholder Advisory Group and Elected Leadership Group. Appendix F provides additional information on the public outreach conducted. All Level 3 evaluation alternatives and design options were carried forward into the scoping process for the Draft Environmental Impact Statement, which is described in Section 2.5.3, Alternatives Carried Forward.

2.5.2 NEPA and SEPA Scoping Process

Scoping for this Environmental Impact Statement was conducted under NEPA and SEPA. The scoping process began with a Notice of Intent to prepare an environmental impact statement in the *Federal Register* on February 12, 2019 (84 *Federal Register* 3541), and a Determination of Significance in the SEPA Register on February 15, 2019. These notices initiated formal scoping and started a required 30-day comment period through March 18, 2019. The FTA and Sound Transit extended this comment period until April 2, 2019, based on requests from the public and the City of Seattle.

Three public scoping meetings and a meeting for agencies and Tribes were held during this period, as well as an online open house from February 15 through April 2, 2019. Sound Transit asked for comments on the preliminary purpose and need statement; the alternatives that Sound Transit should evaluate in the Draft Environmental Impact Statement; and social, economic, environmental, and transportation issues to evaluate in the Draft Environmental Impact Statement. Comments were accepted by mail, email, online comment forms, phone, and in a variety of forms at the scoping meetings. Appendix F provides additional information on the scoping process and comments received.

2.5.3 Alternatives Carried Forward

Following the public scoping period, the Sound Transit Board of Directors reviewed the comments received and the alternatives evaluated in the three-level screening process (see Appendix M for details). In May 2019, the Board-approved Motion M2019-51 (Sound Transit Board 2019a), which identified preferred alternatives, preferred alternatives with third-party funding, and other alternatives to study in the Draft Environmental Impact Statement. The Board also directed Sound Transit project staff to conduct an initial assessment of additional alternatives suggested during the scoping period to establish whether further detailed study in the Draft Environmental Impact Statement was appropriate. Following completion of that initial assessment, the Board reviewed the initial assessment findings and public input. Public outreach during the initial assessment included an online open house, distribution of flyers to residences and businesses, information booths at several fairs and festivals, media briefings, project-wide email updates, as well as personalized emails to community groups to notify them about the opportunity to comment online (refer to Appendix F for additional information). In October 2019, the Board-approved Motion M2019-104 (Sound Transit Board 2019b), which identified additional alternatives to study in the Draft Environmental Impact Statement. Sections 2.5.3.1, West Seattle Link Extension, and 2.5.3.2, Ballard Link Extension, describe the alternatives identified by the Board. These sections also describe how Sound Transit has continued to refine the conceptual design of the alternatives following the Board motions.

Information on why alternatives were not carried forward is included in Section 2.5.4, Alternatives Not Carried Forward, and Appendix M.

2.5.3.1 West Seattle Link Extension

Table 2-4 lists the West Seattle Link Extension alternatives identified in Sound Transit Board Motions M2019-51 and M2019-104 for study in the Draft Environmental Impact Statement.

Table 2-4. West Seattle Link Extension Alternatives and Design Options Carried Forward

Segment	Draft Environmental Impact Statement Alternative or Design Option	Alternative Name in Sound Transit Board Motion
SODO	Preferred At-Grade (SODO-1a)	E3 At Grade
	At-Grade South Station Option (SODO-1b)	
	Mixed Profile (SODO-2)	SODO Partial Elevated
Duwamish (DUW)	Preferred South Crossing (DUW-1a)	South Crossing
	South Crossing South Edge Crossing Alignment Option (DUW-1b)	
	North Crossing (DUW-2)	North Crossing
Delridge (DEL)	Preferred Dakota Street Station (DEL-1a)	North of Genesee Station
	Dakota Street Station North Alignment Option (DEL-1b)	
	Preferred Dakota Street Station Lower Height (DEL-2a)*	
	Dakota Street Station Lower Height North Alignment Option (DEL-2b)*	
	Delridge Way Station (DEL-3)	South of Andover Station
	Delridge Way Station Lower Height (DEL-4)*	
	Andover Street Station (DEL-5)	Yancy/Andover Elevated
	Andover Street Station Lower Height (DEL-6)*	
West Seattle Junction (WSJ)	Preferred Elevated 41st/42nd Avenue Station (WSJ-1)	Elevated Stations
	Preferred Elevated Fauntleroy Way Station (WSJ-2)	
	Preferred Tunnel 41st Avenue Station (WSJ-3a)*	Tunnel Station
	Preferred Tunnel 42nd Avenue Station Option (WSJ-3b)*	
	Short Tunnel 41st Avenue Station (WSJ-4)*	
	Medium Tunnel 41st Avenue Station (WSJ-5)*	

* As described in the introduction to Chapter 2, Alternatives Considered, at the time the Sound Transit Board identified alternatives for study in the Draft Environmental Impact Statement some alternatives were anticipated to require third-party funding based on early cost estimates. The asterisk identifies these alternatives and the alternatives that would only connect to these alternatives in adjacent segments.

Source: Sound Transit Board 2019a and 2019b.

In response to the Board's direction in the Board-approved Motion 2019-51 (Sound Transit Board 2019a), Sound Transit has continued to refine the conceptual design of the alternatives for evaluation in the Draft Environmental Impact Statement. This resulted in the addition of Alternative DEL-6* and Alternative WSJ-5*, which would allow the Delridge Station to connect to

a tunnel in the West Seattle Junction Segment. Alternative WSJ-4* was also added to address the Board's direction to evaluate potential cost-savings opportunities.

Based on public input received during scoping for general support for the Alaska Junction Station in the 41st Avenue Southwest and 42nd Avenue Southwest vicinity as well as comments to stay out of Alaska Junction if the alternative is elevated, the Sound Transit 3 Representative Project was broken into two separate alternatives with a north-south oriented elevated Alaska Junction Station: (1) with the station between 41st and 42nd avenues south of Southwest Alaska Street (Preferred Alternative WSJ-1) and (2) with the station at Fauntleroy Way Southwest and Southwest Alaska Street (Preferred Alternative WSJ-2). In response to public support for shifting the existing SODO Station southward, closer to South Lander Street, Sound Transit developed Option SODO-1b. An additional station configuration for Preferred Alternative SODO-1a, the staggered station configuration, was also developed to avoid permanent impacts to the United States Postal Service Carrier Annex and Distribution Center/Terminal Post Office.

