

King Street Station Area Platform Improvements Project Final Alternatives Analysis

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Acronyms and Abbreviations

ADA	Americans with Disabilities Act
BNSF	BNSF Railway
Board	Sound Transit Board of Directors
CID	Chinatown-International District
FTA	Federal Transit Administration
NRHP	National Register of Historic Places
ROM	Rough order of magnitude
SDIP	Sounder South Strategic Development and Implementation Plan
SDOT	City of Seattle Department of Transportation
ST2/ST3	Sound Transit 2 Plan/Sound Transit 3 Plan
WSBLE	West Seattle to Ballard Link Extensions Project
WSDOT	Washington State Department of Transportation

1 INTRODUCTION

1.1 Project Purpose and Need Statement

King Street Station is the primary destination for Sound Transit Sounder commuter rail riders. At times the platform can feel crowded, especially on stairs and in elevators. The purpose of the King Street Station Area Platform Improvements Project is to make improvements to the station area so that it can serve even more riders in the future. The purpose of Phase 1 – Alternatives Analysis of the project is to evaluate and identify a preferred set of improvements, such as additional stairs and elevators and an extended platform, to advance into further study.

1.2 Background and Overview

Major investments in the Regional Transit System began in the mid-1990s with the passage of Sound Move, and later the Sound Transit 2 Plan (ST2) of 2008 and Sound Transit 3 Plan (ST3) in 2016. The *Sounder South Strategic Development and Implementation Plan* (SDIP) (Sound Transit 2020) is a planning document that guides the implementation of ST2 and ST3 projects in the Sounder South corridor, including planned improvements at King Street Station. Sound Transit developed the SDIP to prioritize investments that will add more passenger capacity to the system. The SDIP presents a strategy to give Sound Transit flexibility to tailor capacity enhancements to address expected ridership demand changes between now and 2046, which is the ST3 planning horizon year. It also establishes a program of improvements to the Sounder South corridor that will enable Sound Transit to meet forecasted ridership demand and maintain service quality over the life of the ST3.

King Street Station is the southern terminus for Sounder North, which extends from Everett to Seattle and has four stations, and is the northern terminus for Sounder South, which extends from Seattle to Lakewood and has nine stations. Sounder provides primarily peak hour service and has limited off-peak options. Sound Transit is advancing the King Street Station Platform Improvement Project, Phase 1 – Alternatives Analysis, as a first step in implementing improvements at King Street Station related to access and platform extension.

1.3 Purpose and Process of the Alternatives Analysis

The King Street Station Platform Area Improvements Project planning consists of three phases. The purpose of Phase 1 – Alternatives Analysis was to complete an alternatives evaluation and screening process to help identify a preferred set of access improvements. The purpose of this report is to document and summarize the findings of the analysis of the alternatives for the platform improvements, as well as the screening criteria and performance metrics used to quantify potential impacts. Following the environmental review to be completed in Phase 2, the Sound Transit Board of Directors (Board) will select the improvements to be built. At that time, improvements will be advanced into design, and then project delivery and construction processes will commence.

The analysis considered a variety of access improvement options for the station, and included the following additions and improvements:

- Additional stairs and elevators
- An extended platform to accommodate longer trains
- Pick-up/drop-off area
- Facilities to support connection to other transit
- Improvements to the station area

The goals of King Street Station Platform Area Improvements Project, in summary, are to:

- Provide and improve multimodal access connections, including improving opportunities for underserved communities to access the station.
- Improve passenger experience, accessibility and comfort at the station for people of all abilities.
- Accommodate existing ridership and attract new riders, with an emphasis on underserved communities.
- Minimize potential negative project effects to the built and natural environment and to underserved communities.
- Enhance the overall connections between the station and the adjacent neighborhoods, with an emphasis on underserved neighborhoods, in partnership with the city and stakeholders.

1.4 Study area and WSBLE planning

The study area includes the King Street Station platform itself and areas used to access the platform, including stairs, walkways and elevators. See **Figure 1-1**(Study area). The study area is bounded by Second Avenue Extension South to the north, Fourth Avenue South to the east, and South King Street and Lumen Field to the west. The study area was developed in coordination with Sound Transit’s West Seattle Ballard Link Extensions Project (WSBLE), which is evaluating a larger area outside of the station platform area.

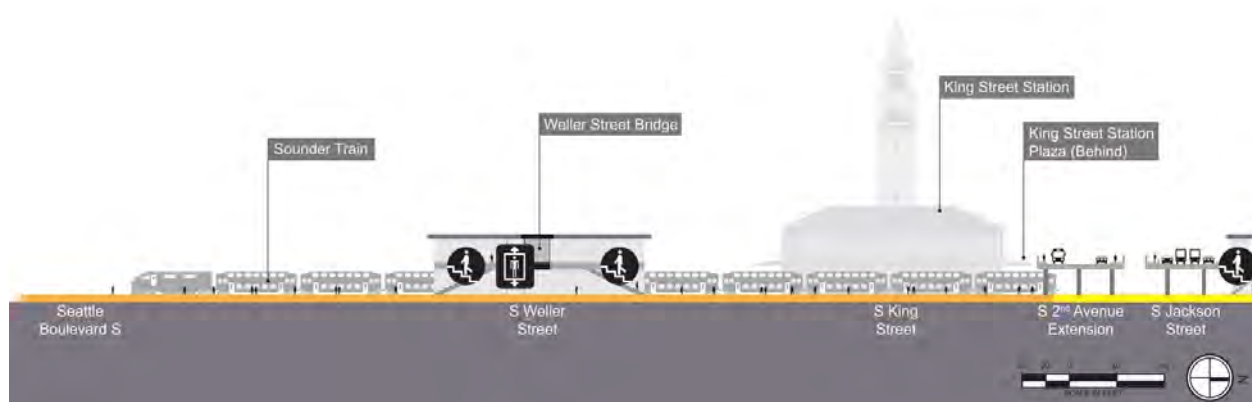


Figure 1-1 Study area

Sound Transit and the Federal Transit Administration (FTA) published the WSBLE Draft Environmental Impact Statement for public comment on January 28, 2022, and the public comment period closed on April 28, 2022. The proposed expansion of Link light rail transit

service from Downtown Seattle to West Seattle and Ballard includes two extensions. The Ballard Link Extension would be about 7.1 miles. It would include a new 3.3-mile light rail-only tunnel from the Chinatown-International District (CID) to South Lake Union and Seattle Center/Uptown and a second station in the CID. The Draft Environmental Impact Statement evaluates a No Build Alternative and multiple Build Alternatives in the project corridor, including different alignments and station options. In May 2019, the Board identified one or more preferred alternatives for most of the project segments. A preferred alternative is not a decision on the project to build; instead, it is a statement of preference based on currently available information. The Board did not identify a preferred alternative in the CID segment and is not bound by its identification of a preferred alternative.

The purpose of the WSBLE, in part, is to make appropriate community investments to improve mobility, and to increase capacity and connectivity for regional connections. Therefore, although completion of the Environmental Impact Statement for the WSBLE is anticipated in a couple of years, WSBLE project staff is engaged in the planning process for the King Street Station improvements to ensure coordination and consistency between both projects. This planning process includes any study of potential access improvements at King Street Station because the existing Link light rail station is in proximity to the Sounder commuter rail station.

2 DESCRIPTIONS OF EXISTING CONDITIONS

Sound Transit subleases the platform area at the King Street Station from Amtrak, which leases it from BNSF Railway (BNSF). Sound Transit has a 40-year lease that expires in 2040. There are currently seven tracks at King Street Station, as shown on **Figure 2-1** (Track layout): four single-end south-facing tracks (all Amtrak; King-6, King-7, King-8, King-9) and three through tracks (King-3, King-4, King-5). The two BNSF main line tracks (Main-1 and Main-2) also pass by the station to the east. There are three center platforms, one of which is dedicated to Sounder service, and one side platform. The platform for Sounder service can be accessed by overhead bridges, while Amtrak service platforms can be accessed from the main station house.

King Street Station is within Seattle's downtown core. The surrounding area is predominantly commercial mixed use and multifamily residential, with a few residential neighborhoods. Five parks are located within 0.25 mile of the station: Klondike Goldrush National Historic Park, Union Station Square, Hing Hay Park, Occidental Square and City Hall Park. The SDIP Environmental Constraints Evaluation identified no wetlands or streams, and no floodplain or floodway within 0.5 mile of King Street Station. The hazardous materials survey found no sites on the State of Washington's 2019 Hazardous Sites List (Sound Transit 2019).

According to U.S. Census data, block groups near King Street Station have minority percentages greater than 50 percent, high poverty and a population with limited English proficiency (Sound Transit 2019).

The study area crosses two historic districts listed in the National Register of Historic Places (NRHP), the Pioneer Square-Skid Road Historic District and the Seattle Chinatown Historic District. Additionally, the study area includes seven built-environment resources that are either listed in the NRHP, eligible for listing in the NRHP, or listed as contributing resources to one of the two NRHP-listed historic districts. No unevaluated historic-period built-environment

resources (i.e., historic period resources with no formal determination of eligibility) have been identified within the study area. In addition, four previously recorded archaeological resources are within the study area.

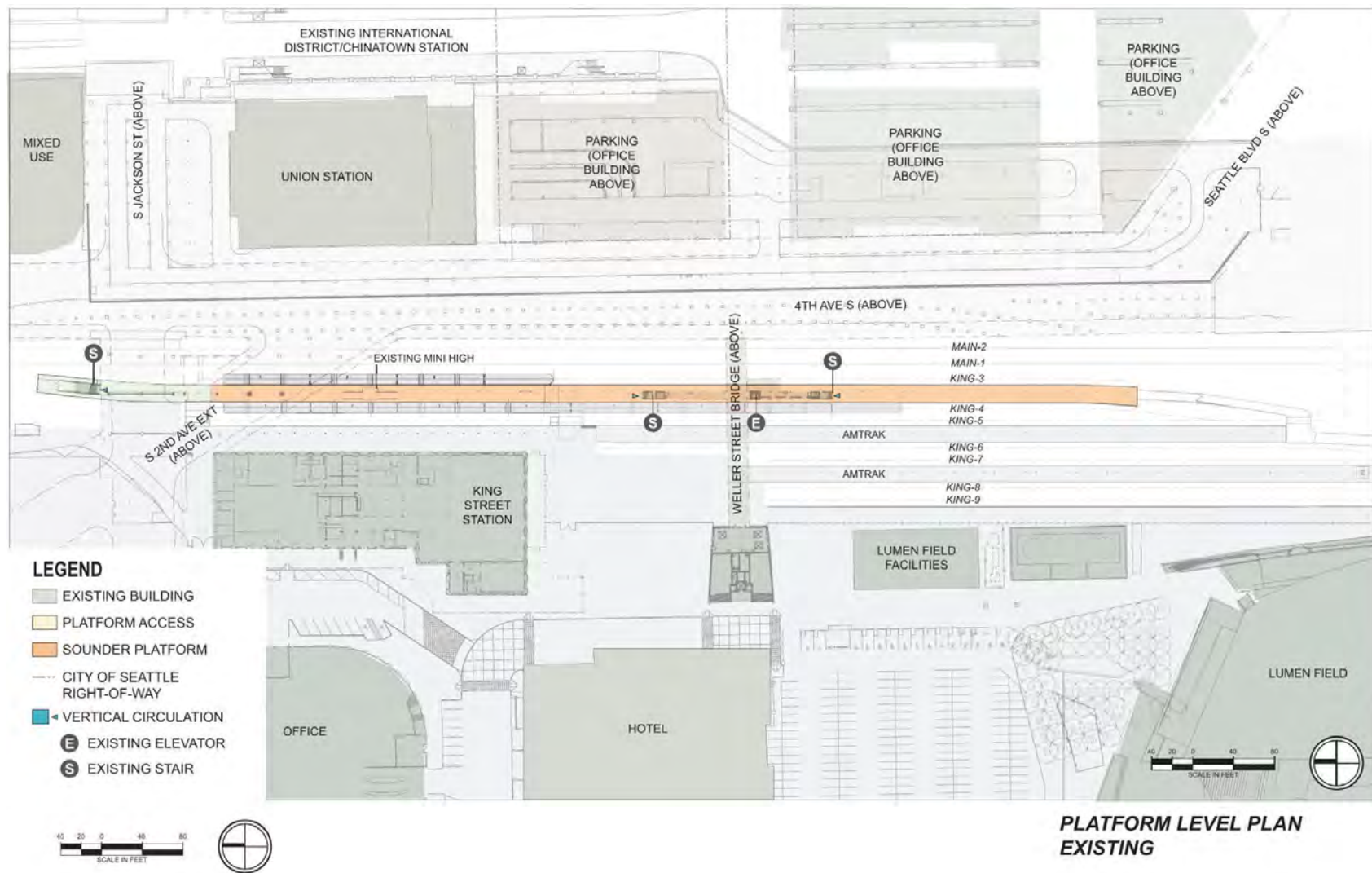


Figure 2-1 Track layout

3 DEVELOPMENT AND DESCRIPTION OF ALTERNATIVES

Generally, the platform area improvement alternatives consider improvements to King Street Station to connect the platform level to the surrounding streets and sidewalks. The station currently has three stairways and one elevator that connect the streets and sidewalk to the platform, as shown in **Figure 1-1**(Study area).

The improvements to the existing station were developed to accomplish the following:

- Relieve congestion on the platform as passengers wait to board departing trains and while other passengers disembark arriving trains.
- Provide more egress options.
- Increase safety for passengers to leave the station in the event of an emergency.
- Consider where the passengers are going after they arrive, and where they are coming from to enter the station. The dominant pedestrian movement is to and from the neighborhoods north, east and west of the station (Pioneer Square, CID and downtown) and to connect with buses and light rail for travel beyond those neighborhoods, as **Figure 3-1**(Station access routes) and **Figure 3-2**(Potential connections) show. Based on observation, there is notably less pedestrian movement to the south.

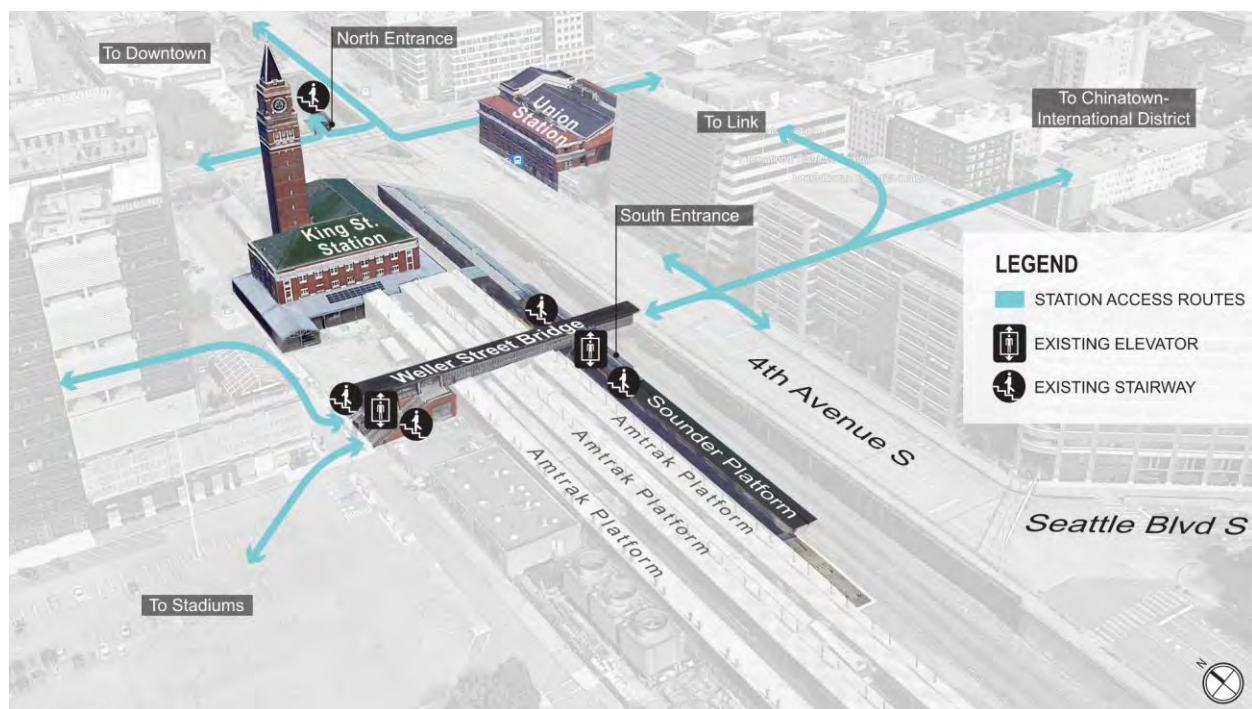


Figure 3-1 Station access routes

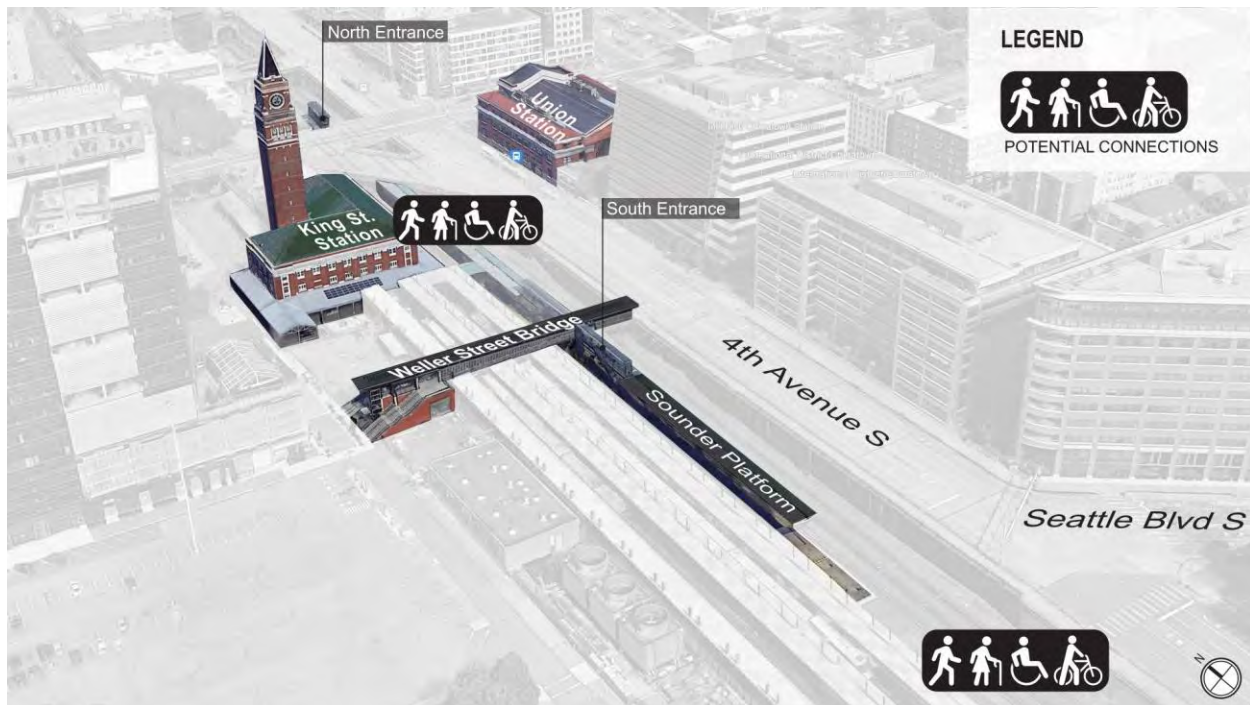


Figure 3-2 Potential connections

The projected occupant loads for the 10-car Sounder South train and the 3-car Sounder North train were used to evaluate egress capacity of the station and identify the minimum number of stairways needed to meet the City of Seattle's adopted egress code for passenger rail systems. Stair capacity of 1.41 people per minute per inch width of stair was used to estimate the width of total stairs that are needed to permit the projected occupant load to safely exit the station platform in 4 minutes. The egress study estimated that a minimum of 48 feet of new stairway width would be needed to allow safe egress of the occupant load for a 15-minute headway. For an alternative that would not increase the existing platform width, new stairways were assumed to be the width of the existing stairs to the Weller Street bridge (66 inches or 5.5 feet) to allow for space on the platform to walk around the new stairways. The new stairway at the southern end of the platform extension could be wider.

The design of the platform area improvement alternatives has been completed only to the level necessary to support the alternatives evaluation and screening process.

Several physical design features and components fundamentally characterize the preliminary alternatives. These design features and components are shown on **Figure 3-3** (Design components – plan view) and **Figure 3-4** (Design components - Elevation Seattle Boulevard to Jackson Street). These include:

- Additional elevators: ranging from two to six.
- Additional stairways: ranging from five to eight.
- Platform (holding area) (net square feet): ranging from 10,000 to 22,000.
- Concourse (holding area) (gross square feet): ranging from 7,000 to 19,000.
- Improvements for accessibility including the new elevators.

- Added station amenities such as ORCA card readers, wayfinding signage, ticket machines for visitors and less frequent riders, security cameras, lighting, audible and visible real-time arrival signage, and schedule information.

The number and composition of the physical design features, along with different solutions for pedestrian circulation, form each of the unique improvement alternatives that were evaluated (see Sections 3.1 through 3.5 below). The following sections contain a platform-level plan and a street/concourse plan to illustrate each alternative. Two variations of canopies are considered for each alternative: One variation has canopies over the entire concourse, and the second variation has canopies only over stairways. See Appendix A (Large Canopy Plans and Small Canopy Plans for Each Alternative).

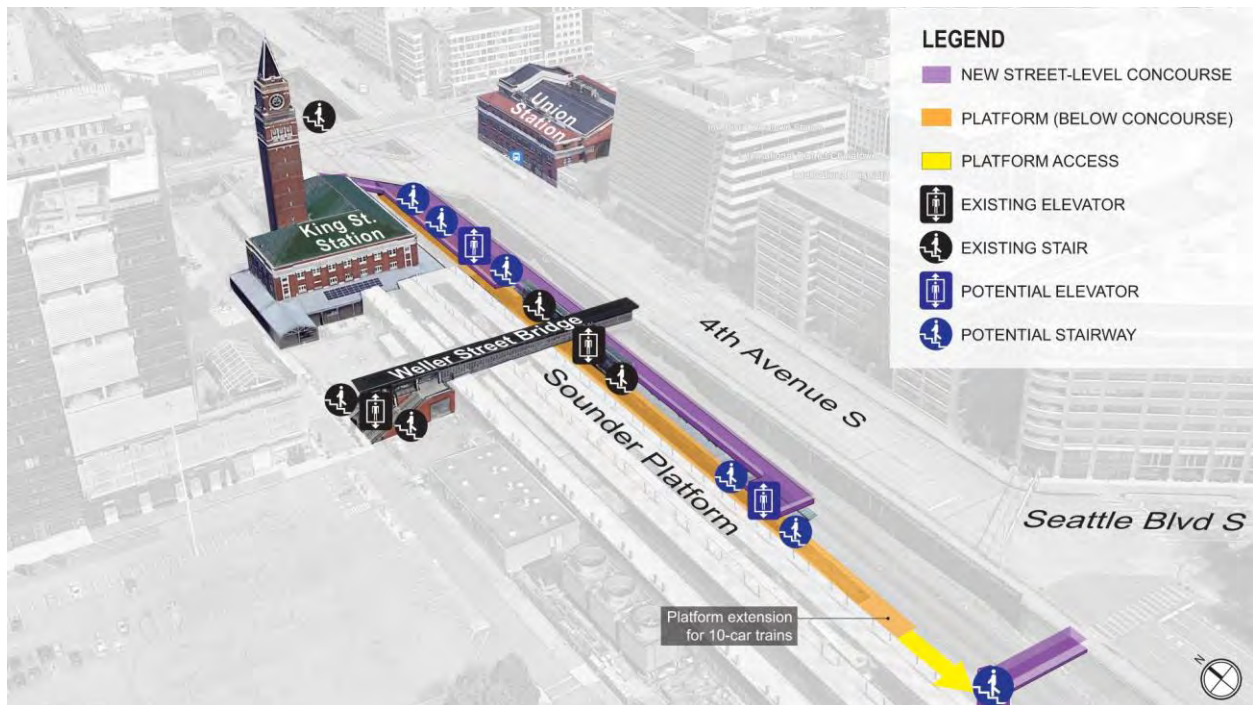


Figure 3-3 Design components – plan view

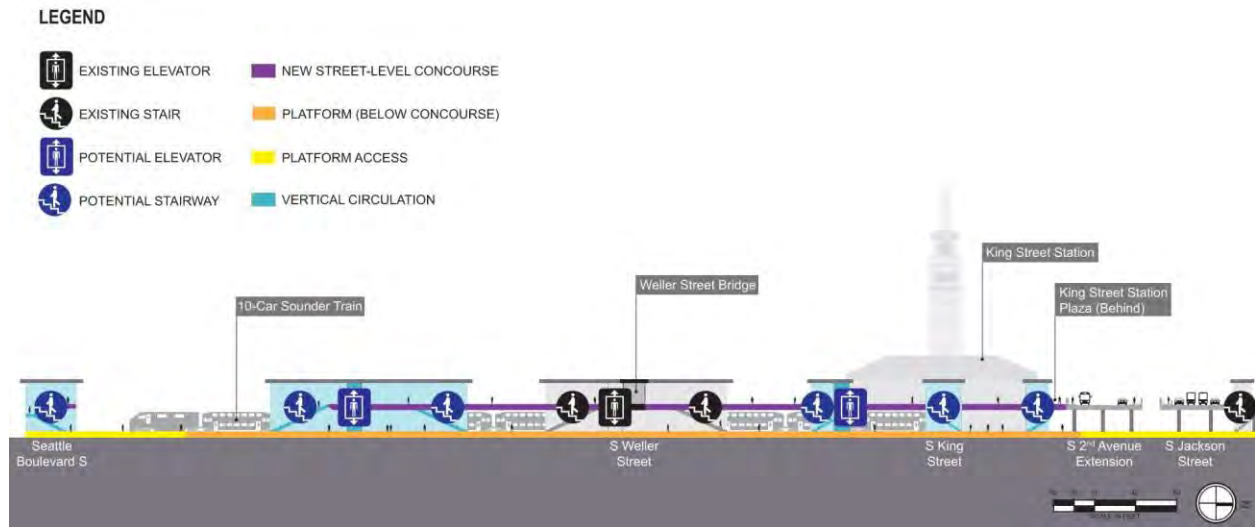


Figure 3-4 Design components – elevation Seattle Boulevard to Jackson Street

3.1 Alternatives 1A and 1B

Alternative 1 includes a lengthened platform to accommodate the 10-car trains, moves the existing mini-high (the ramp and landing on the platform to allow wheelchairs to enter the train at the height of the existing train's door) south, and adds six stairways and two elevators to relieve congestion and provide additional egress capacity, as shown on **Figure 3-5** (Alternative 1A platform-level plan). One stairway is located at the south end of the platform extension. This stairway includes a pedestrian bridge to take passengers over the tracks, thereby connecting Fourth Avenue South (south of Seattle Boulevard) with the station.

