To:	Cathal Ridge, Sound Transit
From:	HNTB
Prepared by:	Mariel Kirschen
Date:	January 24, 2023
Re:	West Seattle and Ballard Link Extension Further Studies: Additional Board Direction

INTRODUCTION

On July 28th, 2022, the Sound Transit Board requested further studies and public engagement in some areas to inform potential additional future Board action to confirm or modify the Draft Environmental Impact Statement (EIS) Preferred Alternative (PA) for the Ballard Link Extension.[1] This memo focuses on the additional Board direction to address project-wide interests and concerns for the WSBLE project.

Board Direction

Board Motion M2022-57 directed staff to continue public engagement and planning to address project-wide interests and concerns, including:

- Encourage more biking and walking mode share
- Accommodate future expansion
- Advance equitable Transit Oriented Development (eTOD), particularly community-led/driven TOD
- Design shallower tunnel stations and fast and reliable transit transfers
- Enhance station accessibility and reliability of vertical circulation (e.g., escalators, elevators)

This memo summarizes how the project team addressed the additional Board direction through the further study of concepts for the WSBLE, including how the team plans to address each interest and concern as environmental review moves forward and in the Preliminary Engineering (PE) phase of the West Seattle Link Extension. Similar actions will be taken with the Ballard Link Extension once the project advances to that phase.

[1] West Seattle and Ballard Link Extensions Draft Environmental Impact Statement, January 2022, Sound Transit, https://www.soundtransit.org/get-to-know-us/documents-reports/west-seattle-ballard-link-extensions-draft-environmental-impact-0

Summary

Figure 1 summarizes the ways that the WSBLE project team has addressed the additional Board direction through the further studies work and intends to continue to address in the upcoming environmental and PE phases of the project.

Figure 1 Summary of Additional Board Direction – Completed and Ongoing Work on WSBLE

Additional Board Direction	Completed and Upcoming Work
Biking and walking mode share	**Further studies completed** • Highlighted biking and walking access implications as key considerations for decision-making • Identified additional opportunities to refine station design to encourage biking and walking connections **Upcoming environmental and PE phases** • Develop street concept plans for each station area in coordination with the City of Seattle and King County Metro • Work with the City to identify projects for funding with the station access allowance included in Sound Transit 3 (ST3)
Accommodating future expansion	**Further studies completed** • Assessed and highlighted implications of further studies concepts for accommodating future expansion and potential increased ridership • Identified opportunities for continued refinement of stations and track designs to accommodate potential future expansion of the Link system beyond ST3 **Upcoming environmental and PE phases** • Tail track design will accommodate future potential Link extensions beyond Ballard and Alaska Junction
Equitable, community-driven TOD	**Further studies completed** • Assessed eTOD opportunities associated with new station concepts (e.g., Interbay-Smith Cove, CID) at a high level (physical fit and likely delivery model) • Assessed implications of cost saving and other refinements with respect to eTOD opportunities analyzed in the Draft EIS phase • Highlighted eTOD development potential implications as key considerations for decision-making **Upcoming environmental and PE phases** • Update potential agency eTOD and joint development project definitions for the Final EIS PA, including physical test fit and pro forma/economic performance • Develop a scope for additional design to connect transit infrastructure and TOD • Hold conversations with property owners, community organizations, and development community on opportunities to partner, either on integrated/air rights joint development or on future redevelopment of property acquired by Sound Transit

Shallower tunnel stations and fast, reliable transit transfers	**Further studies completed** • Highlighted station accessibility implications as key considerations for decision-making • Identified refinements to Draft EIS station concepts to improve transit transfers and provide more reliable passenger circulation • Identified new station locations for key transfer locations and demonstrated trade-offs to inform decision making **Upcoming environmental and PE phases** • In PE and final design, focus on ensuring station designs prioritize intuitive design with clear passenger pathways and ensuring a reliable and resilient vertical circulation program. • Apply guidance from Station Experience Design Guidelines to inform design refinements during PE phase and final design • Utilize pedestrian microsimulation tool to focus on addressing key design functions at the identified locations (e.g., rail-rail transfers, bus-rail transfer, large events) during future environmental and PE phases • Assess each station from passenger experience perspective to inform design refinements to improve station access.
Station accessibility and reliable vertical circulation	**Further studies completed** • Identified station entrance refinements to shorten distance to major destinations, better integrate stations into the public realm, and improve vertical circulation redundancy **Upcoming environmental and PE phases** • Establish core design requirements for different station typologies that support an overall safe, intuitive and consistent passenger flow and circulation, in line with the Station Experience Design Guidelines • Review station designs from passenger experience perspective and use pedestrian microsimulation software to assess and iterate design refinements to provide faster and more reliable station access and transit transfers • Test vertical circulation maintenance scenarios and assess opportunities for providing redundancy in vertical circulation • Investigate opportunity for continuous concourse (where not already provided) and single consolidated fare-paid zone. • Set goals for providing redundant vertical circulation including ensuring reliable passenger pathways accounting for planned and unplanned maintenance. • Systemwide: Update Design Criteria Manual (DCM) requirements for vertical conveyance equipment (heavy-duty, transit-grade).