2.5.3.2 Ballard Link Extension

Table 2-5 lists the Ballard Link Extension alternatives identified in Sound Transit Board Motion M2019-51 for study in the Draft Environmental Impact Statement.

Table 2-5. Ballard Link Extension Alternatives and Design Options Carried Forward

Segment	Draft Environmental Impact Statement Alternative or Design Option	Alternative Name in Sound Transit Board Motion
SODO	Preferred At-Grade (SODO-1a)	E3 At-Grade
	At-Grade South Station Option (SODO-1b)	
	Mixed Profile (SODO-2)	SODO Partial Elevated
Chinatown-International District (CID)	4th Avenue Shallow (CID-1a)*	4th Shallow or Deep Station
	4th Avenue Deep Station Option (CID-1b)*	
	5th Avenue Shallow (CID-2a)	5th Shallow or Deep Station
	5th Avenue Deep Station Option (CID-2b)	
Downtown (DT)	Preferred 5th Avenue/Harrison Street (DT-1)	5th and Harrison
	6th Avenue/Mercer Street (DT-2)	6th and Mercer
South Interbay (SIB)	Preferred Galer Street Station/Central Interbay (SIB-1)	Galer St Station
	Prospect Street Station/15th Avenue (SIB-2)	Prospect St Station/Sound Transit 3 Representative Project
	Prospect Street Station/Central Interbay (SIB-3)	Prospect St Station
Interbay/Ballard (IBB)	Preferred Elevated 14th Avenue (IBB-1a)	High Fixed Bridge with 14th Elevated Station
	Elevated 14th Avenue Alignment Option (from Prospect Street Station/15th Avenue) (IBB-1b)	
	Preferred Tunnel 14th Avenue (IBB-2a)*	Tunnel with 14th and 15th Tunnel Stations
	Preferred Tunnel 15th Avenue Station Option (IBB-2b)*	
	Elevated 15th Avenue (IBB-3)	Moveable Bridge with 15th Elevated Station

* As described in the introduction to Chapter 2, Alternatives Considered, at the time the Sound Transit Board identified alternatives for study in the Draft Environmental Impact Statement some alternatives were anticipated to require third-party funding based on early cost estimates. The asterisk identifies these alternatives and the alternatives that would only connect to these alternatives in adjacent segments.

Source: Sound Transit Board 2019a.

Following the Board motions, Sound Transit has continued to refine the conceptual design of the alternatives for evaluation in the Draft Environmental Impact Statement. This resulted in addition of a design option to the high-level fixed bridge over Salmon Bay (Option IBB-1b) for connecting Alternative SIB-2 in the South Interbay Segment; refer to Section 2.1.2.2, Ballard Link Extension. It also resulted in refinement of the tunnel portal location for Preferred Alternative SIB-1 to avoid contaminated land and to minimize property impacts, thereby eliminating the at-grade profile. Refinements were also made to the alignment of Alternative SIB-2 to minimize property and roadway impacts. An additional station configuration for Alternative CID-2a, the diagonal station configuration, was also included to avoid some utility impacts and reduce construction impacts to traffic and transit. A detailed description of the alternatives and design options being studied in the Draft Environmental Impact Statement is provided in Section 2.1, Build Alternatives.

2.5.4 Alternatives Not Carried Forward

The scoping process generated some new alternative suggestions that were considered but not identified for study in the Draft Environmental Impact Statement. These suggestions and the reason they were not carried forward are described in Appendix M.

2.6 Construction Approach

This section provides an overview of potential construction activities and timing. Both extensions would have multi-year construction periods. The West Seattle Link Extension would be completed in 2032 and the Ballard Link Extension would be completed in 2037 or 2039. The majority of the construction timeline for the WSBLE Project would be for civil construction. Concurrent work at multiple construction areas would be required to complete the project in this timeframe. Civil construction would include utility and drainage relocations and construction of guideways (including guideway columns and foundations), tunnels (including access at tunnel portals), bridges, stations and station access, track, and supporting facilities such as traction power substations and vent shafts. Civil construction would be followed by installation of the electrical system that powers and controls the trains. This would be followed by testing and startup activities, when communications, safety, and emergency systems would be tested and certified before beginning operations for the public.

The greatest potential for construction impacts would occur during civil construction. The following major civil construction activities could cause environmental impacts and community disruption:

- Partial and full demolition of existing structures (buildings, pavement) and debris removal
- Remediation of existing contamination at construction sites
- Building temporary vehicular, bicycle, and pedestrian detour routes
- Protective works (such as underpinning) for buildings that would not be demolished
- Clearing and vegetation removal
- Fill and excavation
- Utility extensions, relocations, or disruptions

- Drainage system relocations and new connections, including stormwater vaults
- Construction staging area use
- Guideway structure construction
- Tunnel construction, particularly at the tunnel portals and vent shafts
- Tunnel cross passage construction, including ground treatment near the cross passages
- Delivery of materials and equipment
- Removal and hauling of excavation spoils and other construction debris
- Station construction, including elevated stations and tunnel stations under street rights-of-way
- Crossover track, tail track, and other special trackwork construction, including at-grade, elevated, and underground trackwork structures
- Bridge construction
- Slope stabilization (such as retaining wall) construction
- Ground treatment and improvement (such as stone guideway columns, jet grouting, and ground freezing)
- Pile-driving and shaft drilling
- Roadway reconstruction

The following sections describe the sequence, methods, and anticipated duration for each major type of construction.

