November 2024

Ballard Link Extension

Additional study results: Construction Approach and Duration for Chinatown-International District Alternatives

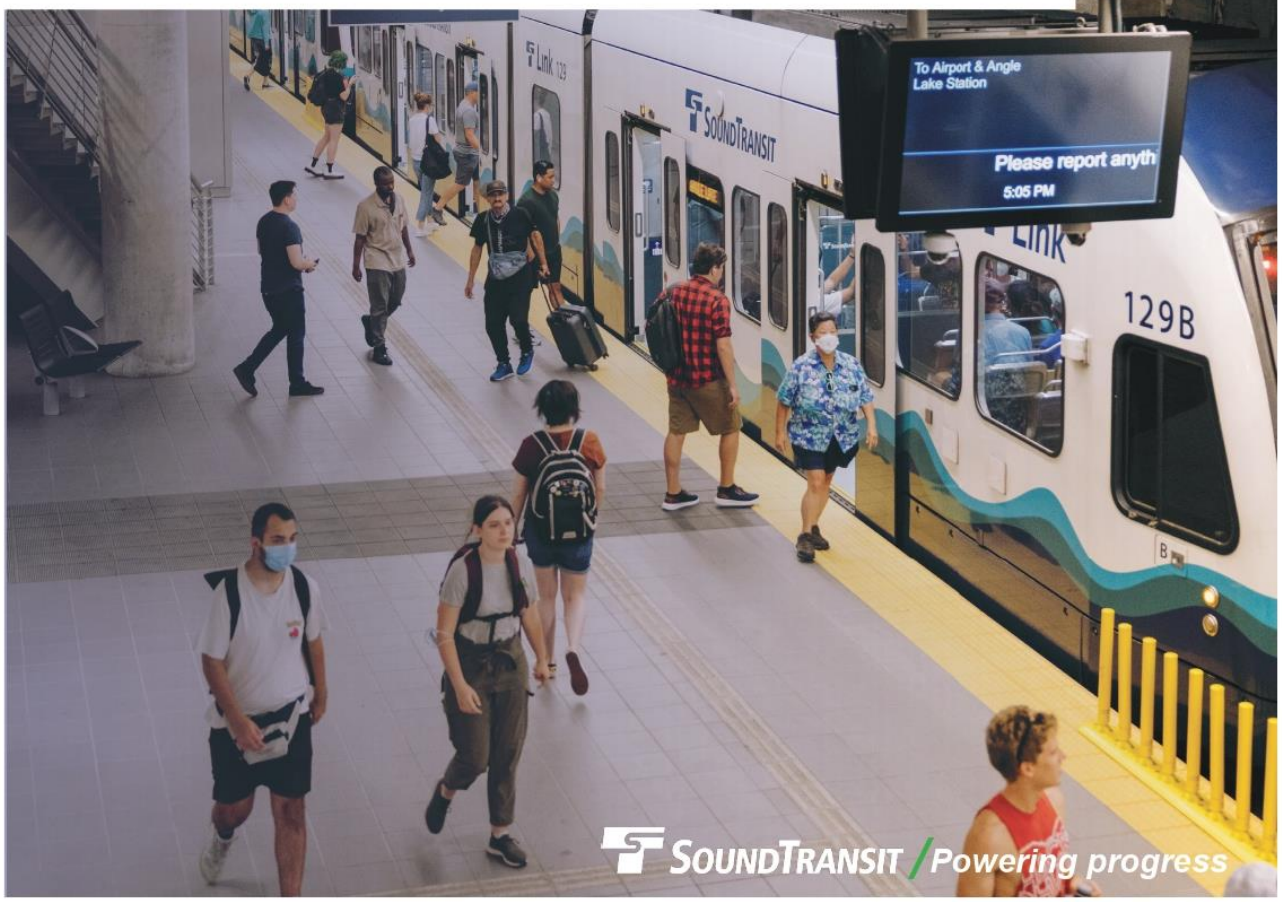
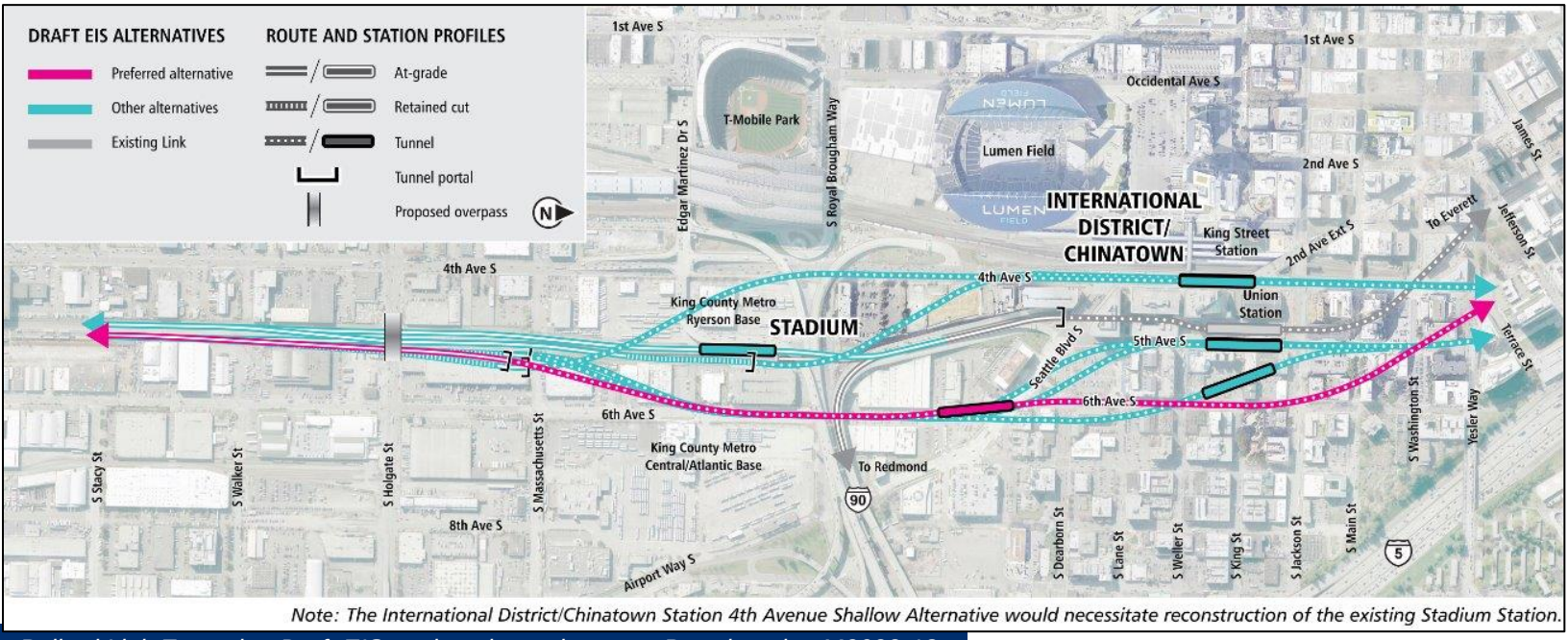