ADDITIONAL BOARD DIRECTION FURTHER STUDY

Biking and walking mode share

The WSBLE project team is focused on expanding regional biking and walking mode share by working closely with the City of Seattle (City), King County Metro (Metro), and other partners to integrate stations into the station areas through coordinated land and transportation planning and strategic application of the Non-Motorized Access Allowance. As outlined in the Draft EIS, the project is expected to reduce dependency on single-occupancy vehicles, slow growth in vehicle miles traveled, conserve energy, and reduce greenhouse gas emissions. To ensure that the project meets these expectations, the project team is guided by key elements of the project's purpose, including:

- **Encourage equitable and sustainable urban growth in station areas** through support of transit-oriented development and multi-modal integration in a manner that is consistent with local land use plans and policies, including Sound Transit's Equitable Transit Oriented Development Policy (Sound Transit 2018) and Sustainability Plan (Sound Transit 2019).
- **Encourage convenient and safe non-motorized access to stations**, including bicycle and pedestrian connections, consistent with Sound Transit's System Access Policy (Sound Transit 2013).

Further studies of WSBLE project concepts highlighted biking and walking access implications as key considerations for decision-making. During the environmental and PE phases, the project team is prioritizing access for people walking and biking in the following ways:

- **Developing street concept plans for each station area** in coordination with the City and Metro. This work is being done earlier than on past light rail projects and is a component of the Preliminary Permitting Plan with the City. Street concept plans will include street use adjacent to station entrances and within the project footprint, identify zones of agency responsibility, and be included in PE drawings, where appropriate. Coordinating on street concept plans at this early stage of project development will contribute to overall better integration between station designs and the surrounding urban environment.
- **Working with the City to identify projects for funding with the station access allowance** included in Sound Transit 3 (ST3), which provides funding for non-motorized access improvements outside the station footprint. These efforts could include funding projects that would tie into the street concept plans.

More details about how the project team is prioritizing access for people walking and biking through the further studies and environmental and PE at select WSBLE stations are provided in Figure 2. Additional detail on how the project team is advancing eTOD is outlined later in this memo.

Figure 2 Elements **Biking and Walking Mode Share: WSBLE Station Further Study & Environmental and PE**

Station	Completed and Upcoming Work
West Seattle Link Extension	
Alaska Junction	• Completed work: Conducted further study of adding a walking and biking access point on 42nd Avenue SW to provide more visibility to California Avenue SW and SW Alaska Street. For more information, see the *West Seattle Extension Further Studies Memo*. • Upcoming work: Develop street concept plans for station area to coordinate multimodal access improvements along Alaska Street and other connecting streets • Upcoming work: Coordinate non-motorized access allowance improvements that connect into street concept plans
Avalon	• Upcoming work: Investigate crossing and streetscape improvements to surrounding street network to enhance station accessibility, including at 35th Avenue SW and Fauntleroy Way SW • Upcoming work: Coordinate non-motorized access allowance improvements that connect into street concept plans
Delridge	• Completed work: Conducted further study of station access refinements and developed new design concept to separate truck movements from passenger access pathways to the station. For more information, see the *West Seattle Extension Further Studies Memo*. • Upcoming work: Advance detailed site planning and street concept plans to integrate transit, walk and bike pathways between the neighborhood and station • Upcoming work: Use traffic and pedestrian microsimulation software to test circulation and access scenarios and achieve early agreement with agency partners • Upcoming work: Coordinate non-motorized access allowance improvements that connect into street concept plans
SODO	• Completed work: Conducted further study of station access refinements and developed revised SODO-1a station concept to provide direct station access to planned Lander Street overpass. For more information, see the *West Seattle Extension Further Studies Memo*. • Upcoming work: Develop street concept plans to coordinate multimodal access improvements with agency partners, including design, integration and enhancement of SODO trail • Upcoming work: Coordinate non-motorized access allowance improvements that connect into street concept plans
Ballard Link Extension	
CID	• Completed work: Conducted further study of station access implications of refinements to *4th Avenue Shallow DEIS Alternative (CID-1a)*, including strategies to reduce passenger travel time within the station. For more information, see the *Ballard Extension Further Studies: Chinatown/International District Ideas Memo*. • Completed work: Conducted further study of access implications and opportunities for community-driven ideas for station locations outside of the CID. For more information, see the *Ballard Extension Further Studies: Chinatown/International District Ideas Memo*.
Midtown	• Completed work: Conducted further study of moving station entrances into the public ROW to provide opportunity to reduce space dedicated to motor vehicles and better integrate entrances into the public realm. For more information, see the *Ballard Extension Further Studies: Downtown Concepts Memo.* • Upcoming work: For the *Preferred 5th Avenue/Mercer Street (DT-1),* provide a passenger connection to an underground walkway that connects Seattle Municipal Tower and Columbia Center