2.6.1 Construction Sequence and Activities

Construction of linear projects such as light rail is typically divided into various segments or line sections based on similarities in configurations such as at-grade or elevated structures, tunnels, or retained-cut sections; sequence and schedule constraints; and geographical constraints. These segments or line sections may include stations, substation and signal control facilities, access facilities, tunnel vents, and other related improvements.

Civil construction would take between 3 and 5 years in non-tunnel areas of the project corridor, and 4 to 7 years along tunnel areas. Site-specific conditions, permit requirements, and market conditions at the time of construction, among other factors, affect how a project is built. Sound Transit would coordinate with the appropriate jurisdictions on land use approvals, right-of-way use and land disturbance permits, and other permits required for construction.

A work-specific construction plan would be confirmed during final design to establish the various construction phases and contract packages, their estimated schedule and duration, and appropriate sequencing. Where possible, construction activities would be coordinated with other capital improvement projects or joint development projects to help minimize construction impacts.

Typical construction for surface and elevated guideways and stations would occur on a 5- to 6-day work week and would occur primarily between the hours of 7 a.m. and 10 p.m. In some locations, additional shifts, all-week, nighttime, or 24-hour construction activities could be necessary to reduce impacts from roadway closures. Tunneling work would typically occur between 20 and 24 hours per day, 6 to 7 days per week.

2.6.2 Typical Construction Activities

Typical construction activities necessary prior to construction, regardless of the track alignment or profiles, would involve partial and full demolition of existing structures; removal or modifying underground tiebacks; vegetation clearing and soil fill, excavation, and grading; relocating utilities and drainage systems; remediation of contaminated sites; preparing construction access; building temporary construction roads where access is not available from existing roads; temporarily closing some roads or traffic lanes; and detouring traffic.

Underground utility work and support or strengthening of areaways may require temporary steel plates in the roadway and temporary lane closures. Areaways are belowground spaces within street rights-of-way, enclosed by the sidewalks above and by building foundations and street supports on either side. When work occurs in roadways, reconstruction of streets, sidewalks, and other existing facilities may occur. Overhead utility relocation work may consist of temporary lane closures, site access limitations, vegetation removal, and demolition of existing structures. Work could include construction of new utility pole foundations, and installation of poles, anchors, vaults, conduit, and cables, followed by removal of existing overhead utilities. Outside of road right-of-way, restoration of work areas could be necessary.

When work would be adjacent to a roadway, removal of on-street parking, closure of lanes or closure of the full roadway may be needed. Where the project would partially or fully close streets, through traffic would be rerouted on detours while maintaining access to existing businesses and residences. Road closures and detours would require approval by the Seattle Department of Transportation or Washington State Department of Transportation. More detailed information on road closures, lane closures, and detours is provided in Chapter 3, Transportation Environment and Consequences, and the Transportation Technical Report in Appendix N.1.

Dewatering could be needed throughout the project corridor and could be done using mechanical methods such as sumps, pumps, and dewatering wells. These systems pump water to the surface for discharge, storage, or recharge into the ground. Discharge would follow the National Pollution Discharge Elimination System permit requirements from the Washington State Department of Ecology. Water would be treated, if necessary, prior to discharge.

Ground improvements, or mechanical methods to address weak soils to enable building on them, might be needed at many places along the project corridor, especially in areas of fill material on top of tide flats and for tunnel portals and cross passages. Ground improvement methods may include jet grouting, ground freezing, rock displacement, or a combination of these methods.

Steep slope stabilization would be necessary in places. The West Seattle Link Extension would require steep slope stabilization (retaining walls or regrading the slope) at the north edge of Pigeon Point. The Ballard Link Extension would require steep slope stabilization and dewatering near the north downtown tunnel portal and the Smith Cove Station on the Queen Anne hillside. Depending on the location, slope stabilization could include retaining walls, regrading, slope drains, soil nails, reinforced mats, and vegetation.

2.6.3 Elevated Light Rail Construction

Construction of elevated guideway would begin with construction of the substructure. The foundations would likely consist of shallow spread footings or drilled shafts. Ground improvement would be provided around drilled shafts, where required. Following the foundations, concrete guideway columns and piers or straddle bents that support the guideway would be constructed cast-in-place (Figure 2-65). False-work (Figure 2-66), which is a

temporary support structure, would be required in places where cast-in-place construction is used. False-work would support elements of the substructure while the concrete is poured and the concrete gains enough strength to support itself.

The elevated guideway superstructure (the part of the structure above the foundations) could be constructed of reinforced concrete which would either be cast-in-place or pre-cast. False-work could be used in places to support the cast-in-place superstructure. Pre-cast segments would be transported to the construction area and lifted into place with cranes. Construction of elevated stations would begin similar to construction of the guideway but would then include construction of the station platforms and buildings.

Elevated guideways (Figure 2-67) would require construction similar to bridges where longer spans are needed in order to cross roadways, railroads, or due to topography (refer to Section 2.6.7, Bridge Light Rail Construction Over-water Crossings).

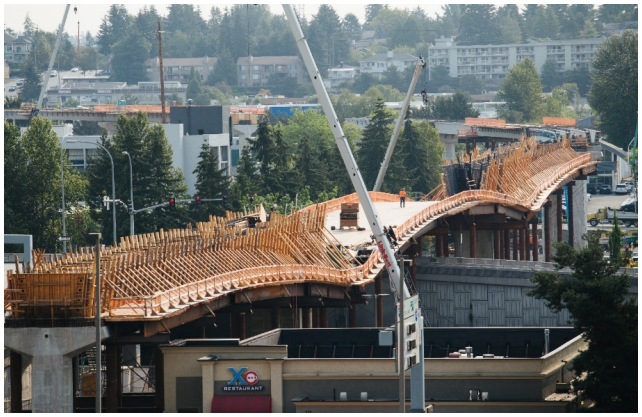
2.6.4 At-grade Light Rail Construction

Construction methods for at-grade guideways would be similar to typical road construction. Construction would involve shallow excavations to relocate utilities and construction of the subgrade, ballast walls, track, and station platform slabs. Drainage structures and below-grade light rail infrastructure would also be installed. Construction of at-grade stations would be similar to typical building construction. The SODO Station for Preferred Alternative SODO-1a and Option SODO-1b in the SODO Segment would be constructed at-grade.