Table of contents



Ballard Link Extension Draft EIS station alternatives, per Board motion M2023-18

1. Executive Summary

Background

The Ballard Link Extension project is part of the Sound Transit system expansion approved by voters in 2016. The Ballard Link Extension will operate from downtown Seattle to Ballard's Market Street area and include a new rail-only tunnel from the Chinatown-International District (CID) to South Lake Union and Seattle Center/Uptown. The voter-approved system plan, ST3, included a representative project with a tunnel station serving the CID adjacent to the existing International District/Chinatown Station under 5th Avenue.

The CID Station area, which includes the historic Pioneer Square and CID neighborhoods, is the only station area densely populated with by communities of color along the project corridor, is lower income, and includes higher-than-average proportions of elderly and disabled residents. This station area is focus for Sound Transit and the City of Seattle's Racial Equity Toolkit for the project, shaping project development and community engagement.

In July 2022, after reviewing the West Seattle and Ballard Link Extensions (WSBLE) Draft Environmental Impact Statement (EIS) and comments from Tribes, the public and agency partners, the Sound Transit Board identified a preferred route and station

locations for the West Seattle Link Extension and directed staff to conduct further studies and community engagement for the Ballard Link Extension.

Community engagement and feedback on the WSBLE Draft EIS was extensive, and informed the Board's direction regarding further study in the CID Station area as well as Sound Transit's further study scope and engagement process. Community feedback themes included:

- Recognize the multitude of past harms inflicted on the community from past infrastructure projects and policies that have ongoing effects today
- Strong concern over displacement of businesses in the CID, which are valued as places of gathering and community wealth-building, and potential loss of cultural identity and community ownership of land
- Desire to see additional near-term engagement between community and agency partners to collectively address remaining questions, minimize potential impacts and maximize community benefits, whether as part of design, through mitigation approaches, or as part of broader partnerships
- Support for investment in public spaces that foster connections between CID and Pioneer Square, promote safety and a sense of belonging, and support for an improved experience for riders accessing transit services

Based on the results of further studies and community feedback, the Sound Transit board adopted motion M2023-18 in March 2023, which identified a preferred alternative for the Ballard Link Extension project. As part of this motion, the board also directed staff to conduct further study of ways to minimize or eliminate construction impacts to the Chinatown-International District (CID) to significantly reduce the duration and effects of construction.

Additional Studies Overview

In response to the board request and community feedback, the Sound Transit technical team conducted the following activities to optimize CID alternatives:

- Conducted an extensive further studies effort in the fall of 2022 and early 2023, including engaging community through workshops, consultants and agency partners.
- Engaged with the independent consultant to the Sound Transit Board to review refinement ideas, particularly for the 4th Avenue Shallow alternative, and gather any additional ideas.
- Convened an independent expert panel to review the design for CID alternatives, construction approach and duration, and to offer new ideas on how to construct the 4th Avenue Shallow Alternative in a way that reduces the construction duration and potentially reduces impacts.

- Refined the design and construction approach to incorporate any promising refinement ideas that may reduce the construction duration and/or related impacts.

This report provides information on construction duration drivers and construction activities associated with the following CID Station Alternatives:

- 4th Avenue Shallow Alternative
- 5th Avenue Shallow Diagonal Alternative
- Dearborn Street Preferred Alternative

Additionally, this report provides an overview of the refinement ideas that emerged for the 4th Avenue Shallow Alternative to reduce construction duration and impacts.

While this report includes some descriptive visuals, many more can be found on the Ballard Link Extension website and are available in English, Traditional Chinese, Simplified Chinese, and Vietnamese.