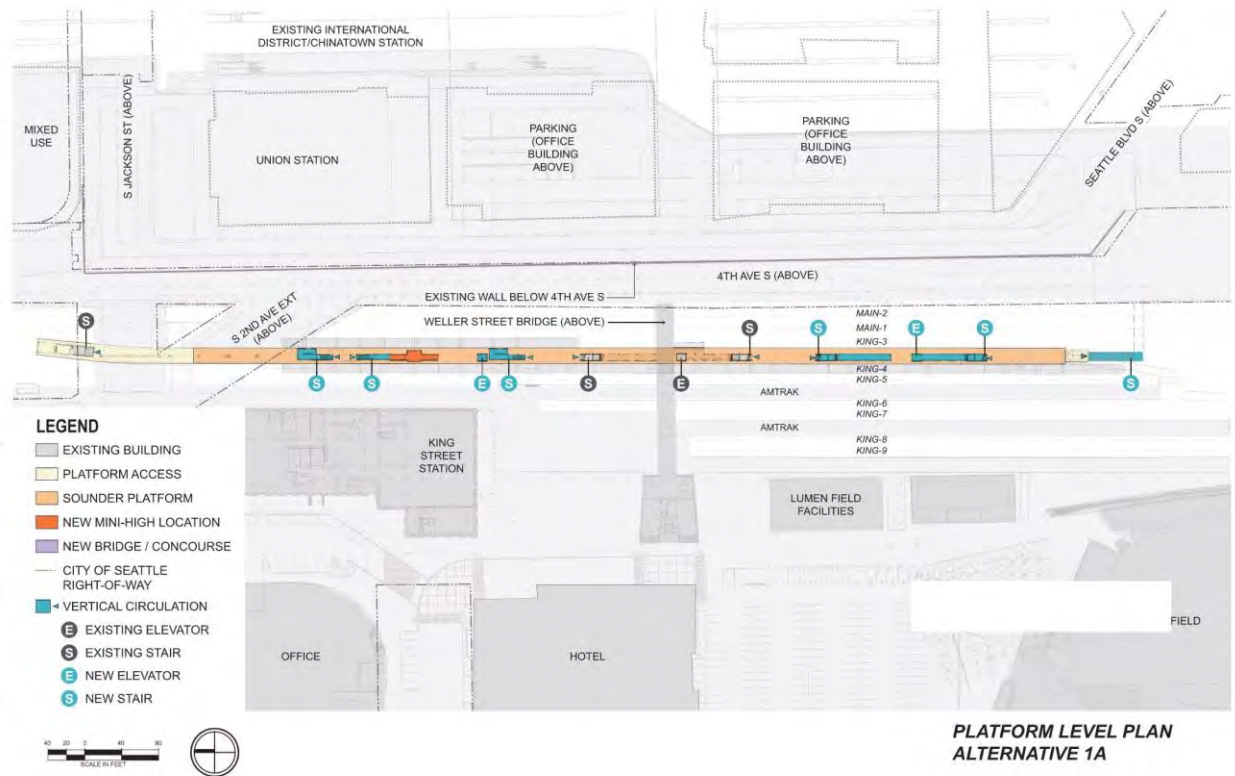


Figure 3-5 Alternative 1A platform-level plan

The major improvement for Alternative 1 (referred to as Alternative 1A) is the construction of a concourse above the existing platform and connecting it to King Street Station Plaza. See the purple shading on **Figure 3-6** (Alternative 1A Street/concourse plan). A variation of this alternative (referred to as Alternative 1B) extends the concourse to Fourth Avenue South at the intersection with Second Avenue Extension South. (Alternative 1B is not shown—see Section 6.3, Alternatives not recommended for future consideration.)

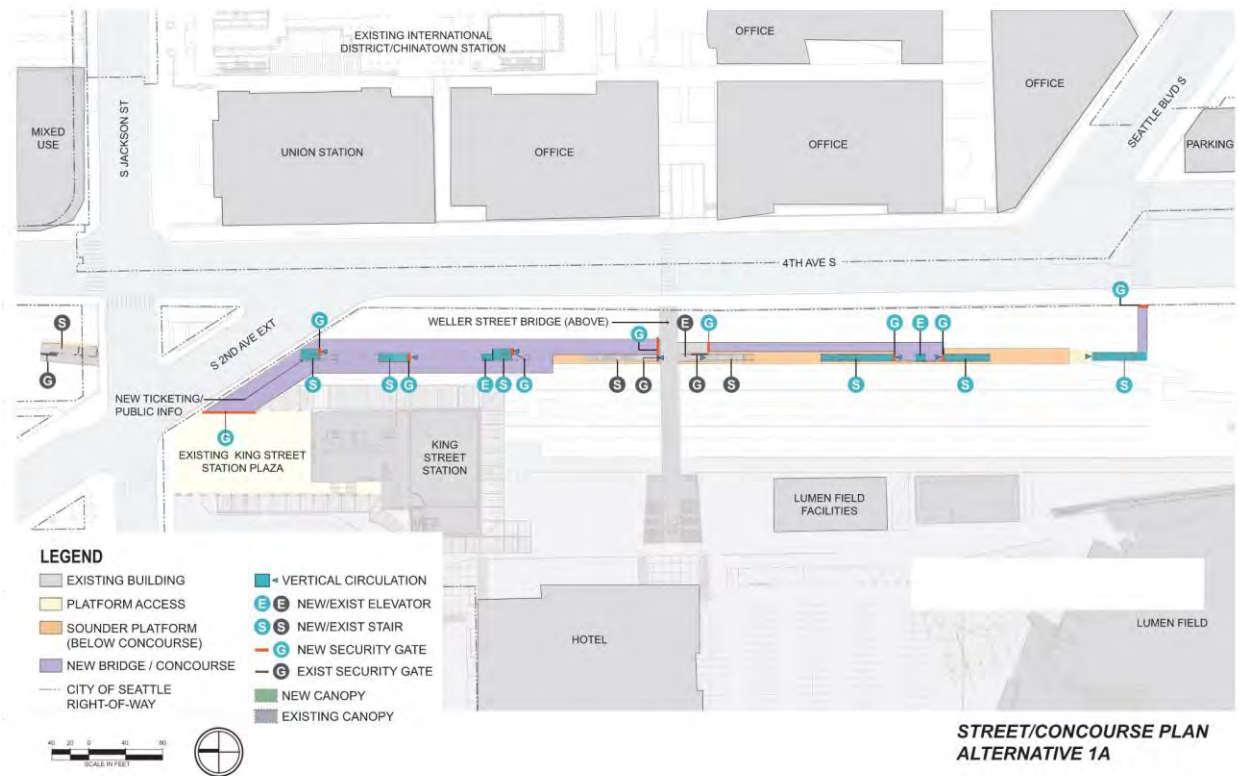


Figure 3-6 Alternative 1A street/concourse plan

3.2 Alternatives 2A and 2B

Alternative 2 includes a lengthened platform to accommodate the 10-car trains, moves the existing mini-high south, and adds six stairways and two elevators to relieve congestion and provide additional egress, as shown on **Figure 3-7** (Alternative 2A platform-level plan) and **Figure 3-8** (Alternative 2B platform-level plan). One stairway is located at the south end of the platform extension. This stairway includes a pedestrian bridge to take passengers over the tracks, thereby connecting Fourth Avenue South (south of Seattle Boulevard) with the station.

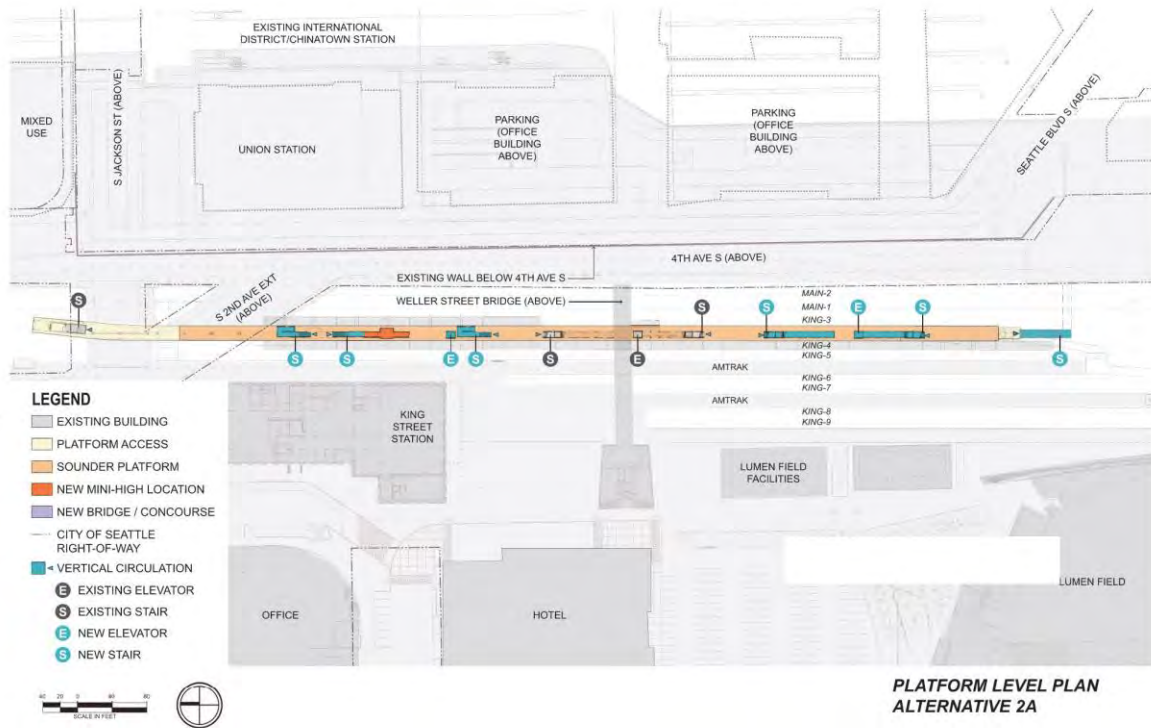


Figure 3-7 Alternative 2A platform-level plan

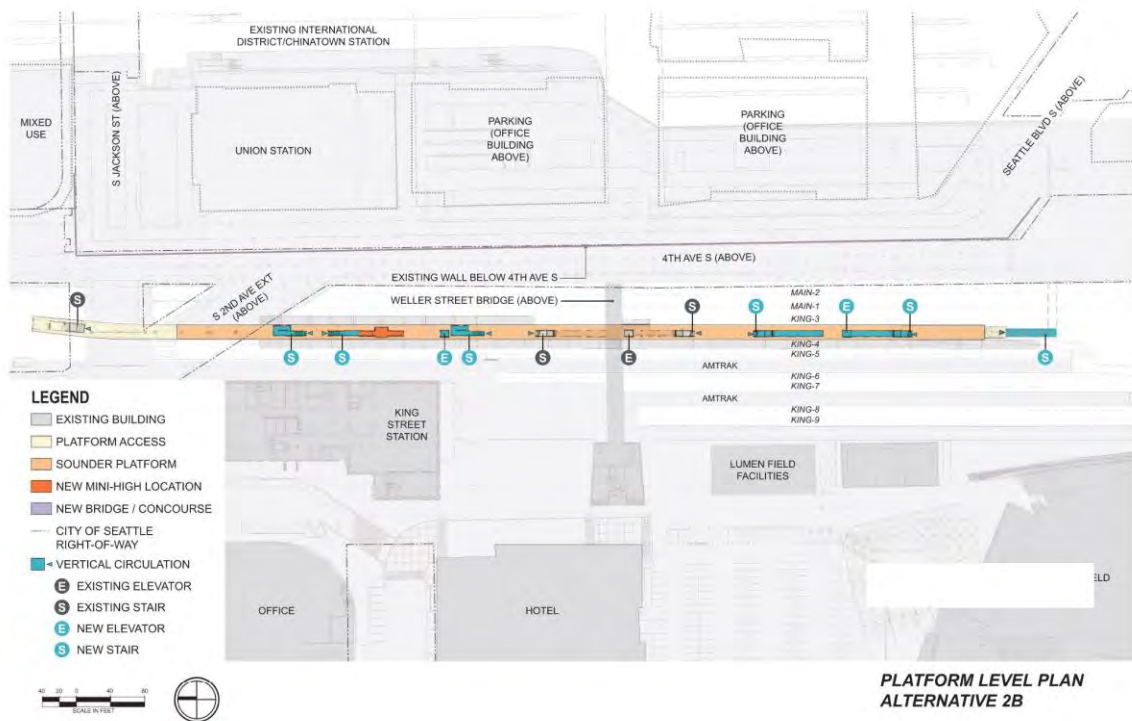


Figure 3-8 Alternative 2B platform-level plan

The major improvement in Alternative 2 is a concourse above the existing platform with a connection to Second Avenue Extension South. Alternative 2A extends one of the proposed stairways with a ramp over the existing bridge girder and includes a ramp and two additional short flights of stairs along the southwest side of Second Avenue Extension South to allow passengers to reach the street level. See **Figure 3-9** (Alternative 2A street/concourse plan). This alternative assumes that half of Second Avenue Extension South must be closed to vehicular traffic.

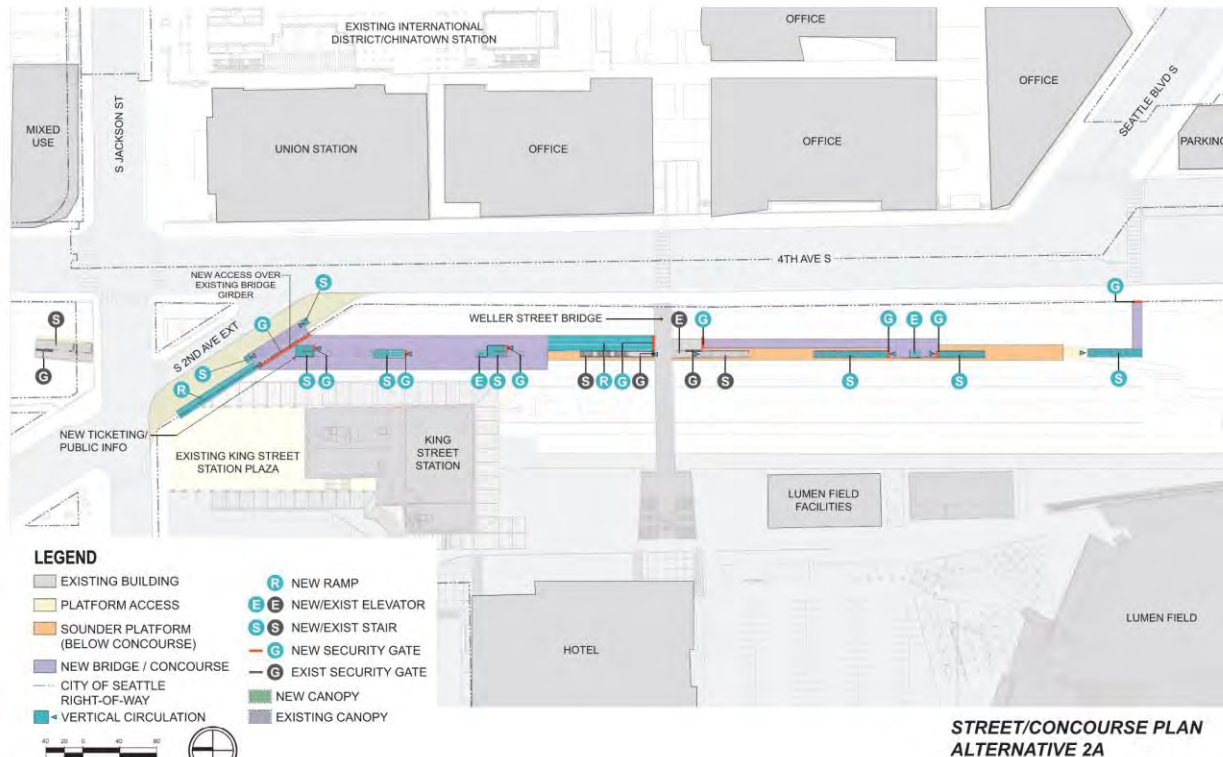


Figure 3-9 Alternative 2A street/concourse plan

Alternative 2B replaces the ramp over the bridge girder with an opening through the girder connecting the concourse with Second Avenue Extension South at street level. See **Figure 3-10** (Alternative 2B street/concourse plan). This alternative would require a significant modification to the existing bridge structure.

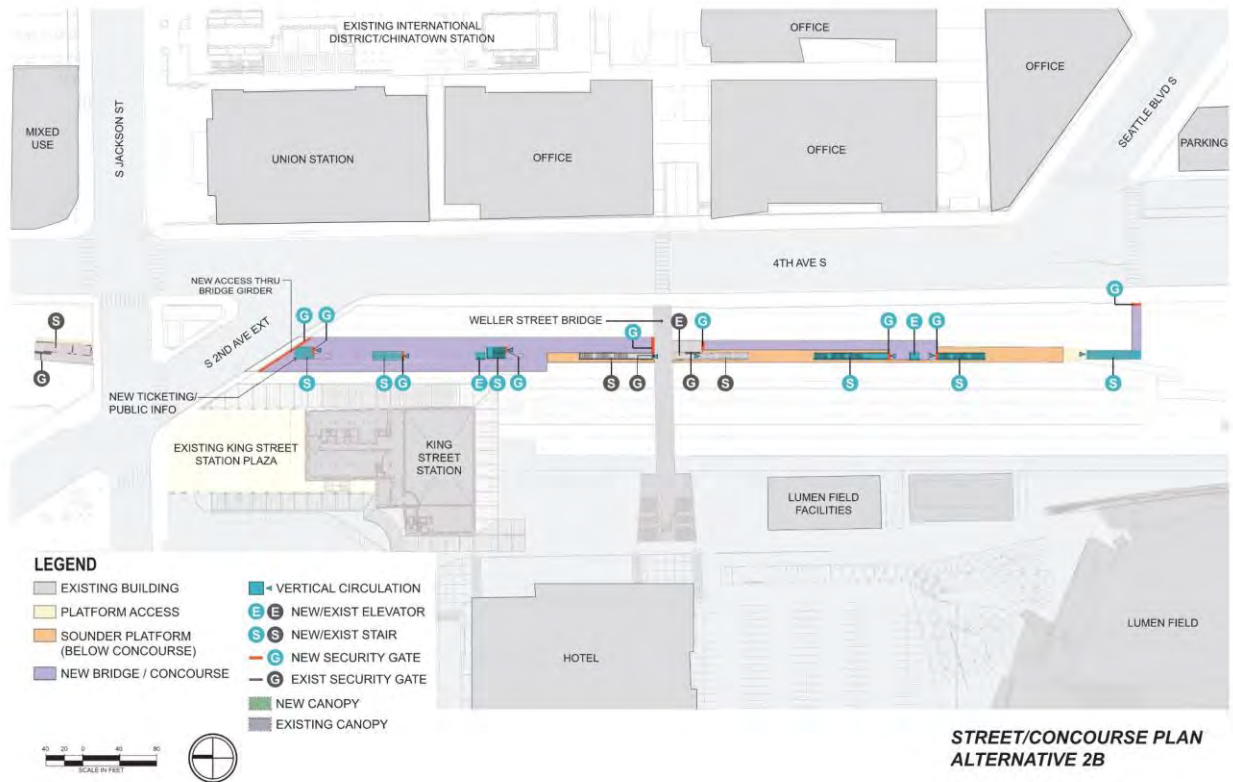


Figure 3-10 Alternative 2B street/concourse plan

3.3 Alternative 3

Alternative 3 includes a lengthened platform to accommodate the 10-car trains, moves the existing mini-high south, and adds six stairways and two elevators to relieve congestion and provide additional egress. One stairway is located at the south end of the platform extension. This stairway includes a pedestrian bridge to take passengers over the tracks, thereby connecting Fourth Avenue South (south of Seattle Boulevard) with the station, as shown in **Figure 3-11** (Alternative 3 platform-level plan).

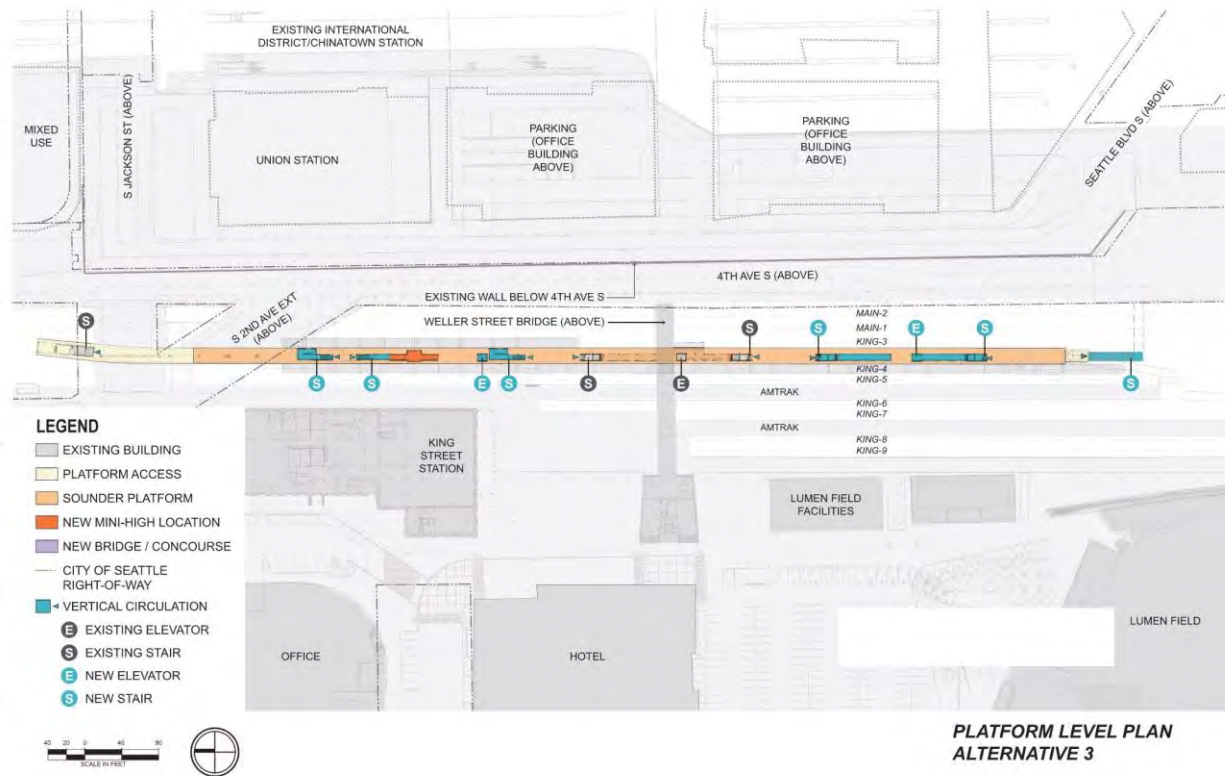


Figure 3-11 Alternative 3 platform-level plan

The major improvements for Alternative 3 include a concourse above the existing platform with a connection to King Street Station Plaza and a pedestrian bridge over the tracks that connects the concourse to the sidewalk along Fourth Avenue South, across from the south end of Union Station. See **Figure 3-12** (Alternative 3 street/concourse plan). This alternative would require a new crosswalk across Fourth Avenue South and potentially a new traffic signal.