Figure 2-65. Construction of Guideway Columns

Figure 2-66. Construction of Elevated Guideway Showing False-work

Figure 2-67. Construction of Elevated Guideway Over Roadways



2.6.5 Retained-Cut Light Rail Construction

Retained-cut guideway and station construction would be similar to at-grade guideways but would be more intensive and of longer duration because of retaining walls required on one or both sides (Figure 2-68). In some locations, subsurface anchors, tiebacks, or internal bracing would be required to support the retaining wall. Depending on the depth of the retained cut and groundwater conditions, dewatering may be necessary. Some retained-cut stations would involve construction of a lid over the station that is similar to cut-and-cover construction, as well as reconstruction of streets, sidewalks, and other existing facilities over or around the cut (see Section 2.6.6, Tunnel Light Rail Construction).

Figure 2-68. Retained-cut Construction

2.6.6 Tunnel Light Rail Construction

Tunnel and underground station construction may involve tunnel boring (using twin or single tunnel boring machines), cut-and-cover construction, or sequential excavation mining.

Figure 2-69. Tunnel Construction

Tunnel construction requires either open-cut tunnel portals or shafts for equipment to launch, or enter, and to be retrieved from the tunnel at each end. On hillsides, the portal would be dug directly into the hillside, while in flatter areas, an access shaft or pit would be excavated from the surface. Once a portal or shaft is dug, tunnel excavation can begin, and the tunnel would be lined with concrete (Figure 2-69). Excavated material, or spoils, would be transported to the shaft or tunnel portal for stockpiling or hauling, as needed. Spoils can be transported back through the completed tunnel sections using small trains, conveyors, or pipes. Tunnel boring machines would likely be used for the tunnels in the Chinatown-International District, Downtown, and Interbay/Ballard segments because of the greater length and depth of the tunnels.

Cut-and-cover construction involves excavating from the surface and is essentially a retained cut that is subsequently lidded. The excavation can be decked over during construction, either partially or totally, at the street level to allow traffic to continue once the excavation is deep

enough to allow earthmoving equipment below (about 10 to 15 feet). It would take 6 to 12 months in some areas to establish these temporary decked areas, and there would be some traffic disruption during their installation. Openings in the decking are needed to remove excavated material and bring in construction materials. Following completion of the excavation, the permanent underground structures would be installed using cast-in-place concrete techniques. Cut-and-cover work may also include backfill with imported fill or suitable excavated material following the lid or station roof construction. Cut-and-cover construction would be used for more shallow stations, at tunnel portals, where tunnel depths are shallow, where tunnel lengths are too short for boring or mining methods, or to address other construction constraints.

For the West Seattle Link Extension tunnel alternative and design option, cut-and-cover construction would likely be used for the Avalon and Alaska Junction stations and associated tail tracks. For the Ballard Link Extension, cut-and-cover construction could be used for the International District/Chinatown (Alternative CID-1a* and Alternative CID-2a), Denny, South Lake Union, and Seattle Center stations. It would also be used for constructing the Ballard Station and tail track associated with the tunnel alternative and option in the Interbay/Ballard Segment. For stations in the Chinatown-International District and Downtown segments, the cut-and-cover stations would likely be excavated before arrival of the tunnel boring machines. The machines would mine into the completed cut-and-cover boxes, be pulled though the boxes, then be re-launched at the other end to continue boring. Cut-and-cover construction would be used at all tunnel portals for the WSBLE Project until the excavation is deep enough for mining.

Sequential excavation mining involves excavating a tunnel using a pre-defined sequence of several smaller excavations (known as “headings”) to build up the larger final cross section of the full tunnel. It is used where excavation of the full tunnel in a single heading could result in instability. Additional measures to stabilize the ground during excavation may be required and could include the use of temporary structural elements such as steel bars, ground improvement such as jet grouting installed either from the surface or within the tunnel, or stabilization measures such as dewatering or ground freezing, also from within the tunnel or from the surface. The excavated headings and full tunnel cross section would initially be lined with shotcrete. Subsequently a permanent waterproofing membrane and final cast-in-place concrete lining would be installed in the completed tunnel excavation. The tunnel alternative and option in the West Seattle Junction Segment could use either tunnel boring machines or sequential excavation mining because they are shorter, shallower tunnels. The deep International District/Chinatown Station design options (Option CID-1b* and Option CID-2b) and the Midtown and Westlake stations in downtown would likely be mined using sequential excavation methods because the stations’ depths make cut-and-cover construction impractical. Spoils would be removed at the surface via shafts where future station entrances would be located.

For all proposed tunnel construction methods, the need for fresh air requires that a mechanical ventilation system and fans be in place. Fans could run for 24 hours a day and could be audible at tunnel portals, stations, or access locations.

Tunneling could require some forms of soil stabilization before tunneling begins. Methods could include jet grouting, cement grouting, dewatering, ground freezing, a combination of these methods, or other methods.

Excavated material would be removed and hauled to a permitted disposal site. Truck hauling would require a loading area, staging space for trucks awaiting loading, and provisions to prevent tracking soil on public streets. Truck haul routes and trucking hours would require approval by the City of Seattle. Surface hauling could occur at night during off-peak traffic periods or could be concentrated during the day to minimize noise in noise-sensitive areas. Depending on portal locations, trains or barges could also be used to haul spoils.