Summary of Findings

- The **Dearborn Street Preferred Alternative** is expected to take about 6-7 years to construct, with a limited number of construction duration drivers (gas line, Seattle Blvd and 6th Avenue)
- The **5th Avenue Shallow Diagonal Alternative** is expected to take about 5-6 years to construct with construction duration drivers including prioritizing minimizing business displacements, minimizing effects to historic buildings and avoiding effects to the Historic Chinatown Gate
- The **4th Avenue Shallow and Shallower Alternatives** are expected to take 10-12 years to construct with construction drivers including very limited construction access, proximity to BNSF Railway, poor soil conditions, complex underground structures, and more
    - Independent experts were consulted to develop ideas to further reduce duration and impacts
    - Ideas were reviewed and incorporated where shown to reduce duration and community impacts (ideas incorporated into the Draft EIS design do not ultimately reduce the construction duration overall)
    - One idea, full closure of 4th Avenue South, may reduce construction duration by up to 3.5 years, but would result in increased community impact with substantially greater traffic detours locally and regionally
    - Refinement ideas do not address construction duration risk related to proximity to BNSF

Station alternatives included in CID additional studies

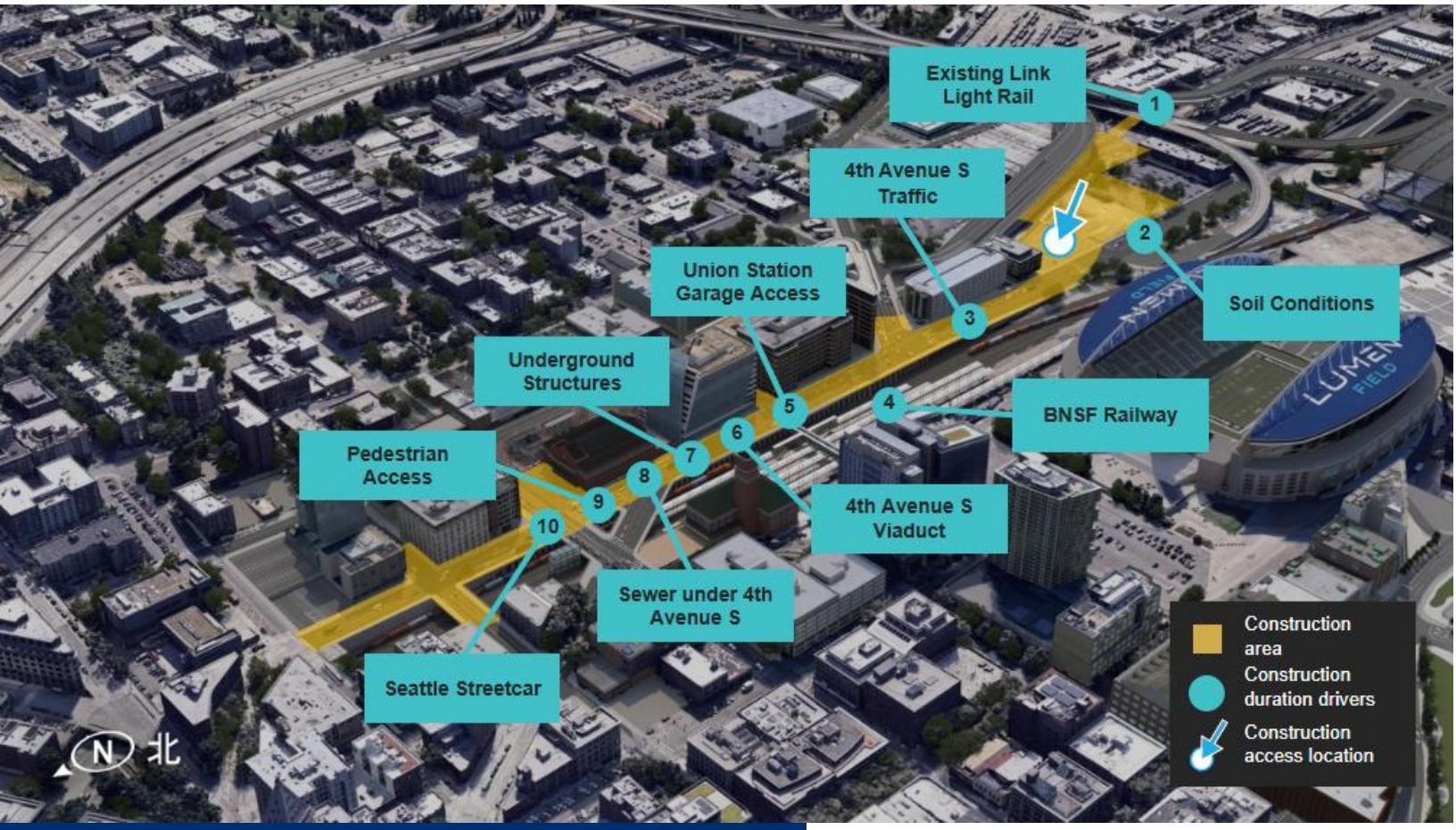
2. CID station alternatives construction

4th Avenue Shallow Alternative

The 4th Avenue Shallow is one of the alternatives being studied as part of the Ballard Link Extension project.

The 4th Avenue Shallow Alternative would begin north of the SODO station and continue east of the existing Link light rail line and extend north. The alternative would then enter a tunnel and continue northwest and then north under 4th Avenue.

Station location: The station would be located beneath 4th Avenue South, west of and with underground pedestrian connection to the existing International District/Chinatown Station.



4th Avenue Shallow Construction Duration Drivers

4th Avenue Shallow construction duration drivers

The following construction duration drivers relate to the 4th Avenue Shallow Alternative when determining construction duration. These construction duration drivers and existing conditions limit the availability of construction staging areas and associated access to the construction area.