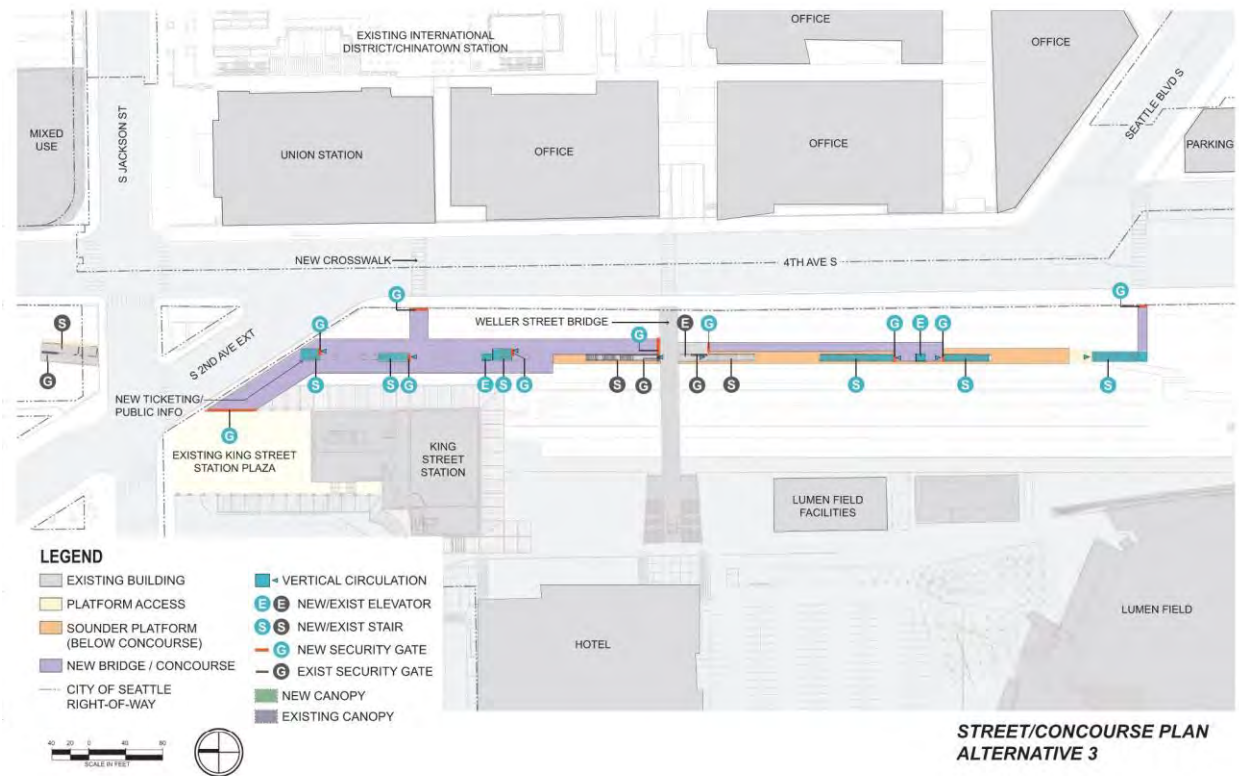


Figure 3-12 Alternative 3 street/concourse plan

3.4 Alternatives 4A and 4B

Alternative 4 includes a lengthened platform to accommodate the 10-car trains, moves the existing mini-high south, and adds six stairways and two elevators to relieve congestion and provide additional egress. One stairway is located at the south end of the platform extension. This stairway includes a pedestrian bridge to take passengers over the tracks, thereby connecting Fourth Avenue South (south of Seattle Boulevard) with the station. At the platform level, Alternatives 4A and 4B would be the same and would be as shown on **Figure 3-13** (Alternative 4 platform-level plan).

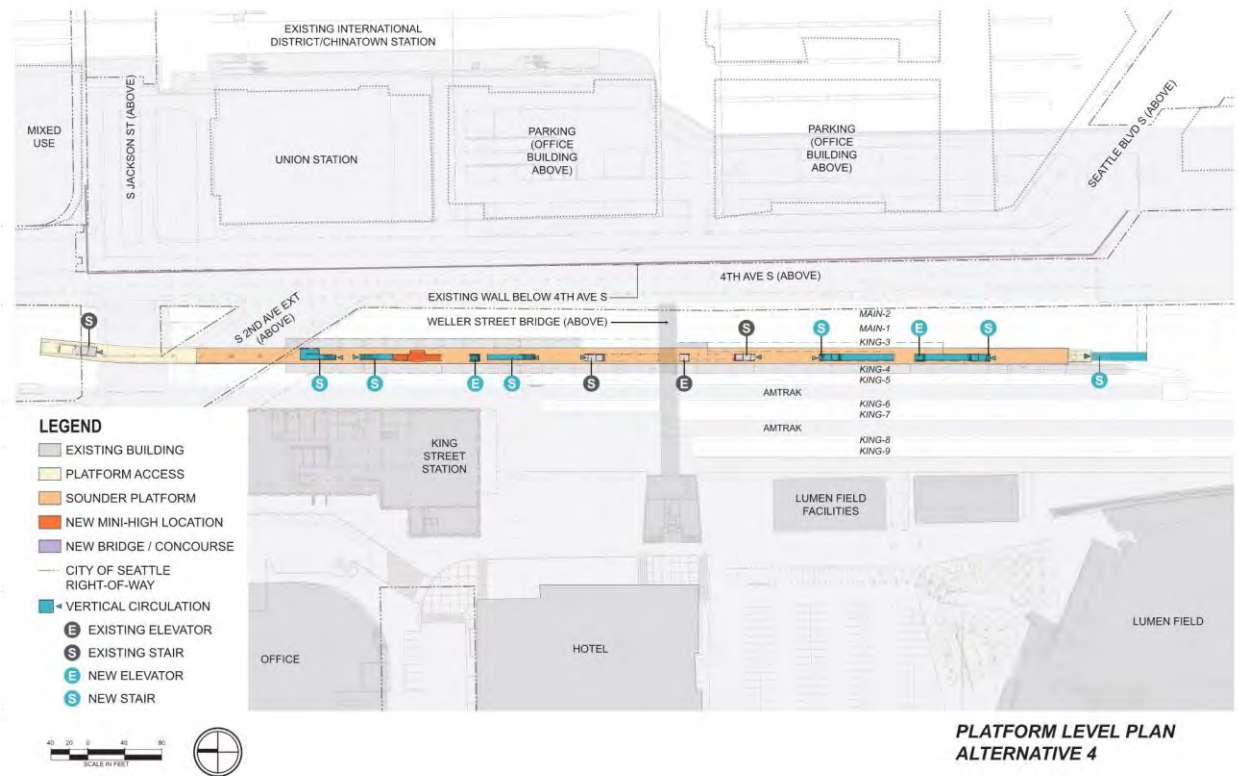


Figure 3-13 Alternative 4 platform-level plan

The major improvements for Alternative 4 include a concourse above the existing platform with a connection to King Street Station Plaza and the construction of a pedestrian bridge over both the tracks and Fourth Avenue South. There is a small ramp and stairway that connects the concourse to the west side of the pedestrian bridge. Alternative 4A adds a stair and elevator on the east side of Fourth Avenue South, adjacent to the sidewalk at the entrance to Union Station Annex. See **Figure 3-14** (Alternative 4A street/concourse plan). Alternative 4B replaces these features at Union Station with a long ramp to connect the pedestrian bridge to the east side of Union Station and the existing Link light rail “International District/Chinatown Station” in the CID, as shown on **Figure 3-15** (Alternative 4B street/concourse plan).

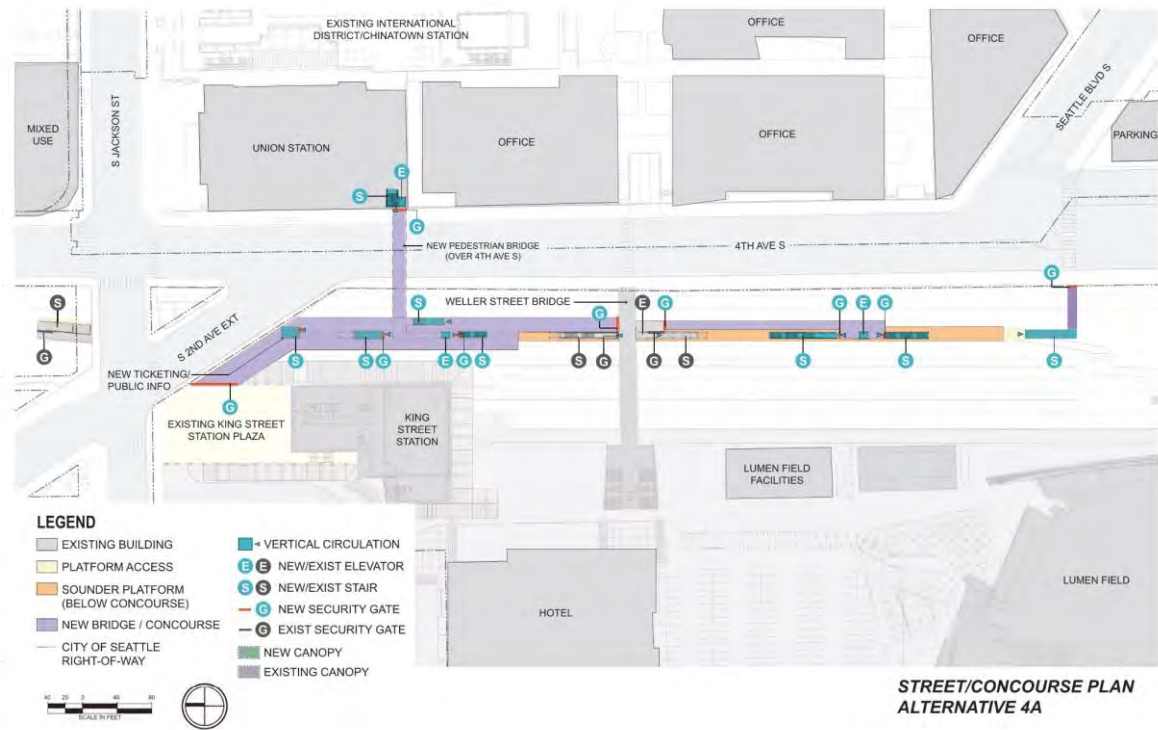


Figure 3-14 Alternative 4A street/concourse plan

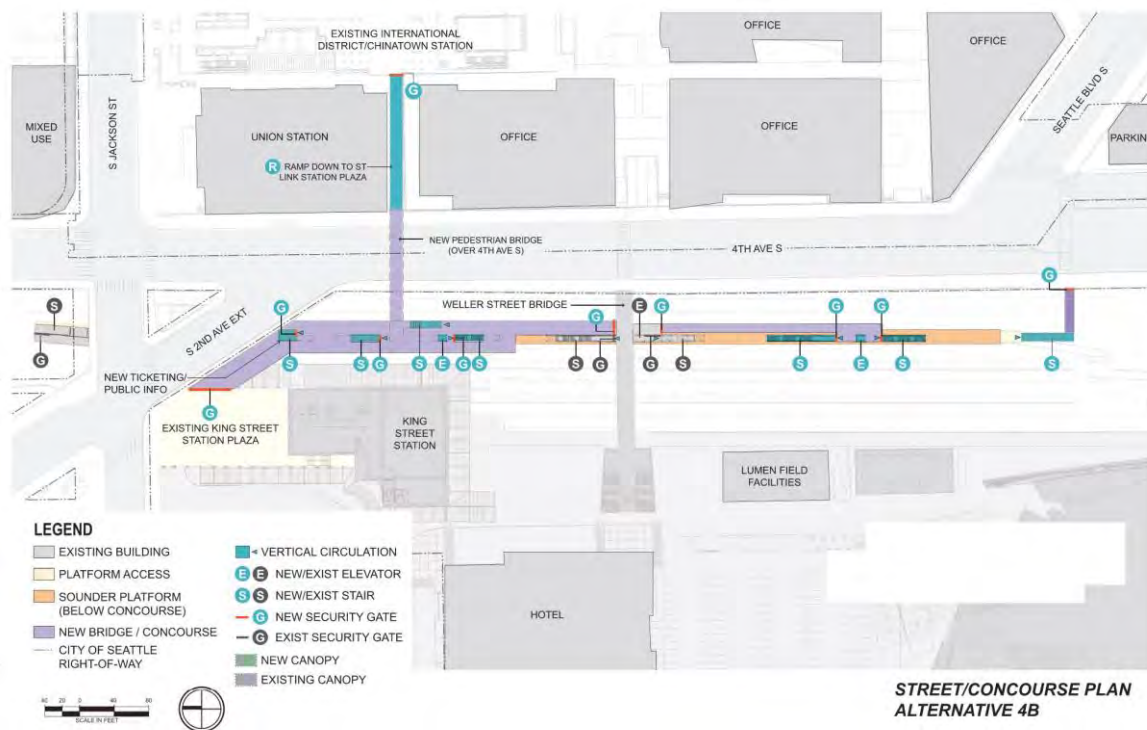


Figure 3-15 Alternative 4B street/concourse plan

3.5 Alternatives 5A and 5B

Alternative 5 includes a lengthened platform to accommodate the 10-car trains, moves the existing mini-high south, and widens the platform to the west by removing the King-4 tracks. See **Figure 3-16** (Alternative 5A platform-level plan) and **Figure 3-17** (Alternative 5B platform-level plan). This alternative adds five stairways and four elevators to relieve congestion and provide additional egress. One stairway is located at the south end of the platform extension. This stairway includes a pedestrian bridge to take passengers over the tracks, thereby connecting Fourth Avenue South (south of Seattle Boulevard) with the station.

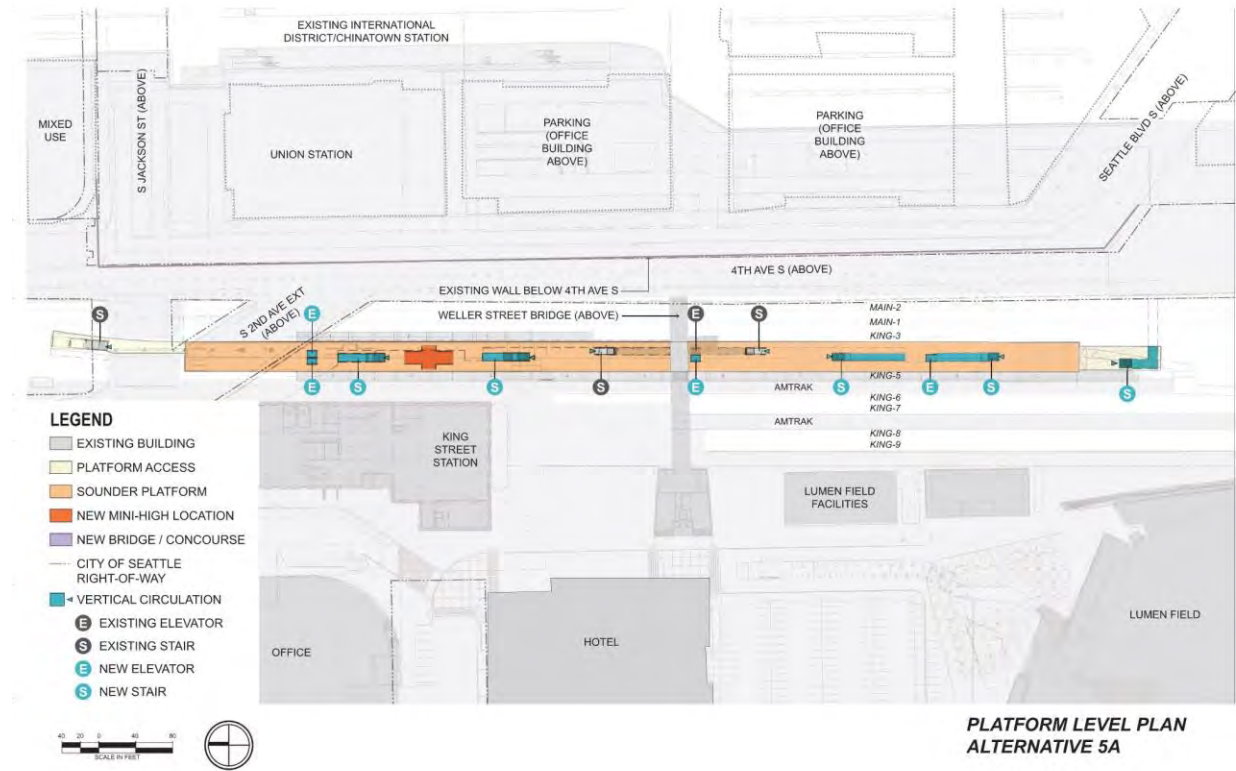


Figure 3-16 Alternative 5A platform-level plan

In addition to the wider platform, another improvement that is part of Alternative 5A is a concourse over much of the platform to connect it to King Street Station Plaza, as shown on **Figure 3-18** (Alternative 5A street/concourse plan). In addition to this concourse to King Street Station Plaza, Alternative 5B includes a tunnel under the tracks and Fourth Avenue South as a connection to a potential underground Fourth Avenue Link light rail station Draft Environmental Impact Statement alternative currently under study for the WSBLE. See **Figure 3-19** (Alternative 5B street/concourse plan).

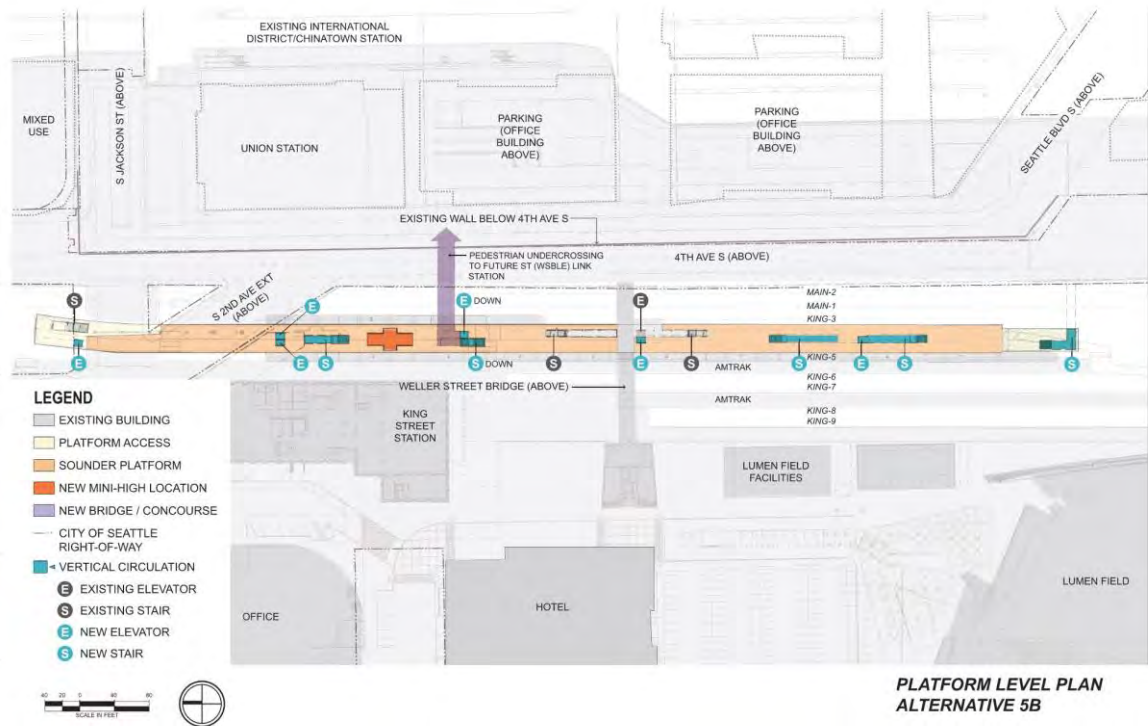


Figure 3-17 Alternative 5B platform-level plan

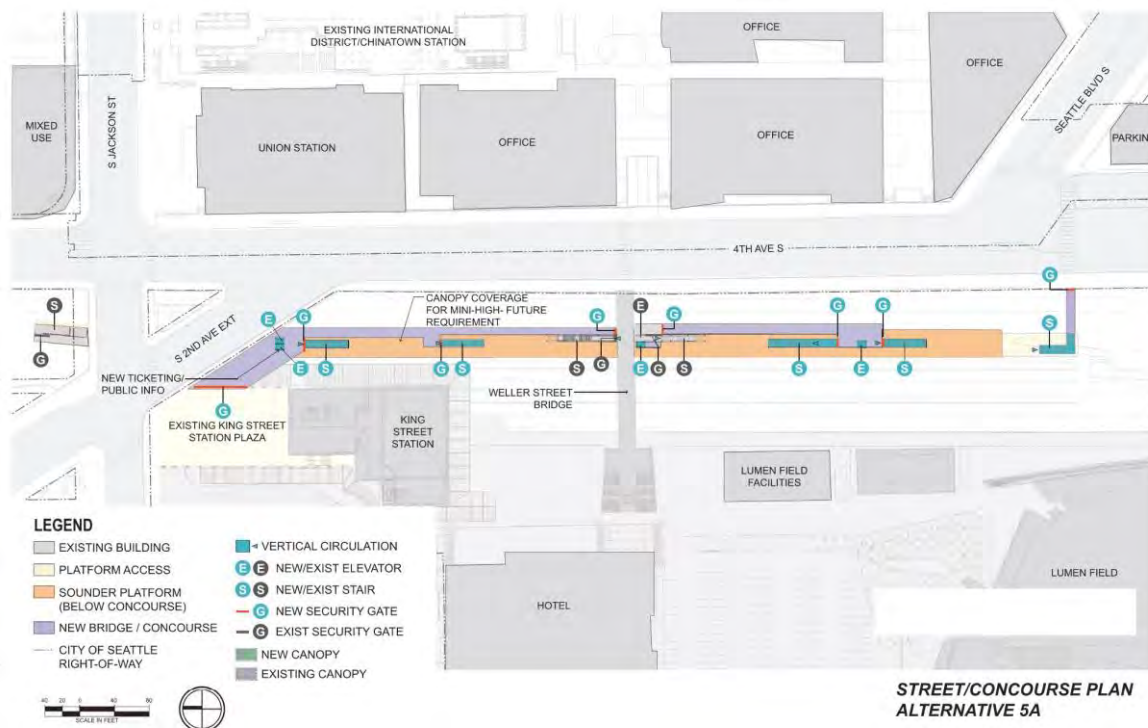


Figure 3-18 Alternative 5A street/concourse plan

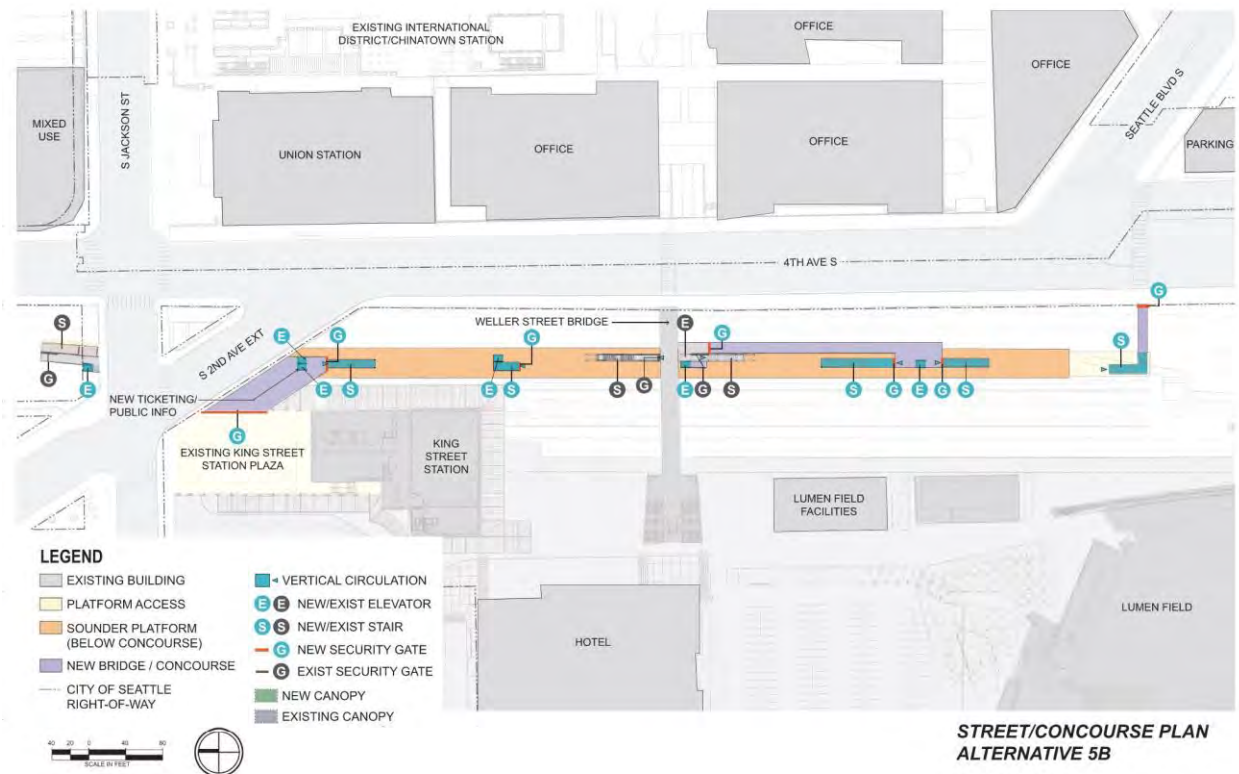


Figure 3-19 Alternative 5B street/concourse plan

4 SCREENING CRITERIA AND PERFORMANCE METRICS

The screening process is used primarily to differentiate between the alternatives in terms of their potential impacts, identify important constraints as well as opportunities among the alternatives, and narrow the range of alternatives into one alternative package of access improvements for the station that staff will recommend for further study in Phase 2 of the project, Conceptual Engineering and Environmental.