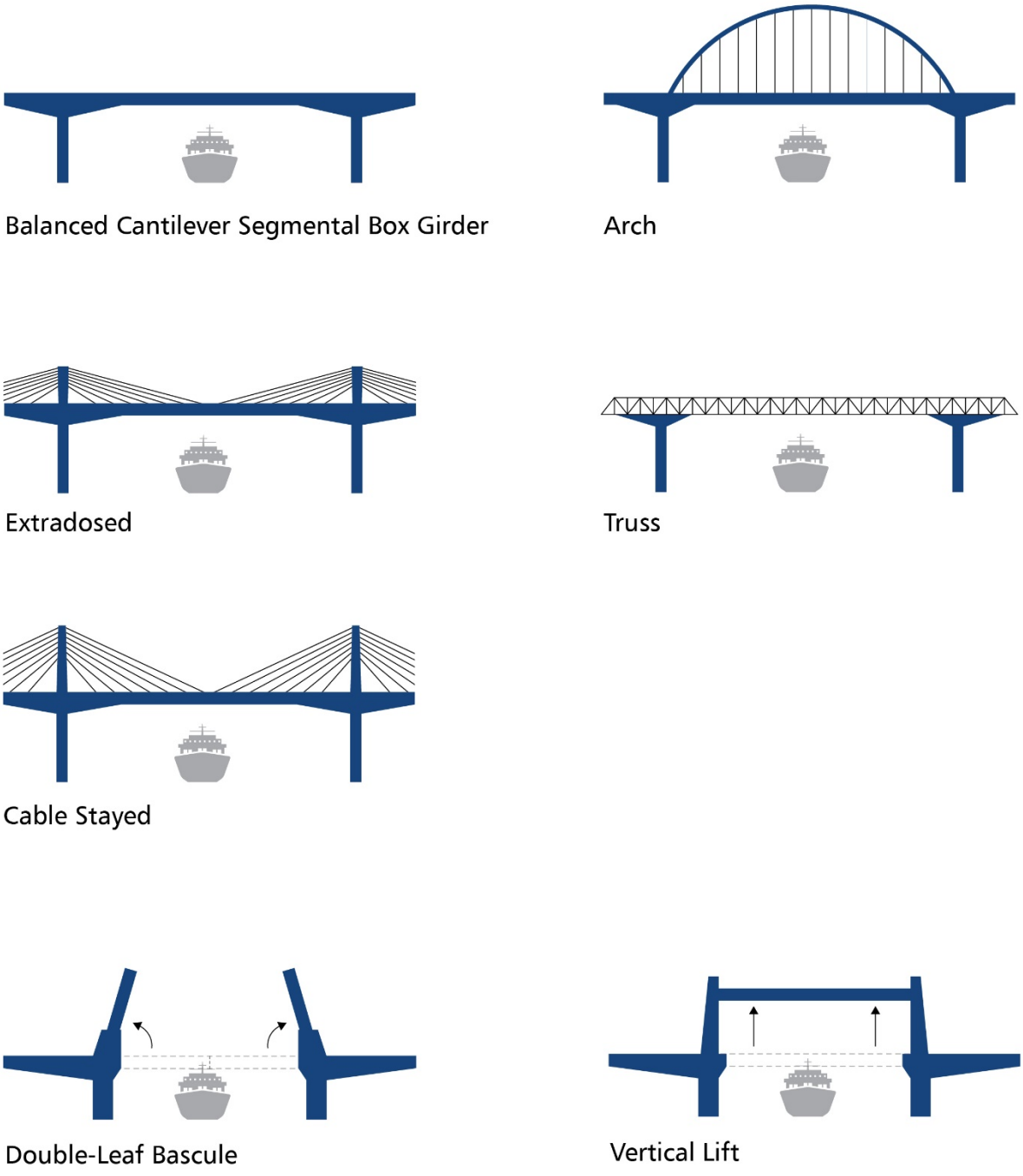
2.6.7 Bridge Light Rail Construction Over-water Crossings

Several alternatives and design options would build bridges over the Duwamish Waterway and Salmon Bay. If bridge foundations are in the water, most of them would be constructed inside sheet-pile cofferdams (temporary enclosures providing a dry working area in the water) where needed. The balanced cantilever segmental box girder design for Preferred Alternative DUW-1a could require piles to be placed without a cofferdam for one guideway column and the piles to be driven or vibrated into place. Cofferdams would be driven or vibrated into place. Bridge foundations constructed inside the cofferdams would include drilled shafts and cast-in-place concrete pile caps. In other areas, foundation excavations would be supported by a temporary shoring system, such as soldier pile shoring.

Temporary work trestles could be installed in the Duwamish Waterway and Salmon Bay to support material delivery and operation of heavy equipment. Temporary work trestles would be constructed with driven or vibrated steel-pipe pile bents, framing, and decking, then removed when the work is complete. Barges for material supply and supporting cranes would also be required for construction of foundations in water and would be moored outside of the navigation channels.

High-level fixed bridge structure types could include balanced cantilever segmental box girder, extradosed, cable-stayed, arch (only for the bridge over Salmon Bay), or truss (only for the bridge over the Duwamish Waterway) superstructures. The moveable bridge over Salmon Bay could include a vertical lift or double-leaf bascule bridge, both with a balanced cantilever segmental box girder for the fixed portion of the bridge. The bridge structure types are shown on Figure 2-70. Bridge type would be determined during final design based on various factors including engineering feasibility and constraints, environmental effects, cost, and coordination with other agencies on permitting requirements. The bridge superstructures (the part of the bridge above the foundation) would be constructed following construction of the foundations. The superstructure of a segmental bridge would be constructed with a balanced cantilever method, which means constructing one short segment at a time alternating on each side of the column. Extradosed bridge superstructure construction would be very similar to that of the balanced cantilever segmental box girder except that every few segments, a stay cable would be installed. Cable-stayed construction would be similar to the extradosed bridge except that many more cables would be required. The balanced cantilever segmental box girder, extradosed and cable-stayed bridge superstructures could be constructed as pre-cast or cast-in-place segments. The arch would be constructed offsite, floated to the bridge location, and then lifted into place. The steel truss would be made up of three spans. Once the piers are constructed, the two end-spans and a portion of the main span cantilevering from the pier would be constructed on false-work in large segments. The remaining preassembled portion of the center span would then be lifted into place as one piece.