Existing Link light rail

The existing Link light rail line crosses the alignment of the 4th Ave Shallow alternative in multiple locations. Stadium Station and the existing at-grade light rail line would need to be relocated to make room for tunnel portal construction. North of S Jackson Street, the existing light rail line is in a tunnel under the BNSF tunnel that controls the depth and alignment of the 4th Avenue Shallow tunnel alternative.

Soil conditions

The area where the neighborhoods of Pioneer Square and the CID are located today were once largely tide flats. As the area was developed, the tide flats were filled in with dirt and other materials. As a result, the ground in this area has poor soils that make underground construction more challenging. These poorer soils extend deeper below the surface in the western portion of the area; thus, soils under 4th Avenue S are more challenging for construction in comparison to soils under 5th Avenue S and S Dearborn Street at 6th Avenue S.

4th Avenue traffic S

4th Avenue S currently carries about 30,000 vehicles per day. Construction activities for this station alternative would affect that traffic and would result in substantial traffic detours through nearby arterials and neighborhoods such as the CID and Pioneer Square. To lessen traffic detours, the demolition of the 4th Avenue S viaduct would need be done in phases to maintain some traffic flow along 4th Avenue S. The need to maintain traffic on 4th Avenue S during construction to the extent possible adds time to the construction duration.

BNSF Railway

The mainline train tracks for BNSF, which carry freight trains as well as Amtrak and Sounder commuter rail service, are located directly adjacent to 4th Avenue. Any construction activity in close proximity to BNSF train tracks would be subject to strict rules enforced by BNSF, including requirements for construction methods, allowable hours of construction and periods of time during the winter holiday season when no construction is allowed at all.

Union Station Garage access

The primary access points for the Union Station parking garage are located along 4th Avenue S where construction would occur. This garage is used by daily office workers as well as by attendees of events at Lumen Field and T-Mobile Park. Access to this garage will need to be maintained during construction.

4th Avenue S viaduct

4th Avenue S sits on an elevated structure (essentially a bridge) between S Main Street and Seattle Boulevard S. Therefore, construction of a station under 4th Avenue S would also require demolition and reconstruction of this structure.

Underground structures

Because of the poor soil conditions in the area, the 4th Avenue S viaduct and adjacent buildings are supported by deep underground piles that extend to reach competent soils that can support the weight of these structures. These piles limit where a new station and tunnel can be placed. During station and tunnel construction, the need to remove

the existing piles supporting 4th Avenue S. adds time to the overall construction duration.

Sewer under 4th Avenue S

There is a large 48-inch diameter existing sewer line located under 4th Avenue S that would need to be either protected in place or relocated and replaced during construction.

Pedestrian access

Many people cross 4th Avenue S at S Jackson Street and at S Weller Street in order to transfer between Link light rail and Sounder commuter rail, as well as to go to the CID and Pioneer Square neighborhoods. Construction activities will need to consider how to maintain pedestrian circulation across 4th Avenue S.

Seattle Streetcar

The First Hill Seattle Streetcar, which carries more than 4,000 riders daily, would not be able to operate through the S Jackson and 4th Avenue S intersection for approximately two years during construction of the 4th Avenue Shallow alternative.

4th Avenue Shallow refinement process

Based on community feedback and Sound Transit Board requests to explore ways to minimize or eliminate construction impacts and significantly reduce the duration of construction, the Sound Transit technical team conducted the following activities:

- Sound Transit staff have explored opportunities to optimize CID alternatives as part of the project development process and through an extensive further studies effort in the fall of 2022 and early 2023, including engaging community through workshops, consultants and agency partners.
- Engaged with the independent consultant to the Sound Transit Board to review refinement ideas, particularly for the 4th Avenue Shallow alternative, and gather any additional ideas.
- Convened an independent expert panel to review the Sound Transit technical team's design for CID alternatives as well as the construction approach and duration, and to offer new ideas on how to construct the 4th Avenue Shallow Alternative in a way that reduces the construction duration and potentially reduces impacts.
- Refined the design and construction approach to incorporate any promising refinement ideas that were shown to be workable and effective in reducing the construction duration and/or related impacts.

WSBLE Further Studies (2022-2023)

In response to community feedback and Sound Transit Board direction, Sound Transit staff developed refinements to the 4th Avenue Shallow alternative to reduce impacts and shorten the construction duration.

ICON Apartments access

One of the impacts of the 4th Avenue Shallow alternative identified in the 2022 WSBLE Draft EIS was the displacement of residents of the Icon Apartment building located at the corner of 4th Avenue S and S Jackson Street due to an extended period of time during which there would be no access to the building while 4th Avenue S is being demolished and reconstructed. The team developed a modified construction approach that includes temporary decking which reduced the duration of restricted access from four years to two periods of two months each.

Reference: Page 11 of 38 in Ballard Extension Further Studies – Chinatown/International District (Jan 2023)

BNSF Railway effects

The Sound Transit team developed a modified construction approach to potentially address BNSF's concerns about proximity of construction to active freight operations. This involves use of secant pile walls instead of slurry walls for support of excavation when constructing the portion of the tunnel and station adjacent to the BNSF tracks. This results in lengthening the duration of construction by approximately one year, but does not resolve all risks associated with construction next to BNSF.

Reference: Page 8 of 38 in Ballard Extension Further Studies – Chinatown/International District (Jan 2023)

Independent consultant to the Board

During the further studies period in late 2022 and as design has evolved, the independent consultant to the board has been asked to review the technical team's design for the 4th Avenue Shallow alternative as well as the construction approach and duration. The consultant identified several ideas for consideration.