4.1 Screening criteria development and selection

The following screening categories and criteria for the King Street Station Platform Area Improvements Project alternatives are based upon the *Final Goals and Criteria Technical Memorandum* (David Evans and Associates, Inc. and Scharrer AD August 2021) prepared for this project. That foundational memorandum developed goals, criteria, methodology and scoring schemes based on: (1) prior Sound Transit studies (for the Lakewood and South Tacoma Stations Access Improvements Projects), (2) public-identified problems and needs from the SDIP (April 2020), and (3) the *King Street Station Draft Community Analysis Report* (Sound Transit 2021). As such, the screening categories and criteria below reflect stakeholder, rider and community input and concerns about King Street Station.

Generally, the criteria reflect five primary goals or areas of focus:

1. Provide or improve multimodal access connections to the station, including improving access opportunities for underserved communities.
2. Improve accessibility and comfort at the station for people of all abilities.
3. Accommodate projected ridership and attract new riders through improved wayfinding and access, with an emphasis on underserved communities.
4. Minimize potential negative project effects to the built and natural environment and to underserved communities.
5. Enhance the overall connections between the station and the adjacent neighborhoods, with an emphasis on underserved neighborhoods, in partnership with the city and stakeholders.

4.2 Screening categories and objectives

Expanding upon the five goals above, screening criteria were developed to ensure that the preliminary alternatives can be compared across a variety of relevant measures (listed below). The project team developed the screening criteria in coordination with Sound Transit and tailored them to the specifics of the King Street Station Area Platform Improvements Project alternatives.

1. Community and Neighborhood Connections

- Supports and is compatible with zoning, plans, policies, planned development.
- Enables potential for funding partners (Seattle Department of Transportation [SDOT], Washington State Department of Transportation [WSDOT], Washington State Public Stadium Authority / First & Goal Inc. [Lumen Field & Event Center], etc.).
- Avoids and minimizes environmental impacts.
- Avoids and minimizes impacts to historic and archaeological resources.
- Minimizes impacts to the character of historic districts.
- Increases physical connections between station and community destinations.

2. Passenger Experience

- Improves the experience of Sounder passengers, who are from diverse populations.
- Improves platform use (comfort, security, etc.).
- Improves station access for persons with mobility challenges.
- Addresses/closes major access barriers to the station.
- Improves connection to Link and other local and regional transportation networks in the CID and Pioneer Square District.
- Does not introduce aboveground physical features that interfere with the surrounding historic character.
- Improves safety by reducing crowding on the platform.
- Improves safety for pedestrians at street-level crossings.

3. Engineering/Operations

- Impacts (temporary) to BNSF freight operations.
- Impacts to Amtrak passenger operations.

4. Project Feasibility/Risk

- Potential capital cost of improvements.
- Permitting/BNSF and Amtrak approval.
- Potential for capital budget to increase.
- Potential capital budget and schedule impacts to WSBLE and platform extension projects.
- Constructability.

4.3 Evaluation factors and performance metrics

The evaluation factors and performance metrics were developed to objectively assess the performance of each alternative, both qualitatively and quantitatively. The project team developed the evaluation factors and performance metrics in coordination with Sound Transit based on available precedent screening information for the proposed alternatives.

A three-level, color-coded evaluation framework ranks each of the proposed alternatives against specific criteria. Appendix C (Screening Analysis Matrix) shows this framework. Green indicates that the alternative performed well against the screening criteria. Red indicates that the alternative did not perform well against the screening criteria. Yellow indicates that the alternative performed in a middle range against the screening criteria. The following sections provide more specifics about the rankings.

4.3.1 Goal 1: Community and Neighborhood Connections

Screening criteria and rankings for Goal 1:

- Supports and is compatible with zoning, plans, policies, planned development.
 - Green: Highly supportive of and/or compatible with adopted plans, policies and permitted projects.
 - Yellow: Somewhat supportive of adopted plans, policies and permitted projects
 - Red: Not supportive of adopted plans, policies and permitted projects.
- Enables potential for funding partners (SDOT, WSDOT, Stadium Authority, etc.).
 - Green: Significant features appear to have strong stakeholder funding potential.
 - Yellow: Some features offer opportunity to be funded by stakeholder partners.
 - Red: No significant, obvious opportunity for funding partnership (only Sound Transit funding).
- Avoids and minimizes environmental impacts.
 - Green: No apparent environmental impacts.
 - Yellow: Slight negative impact to environmental conditions.
 - Red: High negative impact to environmental conditions.
- Avoids and minimizes impacts to historic and archaeological resources.
 - Green: No apparent impacts to historic and archaeological resources.
 - Yellow: Slight negative impact to historic and archaeological resources.
 - Red: High negative impact to historic and archaeological resources.

- Minimizes impacts to the character of historic districts.
 - Green: Does not alter, directly or indirectly, the district's qualifying characteristics.
 - Yellow: Slightly alters, directly or indirectly, those qualifying characteristics in a manner that would diminish the integrity of the district's location, design, setting or association.
 - Red: Substantially alters, directly or indirectly, those qualifying characteristics in a manner that would diminish the integrity of the district's location, design, setting or association.
- Increases physical connections between station and community destinations.
 - Green: Two or more new physical connections.
 - Yellow: One new physical connection.
 - Red: No new physical connections.

4.3.2 Goal 2: Passenger Experience

Screening criteria and rankings for Goal 2:

- Improves platform use (comfort, security, etc.).
 - Green: Widens platform, allowing for more space per passenger and for amenities.
 - Yellow: Makes limited changes to platform space per passenger.
 - Red: Reduces available platform area.
- Improves station access for persons with mobility challenges.
 - Green: Three or more additional elevators.
 - Yellow: Up to two new additional elevators.
 - Red: No additional elevators.
- Addresses/closes major access barriers to the station.
 - Green: Provides a new connection over/under Fourth Avenue.
 - Yellow: Provides new, additional connections to Fourth Avenue.
 - Red: Makes no change to station access and/or barriers.
- Improves connection to Link and other local and regional transportation networks.
 - Green: Provides a new connection over/under Fourth Avenue.
 - Yellow: Provides new, additional connections to Fourth Avenue.
 - Red: Makes no change to station access and/or barriers.
- Does not introduce aboveground physical features that interfere with the surrounding historic character.
 - Green: Provides no visible new aboveground physical feature or features that interfere with views and/or historic elements.
 - Yellow: Provides some new visible aboveground physical features that interfere with views and/or historic elements.
 - Red: Provides significant visible aboveground physical features that interfere with views and/or historic elements.

- Improves safety by reducing crowding on the platform.
 - Green: Provides more area for passengers on the platform.
 - Yellow: Provides more waiting area above the platform, but new egress components reduce passenger area on the platform.
 - Red: Reduces passenger area on the platform because of new egress components.
- Improves safety for pedestrians at street-level crossings.
 - Green: Provides new grade-separated pedestrian crossings.
 - Yellow: Provides new marked pedestrian crossings.
 - Red: Provides no new crossings.

4.3.3 Goal 3: Engineering/Operations

Among the engineering screening criteria, the project team identified impacts to rail operations as very important and therefore subdivided impacts to rail operations into impacts to freight operations and impacts to commuter operations for the performance metrics. Changes to the platform and station that may affect BNSF rail operations would require coordination only with BNSF. Changes have the potential to disrupt Amtrak operations, because Sound Transit and Amtrak share a track. The project team assigned platform utilization and operations, as well as impacts to accessibility and mini-high platforms, to the engineering criteria.

Screening criteria and rankings for Goal 3:

- Impacts (temporary) to BNSF freight operations.
 - Green: No conflicts.
 - Yellow: Minor impacts to configurations; minor changes to operations.
 - Red: Major impacts to configurations or operations; need for additional track infrastructure.
- Impacts to Amtrak operations.
 - Green: No conflicts.
 - Yellow: Minor impacts.
 - Red: Substantial impacts.

4.3.4 Goal 4: Project Feasibility/Risk

Risk is a key factor for any project delivery, and any alternative analysis must consider how projects could be impacted over time. The project team evaluated potential project delivery schedule delay, increased costs and possible impacts to other Sounder South projects.

Screening criteria and rankings for Goal 2:

- Potential capital cost of improvements.
 - Green: Less than 25 percent greater cost than base case (minimum work to meet egress requirements; see Alternative 1A **Figure 3-5** and **Figure 3-6**).
 - Yellow: Between 25 percent and 50 percent greater cost than base case.
 - Red: Greater than 50 percent greater cost than base case.
- Permitting and BNSF/Amtrak approval.

- Green: Little complexity and length of process to obtain BNSF/Amtrak approvals or permits from authority having jurisdiction.
 - Yellow: Moderately complex and lengthy process to obtain BNSF/Amtrak approvals and permits from authority having jurisdiction.
 - Red: Substantially complex and lengthy process to obtain BNSF/Amtrak approvals and permits from authority having jurisdiction.
- Potential for capital budget to increase due to escalation of labor and material costs, and due to competition for labor and material.
 - Green: Less than \$1 million.
 - Yellow: \$1 million to \$5 million.
 - Red: More than \$5 million.
 - Potential capital budget and schedule impacts to WSBLE and platform extension projects.
 - Green: Less than \$1 million increase in capital budgets and less than 6 months of delay in schedule.
 - Yellow: \$1 million to \$5 million increase in capital budgets and between 6 months and 18 months of delay in schedule.
 - Red: More than \$5 million increase in capital budgets and more than 18 months of delay in schedule.
 - Constructability - The improvements to King Street Station will require work around and over active railroad tracks. The phasing and scheduling of the work to construct the improvements will need to be coordinated with Sound Transit, BNSF, Amtrak and WSDOT. This criterion looks at additional constructability issues that are specific to specific alternatives.
 - Green: No unusual or challenging construction techniques required (tunneling, structural reinforcement of the Second Avenue Extension South, structural work overhead of active tracks and roadways).
 - Yellow: One unusual or challenging construction technique.
 - Red: Two or more unusual or challenging construction techniques.

4.4 Non-differentiating screening criteria

During the screening criteria development process, several measures were explored but are no longer being considered, primarily because of their non-differentiation of alternatives (i.e., these criteria had essentially the same ranking for all alternatives). These criteria are:

- Community and Neighborhood Connections:
 - Avoiding and minimizing effects to low-income, minority and no car households are important project objectives; however, given the relatively compact footprint of all alternatives (all are contained within the space between Fourth Avenue South and King Street Station), these criteria appear to perform equally across all alternatives.
- Transportation:

-
- Avoiding both potential impacts to nonmotorized access to the station and potential impacts to motorized access and circulation to the station are important project objectives; however, given the relatively compact footprint of all alternatives (all are contained within the space between Fourth Avenue South and King Street Station), these criteria appear to perform equally across all alternatives.
 - Engineering/Operations:
 - Several engineering and operations factors were considered, including: (1) impacts to Sounder operations (systemwide), (2) improving safety by eliminating at-grade crossing of Amtrak tracks and (3) impacts to existing platform operations during construction. Again, all of these are important considerations, but they are non-differentiating when compared across alternatives.

5 ALTERNATIVES SCREENING ANALYSIS AND RESULTS

5.1 Screening analysis matrix and alternatives ranking

Project staff evaluated the alternatives with input from Amtrak, WSDOT, BNSF, the City of Seattle, FTA and station passengers. Appendix B (Screening Analysis Matrix) contains the screening analysis matrix that color codes the impact of each alternative for each criterion. Project team staff did not weight the criteria in scoring and ranking the alternatives. At this stage in the development of potential improvements, prioritizing one criterion over another may be too prescriptive an approach to deliver desired outcomes in the next stage, particularly if potential impacts could be mitigated. The following discussion ranks the alternatives from 1 to 5 in terms of how well they meet each goal's criteria.

Goal 1: Community and Neighborhood Connections rankings

1. Alternative 4A
2. Alternatives 2A, 2B, 5A
3. Alternatives 4B, 1B, 3
4. Alternative 1A
5. Alternative 5B

Alternative 4A ranks high because of its physical connection to both Second Avenue Extension South and the pedestrian bridge over Fourth Avenue South. Alternative 1B scores and ranks the same as Alternative 3, because it is similar to and somewhat redundant of Alternative 3. However, Alternative 1B connects only to King Street Plaza, whereas Alternative 3 connects to Fourth Avenue South and King Street Plaza.

Goal 2: Passenger Experience rankings

1. Alternative 5B
2. Alternative 5A
3. Alternatives 4A, 4B, 1B, 3
4. Alternatives 1B, 2A, 2B
5. Alternatives 1A, 3

Alternatives 5B and 5A rank high because of their wider platform, which provides more space for passengers on the platform level, and because they include four new elevators instead of the two elevators that the other alternatives include. Alternative 4A has a moderate ranking because it adds a stairway and elevator on the east side of Fourth Avenue South, just outside Union Station.

Goal 3: Engineering/Operations rankings

1. Alternatives 1A, 2A
2. Alternatives 1B, 2B, 3, 4A, 4B, 5A
3. Alternative 5B

Alternative 5B has a low score primarily due to low clearance under the substructure. Widening the platform to the west in Alternatives 5A and 5B would require removing the King-4 track and therefore would require Amtrak and Sounder trains to share a track. Project team staff

completed a track occupancy study, attached to this report as Appendix C (Draft King Street Station Track Occupancy Memorandum) and determined that there are at least two occasions when northbound Amtrak trains would need to use King 5 track at the same time as Sounder South trains in the current schedules. Therefore, removing King 4 track and widening the platform was not recommended.

Goal 4: Project Feasibility/Risk rankings

1. Alternatives 1A, 2A
2. Alternatives 1B, 3
3. Alternative 4A
4. Alternative 4B
5. Alternative 5A
6. Alternative 5B, 2B

Alternatives 1A and 2A rank high in this category because they would be the least and second least expensive, respectively, and would require the least disruption to tracks and operations. Alternative 2B ranks low because it would require a significant modification to the existing bridge structure.

5.2 Input from Amtrak and WSDOT

The Sound Transit project team met with representatives from Amtrak and WSDOT on November 30, 2021.

In regard to adding a concourse, Amtrak wants to ensure that ventilation and air circulation are adequate to mitigate the diesel smoke from the locomotives.

In considering Alternative 5A, although there would be a benefit of extending the platform to the south, because it would provide more room for Sounder passengers, widening the platform to the west would require removing the King-4 track. Removing this track would in turn require Amtrak and Sounder trains to share a track. Amtrak does not view this sharing of a track to as viable, because, according to the schedules, Amtrak and Sounder trains would need to use the same track on at least two occasions daily (see Appendix C), and it would hamper future schedule changes to both services.

5.3 Input from BNSF

The Sound Transit project team met with BNSF Engineering Services on December 14, 2021, to discuss the alternatives. BNSF staff members' concerns centered on a potential reduction in tracks if the platform was widened to the east, and the depth of a tunnel in order to provide sufficient clearance under the substructure (columns) supporting the Fourth Avenue South causeway above and immediately east of BNSF tracks.

BNSF staff members' main concern with Alternatives 5A and 5B and their potential widened platform is with the reduction from three to two tracks. BNSF feels that Amtrak trains should continue to have a separate through track, because trains are not always on time and all trains from the east and north move through this station. With Amtrak and Sound Transit trains (the

latter under BNSF operation) all using the King Street Station facilities, it is crucial for the three entities to coordinate scheduling, particularly as additional train service is added. BNSF staff added that all improvements must meet BNSF's grade separation guidelines.

5.4 Input from City of Seattle

The Sound Transit project team met with representatives from the City of Seattle on April 19, 2022. The City of Seattle representatives indicated that the city may not support an additional pedestrian bridge over Fourth Avenue South, as included in Alternatives 4A and 4B. The primary reason is that Fourth Avenue South is a freight corridor, and the required clearance height would be quite high, making the city reluctant to support such a structure. Additionally, the pedestrian bridge would be located in both the CID and the Pioneer Square Historic Districts, with the border being the centerline of Fourth Avenue South. This bridge would require review and approval by the city and both historic districts, which would be challenging. For Alternative 2B, additional traffic analysis would be needed to evaluate an at-grade crossing at Fourth Avenue South and for making a connection to Second Avenue Extension South.

At this time, the city also does not support all the streetscape improvements identified in the *Jackson Hub: Reconnecting Neighborhoods* plan (Alliance for Pioneer Square 2019). The city also plans to evaluate the structural integrity of bridges in the vicinity, which would include the Second Avenue South Extension. These city actions could affect the viability of Alternative 2B.

5.5 Input from Federal Transit Administration

The Sound Transit project team met with representatives from FTA on March 15, 2022, and discussed Sound Transit's approach to meeting the accessibility requirements for all Sounder platform extension projects, including this King Street Station project. FTA indicated that Sound Transit's proposed approach to add a second mini-high, as well as the addition of car-borne lifts on new car purchases, could meet the Americans with Disabilities Act (ADA) regulations. During the next phase of the project, FTA will want to understand how these approaches are applied, and it need to be demonstrated that they do in fact meet ADA requirements before the issuance of a formal concurrence.

5.6 Public Engagement

Sound Transit hosted an engagement period from April 19, 2022, to May 10, 2022, to share information about potential improvements at King Street Station and seek public input. Informed by an engagement plan that was reviewed by project team staff and with input from the WSBL team, the public engagement materials and activities focused on improvements within the station footprint: lengthening the platform, adding more stairways and elevators, and adding a concourse above the station. The project will solicit additional public input in the next phase regarding potential street-level connections and crossing improvements in connection with the Link light rail extension project. These improvements include a new station in the CID and other future plans for the area.

The engagement period included an online open house website, with graphics and explanations

of the proposed improvements at the station and survey questions asking for feedback. The online open house was available in English, Spanish, Vietnamese, and Traditional and Simplified Chinese. The project team also staffed two tabling events at the station on April 27, 2022, and May 2, 2022. This feedback will be used to further refine the project alternatives and inform future outreach.

5.7 Capital and Operating Costs

To compare the alternatives based on implementation costs, 38 separate items were considered, including physical improvement items, right-of-way, professional services, and contingency, following Sound Transit standards and February 2022 unit rates. The design allowances used in the estimates address the uncertainty of the design at this phase of the project, as well as the space constraints to keep the platform open during construction.

Table 5-1 (ROM cost estimates of alternatives) compares the alternatives to the base case (Alternative 1A), which provides the fewest improvements (longer platform, new stairways and elevators, concourse to connect the stairways to existing sidewalks, and a minimal canopy cover at stairways) to accommodate the 10-car trains. The costs for the base case are higher than the estimates in the SDIP because the SDIP concepts did not include the concourses. Including administrative multipliers, the concourses cost approximately \$150,000 per 100 square feet, and each stairway costs approximately \$200,000.

The costs for the concourse for Alternatives 1 through 4 ranged from 40 percent to 65 percent of the total costs for the physical improvements. For Alternatives 5A and 5B, the concourse costs ranged from 10 percent to 25 percent of the total costs for the physical improvements, because the wider platform and stairway location meant less area for the concourse.

Table 5-1 (ROM cost estimates of alternatives) shows the cost comparison of the alternatives (as percent difference from the base case of Alternative 1A – minimal canopy) and the features that influenced the rough order of magnitude (ROM) cost estimates.

Table 5-1 ROM cost estimates of alternatives

Alternative	Description	Cost Comparison	Notable Cost Difference
1A-Minimal Canopy (M)	Abutting 2nd Ave. S – Connection to King Street Station Plaza along 2nd Ave. Ext. S – Minimal Canopy	Base case	Not applicable
1A-Full Canopy (F)	Abutting 2nd Ave. S - Connection to King Street Station Plaza along 2nd Ave. Ext. S	20% to 30% higher than base case	More canopy costs than base case
1B-M	Abutting 2nd Ave. S – Connection to King Street Station Plaza and 4th Ave. S along 2nd Ave. Ext. S <i>(Removed from consideration before full canopy cost was considered)</i>	40% to 50% higher than base case	More concourse costs than base case

Alternative	Description	Cost Comparison	Notable Cost Difference
2A-F	Integrating w/ 2nd Ave. S – Connection to 2nd Ave. Ext. S by ramp over bridge girder	30% to 40% higher than base case	More canopy and streetscape costs than base case
2A-M	Integrating w/ 2nd Ave. S – Connection to 2nd Ave. Ext. S by ramp over bridge girder – Minimal Canopy	10% to 20% higher than base case	More streetscape costs than base case
2B-F	Integrating w/ 2nd Ave. S – Connection to 2nd Ave Ext. S through bridge girder	40% to 50% higher than base case	Additional costs for bridge modification
2B-M	Integrating w/ 2nd Ave. – Connection to 2nd Ave Ext. S through bridge girder – Minimal Canopy	20% to 30% higher than base case	Additional costs for bridge modification
3-F	Ped. Bridge to 4th Ave. S – Connection to King Street Station Plaza and pedestrian bridge to 4th Ave. S at street level	20% to 30% higher than base case	Additional costs for more canopy and bridge to 4th Ave. S
3-M	Ped. Bridge to 4th Ave. S – Connection to King Street Station Plaza and pedestrian bridge to 4th Ave. S at street level – Minimal Canopy	Less than 5% higher than base case	Additional costs for bridge to 4th Ave. S
4A-F	Bridge over 4th Ave. S – Connection to King Street Station Plaza and bridge over 4th Ave. S with stairs/elevator next to sidewalk	40% to 50% higher than base case	Additional costs for more canopy and bridge over 4th Ave. S
4A-M	Bridge over 4th Ave. S – Connection to King Street Station Plaza and bridge over 4th Ave. S with stairs/elevator next to sidewalk – Minimal Canopy	20% to 30% higher than base case	Additional costs for bridge over 4th Ave. S
4B-F	Bridge over 4th Ave. S – Connection to King Street Station Plaza and bridge over 4th Ave. S with ramp to existing Link light rail station	60% to 70% higher than base case	Additional costs for more canopy and bridge over 4th Ave. S with ramp through Union Station
4B-M	Bridge over 4th Ave. S – Connection to King Street Station Plaza and bridge over 4th Ave. S with ramp to existing Link light rail station – Minimal Canopy	30% to 40% higher than base case	Additional costs for bridge over 4th Ave. S with ramp through Union Station
5A-F	Widen Platform – Widen Platform with connection to King Street Station Plaza	80% to 90% higher than base case	Additional costs for wider platform and relocated signals
5A-M	Widen Platform – Widen Platform with connection to King Street Station Plaza – Minimal Canopy	60% to 70% higher than base case	Additional costs for wider platform and relocated signals
5B-F	Widen Platform – Widen Platform with connection to King Street Station Plaza and tunnel to new Link light rail station	90% to 100% higher than base case	Additional costs for wider platform, relocated signals and tunnel

Alternative	Description	Cost Comparison	Notable Cost Difference
5B-M	Widen Platform – Widen Platform with connection to King Street Station Plaza and tunnel to new Link light rail station – Minimal Canopy	80% to 90% higher than base case	Additional costs for wider platform, relocated signals and tunnel

6 ALTERNATIVES RECOMMENDATIONS

King Street Station Area Platform Improvements Project alternatives were proposed, reviewed, and refined by the Consultant team and staff from Sound Transit representing Operations, Safety and Security, Long Range Planning, Engineering, Community Engagement, Sounder Corridor Development and the WBSLE. Alternatives were presented to the City of Seattle, WSDOT, BNSF and Amtrak for their input on compatibility with their existing and planned facilities.

6.1 Alternatives Recommended for Further Study

Based on the collective input from consultants, Sound Transit staff, stakeholders and the public, three alternatives are recommended for further study, as shown in **Table 6-1** (Alternatives recommended for further study).

Table 6-1 Alternatives recommended for further study

Alternative	Scope	Benefits	Challenges
1A	Abutting 2nd Ave. S – Connection to King Street Station Plaza along 2nd Ave. Ext. S	Alternative with minimal costs that improves passenger access between the platform and existing roads and sidewalks	Structural connection abutting 2nd Ave. Ext. S
4A	Bridge over 4th Ave. S – Connection to King Street Station Plaza and bridge over 4th Ave. S with stairways/elevator next to sidewalk	Alternative that improves connection to King Street Station Plaza and to light rail stations around Union Station	Structural connection abutting 2nd Ave. Ext. S and structural and architectural design for connection at Union Station Annex
2A/3	Integrating w/2nd Ave. S – Connection to 2nd Ave. Ext. S by ramp over bridge girder and pedestrian bridge to 4th Ave. S at street level	Improve pedestrian access to and along 2nd Ave. Ext. S and provides connection to 4th Ave. S across from Union Station Annex	Agreement with City of Seattle for use of 2nd Ave. Ext. S and traffic mitigation for 2nd Ave. Ext. S and 4th Ave. S

6.1.1 Alternative 1A

Alternative 1A (see **Figure 3-5** and **Figure 3-6**) provides improvements to address platform congestion and increase egress capacity for the planned increase in ridership. It can accommodate six new stairways and two new elevators. It has an increase in the holding area on the platform of 10,000 square feet and a holding area on the new concourse of 18,000 square feet.