Figure 2-70. Bridge Structure Types



2.6.8 Staging Areas and Construction Easements

Construction staging areas (Figure 2-71) are needed before, during, and for a short time after construction work, for the following:

Figure 2-71. Staging Area Adjacent to New Guideway Under Construction

- Equipment storage
- Construction materials delivery and storage
- Demolition or spoils storage and handling, truck loading, and hauling
- Contractor trailers
- Concrete batch plants or concrete pumping
- Assembling tunnel boring/excavation equipment
- Prefabricating reinforcing steel cages and mats
- Prefabricating, cleaning, and disassembly of column and cap form systems
- Collection, storage, treatment, and discharge of construction water and groundwater
- Access roads
- Construction crew parking

All profile types would have construction staging areas along the alignments. Contractors would use the property on which the facility is being constructed and property that Sound Transit would acquire for permanent facilities or for construction staging, or other properties as negotiated by the contractor. Staging areas would typically be close to the work area, with the exception of Midtown and Westlake stations in the Downtown Segment. The Midtown Station for both Preferred Alternative DT-1 and Alternative DT-2 would likely have some staging areas several blocks away due to property constraints. The Westlake Station for Preferred Alternative DT-1 would likely utilize an existing Sound Transit-owned property for construction staging, which is located several blocks away. This property would be used due to property constraints around the station area. Staging areas would be throughout the project corridor and would generally be 1 acre per mile for elevated or at-grade construction, 3 to 5 acres for water crossing structure construction, 2.5 to 3 acres for tunnel boring machine launch tunnel portals, 1.5 acres for sequential excavation mining launch tunnel portals, and 1.5 acres for station sites in addition to the station footprint. Tunnel receiving portals would be approximately 1 acre. Following construction, staging areas may be used for the project or redeveloped consistent with approved zoning and Sound Transit's Equitable Transit Oriented Development Policy (Resolution R2018-10).

Most construction work would occur in areas acquired for project right-of-way or designated staging areas, but temporary construction easements could be needed from adjacent properties. Following construction, these areas would be restored to pre-construction conditions.

2.6.9 Duration of Construction Activities

Table 2-6 lists the anticipated duration for each major construction component of the WSBLE Project described in Section 2.6.2, Typical Construction Activities; Section 2.6.3, Elevated Light Rail Construction; Section 2.6.4, At-grade Light Rail Construction; Section 2.6.5, Retained-cut Light Rail Construction; Section 2.6.6, Tunnel Light Rail Construction, and Section 2.6.7, Bridge Light Rail Construction Over-water Crossings. The estimated durations presented in the table do not necessarily indicate that continuous intensive construction activity would occur at the station areas for the entire duration. It is likely there would be periods of time when minimal or less intensive construction activity would occur, particularly at the cut-and-cover and mined stations when the tunnel boring machine is operating in the station area.

Table 2-6. Major Construction Activities and Duration

Construction Activity	Estimated Duration
Partial/full demolition of existing structures; protective works for buildings; clearing and vegetation removal; fill and excavation; utility extensions, relocations, or disruptions; drainage system changes	2 to 12 months depending on the activity [a]. Partial/full demolition of existing structures and relocation of utilities and the drainage system would be the most time intensive activities.
Guideway construction	1 to 2 years.
Tunnel portal construction	1.5 to 2 years (including preparation of associated construction staging area).
Tunnel construction	1.5 to 2 years (West Seattle Junction Segment and Chinatown-International District Segment); 2.5 to 3 years (Downtown Segment); 2 to 2.5 years (Interbay/Ballard Segment).
Bridge construction	3 to 4 years, (Duwamish Waterway); 4 to 5 years (Salmon Bay).
Station construction	2 years (retained-cut stations); 3 years (elevated stations); 4 to 6 years (cut-and-cover stations); 6 to 7 years (mined stations).

[a] Based on assessments to date, removal and reconstruction of the 4th Avenue South Viaduct for Alternative CID-1a* and Option CID-1b* could take additional time (see Section 2.1.2.2.2, Chinatown-International District Segment for overall station area construction durations).

2.7 Environmental Practices and Commitments

Sound Transit views environmental stewardship as a responsibility of all employees, contractors, and consultants. The agency integrates environmental ethics and sustainable business practices into the agency's planning, design, construction, and operations.

The agency goes beyond regulation in its commitment to environmental stewardship and sustainability. Sound Transit's 2004 Environmental Policy states that the agency will satisfy all applicable laws and regulations and mitigate environmental impacts consistent with Sound Transit's policies, as well as strive to exceed compliance, restore the environment, avoid environmental degradation, and prevent pollution and conserve resources (Sound Transit 2004). The agency's 2007 Sustainability Initiative builds on this and identifies the agency's sustainability objectives as also addressing social and economic development issues (Sound Transit 2007).

Sound Transit implements these commitments through an International Organization for Standardization (ISO) 14001-certified Environmental and Sustainability Management System.

The Board-approved long and short-term goals for the management system's environmental and sustainability objectives are found in Sound Transit's 2015 and 2019 Sustainability Plan update documents (Sound Transit 2019c).

2.8 Project Funding and Cost Comparison

2.8.1 Project Funding

In 2016, voters approved funding for Sound Transit 3, which includes funding to construct the WSBLE Project. Additional funding sources to complete the project could include FTA or other federal agency grants or additional voter-approved tax revenue. In addition, Sound Transit Board Motion M2019-51 states that third-party funding could be necessary to cover the gap between the cost of the preferred alternatives and the alternatives and design options identified as requiring third-party funding (these alternatives and options are identified in Tables 2-4 and 2-5).

Sound Transit Funding

Sound Transit's regional transit programs and projects are typically funded through a combination of voter-approved taxes collected in a three-county district, FTA grants and loans, bonds, and farebox revenue.