Westlake	• Completed work: Conducted further study of consolidating entrances to provide opportunity for improved access to the station from Westlake Park and concluded its possible. For more information, see the *Ballard Extension Further Studies: Downtown Concepts Memo* • Upcoming work: Exploring opportunities to provide a bike hub or integrated bike parking (with third-party partner)
Denny	• Completed work: Conducted further study of station entrance refinements and concluded that it is possible to move entrances into the public ROW to provide opportunity to reduce space dedicated to motor vehicles and better integrate entrances into the public realm. For more information, see the *Ballard Extension Further Studies: Downtown Concepts Memo.* • Completed work: Conducted further study of station entrance refinements to *6th Avenue/Harrison Street Alternative (DT-2)* on Terry Avenue, and concluded it is possible to provide station entrances on both sides of Denny Way to eliminate need for passengers to cross the street when accessing the station and concluded it's possible. For more information, see the *Ballard Extension Further Studies: Downtown Concepts Memo.* • Upcoming work: For DT-1 Alternative on Westlake Avenue, investigate adding a knock-out panel to allow for future entrance on north side of Denny (by third-party partner)
SLU	• Upcoming work: Explore opportunities to provide a bicycle box treatment on Dexter to facilitate bicycle access from Thomas
Seattle Center	• Upcoming work: Explore opportunities to coordinate station entrances with locations of future TOD • Upcoming work: Explore opportunities to connect bike parking and entrances to existing bicycle facilities
Smith Cove	• Completed work: Conducted further study of how a shifted Smith Cove Station can accommodate multimodal station access including development of station planning concepts. For more information, see the *Ballard Extension Further Studies: Interbay-Smith Cove Concepts Memo.* • Upcoming work: Investigate and coordinate with agency partners to facilitate land use changes to create a denser, more walkable station environment
Interbay	• Completed work: Conducted further study of a shifted Interbay station that provides station entrances on both sides of Dravus Street to facilitate better access for people walking, biking, and transferring from bus. For more information, see the *Ballard Extension Further Studies: Interbay-Smith Cove Concepts Memo.*
Ballard	• Completed work: Conducted further study of adding a station entrance on the north side of NW Market Street to the *Tunnel 15th Avenue Alternative (IBB-2b)* to reduce the need for pedestrians to cross NW Market Street. For more information, see the *Ballard Extension Further Studies: Ballard Concepts Memo.* • Completed work: For the Tunnel 15th Avenue Alternative, conducted further study of how eliminating and/or reducing the size of station entrances affects access for people biking and walking. For more information, see the *Ballard Extension Further Studies: Ballard Concepts Memo.* • *Com*pleted work: For the Tunnel 14th Avenue Alternative, conducted further study of how improvements to the crossing of 15th Avenue NW reduce passenger travel time and enhance passenger experience. For more information, see the *Ballard Extension Further Studies: Ballard Concepts Memo*.

Accommodating future expansion

The WSBLE project team is exploring opportunities to plan for and accommodate future system expansion of the Link light rail network during the further studies and environmental and PE phases of the project. The project team identified a list of future expansion projects from ST3 and the 2014 Long-Range Plan (LRP). This section outlines how the WSBLE project team is considering future high-capacity transit expansion, as well as potential implications of preparing for expansion.