"Top down" construction with new permanent viaduct

This idea proposed uses a "top down" construction approach for the 4th Avenue Shallow alternative to reduce construction duration by building the permanent structure instead of first a temporary bridge structure and later a permanent structure in the construction sequence. The Sound Transit technical team reviewed this idea and found that it works and results in a one-year reduction to the duration of traffic effects. The idea was incorporated into the design as part of the late 2022 and early 2023 further studies effort.

Reference: Figure 5 Case 1 in Page 10 of 38 in Ballard Extension Further Studies – Chinatown/International District (Jan 2023)

Build the tunnel station without demolishing the existing viaduct

This idea suggests building the 4th Avenue Shallow station underneath 4th Avenue S without demolishing the existing viaduct to reduce construction duration and cost. The Sound Transit technical team reviewed this idea and identified challenges including the low headroom to construct below the viaduct, the long-term performance of the existing viaduct, and the potential challenge of maintenance or repairs to the 4th Avenue S Viaduct needed in the future with an active light rail station immediately below it. In addition, the specialized low headroom equipment needed for this work would greatly reduce productivity. For these reasons, the Sound Transit technical team did not incorporate this idea into the design of the 4th Avenue Shallow Alternative.

Reference: Figure 5 Case 2 in Page 10 of 38 in Ballard Extension Further Studies – Chinatown/International District (Jan 2023)

Retained cut with canopy

This idea suggests building the station in a retained cut with the 4th Avenue S viaduct rebuilt as a canopy over the station to reduce construction duration and avoid the need for ventilation. A retained cut station is an open-air station (not a tunnel station that is fully covered), with the lower part of the station structure below ground, similar to the style of the existing International District-Chinatown Station. The Sound Transit technical team reviewed this idea and after further analysis found that it would not be possible to provide the necessary structural support for the new viaduct and to allow for phased construction to maintain some traffic. The station would likely not be considered an open-air station and would therefore require tunnel ventilation equipment. In addition, station circulation would require passengers to travel under the platform to exit the station due to the lack of room for a typical mezzanine above the platform. Given these issues, the Sound Transit technical team did not incorporate this idea into the design for the 4th Shallow Alternative.

Reference: Figure 5 Case 3 in Page 10 of 38 in Ballard Extension Further Studies – Chinatown/International District (Jan 2023)

Station at ground level

This idea suggests constructing the station at the existing ground level next to the BNSF tracks to reduce construction duration by avoiding underground construction. The technical team reviewed this idea and found that below-grade construction would be required to construct this station in order to provide

passenger circulation to and from the station platform. Also, similar to the retained cut station idea, it would not be possible to provide the necessary structural support for the new viaduct and allow for phased construction to maintain some traffic. There would also not be adequate space for provision of ventilation equipment and emergency egress stairs. Finally, this approach does not include support structure for excavation walls, so crash walls* next to the BNSF train tracks may be required, adding cost and complexity. For these reasons, the Sound Transit technical team did not incorporate this idea into the design for the 4th Avenue Shallow Alternative.

* Crash walls (also known as deflection walls) are very large walls shaped reinforced concrete structures. Crash walls provide for protection of structures like piers or abutments adjacent to the railway tracks. The purpose of these wall is to prevent head-on collision or impact from derailed trains on the primary structure support elements.

Reference: Figure 5 Case 4 in Page 10 of 38 in Ballard Extension Further Studies – Chinatown/International District (Jan 2023)

Independent expert panel review

Sound Transit convened an independent expert panel to review the Sound Transit technical team's design for the 4th Avenue Shallow Alternative as well as the construction approach and duration, and to identify any ways to minimize/eliminate construction effects and reduce the duration of construction. The panel was also asked to review overall constructability and activity durations for the Dearborn Street Preferred Alternative.

The panel conducted a site visit and reviewed the design to date. They validated the overall construction duration for the Dearborn Street Preferred Alternative and for the 4th Avenue Shallow Alternative[1] given the current level of design and available information, and developed ideas for consideration to potentially reduce construction duration for the 4th Avenue Shallow Alternative.

Finally, the panel also identified construction access and maintaining access to Union Station parking garage as construction duration risk and emphasized that the existence of the BNSF train tracks in close proximity to the 4th Avenue Shallow Alternative[2], presents a substantial construction duration risk and exist regardless of the refinement ideas they proposed for the 4th Avenue Shallow Alternative.

References:

[1] #1 in Page 7 of 233 and Page 14 of 233 of 4th Avenue Shallow Alignment Schedule Analysis Study Report Nov 2023 by Independent Expert Panel (Nov 2023)

[2] *#3 in Page 8 of 233 and Page 14 of 233 of 4th Avenue Shallow Alignment Schedule Analysis Study Report Nov 2023 by Independent Panel Review (Nov 2023)*

Multiple construction access locations

The panel proposed potentially increasing the number of access points for construction vehicles to the station construction area beyond the one location identified at the former Salvation Army Yard to reduce the construction duration by about three years. The Sound Transit technical team reviewed this idea and after further analysis found that there would not be enough space for the ramp location idea at Seattle Boulevard S and the slope would be too steep to work for construction equipment. There would also be conflicts with the existing light rail line and the Union Station parking garage at this location. For the other location idea at S Main Street, the proximity to the BNSF train tracks, conflict with an existing retaining wall, and minimal available space would add complexity and reduce or negate the potential construction duration savings. For these reasons, the Sound Transit technical team did not move forward with this idea and did not incorporate it into the design of the 4th Avenue Shallow Alternative.