2.8.2 Cost Comparison

2.8.2.1 Capital Cost

This section provides preliminary capital costs for each West Seattle and Ballard Link Extension alternative and design option, and a combined capital cost for the WSBLE Project as a whole. These costs are based on early design and will be refined during final design. Capital costs are one-time costs and include construction costs, anticipated/estimated mitigation, right-of-way/property acquisition costs, engineering costs, equipment costs and contingency, but not the cost of additional light rail vehicles needed to operate the WSBLE. Some of the alternatives and options studied would impact federally funded facilities and would require Sound Transit to pay back a portion of federal dollars already expended. These facilities may include, but are not limited to Ryerson Bus Base, RapidRide stations, and Seattle Streetcar. The capital cost estimate for the alternatives and options does not include the cost of impacting federally funded facilities.

2.8.2.1.1 West Seattle Link Extension

Estimated West Seattle Link Extension capital costs based on the current level of design are shown in Table 2-7.

Table 2-7. Estimated West Seattle Link Extension Cost Comparison in 2019 Dollars

Segment	Alternative or Design Option	Estimated Capital Cost Comparison
SODO [a]	Preferred At-Grade (SODO-1a)	$500 to 700 million [b]
	At-Grade South Station Option (SODO-1b)	$600 to 700 million [c]
	Mixed Profile (SODO-2)	$800 million
Duwamish (DUW)	Preferred South Crossing (DUW-1a)	$1.2 to 1.3 billion [d]
	South Crossing South Edge Crossing Alignment Option (DUW-1b)	$1.3 billion
	North Crossing (DUW-2)	$1.5 billion
Delridge (DEL)	Preferred Dakota Street Station (DEL-1a)	$600 to 700 million
	Dakota Street Station North Alignment Option (DEL-1b)	$700 million
	Preferred Dakota Street Station Lower Height (DEL-2a)*	$400 million
	Dakota Street Station Lower Height North Alignment Option (DEL-2b)*	$500 million
	Delridge Way Station (DEL-3)	$600 million
	Delridge Way Station Lower Height (DEL-4)*	$400 million
	Andover Street Station (DEL-5)	$500 million
	Andover Street Station Lower Height (DEL-6)*	$400 million
West Seattle Junction (WSJ)	Preferred Elevated 41st/42nd Avenue Station (WSJ-1)	$1.3 billion
	Preferred Elevated Fauntleroy Way Station (WSJ-2)	$900 million
	Preferred Tunnel 41st Avenue Station (WSJ-3a)*	$1.7 billion
	Preferred Tunnel 42nd Avenue Station Option (WSJ-3b)*	$1.7 billion
	Short Tunnel 41st Avenue Station (WSJ-4)*	$1.3 billion
	Medium Tunnel 41st Avenue Station (WSJ-5)*	$1.1 billion

* As described in the introduction to Chapter 2, Alternatives Considered, at the time the Sound Transit Board identified alternatives for study in the Draft Environmental Impact Statement some alternatives were anticipated to require third-party funding based on early cost estimates. The asterisk identifies these alternatives and the alternatives that would only connect to these alternatives in adjacent segments.

[a] SODO Segment costs are the combined costs for both the West Seattle and Ballard Link Extensions.

[b] Low end of the range reflects cost of the Preferred Alternative SODO-1a (staggered station configuration) connecting to Alternative CID-1a*. High end of the range reflects Preferred Alternative SODO-1a (without the staggered station configuration, which includes the relocation of the United States Postal Service facility) connecting to Alternative CID-2a and Option CID-2b.

[c] Low end of the range reflects connecting to CID-1a.

[d] High end of the range reflects higher cost of Preferred Alternative DUW-1a when connecting to Alternatives DEL-3 or DEL-4*.

2.8.2.1.2 Ballard Link Extension

Estimated Ballard Link Extension capital costs based on the current level of design are shown in Table 2-8.

Table 2-8. Estimated Ballard Link Extension Cost Comparison in 2019 Dollars

Segment	Alternative or Design Option	Estimated Capital Cost Comparison
SODO [a]	Preferred At-Grade (SODO-1a)	$500 to 600 million [b]
	At-Grade South Station Option (SODO-1b)	$600 to 700 million [b]
	Mixed Profile (SODO-2)	$800 million
Chinatown-International District (CID)	4th Avenue Shallow (CID-1a)*	$1.8 billion [c]
	4th Avenue Deep Station Option (CID-1b)*	$1.7 billion [c]
	5th Avenue Shallow (CID-2a)	$1.2 to 1.3 billion [d]
	5th Avenue Deep Station Option (CID-2b)	$1.3 billion
Downtown (DT)	Preferred 5th Avenue/Harrison Street (DT-1)	$4.7 to 4.9 billion [e]
	6th Avenue/Mercer Street (DT-2)	$4.9 to 5.0 billion [f]
South Interbay (SIB)	Preferred Galer Street Station/Central Interbay (SIB-1)	$1.3 billion
	Prospect Street Station/15th Avenue (SIB-2)	$1.4 to 1.5 billion [g]
	Prospect Street Station/Central Interbay (SIB-3)	$1.5 to 1.6 billion [h]
Interbay/Ballard (IBB)	Preferred Elevated 14th Avenue (IBB-1a)	$1.5 to 1.6 billion [i]
	Elevated 14th Avenue Alignment Option (from Prospect Street Station/15th Avenue) (IBB-1b)	$1.6 billion
	Preferred Tunnel 14th Avenue (IBB-2a)*	$1.5 billion
	Preferred Tunnel 15th Avenue Station Option (IBB-2b)*	$1.7 billion
	Elevated 15th Avenue (IBB-3)	$1.5 billion

* As described in the introduction to Chapter 2, Alternatives Considered, at the time the Sound Transit Board identified alternatives for study in the Draft Environmental Impact Statement some alternatives were anticipated to require third-party funding based on early cost estimates. The asterisk identifies these alternatives and the alternatives that would only connect to these alternatives in adjacent segments.

[a] SODO Segment costs are the combined costs for both the West Seattle and Ballard Link Extensions.

[b] Low end of the range reflects lower cost of Preferred Alternative SODO-1a and Option SODO-1b when connecting to Alternative CID-1a*.

[c] The cost of Alternative CID-1a* and Option CID-1b* includes the cost of reconstructing the 4th Avenue South Viaduct.