All improvements are within the existing Sound Transit right-of-way. Alternative 1A is considered the base case because the improvements are contained within the station footprint and therefore are entirely within Sound Transit's leased area. It scored moderately well (ranked fourth out of nine alternatives evaluated) against the 19 screening criteria (see Appendix B (Screening Analysis Matrix)). It scored poorly for providing potential for funding partners, improving platform use and improving connections to Link light rail and other transportation networks.

6.1.2 Alternative 4A

Alternative 4A (see **Figure 3-13** and **Figure 3-14**) provides improvements to address platform congestion and increase egress capacity for the planned increase in ridership. It can accommodate eight new stairways and three new elevators. It has an increase in the holding area on the platform of 10,000 square feet and a holding area on the new concourse of 18,000 square feet.

Alternative 4A will require work within the city's right-of-way and close coordination at Union Station for the location and design of the stairway and elevator on the east side of Fourth Avenue South. It has a capital cost that is approximately 20 percent to 30 percent more than the base case. It scored the highest of the nine alternatives evaluated against the 19 screening criteria. However, it scored poorly for improvement of platform use, impacts to BNSF freight operations due to construction over the tracks and permitting/railroad approval.

The new bridge over Fourth Avenue South improves connections to Link light rail and other transportation networks. However, the city was not supportive of a bridge over Fourth Avenue South, and this will be a critical area for further study and discussion with the city staff members.

6.1.3 Hybrid of Alternatives 2A and 3

A hybrid of Alternatives 2A and 3 is shown in **Figure 6-1** Alternative 2A/3 hybrid) is a combination of Alternative 2A and Alternative 3. It provides improvements to address platform congestion and increase egress capacity for the planned increase in ridership. It can accommodate six new stairways and two new elevators. It has an increase in the holding area on the platform of 10,000 square feet and a holding area on the new concourse of 19,000 square feet.

This alternative will require work within the City of Seattle's right-of-way. Alternative 2A was the second-highest-ranking alternative. The addition of the pedestrian bridge to Fourth Avenue South improves connections to Link light rail and other transportation networks. Alternative 2A

has a capital cost of 10 percent to 20 percent more than the base case. Alternative 3 was less than 5 percent more than the cost of the base case. The combination of Alternative 2A and 3 has a capital cost approximately 20 percent to 30 percent higher than the base case.

This alternative requires more coordination with the city for the use of Second Avenue Extension South and the new cross walk for the new pedestrian bridge. The requirement for traffic mitigation will need be studied, and at this time no funding for this mitigation has been identified.

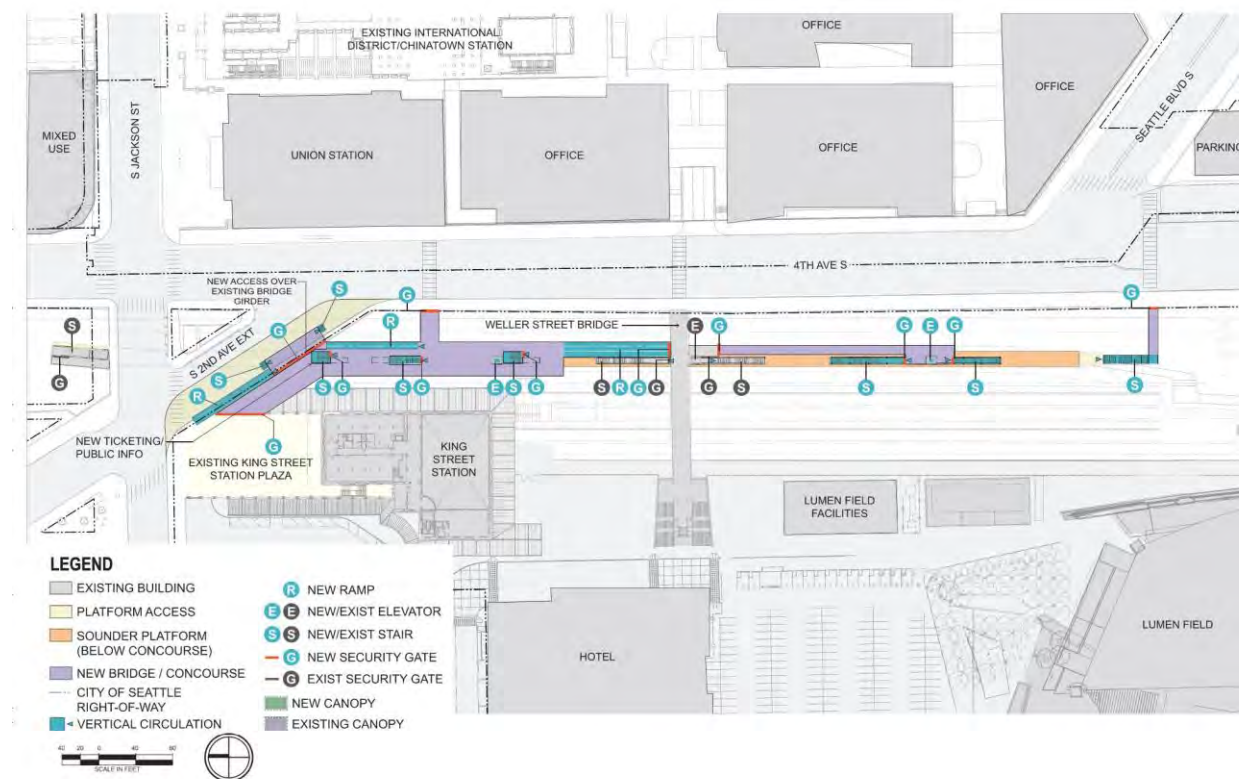


Figure 6-1 Alternative 2A/3 hybrid

6.2 Alternatives acceptable but not recommended

6.2.1 Alternative 2B

The major improvement for Alternative 2 includes a concourse above the existing platform connecting to Second Avenue Extension South. Alternative 2B requires an opening through the girder connecting the concourse with Second Avenue Extension South at street level, as shown on **Figure 3-11** (Alternative 2B street/concourse plan) instead of a ramp over the bridge girder (Alternative 4A). Alternative 2B would require a significant modification to the existing Second Avenue Extension South bridge structure.

6.2.2 Alternative 4B

The major improvements for Alternative 4 include a concourse above the existing platform and the construction of a pedestrian bridge over the tracks and over Fourth Avenue South. Alternative 4A adds a stairway and elevator on the east side of Fourth Avenue South, adjacent to the sidewalk at the entrance to Union Station Annex, as shown on **Figure 3-14** (Alternative 4A street/concourse plan). Alternative 4B replaces these features at Union Station with a long ramp to connect the pedestrian bridge to the east side of Union Station and the existing Link “International District/Chinatown Station” in the CID, as shown on **Figure 3-15** (Alternative 4B street/concourse plan). Alternative 4B costs more than Alternative 4A for the ramp and alterations to the Union Station Annex and has greater impact on the existing use of the Union Station Annex.

6.3 Alternatives not recommended for future consideration

6.3.1 Alternative 1B

Alternative 1B would connect the plaza and Fourth Avenue South. However, because Alternative 3 has a separate pedestrian bridge on the south end, Alternative 1B was considered redundant and removed from further evaluation.

6.3.2 Alternatives 5A and 5B

Removing the King-4 track is not recommended because of its significant reduction in operational flexibility and future train service expansion opportunities, which would be caused by the reduction in through-tracks from three to two, requiring Sounder and Amtrak trains to share one through track.

The track occupancy study provided in Appendix C (Draft King Street Station Track Occupancy Memorandum) showed that it is not possible to adjust Sounder and Amtrak schedules to accommodate this track use change and still maintain the same number of Sounder and Amtrak trains arriving and departing at both current (pre-pandemic) and future schedules. Although having Sounder South (i.e., S-line) trains use the platform at King 9 track could mitigate the operational challenges, Sounder passengers transferring between N-line and S-line trains when S-line trains are using the platform at King 9 track would be negatively impacted. Further, improving passenger access to the platform at King 9 track could also be costly and could create security issues for Sound Transit. Further, Amtrak, BNSF, WSDOT and Sound Transit Operations do not consider these alternatives operationally viable.

In addition, the underground crossing to connect to the future light rail station that is included in Alternative 5B is unlikely to be built, because the depth of the tunnel required to avoid the existing structural support for Fourth Avenue South would be prohibitively costly.

7 SUMMARY

King Street Station had an existing problem with congestion on the platform before the COVID-19 pandemic. Sound Transit expects ridership to return to pre-pandemic levels and projects increased ridership above that level in the future, based on Sound Transit-provided ridership projections to the year 2042. To accommodate the increase in ridership, Sound Transit is considering using longer trains and reducing the headways between trains. Increasing the Sounder South (S-line) trains from the existing 7 cars to 10 cars will accommodate the projected increased ridership. The existing platform must be lengthened to accommodate the 10-car trains. The longer platform also allows the Sounder South train to stop farther south in the station to eliminate an existing signal issue on one of the tracks at the north end of the station. Stopping the train farther south requires reconstruction of the existing mini-high platform to position at the adjusted location of Car 2.

New stairways are necessary to meet the current codes, which, in turn, requires the construction of a new concourse to connect them to public walkways. These connections are preferably located to the north and east of the existing station. The alternatives evaluated different ways to improve the connections to the north and east. A new connection at the south end of the station is planned for additional egress.

Five major alternatives were initially identified: (1) connecting to King Street Station Plaza, (2) connecting to Second Avenue Extension South, (3) connecting to Fourth Avenue South, (4) connecting to Union Station over Fourth Avenue South and (5) widening the existing platform. Variations of these five alternatives were considered for screening against 19 criteria identified by the project team. Two of the alternatives evaluated (Alternatives 1A and 4A) are recommended for further study. An alternative that combines Alternative 2A and Alternative 3 is also recommended for further study. The improvements identified in Alternative 1A are entirely within existing right-of-way. The improvements identified in Alternative 4A and Alternative 2A/3 will require coordination with and approvals by the City of Seattle, BNSF, Amtrak and WSDOT.

8 REFERENCES

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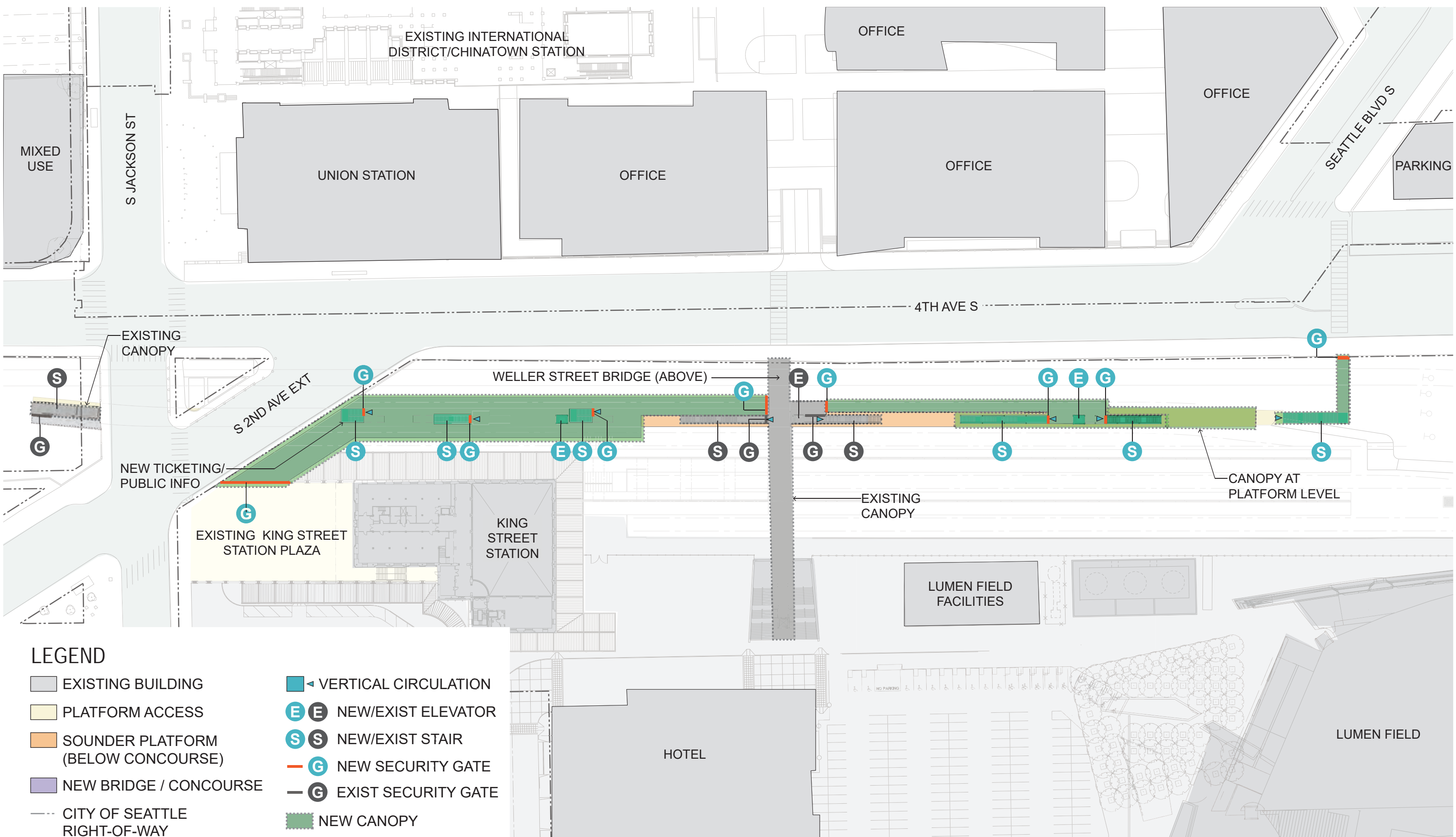
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Sound Transit. 2020. *Final Sounder South Strategic Development and Implementation Plan (SDIP)*.

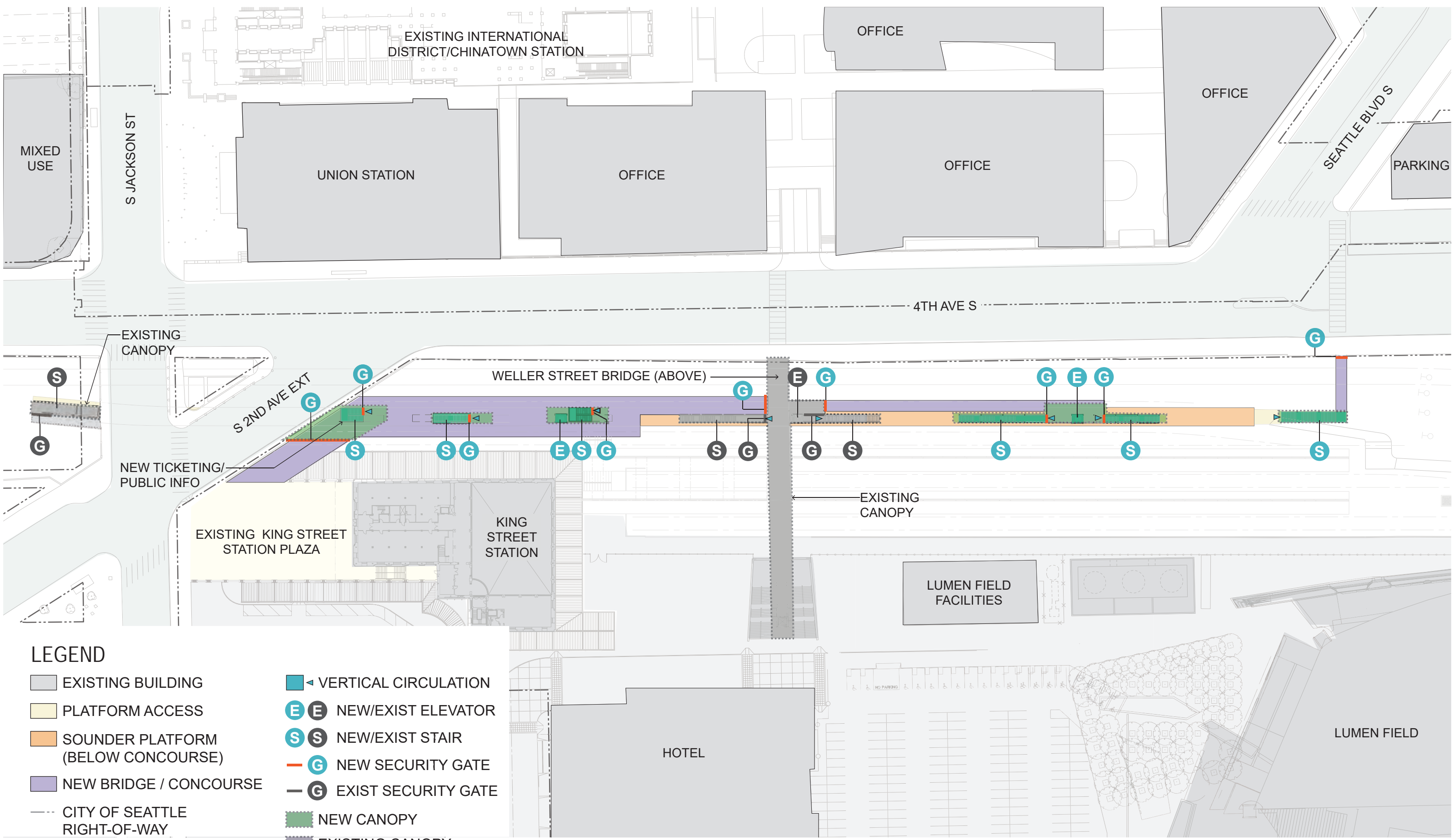
Sound Transit. 2019. *Sounder South Strategic Development and Implementation Plan (SDIP) Preliminary Environmental Constraints Evaluation*.

Appendix A

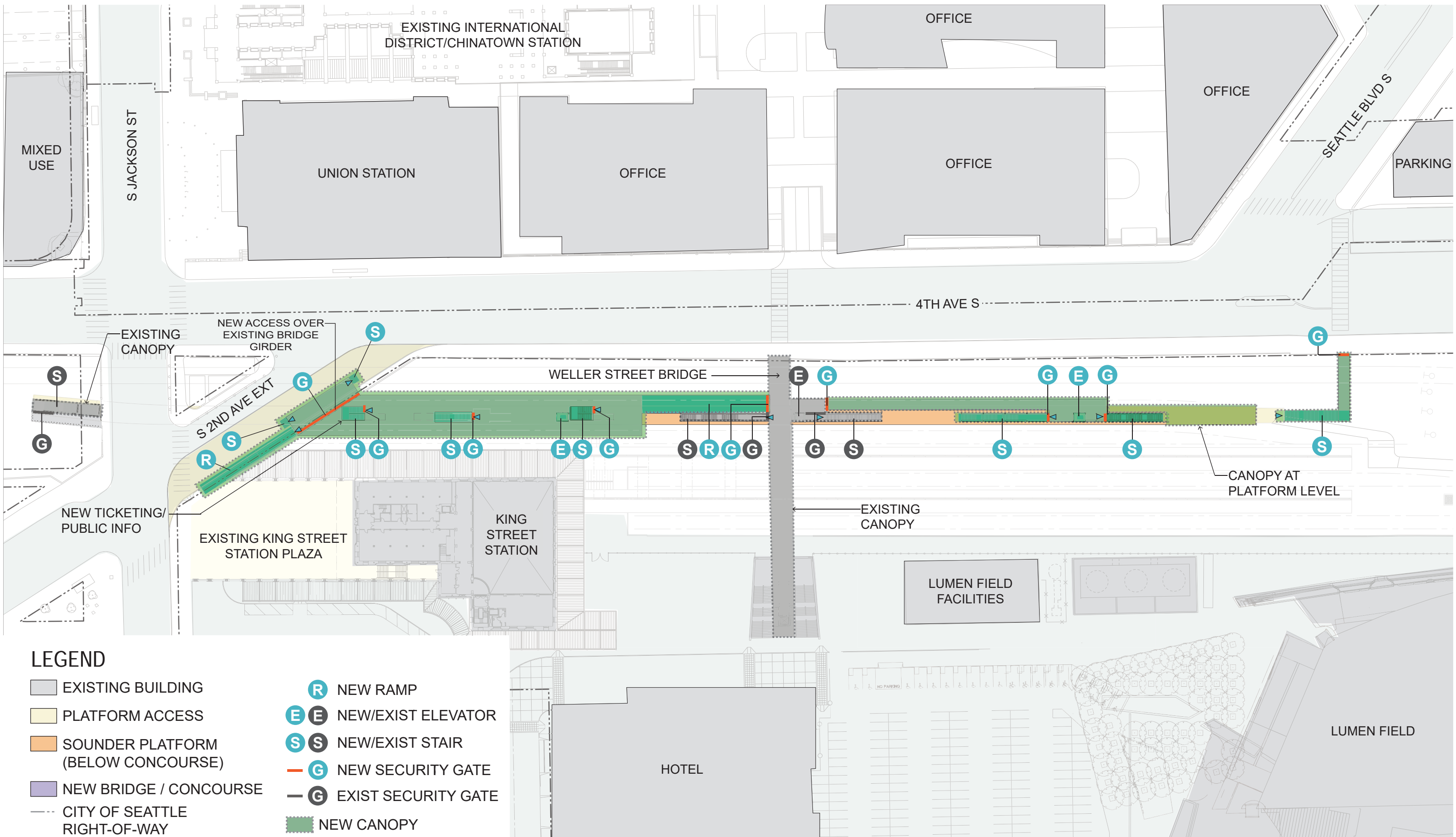
Large Canopy Plans and Small Canopy Plans for
Each Alternative