References:

Option 1 in Page 18 to 35 of 233 of 4th Avenue Shallow Alignment Schedule Analysis Study Report Nov 2023 by Independent Expert Panel (Nov 2023)

Option 1 in Page 2 of 6 in 4th Avenue Shallow Alignment Schedule Analysis Response March 2024 by HNTB (Mar 2024)

Full traffic closure

The panel proposed a full closure of 4th Avenue for approximately two to four years so that the viaduct structure can be demolished and rebuilt faster. This idea could reduce the overall construction duration by up to three and a half years, but would likely result in substantially greater traffic and transit detours into the CID and Pioneer Square neighborhoods, while some traffic can detour to regional transportation facilities such as I-5 and SR 99. Due to these effects, this idea was not included in the current design concept for the 4th Avenue Shallow Alternative.

References:

Option 2 in Page 36 to 39 of 233 of 4th Avenue Shallow Alignment Schedule Analysis Study Report Nov 2023 by Independent Expert Panel (Nov 2023)

Option 2 in Page 4 of 6 in 4th Avenue Shallow Alignment Schedule Analysis Response March 2024 by HNTB (Mar 2024)

Pipe box

The panel suggested consideration of an innovative alternative design concept called a “pipe box” that could potentially avoid the need to demolish the 4th Avenue S viaduct and, if workable, could reduce the construction duration by up to four years. The Sound Transit technical team reviewed this idea and after further analysis, found that to avoid substantially impacting the 4th Avenue S viaduct and to be able to construct the station box in competent soils, the station would be very deep. At approximately 160 to 175 feet deep, this would be an elevator-only station. Also, at least some of the viaduct, if not all, would still need to be reconstructed to accommodate the vertical shafts needed to construct the pipe box, as well as station elements such as elevators, ventilation, and emergency egress. Finally, this construction method is unproven at this length – it has never been used or achieved for this extent of construction – and therefore poses substantial risk. Given the challenges and the risk described above, this idea has not been incorporated into the design of the 4th Shallow Alternative.

References:

Option 3 in Page 40 to 51 of 233 link 4th Avenue Shallow Alignment Schedule Analysis Study Report Nov 2023 by Independent Expert Panel (Nov 2023)

Option 3 in Page 5 of 6 in in 4th Avenue Shallow Alignment Schedule Analysis Response March 2024 by HNTB (Mar 2024)

Other ideas

Additional ideas for reducing the construction duration of the 4th Avenue Shallow alternative were suggested by Sound Transit Board Members and the community.

Conveyor belts

Some have suggested the use of conveyer belts to speed up construction and reduce construction impacts. This is a standard industry practice often used by contractors. Because it is already likely to be used, adding this practice would not result in any additional time savings. Conveyor belts can be used to transport materials between locations within the construction zone, including to trucks where materials are then transported off-site. However, they would not increase the speed of excavation, which is the main construction duration driver in this case.

Multiple shifts

Some have suggested that multiple shifts could speed up construction. The construction duration for the 4th Avenue Shallow alternative already assumes that, based on industry practice, multiple concurrent construction activities for the station and 4th Avenue S viaduct would occur 10 hours per day, 6 days per week, while underground tunnel work would occur 24 hours per day, 7 days per week. Additional shifts beyond these assumptions would be difficult to achieve due to

noise ordinance limitations and the potential for crew fatigue. However, if it were possible to achieve, these duration savings could be realized on any CID alternative.

Reference: Page 9 of 38 in Ballard Extension Further Studies – Chinatown/International District (Jan 2023)

4th Avenue Shallow stage two of construction

4th Avenue Shallow construction sequence and methods

Construction of the 4th Avenue Shallow alternative would occur in three main stages and is anticipated to take **approximately 10 to 12 years** to complete. The activities described here incorporate the promising ideas developed during Further studies and from outside experts.

Stage one: I-90 to S Jackson Street, east side of 4th Avenue S

In the first stage, construction would occur between the I-90 off ramp and S. Jackson Street. Traffic would be maintained on the west side of 4th Avenue S with reduced traffic capacity, resulting in substantial traffic detours to other highways and arterials, including some nearby local streets. Work would be sequenced in order to maintain access to at least one of the entrances to the Union Station parking garage at all times.

On the east side, major work would include:

1. 4th Avenue S viaduct demolition
2. Cut-and-cover tunnel construction
3. New permanent 4th Avenue S structure and roadway construction

Due to the poor soils, the tunnel walls would be about 100 feet deep in order to reach the competent layer of soil and support the tunnel.

This is anticipated to take **approximately two years**.

Stage two: I-90 to Jackson Street, west side of 4th Avenue S

In the second stage, a similar process would occur between the I-90 off-ramp and S Jackson Street. Traffic would be maintained on the east side of the new permanent 4th Avenue with reduced traffic capacity, resulting in substantial traffic detours to other highways and arterials, including some nearby local streets. Work would be sequenced in order to maintain access to at least one of the entrances to the Union Station parking garage at all times.

On the west side, major work would include:

1. 4th Avenue S viaduct demolition
2. Cut-and-cover tunnel construction
3. New permanent 4th Avenue S structure and roadway construction
4. Sewer line relocation
5. Station and tunnel excavation under new 4th Avenue S viaduct

Because construction would occur adjacent to BNSF tracks, a special tunnel wall type (secant pile) would be used to reach depths of about 100 feet to reach the competent layer of soil and support the tunnel. This special tunnel wall type is needed to minimize ground settlement risk of the BNSF train tracks and takes longer to construct than the tunnel wall type on the east side.

This stage is anticipated to take **approximately three years**.