Future expansion projects included in ST3 and LRP

This section summarizes the WSBLE project opportunities for accommodating future expansion for projects identified in ST3 and the LRP.

Southern Link expansion from Alaska Junction

To prepare for a future southern Link extension past Alaska Junction Station to Burien on the West Seattle Link Extension identified in the LRP, the project team has designed the station to be oriented north-south with tail tracks designed to accommodate future expansion (with minimal disruption to passengers). Potential issues with this design would arise if Sound Transit were to plan an extension along 35th Avenue SW or Delridge Avenue SW, and these would come with additional costs. The project team will also consider additional design features, such as knock-out panels in the tunnel, that will facilitate future extension without incurring operation interruption and consequently, substantial additional cost.

Eastern Link expansion from Ballard

A future east-west Link expansion from Ballard Station to University of Washington identified in the LRP could be accommodated, either as a connected line extending to the east, or with a passenger transfer connection to a separate future line. A connected line may require an alignment that extends north of Market Street before turning east. A separate line could be located in a tunnel under the Ballard Extension alignment. Refinements to Ballard Station to accommodate direct transfers to a future east-west line can be considered as project design progresses.

HCT on Madison Street

To prepare for a connection to future high-capacity transit (HCT) on Madison Street identified in the LRP, the project team has planned for a convenient transfer at Midtown Station to the Madison Street RapidRide G Line under construction. It should be noted that, as part of the CID further studies, the project team has evaluated a concept that involves shifting Midtown Station to the South to facilitate transfers at the existing Pioneer Square Station. This shift would require coordination with City and Metro to reroute the G Line to connect with all three Link lines. More details about this idea can be found in the *Ballard Extension Further Studies: Chinatown/International District Ideas Memo*.

BRT on State Route 99

To prepare for a connection to the existing RapidRide E Line bus rapid transit (BRT) on State Route (SR) 99 identified in the LRP, the project team has planned for a convenient transfer at South Lake Union Station in DT-1 and with the South Lake Union Mix-and-Match concept. This

transfer would be less convenient with the South Lake Union Station location in DT-2. Passengers traveling northbound on the E Line would need to travel two blocks south from the station to access the northernmost bus stop before the bus travels up SR 99.

Equitable, community-driven TOD

Through the further studies and environmental and PE phases of the WSBLE project, the project team is focused on maximizing opportunities to advance eTOD around future project stations in a manner that is consistent with local land use plans and policies, including Sound Transit's Equitable Transit Oriented Development Policy (Sound Transit 2018) and Sustainability Plan (Sound Transit 2019).

While completing further studies of WSBLE project concepts, eTOD was advanced through the following:

- An assessment of eTOD opportunities associated with new station concepts (e.g., Interbay-Smith Cove, CID) at a high level (physical fit and likely delivery model).
- An assessment of implications of cost savings and other refinements with respect to eTOD opportunities analyzed in the Draft EIS phase.

During the environmental and PE phases, community-driven eTOD is being advanced through the following:

- An update of potential agency eTOD and joint development project definitions for the Final EIS Preferred Alternative, including physical test fit and pro forma/economic performance.
- Planning for additional design to connect transit infrastructure and TOD.
- Conversations with property owners and the development community about opportunities to partner, either in integrated/air rights joint development or through future redevelopment of property acquired by Sound Transit.

Figure 3 presents the conclusions of the further study of eTOD opportunities for select WSBLE stations based on project refinements. The project team will continue to define and optimize eTOD opportunities in the environmental and PE phases of the project.