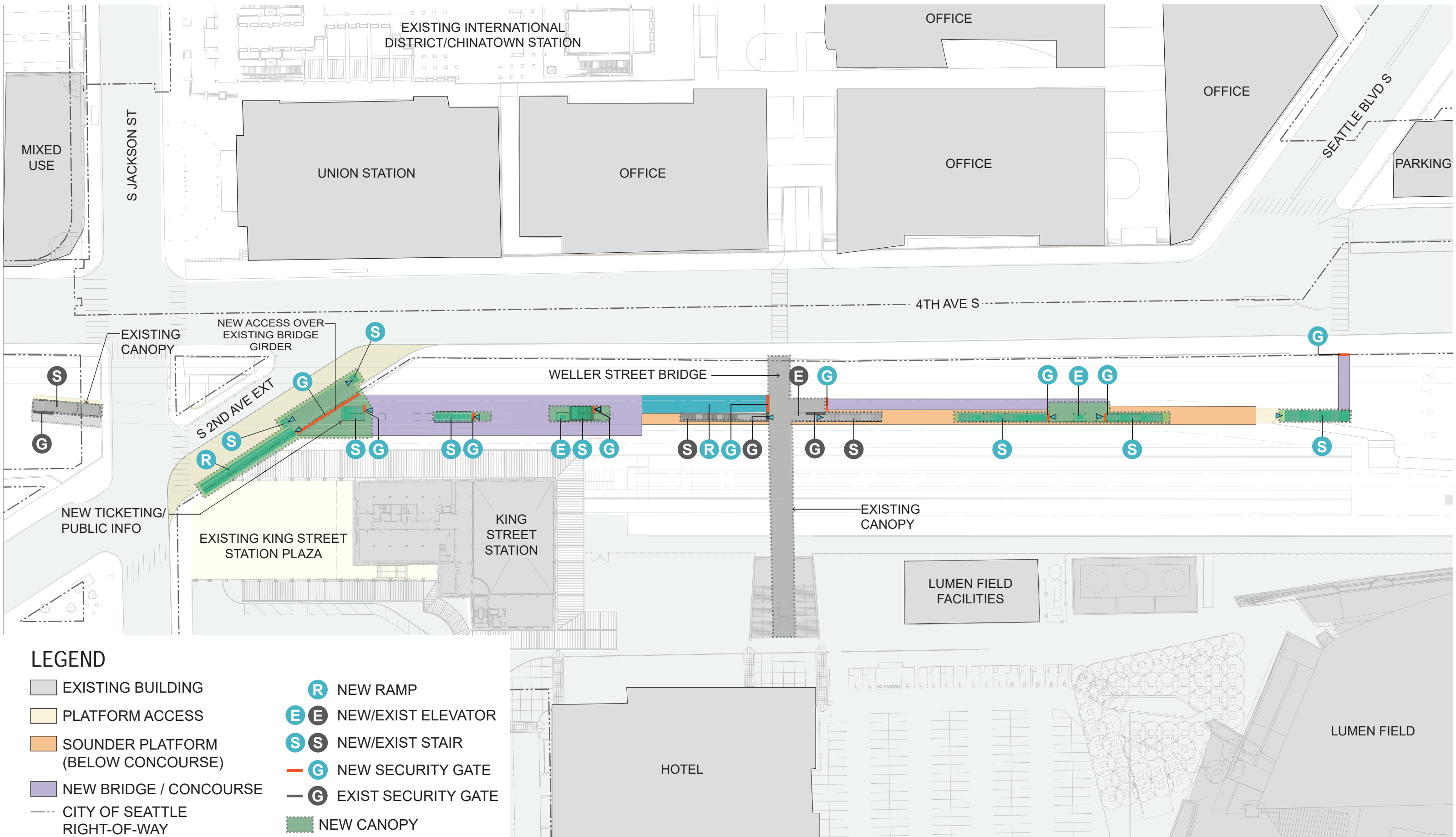
**LARGE CANOPY PLAN
ALTERNATIVE 1A**



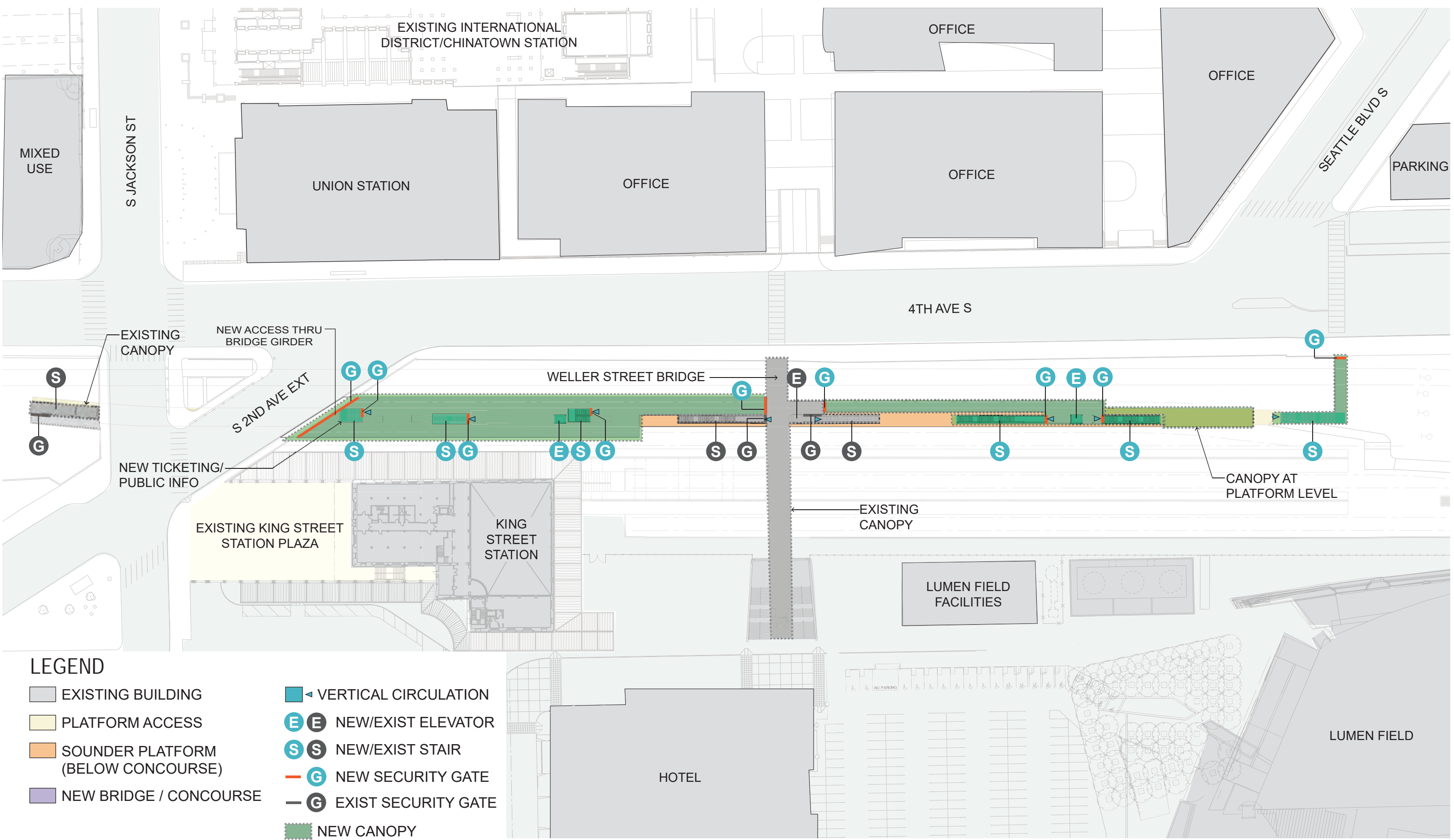
**SMALL CANOPY PLAN
ALTERNATIVE 1A**



**LARGE CANOPY PLAN
ALTERNATIVE 2A**



**SMALL CANOPY PLAN
ALTERNATIVE 2A**



LEGEND

- EXISTING BUILDING

PLATFORM ACCESS

SOUNDER PLATFORM
(BELOW CONCOURSE)

NEW BRIDGE / CONCOURSE
- ◀ VERTICAL CIRCULATION

E NEW/EXIST ELEVATOR

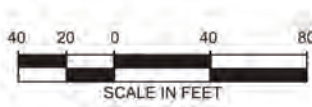
S NEW/EXIST STAIR

G NEW SECURITY GATE

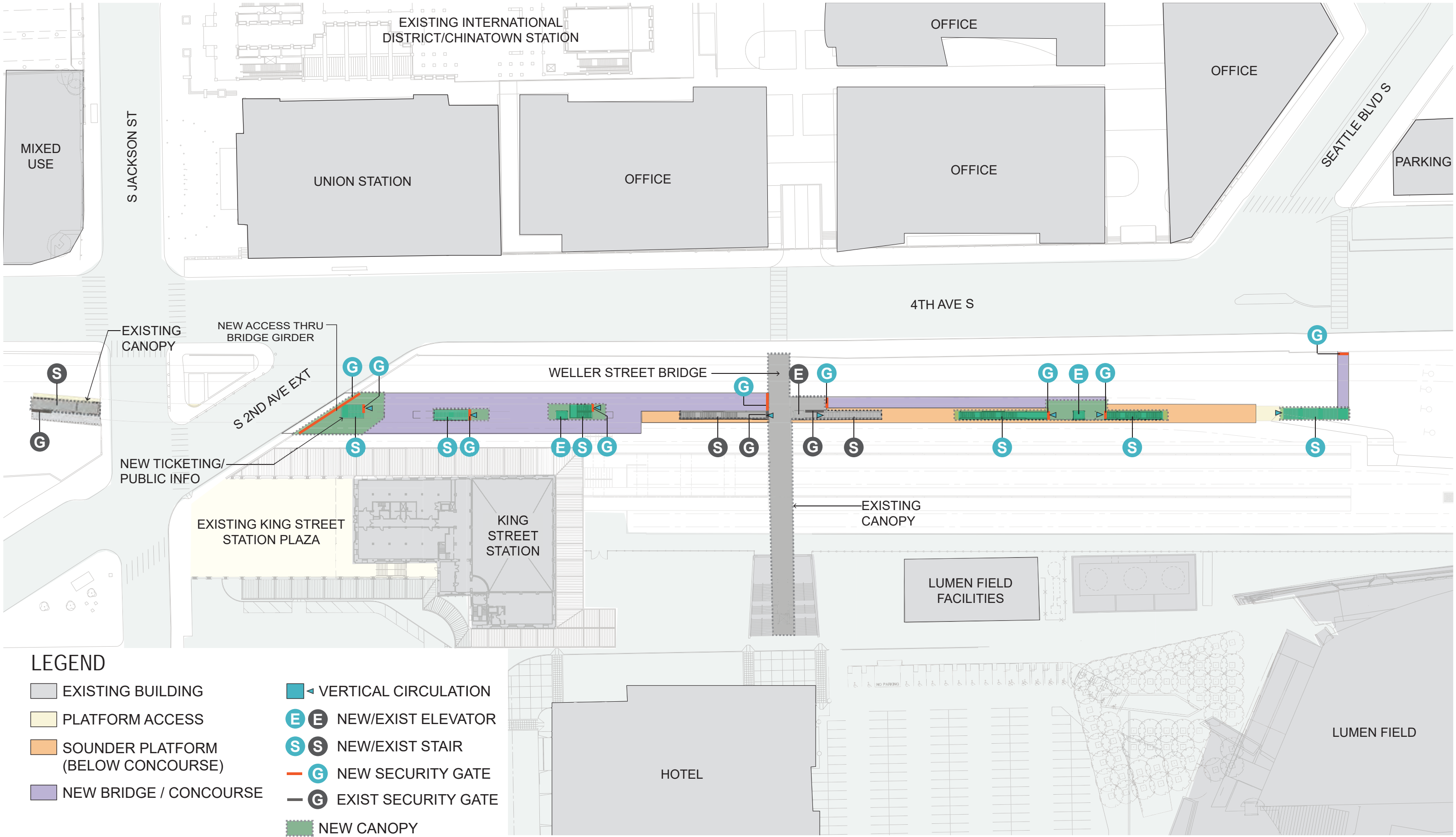
G EXIST SECURITY GATE

NEW CANOPY

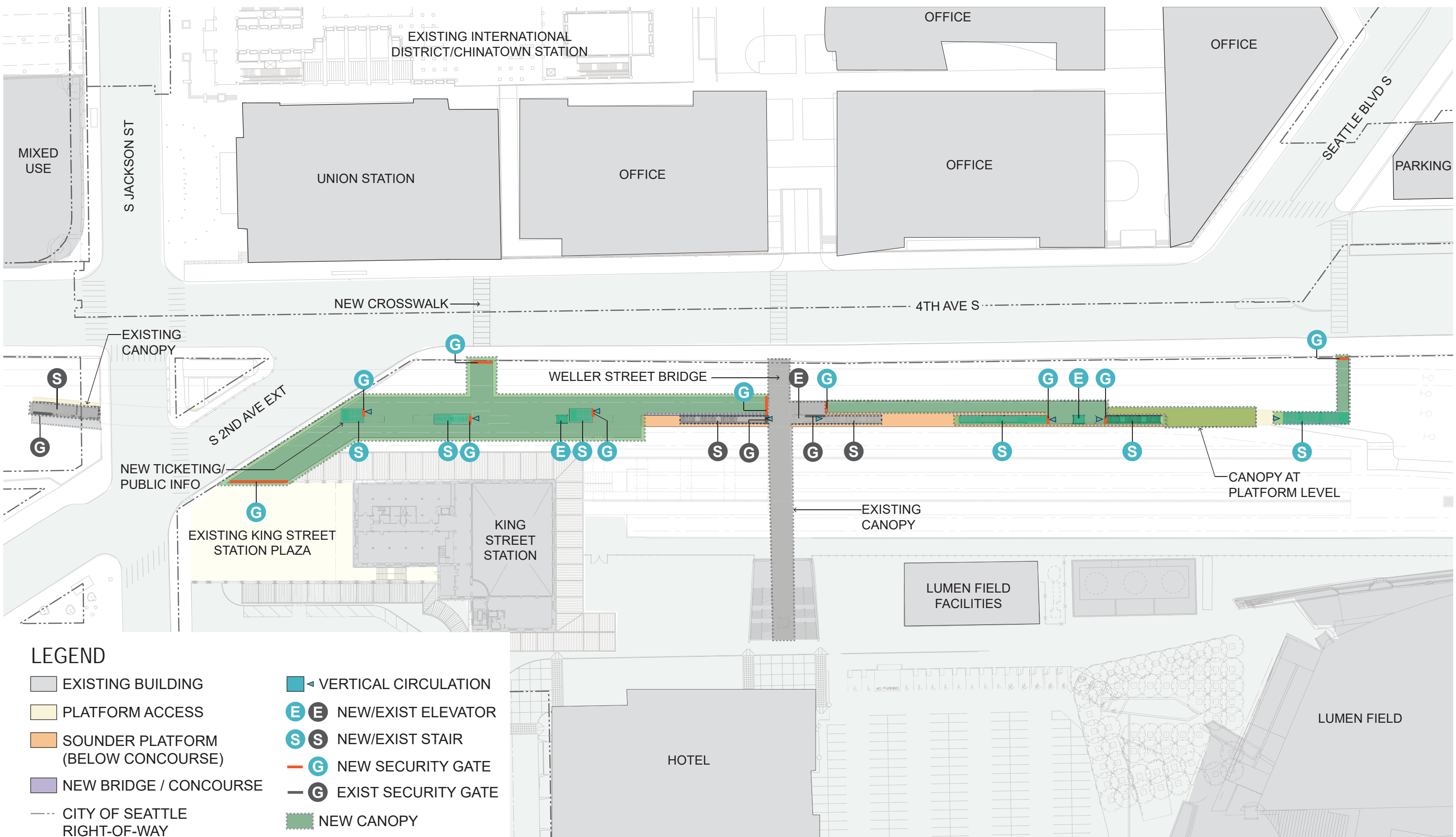
EXISTING CANOPY



**LARGE CANOPY PLAN
ALTERNATIVE 2B**



**SMALL CANOPY PLAN
ALTERNATIVE 2B**



LEGEND

EXISTING BUILDING

PLATFORM ACCESS

SOUNDER PLATFORM
(BELOW CONCOURSE)

NEW BRIDGE / CONCOURSE

CITY OF SEATTLE
RIGHT-OF-WAY

VERTICAL CIRCULATION

NEW/EXIST ELEVATOR

NEW/EXIST STAIR

NEW SECURITY GATE

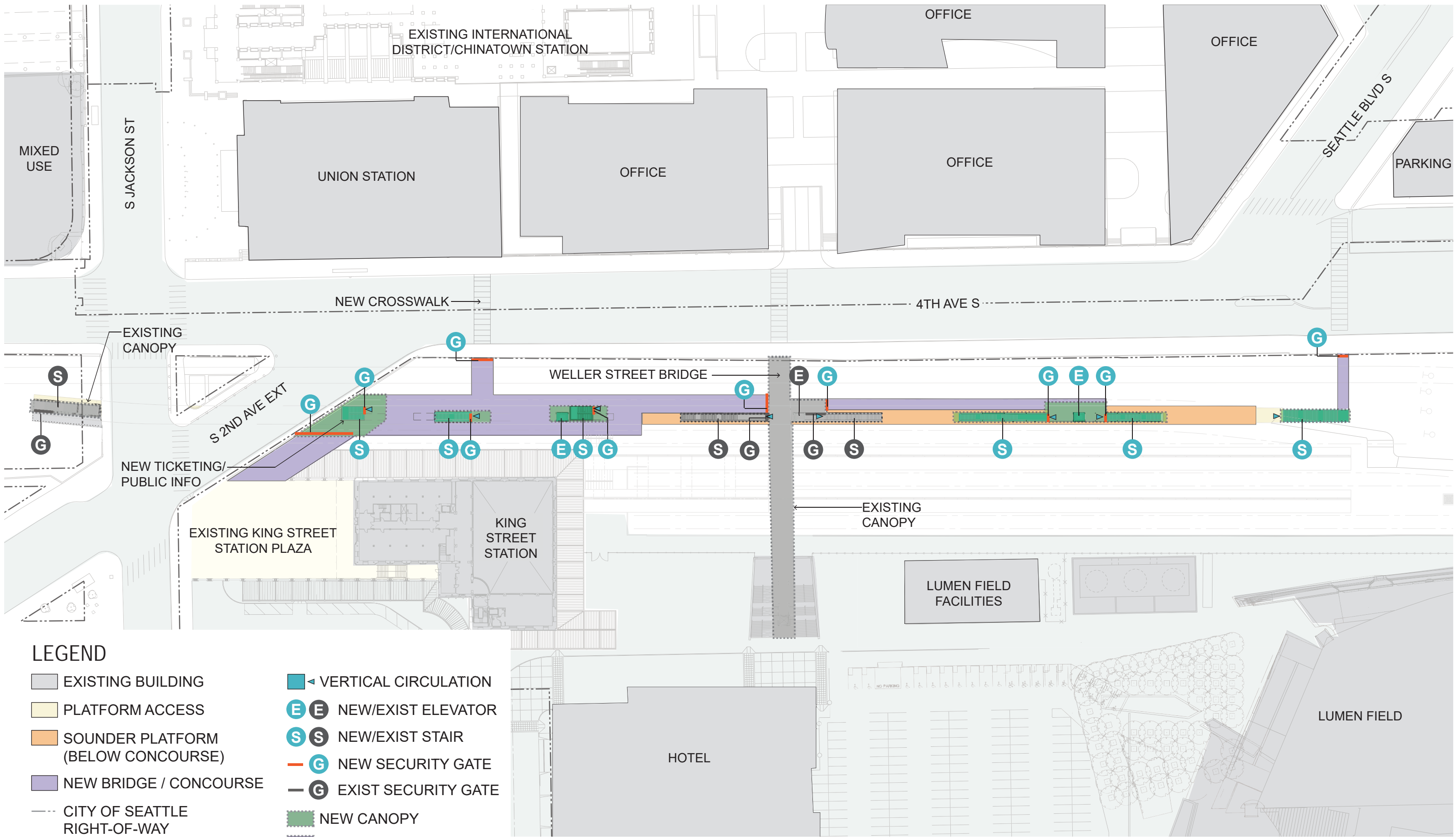
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NEW CANOPY

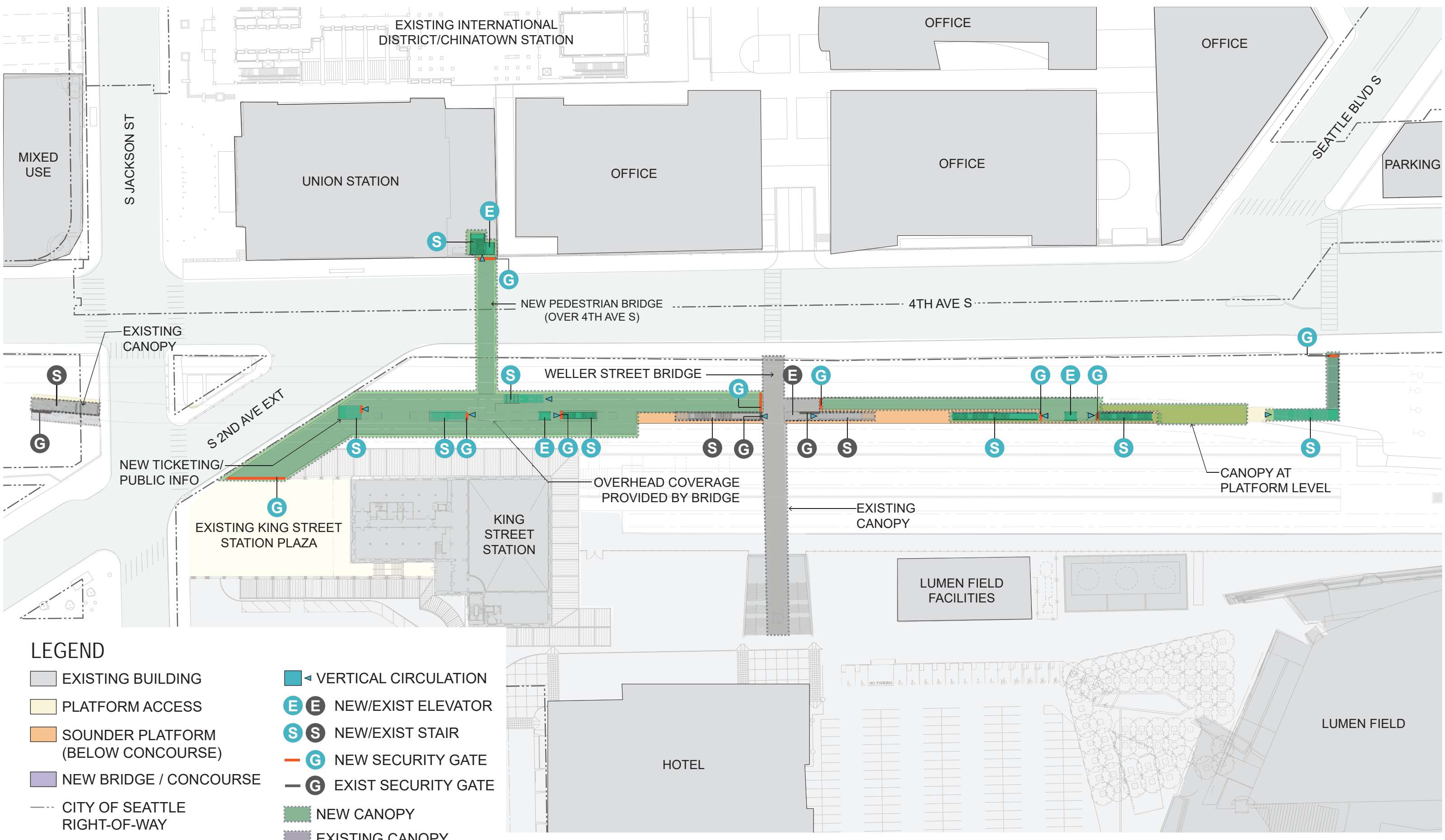
EXISTING CANOPY



LARGE CANOPY PLAN ALTERNATIVE 3



**SMALL CANOPY PLAN
ALTERNATIVE 3**

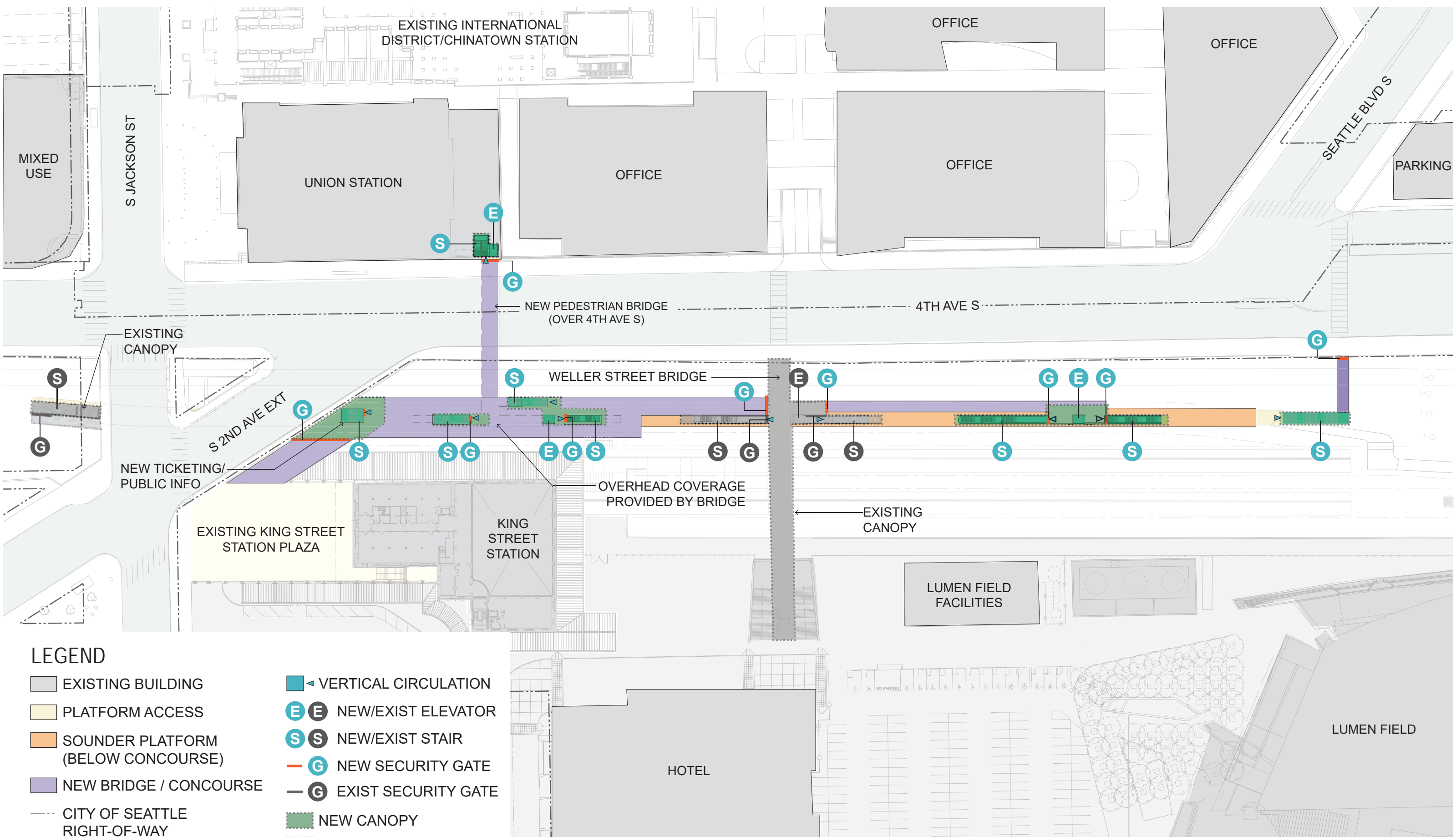


LEGEND

- EXISTING BUILDING
- PLATFORM ACCESS
- SOUNDER PLATFORM (BELOW CONCOURSE)
- NEW BRIDGE / CONCOURSE
- CITY OF SEATTLE RIGHT-OF-WAY