Stage three: S Jackson Street to S Main Street

In Stage 3, 4th Avenue S would be fully closed to traffic between S Jackson Street and S Main Street. This would result in detours of substantial volumes of general-

purpose traffic and buses to nearby streets such as 2nd Avenue Extension S, 5th Avenue S, and S Washington Street.

During this time, major work would include:

1. Temporary decking for ICON apartment building
2. S Main Street bridge demolition over BNSF train tracks
3. 4th Avenue S viaduct and S Jackson Street demolition
4. Demolition of a retaining wall system adjacent to the BNSF train tracks
5. Cut-and-cover tunnel construction
6. New permanent 4th Avenue S roadway and S Jackson Street bridge reconstruction
7. S Main Street bridge reconstruction over BNSF train tracks

This is anticipated to take **approximately four years**. However, work during this period will require intensive coordination with BNSF due to construction activities adjacent to and above the BNSF train tracks and could further lengthen the duration of construction.

Stage four: station construction

In the final stage, the new station would continue to be constructed under the new 4th Avenue S. Major work in this stage would include:

1. Station platforms, escalators, elevators, and station entrances
2. Underground passenger connection to existing International District/ Chinatown Station
3. Track, signal, mechanical, and electrical systems
4. Construction complete

This is anticipated to take **approximately five to seven years** and would overlap with Stage 3. 4th Avenue S would be fully open to traffic during years 10 through 12.

4th Avenue Shallower Alternative

Many of the construction duration drivers associated with the 4th Avenue Shallow alternative also apply to the 4th Avenue Shallower alternative. In addition, construction activities would extend further north along 4th Avenue S to Jefferson Street and would affect additional buildings including the King County Administration building.

Additional major work includes:

1. Cut-and-cover tunnel construction between S Main Street and Jefferson Street
2. Reconstruction of retaining wall adjacent to BNSF train tracks between S Main Street and Jefferson Street

3. Yesler Way bridge reconstruction (S Main Street bridge over BNSF train tracks would not be demolished and reconstructed)

This work would occur during Stage 3 and have a similar construction duration as Stage 3 for 4th Shallow Alternative.

5th Avenue Shallow Diagonal Alternative

The 5th Avenue Shallow Diagonal is one of the alternatives being studied as part of the Ballard Link Extension project.

The 5th Avenue Shallow Diagonal Alternative would begin north of the SODO station and continue east of the existing Link light rail line and extend north. The alternative would then enter a tunnel heading north beneath 6th Avenue and then transition to under 5th Avenue South north of Seattle Boulevard South.

Station location: The station would be located beneath the area between 5th Avenue South and 6th Avenue South, east of and with underground pedestrian connection to the existing International District/Chinatown Station.

5th Avenue Shallow Diagonal construction duration drivers

The following construction duration drivers relate to the 5th Avenue Shallow Diagonal alternative. Many of the construction duration drivers associated with the 4th Avenue Shallow alternative do not exist for the 5th Avenue Shallow Diagonal alternative.

Minimizing effects to historic buildings and avoiding effects to the Historic Chinatown Gate

Many of the adjacent buildings in the construction area are historic buildings. In addition, the Historic Chinatown Gate is located at the intersection of 5th Avenue S and S King Street. The need to minimize effects to historic buildings and avoid effects to the Historic Chinatown Gate constrains the available area for construction staging.

Prioritizing minimizing business displacement

5th Avenue Shallow Diagonal Duration Drivers

The Chinatown-International District neighborhood is home to many small, local, people of color-owned businesses. Prioritizing minimizing business displacement and maintaining access for customers during construction constrains construction activities and drives duration.

5th Avenue Diagonal stage three of construction

e and methods

Construction of the 5th Avenue Diagonal alternative would occur in three main stages and is anticipated to take **approximately five to six years** to complete.

Stage one: Station excavation

Major work during this stage would include:

1. Protection of Historic Chinatown Gate
2. Demolition of certain existing buildings identified within the construction area
3. Station wall construction
4. Station excavation and mining

This work is anticipated to take **approximately two years**.

Stage two: Tunnel Boring Machine (TBM) arrivals

Major work during this stage would include:

1. TBM arrival at the station
2. TBM removal and transport from site

This work is anticipated to take **approximately one year** of intermittent activity.

Stage three: Station internal structures

During this stage, station finishes would be installed, including:

1. Station platforms, escalators, elevators, and station entrances
2. Underground passenger connection to existing International District/Chinatown Station
3. Track, signal, mechanical, and electrical systems
4. Construction complete