Figure 3 eTOD: WSBLE Station Further Study & environmental and PE Elements

Station	Completed and Upcoming Work
West Seattle Link Extension	
Alaska Junction	• Completed work: Conducted further study of a modified Alaska Junction station configuration with an access point on 42nd Ave SW. Concluded that could result in greater eTOD opportunity, increasing potential housing unit production by nearly 20% assuming current zoning
Delridge	• Completed work: Conducted further study of modifications to the PA at Delridge Station. Concluded that an integrated joint development approach is needed to realize full potential of the site, along with rezoning action by the City • Upcoming work: Ongoing investigation of site and structural design schemes that optimize TOD potential, including contemplating TOD site access and integrated podium
Ballard Link Extension	
CID	• Completed work: Conducted further study of other station locations outside of the CID neighborhood. Concluded that the North of CID and South of CID station locations have much stronger eTOD potential than the Draft EIS alternatives for CID and Midtown Station • Upcoming work: Ongoing collaboration with the community to identify locations for a station and adjacent eTOD within and outside of the CID
Westlake	• Completed work: Conducted further study of a consolidated station entrance. Concluded that concept results in a more complicated development site, which would require an integrated joint development approach and revision to zoning to realize full site development potential
SLU and Seattle Center	• Completed work: Conducted further study of mix-and-match concepts between DT-1 and DT-2. Concluded that a SLU Harrison (DT-1) to Seattle Center Mercer (DT-2) connection results in higher overall eTOD potential between the two stations • Completed work: Conducted further study of shifting Seattle Center Republican (DT-1) station location to the west. Concluded that the concept results in slightly higher eTOD potential than Draft EIS alternative, though still less than Seattle Center Mercer (DT-2)
Smith Cove and Interbay	• Completed work: Conducted further study of moving the Smith Cove Station closer to or onto the Armory property. Concluded that new location could catalyze considerable opportunity for a master-planned employment-oriented eTOD district, provided that public partners such as the State of Washington and the City work together to align decision-making timelines and investments • Completed work: Conducted further study of a refined Interbay Station spanning Dravus Street. Concluded that shifted location results in similar opportunity for eTOD as does Draft EIS Tunnel 14th Avenue Alternative (IBB-2a) or Tunnel 15th Avenue Station Option (IBB-2b), but with properties distributed between mixed-use and industrial-focused zoning that could support production of some affordable housing units
Ballard	• Completed work: Conducted further study of cost saving opportunities for IBB-2b. Concluded that cost savings measures reduce the opportunity for eTOD by 50% or more through the reduction of the construction footprint, in addition to resulting in more complicated and less cohesive development sites

Shallower tunnel stations and fast, reliable transit transfers

Passenger experience is central to the planning and design phases of the project. Through the further studies and environmental and PE phases of the WSBLE project, the project team is focused on maximizing opportunities to design for shallower tunnel stations and fast, reliable transit transfers to ensure a positive passenger experience for future riders. Public and agency feedback received on the Draft EIS included concerns about the depths of the proposed stations and the potential difficulty of making transit transfers from rail-to-rail and bus-to-light rail. The project team has acknowledged these concerns and is actively exploring ways to decrease the depths of the proposed stations and to provide solutions for facilitating fast and reliable transit transfers.

Through the further studies of the project concepts, the project team highlighted station accessibility implications as key considerations for decision-making. Strategies to address passenger experience during the environmental and PE phases include:

- Established passenger experience workplan focused on process improvements and station design audits. Work during these phases will ensure station designs prioritize intuitive design with clear passenger pathways and a reliable and resilient vertical circulation program.
- Establishing a process for using Station Experience Design Guidelines to inform design refinements during PE phase and during final design.
- Conducting pedestrian microsimulation assessment of select stations to address key design functions at the selected locations (e.g., rail-rail transfers, bus-rail transfer, large events).
- Conducting passenger experience audits and pedestrian microsimulation at each station to assess and iterate design refinements to improve station access.

Figure 4 presents more details about the project team's effort to address station depth and transit transfers through completed and planned work as a part of the further studies and environmental and PE at select WSBLE stations.

Figure 4 Shallower Tunnel Stations and Fast, Reliable Transit Transfers: WSBLE Station Further Study & environmental and PE Elements

Station	Completed and Upcoming Work
West Seattle Link Extension	
Alaska Junction	• Completed work: Ongoing coordination with the City and Metro on transit integration plans that prioritize seamless bus-rail transfers
Delridge	• Completed work: Conducted further study of refinements to improve station access and transit integration. Concluded that refinements create a faster and more direct pathway for bus-to-rail transfer by reducing station height and removing the concourse. For more information, see the *West Seattle Extension Further Studies Memo* • Completed work: Ongoing work with partners to develop a station site plan that minimizes distance and maximizes visibility between bus-to-rail connections • Completed work: Ongoing work with partners on circulation plan that removes or reduces conflicts between freight movements and people walking, biking, and taking transit
SODO	• Upcoming work: Use microsimulation and passenger experience review to inform design refinements with focus on rail-rail transfer, including during the interim terminus condition