- VERTICAL CIRCULATION
- NEW/EXIST ELEVATOR
- NEW/EXIST STAIR
- NEW SECURITY GATE
- EXIST SECURITY GATE
- NEW CANOPY
- EXISTING CANOPY

LARGE CANOPY PLAN
ALTERNATIVE 4A

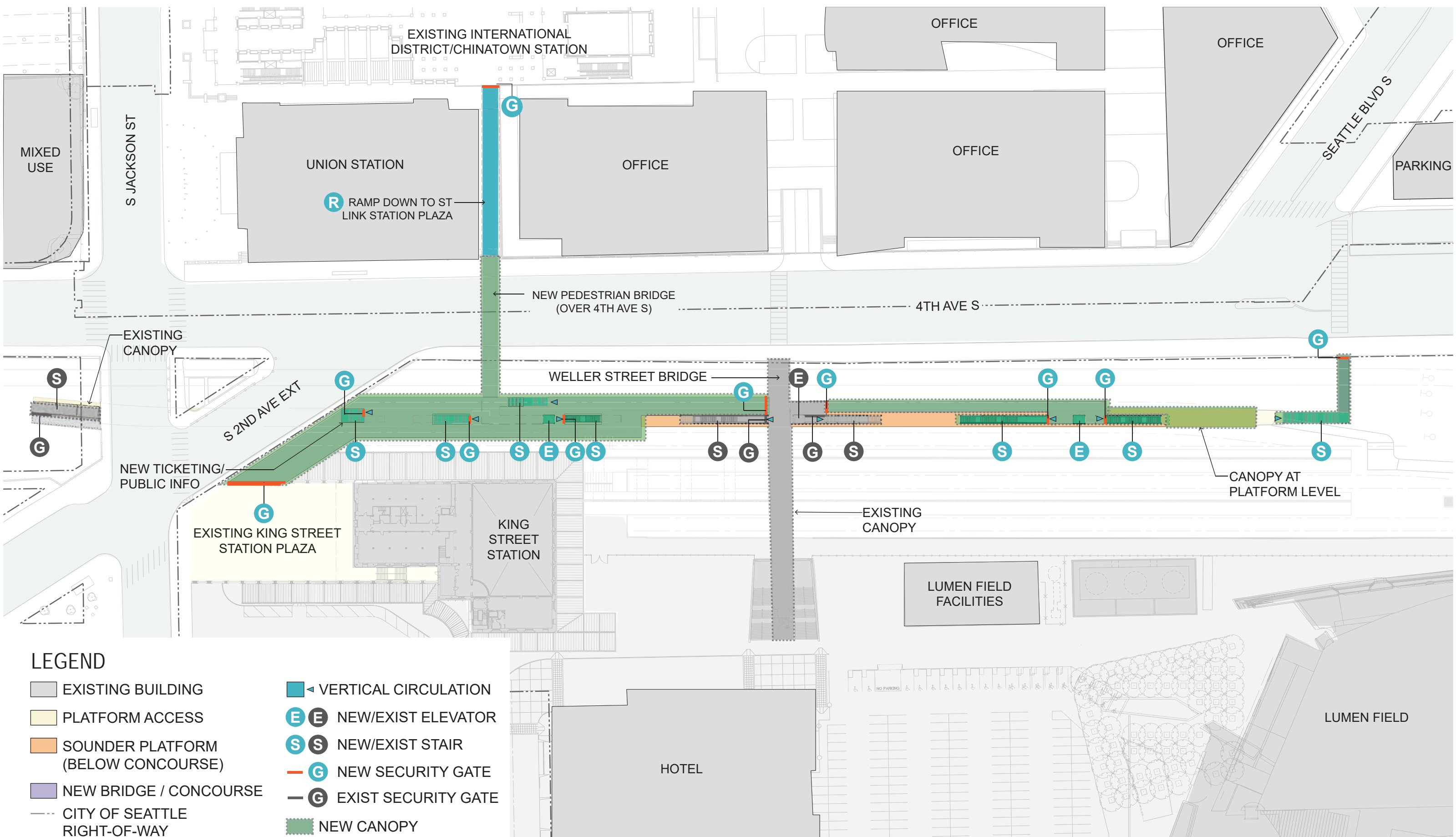


LEGEND

- EXISTING BUILDING
- PLATFORM ACCESS
- SOUNDER PLATFORM (BELOW CONCOURSE)
- NEW BRIDGE / CONCOURSE
- CITY OF SEATTLE RIGHT-OF-WAY
- VERTICAL CIRCULATION
- NEW/EXIST ELEVATOR
- NEW/EXIST STAIR
- NEW SECURITY GATE
- EXIST SECURITY GATE
- NEW CANOPY
- EXISTING CANOPY



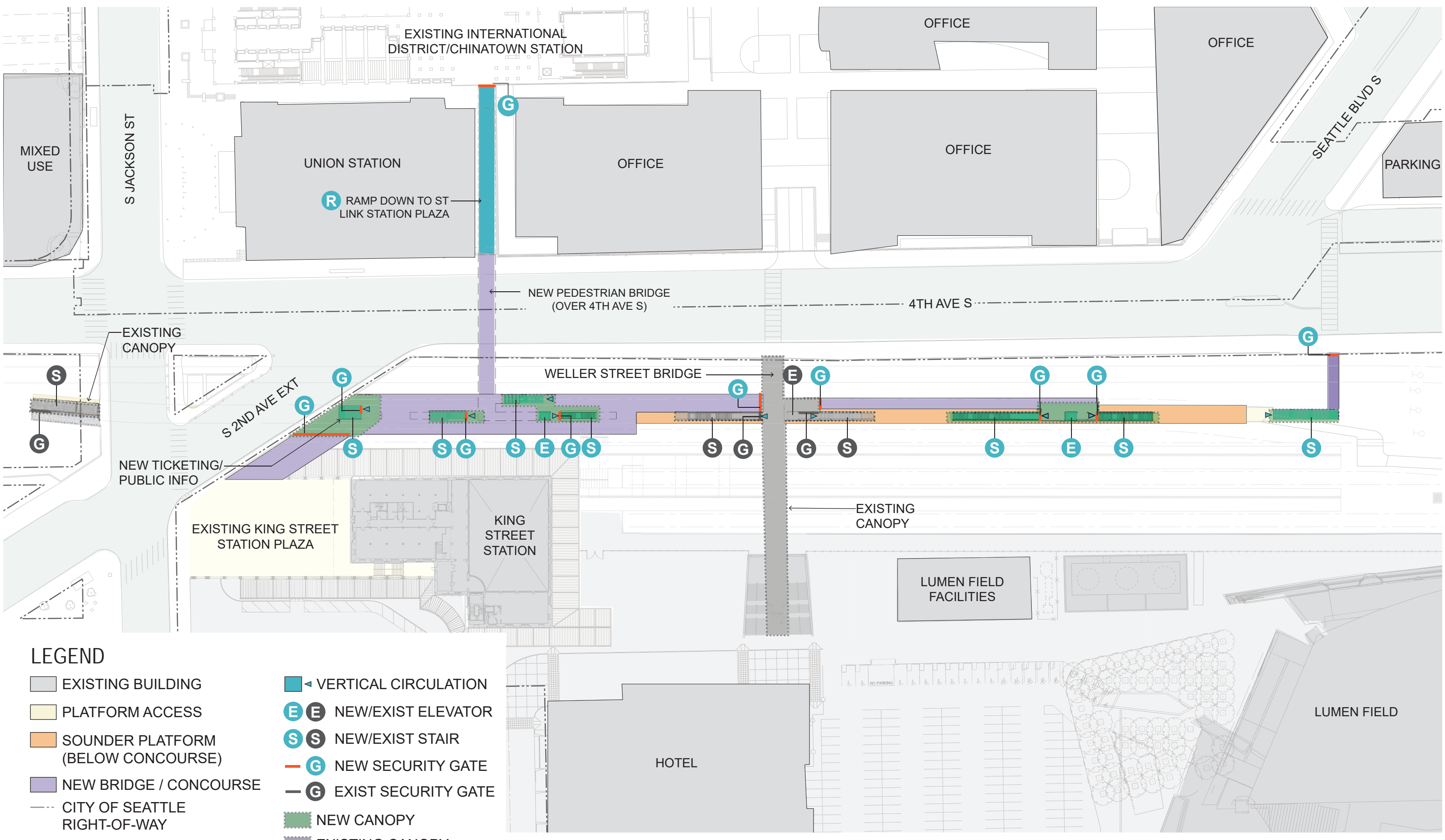
**SMALL CANOPY PLAN
ALTERNATIVE 4A**



LEGEND

- EXISTING BUILDING
- PLATFORM ACCESS
- SOUNDER PLATFORM (BELOW CONCOURSE)
- NEW BRIDGE / CONCOURSE
- CITY OF SEATTLE RIGHT-OF-WAY
- VERTICAL CIRCULATION
- NEW/EXIST ELEVATOR
- NEW/EXIST STAIR
- NEW SECURITY GATE
- EXIST SECURITY GATE
- NEW CANOPY
- EXISTING CANOPY

**LARGE CANOPY PLAN
ALTERNATIVE 4B**

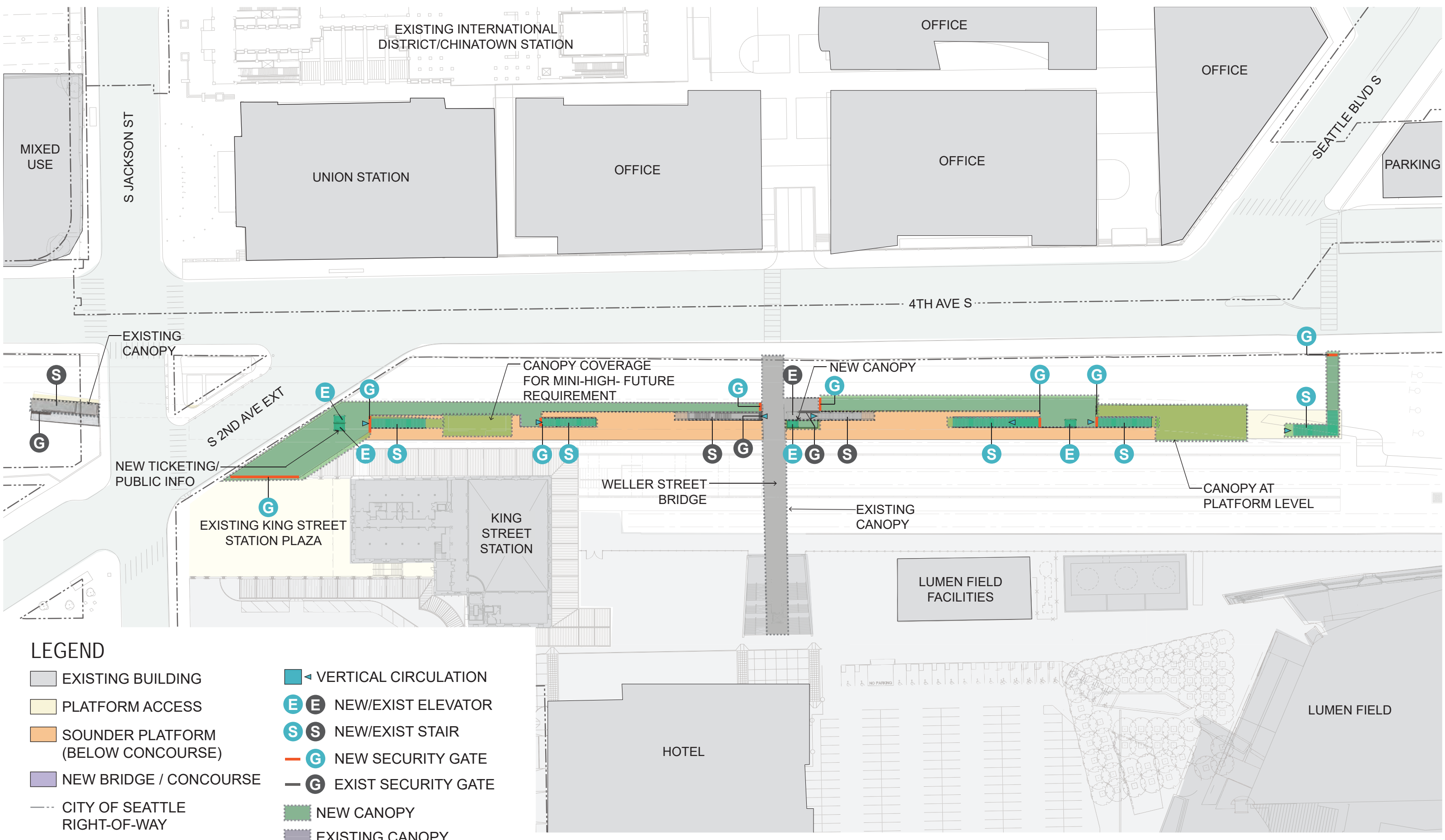


LEGEND

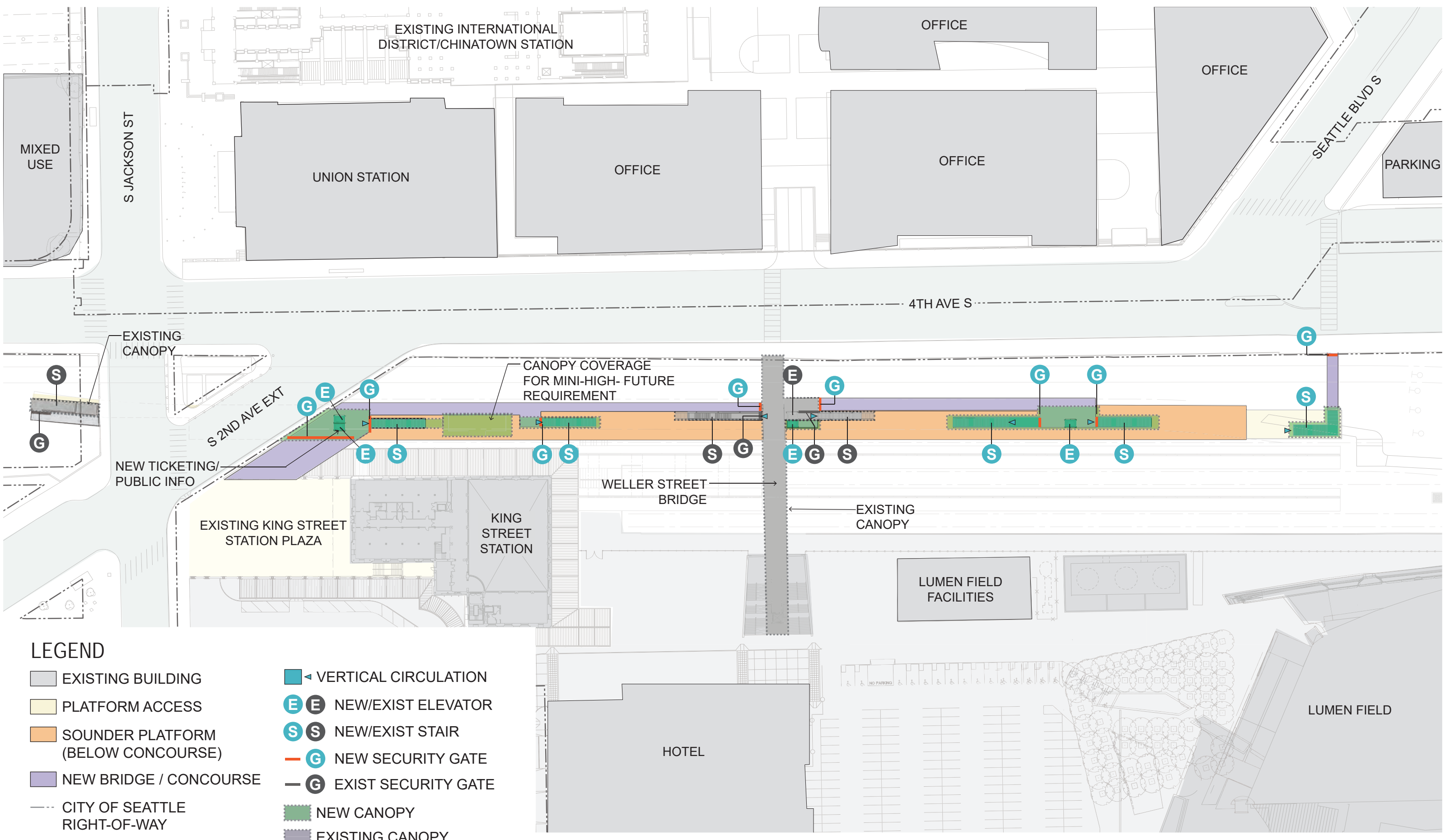
- EXISTING BUILDING
- PLATFORM ACCESS
- SOUNDER PLATFORM (BELOW CONCOURSE)
- NEW BRIDGE / CONCOURSE
- CITY OF SEATTLE RIGHT-OF-WAY
- VERTICAL CIRCULATION
- NEW/EXIST ELEVATOR
- NEW/EXIST STAIR
- NEW SECURITY GATE
- EXIST SECURITY GATE
- NEW CANOPY
- EXISTING CANOPY

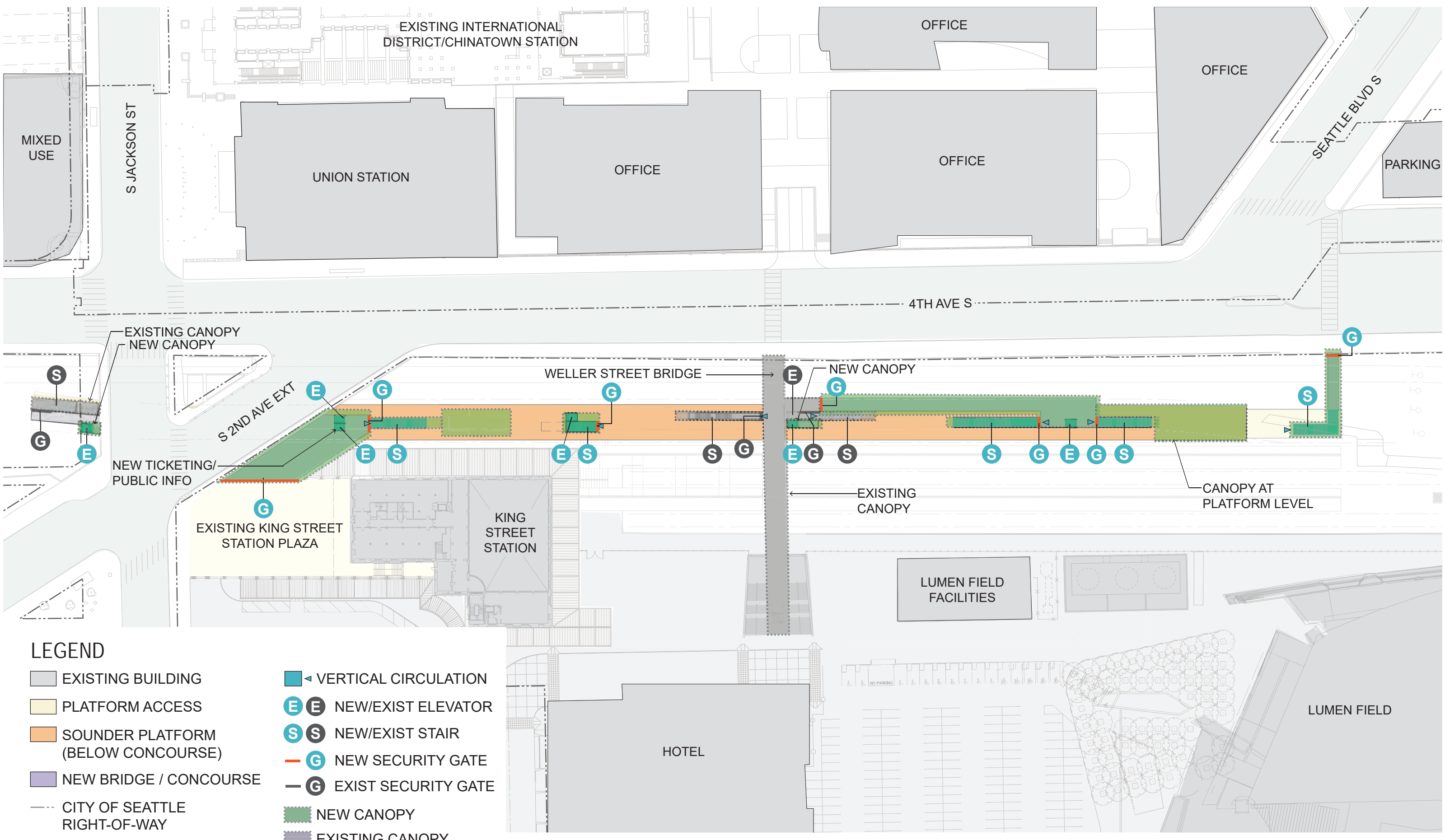


**SMALL CANOPY PLAN
ALTERNATIVE 4B**



**LARGE CANOPY PLAN
ALTERNATIVE 5A**



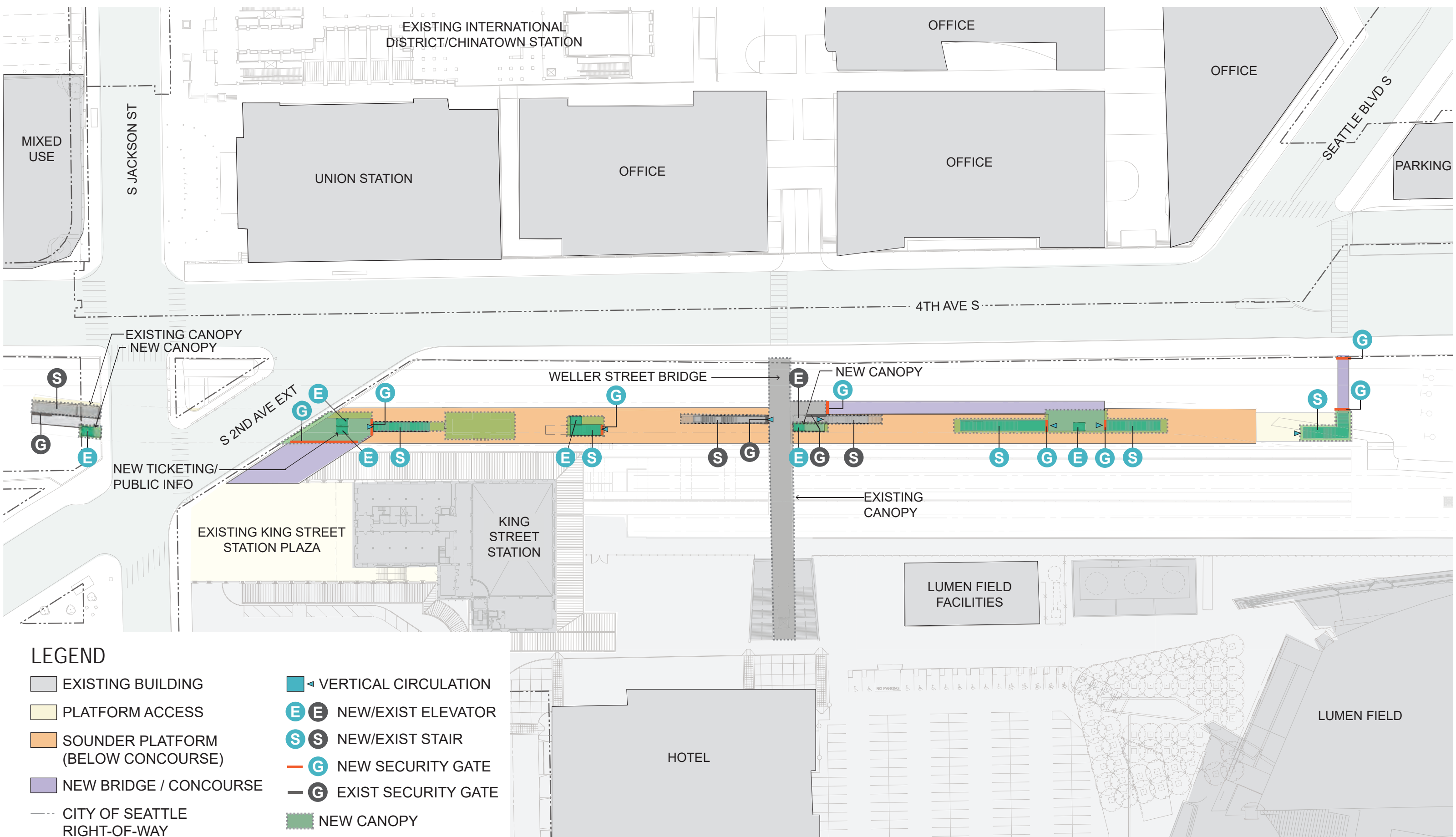


LEGEND

- EXISTING BUILDING
- PLATFORM ACCESS
- SOUNDER PLATFORM (BELOW CONCOURSE)
- NEW BRIDGE / CONCOURSE
- CITY OF SEATTLE RIGHT-OF-WAY
- VERTICAL CIRCULATION
- NEW/EXIST ELEVATOR
- NEW/EXIST STAIR
- NEW SECURITY GATE
- EXIST SECURITY GATE
- NEW CANOPY
- EXISTING CANOPY



**LARGE CANOPY PLAN
ALTERNATIVE 5B**



**SMALL CANOPY PLAN
ALTERNATIVE 5B**

Appendix B

Screening Analysis Matrix

Appendix C

Draft King Street Station Track Occupancy
Memorandum (April 13, 2022)



DAVID EVANS
AND ASSOCIATES INC.