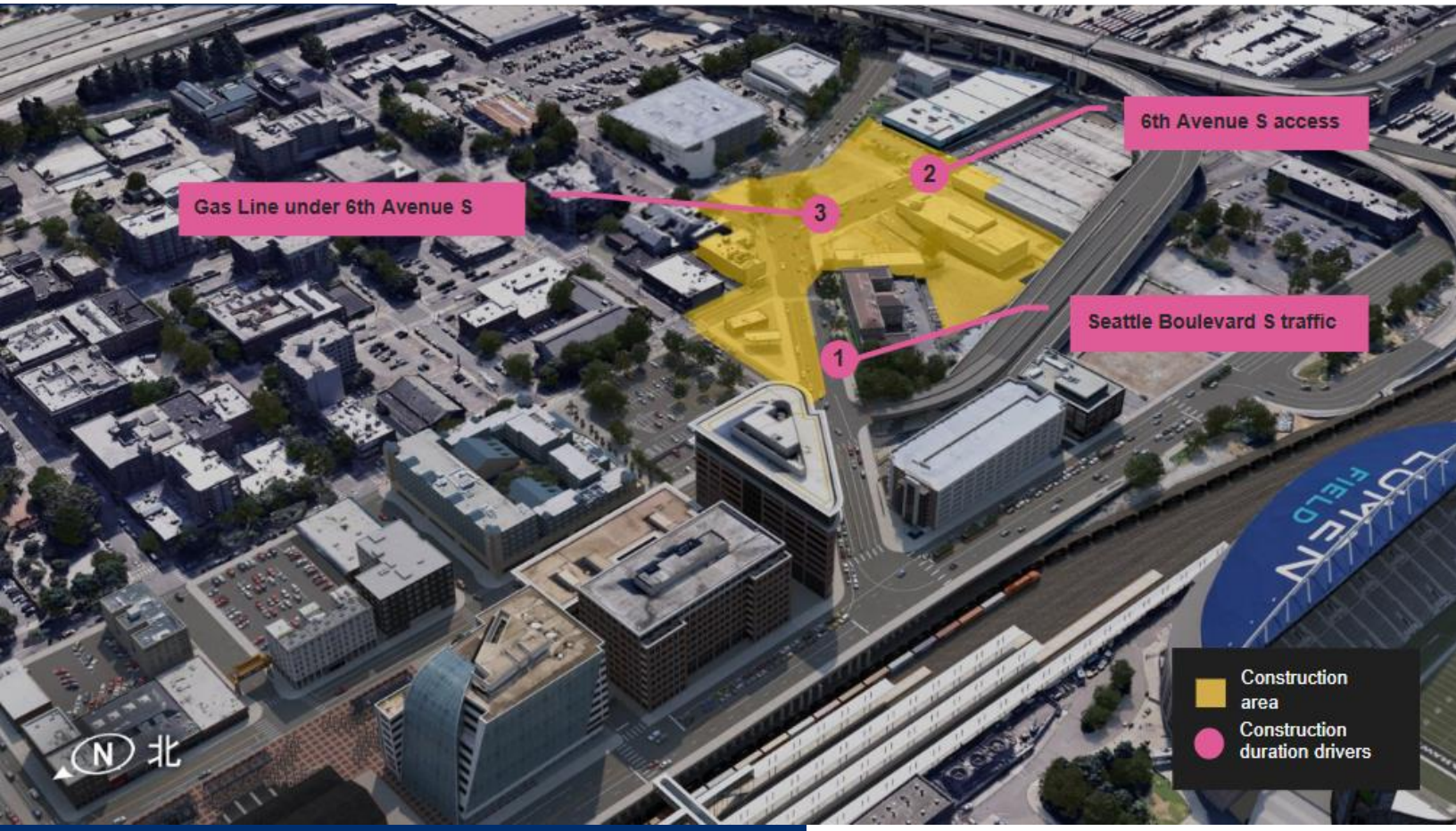
This work is anticipated to take **approximately two to three years**.

Dearborn Street Preferred Alternative

The Dearborn Street Preferred is one of the alternatives being studied as part of the Ballard Link Extension project. The Dearborn Street station was identified as the preferred alternative for the Ballard Link Extension project as part of motion M2023-18.

The Dearborn Street Preferred Alternative would begin north of the SODO station and continue east of the existing Link light rail line and extend north. The alternative would then enter a tunnel heading north beneath 6th Avenue. The tunnel alignment would continue north beneath 6th Avenue South to South Jackson Street and then transition to continue northwest passing under 5th Avenue South.

Station location: The station would be located beneath 6th Avenue South, straddling Seattle Boulevard South.



Dearborn Street Preferred Alternative Duration Drivers

Dearborn Street Preferred Alternative construction duration drivers

The following construction duration drivers relate to the Dearborn Street Preferred Alternative. Many of the construction duration drivers associated with the 4th Avenue Shallow Alternative and 5th Avenue Shallow Diagonal Alternative do not exist for the Dearborn Street Preferred Alternative.

Seattle Boulevard S traffic

Seattle Boulevard S currently carries about 7,000 vehicles per day. Traffic would be maintained with the use of temporary decking during construction of the station.

6th Avenue S access

The section of 6th Avenue S that is south of Seattle Boulevard S carried about 4,000 vehicles per day before 2020. Since 2020, 6th Avenue S has been closed to traffic. It would be fully closed during station construction.

Gas line under 6th Avenue S

An existing 16-inch gas line is located under 6th Avenue S at the location of the Dearborn Street Preferred Alternative. This line would need to be either protected in place or relocated and replaced during construction.

Dearborn Street Preferred Alternative stage three of construction

Dearborn Street Preferred Alternative construction sequence and methods

Construction of the Dearborn Street Preferred Alternative would occur in three main stages and is anticipated to take **approximately six to seven years** to complete.

Stage one: Station excavation

Major work during this stage would include:

1. Demolition of existing buildings
2. Gas line relocation (if protecting in place is determined not to be possible)
3. Decking to maintain traffic on Seattle Boulevard S
4. Station wall construction
5. Station excavation

This work is anticipated to take **approximately three years**.

Stage two: Tunnel Boring Machine (TBM) arrivals/departures

Major work during this stage would include:

1. TBM arrival at the station
2. TBM maintenance and re-launch of TBMs to next station

This work is anticipated to take **approximately one year** of intermittent activity.

Stage three: Station internal structures

During this stage, station finishes would be installed, including:

1. Station platforms, escalators, elevators, and station entrances
2. Track, signal, mechanical, and electrical systems
3. Roadway Restoration
4. Construction complete

This work is anticipated to take **approximately two to three years**.