Ballard Link Extension	
CID	• Completed work: Conducted further study of refinements to reduce station depth and transfer time with 4th Avenue Shallow Alternative (CID-1a). Concluded that station depth can be reduced by about 35 feet by going above the Downtown Seattle Transit Tunnel (DSTT), which adds additional displacements and costs. For more information, see the *Ballard Extension Further Studies: Chinatown/International District Ideas Memo* • Completed work: Conducted further study of new station location ideas. Found that a station north of CID can facilitate transfers between all three Link lines. Additionally, a station north of CID would replace Midtown Station with a shallower station that would include more redundancy with vertical circulation, including the addition of escalators. For more information, see the *Ballard Extension Further Studies: Chinatown/International District Ideas Memo*
Midtown	• Completed work: Conducted further study of opportunities to reduce station depth in connection with CID alternatives. Concluded that the station depth of DT-1 Midtown Station can be reduced by about 55 to 60 feet when connected to a shallower 4th Avenue Shallow station. For more information, see the *Ballard Extension Further Studies: Downtown Concepts Memo* and *Ballard Extension Further Studies: Chinatown/International District Ideas Memo* • Completed work: Conducted further study of opportunities to refine station entrances to provide an escalator and improve passenger circulation. Found that an escalator can be added to Midtown Station by shifting a station entrance to Columbia Street, but only when the station is connected to a shallower station in CID. For more information, see the *Ballard Extension Further Studies: Downtown Concepts Memo* • Completed work: Used pedestrian microsimulation to identify passenger circulation improvements. Concluded that a deeper Midtown Station alternative would lead to substantially longer passenger access times compared to the shallower alternative. Additionally, the elevator-only configuration could limit the station's capacity to accommodate future growth in service and ridership and presents concerns regarding maintaining passenger flow during planned and unplanned maintenance of vertical circulation
Westlake	• Completed work: Conducted further study of consolidation of station entrances. Concluded that refinements would provide more redundancy and simplify pathways between rail transfers. For more information, see *Ballard Extension Further Studies: Downtown Concepts Memo*
Denny	• Completed work: Conducted further study of providing station entrances on both sides of Denny Way for DT-1. Concluded that refinements would eliminate the need for passengers to cross Denny Way when accessing the station from the south. For more information, see *Ballard Extension Further Studies: Downtown Concepts Memo*
Seattle Center	• Completed work: Conducted further study of shifting the DT-1 station location to the west. Concluded that refinement could reduce station depth. For more information, see *Ballard Extension Further Studies: Downtown Concepts Memo*
Smith Cove	• Completed work: Developed station planning concepts to accommodate multimodal station access, including bus-to-rail transfers, for new station locations north of the Magnolia Bridge. Concluded that these locations perform similarly to Draft EIS alternatives with respect to transit integration, with a slightly higher performance possible with the Consolidated station location. Moving stations farther north also bring the possibility of greater activation and amenities around the station to support passenger experience
Interbay	• Completed work: Conducted further study of a shifted Interbay station that provides station entrances on both sides of Dravus Street. Concluded that refinement can facilitate better access for people making bus-to-rail transfers. For more information, see the *Ballard Extension Further Studies: Interbay-Smith Cove Concepts Memo*
Ballard	• Completed work: Conducted further study of how station entrance refinements affect station depth and bus-to-rail transfers. For more information, see the *Ballard Extension Further Studies: Ballard Concepts Memo*

Station accessibility and reliable vertical circulation

Through the further studies and environmental and PE phases of the WSBLE project, the project team is exploring ways to enhance the future passenger experience through improved accessibility of station entrances and reliability of vertical circulation, including:

- Establishing core design requirements for different station zones that support an overall safe and intuitive and consistent passenger flow and circulation, in line with the Station Experience Design Guidelines
- Using passenger experience exercise and pedestrian microsimulation to assess and inform design refinements to provide faster and more reliable station access and transit transfers
- Performing pedestrian modelling and passenger experience studies including testing vertical circulation maintenance scenarios and assessing opportunities for providing redundancy in vertical circulation
- Investigating opportunity for continuous concourse (where not already provided). Continuous concourse means passengers would not have to make wayfinding decisions on the platform and provides opportunity for centralizing ORCA card readers, ticket vending machines, and vertical circulation, contributing to more flexibility and reliability in the passenger journey.
- Setting goals for providing redundant vertical circulation including ensuring reliable passenger pathways accounting for planned and unplanned maintenance
- Systemwide updating of Design Criteria Manual (DCM) requirements and specifications for vertical circulation equipment (heavy-duty, transit-grade), including a requirement to refurbish one machine at a time

More details about how the project team is enhancing station accessibility and reliability of vertical circulation through the further studies and environmental and PE for each of the WSBLE stations are presented in Figure 5.