[d] Cost range for Alternative CID-2a is due to connection to alternatives in the Downtown Segment.

[e] High end of the range reflects higher cost of Preferred Alternative DT-1 when connecting to Alternative CID-1a*, Option CID-1b*, and Option CID-2b.

[f] High end of the range reflects higher cost of Alternative DT-2 when connecting to Alternative CID-2a.

[g] High end of the range reflects higher cost of Alternative SIB-2 when connecting to Option IBB-1b.

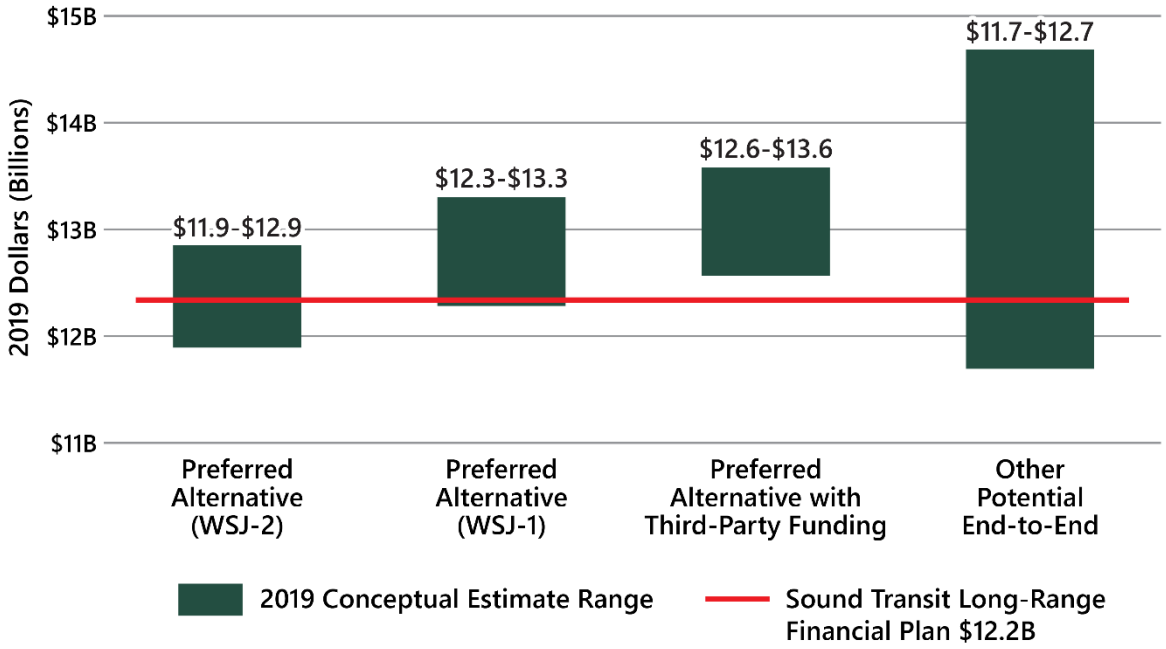
[h] High end of the range reflects higher cost of Alternative SIB-3 when connecting to Preferred Alternative IBB-2a* and Preferred Option IBB-2b*.

[i] High end of the range reflects higher cost of Preferred Alternative IBB-1a when connecting to Alternative SIB-3.

2.8.2.1.3 West Seattle and Ballard Link Extensions

Figure 2-72 depicts the West Seattle and Ballard Link Extensions conceptual cost estimate ranges. The total estimated capital cost of the WSBLE Project Preferred Alternative from Alaska Junction to Ballard stations based on the current level of design could vary between $11.9 and $13.6 billion. Depending on the alternative or design option that the Sound Transit Board selects to be built, the total capital cost of the project could further vary between $11.7 and $14.7 billion. The ranges are based on the preferred alternatives as identified by Sound Transit Board. A preferred alternative was not identified within the Chinatown-International District Segment. Therefore, Alternative CID-2a was used for the conceptual cost estimate range, because this alternative is most like the Sound Transit 3 representative project. Preferred alternative costs are shown for both elevated preferred alternatives in West Seattle, Preferred Alternative WSJ-1 and Preferred Alternative WSJ-2. The Preferred Alternative with Third Party Funding cost estimate range assumes Preferred Alternative WSJ-3a* in West Seattle and Preferred Alternative IBB-2a* in Ballard.

Figure 2-72. West Seattle and Ballard Link Extensions Conceptual Cost Estimate Ranges



2.8.2.1.4 West Seattle and Ballard Link Extensions Minimum Operable Segment

The estimated West Seattle and Ballard Link Extensions M.O.S. capital cost would be between approximately $9.3 and $10.3 billion, depending on the alternatives and design options included. This cost estimate is based on the current level of design and would apply to an M.O.S. from SODO Station to Smith Cove Station and from SODO Station to Delridge Station.

2.8.2.1.5 Ballard Link Extension-Only Minimum Operable Segment

Estimated Ballard Link Extension-only M.O.S. capital costs would be between approximately $7.8 and $8.8 billion, depending on the alternatives and design options included. This cost estimate is based on the current level of design and would apply to an M.O.S. from SODO Station to Smith Cove Station with connection to the existing Operations and Maintenance Facility Central.

2.8.2.2 Operation and Maintenance Costs

This section provides operation and maintenance costs for WSBLE. The major determinants of operation and maintenance costs are service levels, running time, and trackway profile.

The West Seattle Link Extension would have estimated operation and maintenance costs of between $35 and $40 million, annually, with tunnels having higher operating costs.

The Ballard Link Extension would have annual operation and maintenance costs of about $80 million, including both elevated guideway and tunnels in the Interbay/Ballard Segment. The moveable bridge for Alternative IBB-3 would have about $3 million in additional costs each year.

The West Seattle and Ballard Link Extensions M.O.S. would have annual operation and maintenance costs of about $91 million.

The Ballard Link Extension-only M.O.S. (SODO to Smith Cove) would have annual operation and maintenance costs of about $65 million.

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