MEMORANDUM

DATE: April 13, 2022

TO: Zachary Eskenazi
Sound Transit
401 S. Jackson Street
Seattle, WA 98104-2868

FROM: Kevin M. Jeffers, PE, PMP and Geoff Walker

SUBJECT: Draft King Street Station Track Occupancy Memorandum

PROJECT: STRA00000118
King Street Station Platform Improvements Project

CC: Greg Laird
Melissa Flores Saxe

This memo presents the service occupancy study of King Street Station as it relates to Options 5A and 5B in the Phase 1 Alternative Analysis. The occupancy study assesses the operational impact of removing King Street Track (Track) 4 and widening the platform to Track 5. The platform would be widened from approximately 16 feet to 30 feet. The existing Track 5 would have a platform face on each side. Widening to the east was not considered because of the interference to the BNSF through tracks.

Description of Track Usage at King Street Station

King Street Station hosts two Sound Transit (ST) commuter rail services and two types of Amtrak services. The ST Sounder services comprise the Sounder North (N-Line) service to and from Everett and Sounder South (S-Line) service to and from Tacoma and Lakewood. The Amtrak services comprise the Cascades service running between Vancouver, B.C. and Eugene, OR via Portland, and the long-distance service. The two long distance trains are the Coast Starlight to Los Angeles via Portland and Empire Builder to Chicago via Everett.

The station is currently divided between Sounder on Tracks 3 and 4 and Amtrak on Tracks 5 through 8. Track 9 is used primarily for Sounder event trains. The Sounder and Amtrak platforms for daily service are accessed by separate entrances with Amtrak passengers required to enter through the station building. Passengers must technically leave the ST controlled area of the station to reach an Amtrak train and vice versa.

King Street Tracks 3, 4 and 5 are all through-tracks and can be entered or exited from the north or south. Tracks 6 through 9 are all terminus platforms that must be entered from the south. The existing Sounder services typically use Track 3 for the N-Line and Track 4 for the S-Line. The Amtrak Cascades through-trains and the two long-distance trains use Track 5. The Amtrak Cascades trains originating or terminating at Seattle use Tracks 5 through 8.



DATE: April 13, 2022

FROM: Kevin M. Jeffers, PE, PMP and Geoff Walker

TO: Zachary Eskenazi

SUBJECT: Draft King Street Station Track Occupancy Memorandum

The BNSF main line has two tracks running to the east of Track 3. The Amtrak Maintenance Facility, which services and stores trains for both ST and Amtrak services, is located south of the station and is connected to the main line and all platforms.

The study area includes the station platform area and station approach tracks.

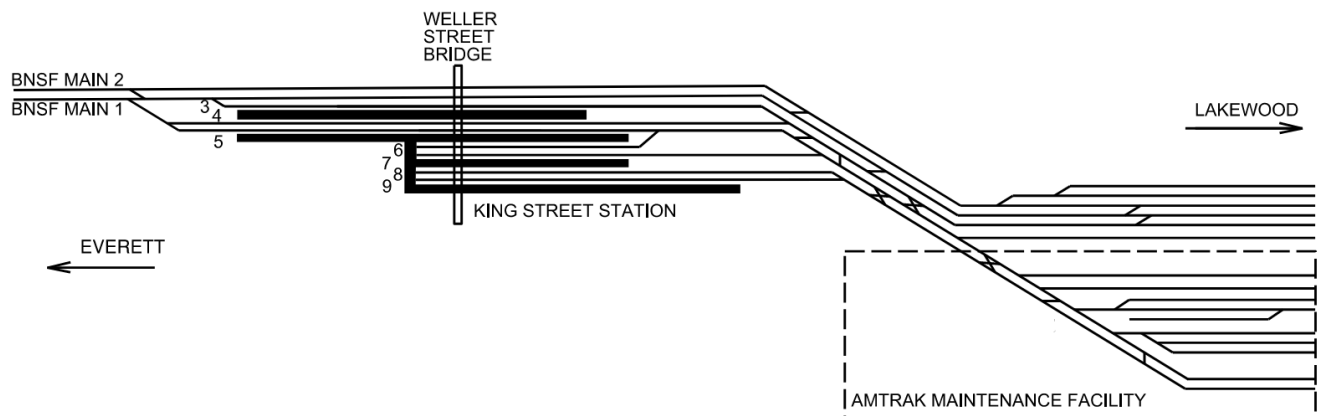


Figure 1 – Existing Track Diagram

Summary of Existing Services

The existing train schedules used assume the same schedule for S-Line and N-Line trains as they occurred prior to March 2020, when service was reduced for the COVID-19 pandemic. They also include the Amtrak trains scheduled in the December 18, 2017 Amtrak timetable, prior to the Dupont derailment. The existing arrival and departure schedules for trains at King Street Station are shown in the Station Occupancy Schedule in Appendix A.

Sounder (15XX and 17XX)

The S-Line has 10 morning arrivals and three morning departures. There are 10 S-Line departures in the afternoon with three arrivals. The morning departures are comprised of the S-Line trains that arrive immediately before them as are the afternoon departures that immediately follow arriving S-line trains; thus, these trains are sometimes referred to as “flip” trains. All S-Line trains are assumed to use Track 4 during normal service as is typical. S-Line trains are numbered 15XX.

The N-Line has four morning arrivals from Everett and four afternoon departures. All N-Line trains are assumed to use Track 3 during normal service as is typical today. N-Line trains are numbered 17XX. While not advertised as a connecting service, it has been observed that a small number of passengers transfer between the N-Line trains and S-Line “flip” trains by walking across the platform.



DATE: April 13, 2022

FROM: Kevin M. Jeffers, PE, PMP and Geoff Walker

TO: Zachary Eskenazi

SUBJECT: Draft King Street Station Track Occupancy Memorandum

To study the occupancy of the tracks, the Sounder trains have been allotted a 10-minute dwell time before they depart and after they arrive. Arriving Sounder trains have been allotted an additional 10-minute contingency for running late. We observed that there are occasions when the current schedule does not allow for the full 10 minutes of contingency; however, adjusting those arrival or departing schedules is not being proposed.

Amtrak Cascades (5XX)

There are five southbound Amtrak Cascades departures originating at King Street Station which typically use Tracks 6 through 8. There is one southbound through-train, Train 517, from Vancouver, B.C. which is only able to use Track 5.

There are five northbound Amtrak Cascades arrivals terminating at King Street Station which typically use Tracks 6 through 8. There is one Amtrak Cascades northbound through train, Train 518, and one northbound originating train, Train 516, both of which are only able to use Track 5.

Amtrak Cascades trains, which are numbered 5XX, have checked baggage and are more likely to arrive after they are scheduled than Sounder trains. As such, to study the occupancy of the tracks, Amtrak Cascades trains have been allotted a 30-minute dwell time before they depart and after they arrive. Arriving Amtrak Cascades trains have been allotted an additional 30-minute contingency for running late.

Amtrak Long Distance Trains (7, 8, 11 and 14)

The Empire Builder comprises a morning arrival (Train 7) and an evening departure (Train 8). The service runs north to Everett and then on to Chicago. The equipment for these trains is typically serviced and stored at the Amtrak Maintenance Facility during the day.

The Coast Starlight comprises a morning departure (Train 11) and an evening arrival (Train 14). The equipment for these trains is typically serviced and stored overnight at the Amtrak Maintenance Facility.

These Amtrak long distance trains use Track 5. The Coast Starlight is usually too long to fit on any other Amtrak-controlled tracks and the Empire Builder arrives from and departs toward Everett.

Amtrak long distance trains also have checked baggage and tend to arrive later than they are scheduled to than Amtrak Cascades trains. As such, to study the occupancy of the tracks, Amtrak long distance trains have been allotted a 30-minute dwell time before they depart and after they arrive. Arriving Amtrak long distance trains have been allotted an additional 60-minute contingency for running late. We observed that there are occasions where the current schedule for Trains 7 and 517 does not allow for the full 60 minutes of contingency for Train 7, but we did not propose to adjust those arrival schedules.



DATE: April 13, 2022

FROM: Kevin M. Jeffers, PE, PMP and Geoff Walker

TO: Zachary Eskenazi

SUBJECT: Draft King Street Station Track Occupancy Memorandum

Widen Sounder Platform – Options 5A and 5B

Proposed Configuration

The existing Sounder Platform, served by Tracks 3 and 4, is an island platform that experiences crowding particularly when N-Line and S-Line trains are arriving and/or departing at nearly the same time. It is not feasible to substantially widen the platform to either the east or the west without removing a track. An option has been proposed to remove Track 4 and widen the platform to reach Track 5. While the tracks may be renumbered in the future, this memo will retain the existing track numbers for clarity.

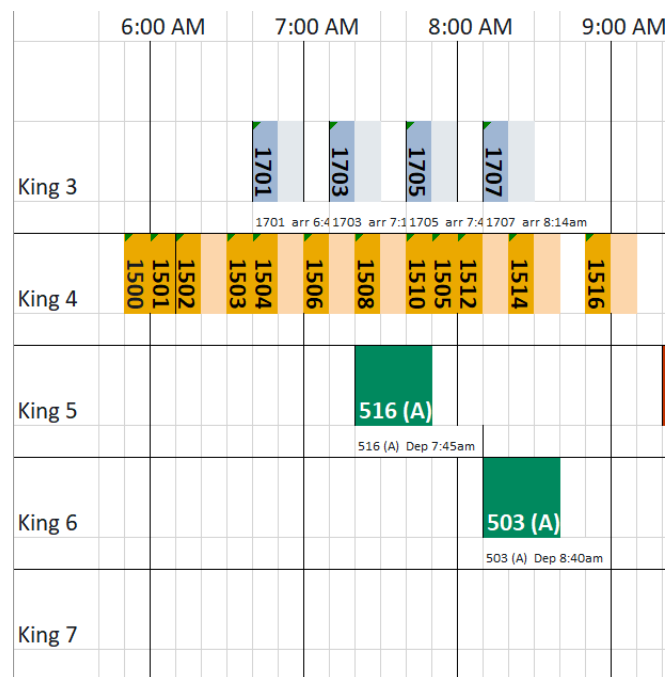


Figure 2 – Example morning occasion of N-Line, S-Line and Amtrak service requiring current Tracks 3, 4 and 5

Proposed Operations

Removing Track 4 reduces the number of through platform tracks and platform tracks serving the north direction from three to two. There are numerous occasions when S-Line and N-line trains are occupying Tracks 3 and 4 at the same time; therefore, it would not be possible to fit both S-Line and N-Line trains on Track 3 alone, as can be seen in Figure 2. Track 5 would be the next best option for Sounder trains as this would be on the same platform and would have the same pedestrian access for all Sounder passengers.



DATE: April 13, 2022

FROM: Kevin M. Jeffers, PE, PMP and Geoff Walker

TO: Zachary Eskenazi

SUBJECT: Draft King Street Station Track Occupancy Memorandum

The occupancy study shows that while S-Line trains could use Track 5, there would be at least two occasions where northbound Amtrak trains (Trains 516 and 8) would need to use Track 5 at the same time as S-Line trains. This results in six S-Line trains that would need to use another track. As depicted in Figure 3, for the purposes of this study, those S-line trains are assigned to Track 9 as it already has a mini-high platform used by special Sounder event trains.

The route between the BNSF main line and Track 9 is less direct than Track 4. S-Line trains using Track 9 would travel over slower turnouts and crossovers for a longer period of time, resulting in a slightly longer travel time. This would be no more than 2 minutes longer than for Track 4.

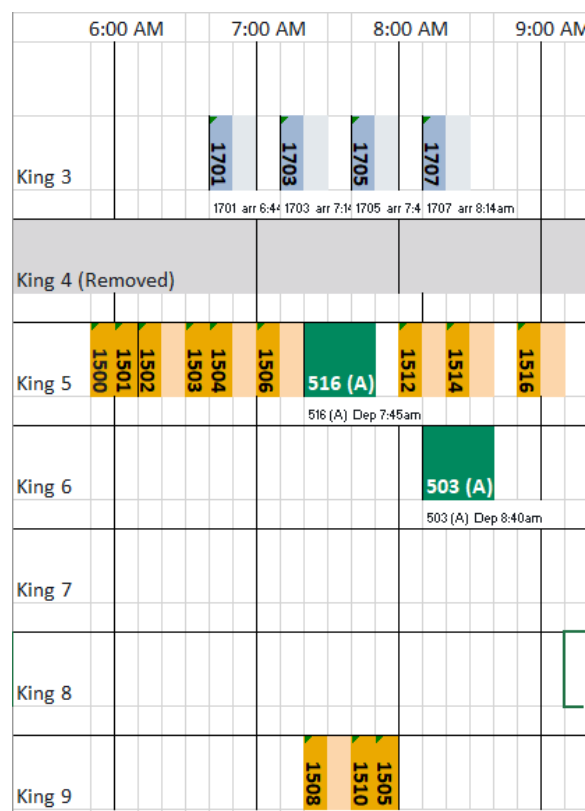


Figure 3 - Example of proposed Sounder use of Track 9 with Track 4 removed from service to widen the Sounder platform

Pedestrian Access

Current Sounder pedestrian access is from the elevated street level via Jackson Street and the Weller Street Bridge. All the King Street Station Phase 1 alternatives increase access to the elevated street including expanding the upper pedestrian level.



DATE: April 13, 2022

FROM: Kevin M. Jeffers, PE, PMP and Geoff Walker

TO: Zachary Eskenazi

SUBJECT: Draft King Street Station Track Occupancy Memorandum

The Amtrak station building is accessed via Jackson Street and King Street. There is no direct access to the Amtrak platforms or the shared platform at Track 9 from the Weller Street Bridge. To access the Track 9 platform today, passengers pass through gates to the west of the platform that provide reasonable access to the football and soccer stadium but are several hundred feet south of the Weller Street Bridge.

If regular daily S-line service is planned, direct access to Platform 9 may be feasible via a new stairwell and elevators from the Weller Street Bridge. Since the Weller Street Bridge has two stairways and one elevator down to the level of King Street, improved access points on the west side of the platform that provide more direct access to Weller Street could be created. However, to do this would require the Stadium Authority and King County, who own the land west of the platform, to grant such a property right, and for ST to secure these accesses when not in use.

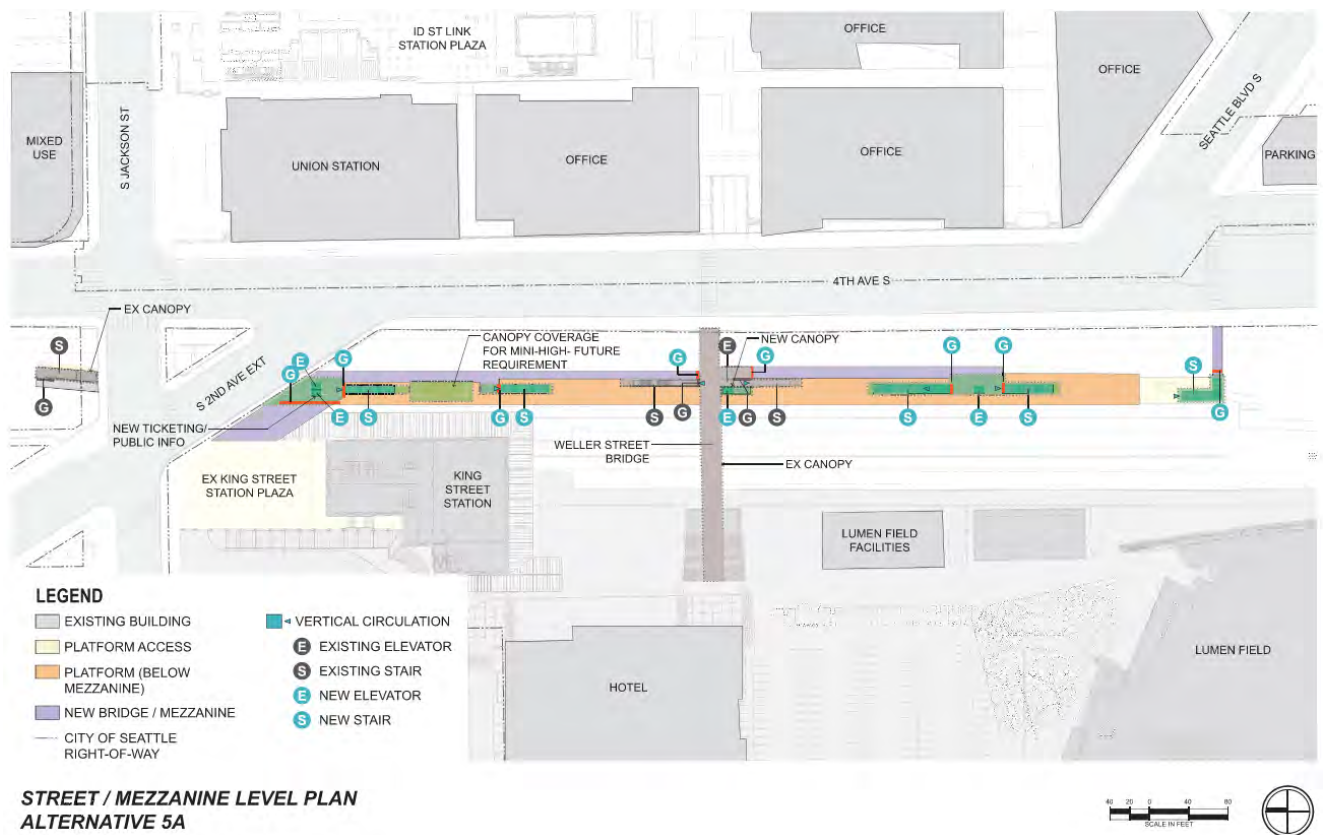


Figure 4 - Phase 1 Alternative Analysis - 5A



DATE: April 13, 2022

FROM: Kevin M. Jeffers, PE, PMP and Geoff Walker

TO: Zachary Eskenazi

SUBJECT: Draft King Street Station Track
Occupancy Memorandum

Recommendation

Due to the significant reduction in operational flexibility and future train service expansion opportunities caused by the reduction in through-tracks from three to two, the consultant team does not recommend removing Track 4. Additionally, Sounder passengers that transfer between N-Line and S Line trains when S-line trains would be using the platform at Track 9 would be negatively impacted. Improving passenger access to the platform at Track 9 could also have significant cost and could create security issues for ST.

Attachments/Enclosures: Appendix A – Occupancy Graphics

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Appendix A - Occupancy Graphics

King Street Station Track Occupancy Analysis

Base Timetable (From 2019 SDIP)

Example Track Occupancy

Assumptions

Sounder (1500 and 1700 Series) - 10 min dwell on all trains. 10 min delay for arrivals only.

Amtrak Cascades (500 Series) - 30 min dwell times, 30 min delay for arrivals only.

Coast Starlight and Empire Builder (11, 14, 7 & 8) - 30 min dwell times, 60 min delay for arrivals only.

Track Each cell is a 10 minute increment

[illegible]

King Street Station Track Occupancy Analysis
Base Timetable (From 2019 SDIP)
Current Typical Track Assignments
 2/24/2022

Assumptions

Sounder (1500 and 1700 Series) - 10 min dwell on all trains. 10 min delay for arrivals only.

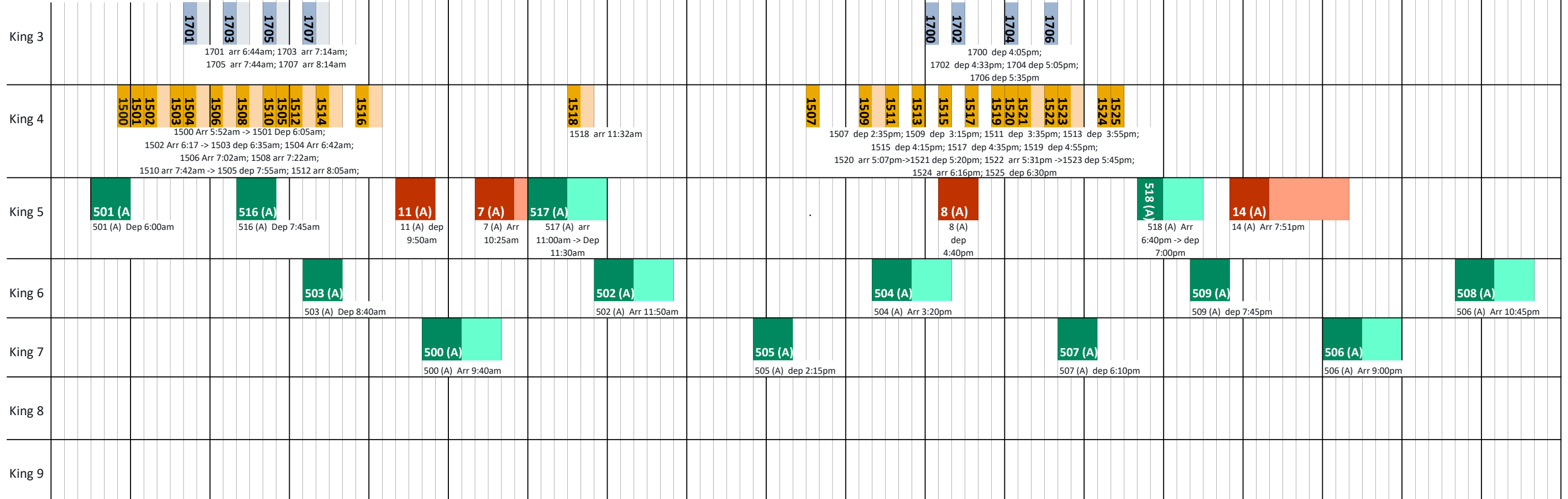
Amtrak Cascades (500 Series) - 30 min dwell times, 30 min delay for arrivals only.

Coast Starlight and Empire Builder (11, 14, 7 & 8) - 30 min dwell times, 60 min delay for arrivals only.

Track

5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
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Each cell is a 10 minute increment



King Street Station Track Occupancy Analysis
Base Timetable (From 2019 SDIP)
Proposed Revision to Typical Track Assignments
 2/24/2022

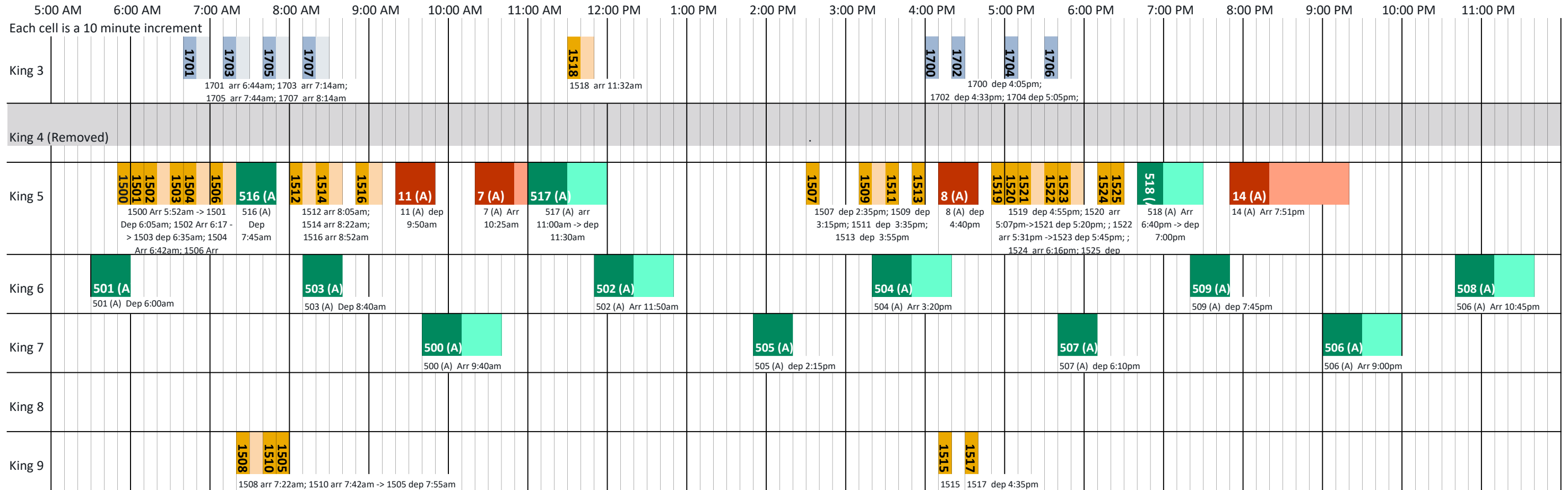
Assumptions

Sounder (1500 and 1700 Series) - 10 min dwell on all trains. 10 min delay for arrivals only.

Amtrak Cascades (500 Series) - 30 min dwell times, 30 min delay for arrivals only.

Coast Starlight and Empire Builder (11, 14, 7 & 8) - 30 min dwell times, 60 min delay for arrivals only.

Track



King Street Station Track Occupancy Analysis
Base Timetable (From 2019 SDIP)
Proposed Revision to Typical Track Assignments - Detailed View
2/24/2022