Figure 5 Station Accessibility and Reliability of Vertical Circulation: WSBLE Station Further Study & Environmental and PE Elements

Station	Completed and Upcoming Work
West Seattle Link Extension	
Alaska Junction	• Completed work: Conducted further study of adding a station entrance at 42nd Avenue. Concluded that refinement shortens the walking distance from the core of Alaska Junction. For more information, see the *West Seattle Extension Further Studies Memo* • Upcoming work: Investigate opportunity to provide redundancy in vertical circulation to improve reliability of passenger journey
Avalon	• Upcoming work: Investigating opportunity to provide redundancy in elevators, particularly at east entrance where paratransit zone is anticipated
Delridge	• Completed work: Conducted further study of station design refinements. Concluded that refinements should be pursued to increase redundancy of vertical circulation at station entrance and provide direct entrance to platform elevators. For more information, see the *West Seattle Extension Further Studies Memo* • Upcoming work: Continue refining station design based on further study findings

SODO	• Completed work: Conducted further study of refinements to the *At-Grade Alternative (SODO-1a)* Staggered Station Configuration. Concluded refinements can provide station access to the Lander Street overpass. For more information, see the *West Seattle Extension Further Studies Memo* • Completed work: Developed design refinement to consolidate two east entrances into one fare paid zone in the middle, increasing redundancy of key station elements • Completed work: Further study of opportunities to enhance station access from the west, and identified limited opportunity due to constraints related to adjacent properties
Ballard Link Extension	
CID	• Completed work: Reviewed potential station performance during large events which demonstrated the importance of escalators in accommodating large crowds
Midtown	• Completed work: Further study of station entrance refinements that resulted in ability to provide escalators in addition to elevators for shallower configuration. For more information, see *Ballard Extension Further Studies: Downtown Concepts Memo* • Completed work: Developed concepts for station entrances in the public ROW which could reduce adjacent space dedicated to personal vehicles and better integrate into a pedestrian-focused urban realm. For more information, see *Ballard Extension Further Studies: Downtown Concepts Memo* • Completed work: Investigated underground connection to existing pedestrian tunnels to adjacent office towers (e.g., Seattle Municipal Tower, Columbia Tower) and concluded that connections could be made in coordination with adjacent property owners
Westlake	• Completed work: Developed concept for station entrance consolidation at Westlake DT-1 to provide opportunity for more redundancy in vertical circulation at highly legible entrance and potential integration with joint development. For more information, see *Ballard Extension Further Studies: Downtown Concepts Memo*
Denny	• Completed work: Developed concept for station entrances in the public ROW which could reduce adjacent space dedicated to personal vehicles and better integrate into a pedestrian-focused urban realm. For more information, see *Ballard Extension Further Studies: Downtown Concepts Memo* • Completed work: For DT-2, developed concept for providing station entrances on both sides of arterial. For more information, see *Ballard Extension Further Studies: Downtown Concepts Memo*
SLU	• Completed work: Investigated opportunity to provide continuous mezzanine with single fare-paid zone and confirmed that it merits additional study
Seattle Center	• Completed work: Reviewed potential station performance during large events and identified refinements to architectural layout to better accommodate large crowds • Completed work: Identified potential for redundancy in vertical circulation along key pathways (including elevators) • Completed work: Identified station design refinements to provide simpler and more intuitive passenger pathways
Smith Cove	• Completed work: Investigated alternate station locations and profiles, including elevated and shallow retained-cut configurations • Completed work: Investigated refinements to station entrance configurations to provide more redundancy in vertical circulation and more direct pathways from entrance to platform
Interbay	• Completed work: Developed refined shallow retained-cut station with entrances on both sides of Dravus Street. For more information, see *Ballard Extension Further Studies: Interbay-Smith Cove Concepts Memo*
Ballard	• Completed work: For Tunnel 15th Avenue Station Option (IBB-2b), studied an additional station entrance north of Market to improve access for passengers from the north. For more information, see *Ballard Extension Further Studies: Ballard Concepts Memo*