

RapidRide Restart Report

March 30, 2022



King County

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II. Proviso Text

On November 17, 2020, the King County Council ("Council") unanimously adopted Ordinance 19210¹, a final \$12.59 billion budget for the 2021-22 biennium, including Section 113, Transit, Proviso P1. On November 23, 2021, the Council unanimously adopted Ordinance 19364², a net supplemental appropriation of \$33,948,000 to various general fund agencies, a net supplemental appropriation of \$37,082,000 to various non-general fund agencies and a net supplemental appropriation of \$288,992,389 from various capital fund budgets; and amending the 2021-2022 Biennial Budget Ordinance, Ordinance 19210, including amended language for Section 113, Transit, Proviso P1.

TEXT OF PROVISO P1 (as amended by Ordinance 19364):

A. Of this appropriation, \$600,000 shall not be expended or encumbered until the executive transmits a RapidRide restart report and a motion that should acknowledge receipt of the report and a motion acknowledging receipt of the report is passed by the council. The motion should reference the subject matter, the proviso's ordinance number, ordinance section and proviso number in both the title and body of the motion.

B. In recognition of the fact that ~~((three))~~ two named RapidRide lines (which are the R (Rainier)~~((, J (Roosevelt)))~~ and K (Totem Lake/Bellevue/Eastgate)), which were planned to be implemented during 2024 and 2025, and for which community engagement and capital planning efforts have already been initiated, have been proposed to be deferred indefinitely, the report shall address the Metro transit department's efforts to implement these deferred lines as quickly as possible, including, but not limited to:

1. Efforts to be undertaken during 2022 to hire staff, continue design, planning or project delivery work, prepare for community and partner engagement or otherwise prepare to present detailed capital program proposals and timelines for both the K and R RapidRide lines as part of the proposed 2023-2024 biennial budget;

2. For the K Line, a description of work already completed or planned to be undertaken during 2022 to make progress on planning for the K Line to reach three to five percent project design completed, based on the fact that work on the K Line was paused with approximately one percent project design completed, as well as a description of efforts to be undertaken during 2022 to prepare to begin the next phase of work on the K Line during the 2023-2024 biennium;

3. For the R Line, a description of work already completed or planned to be undertaken during 2022 to make progress on planning for the R Line to prepare to transition from the planning phase to the project delivery phase, based on the fact that work on the R Line was paused with approximately ten percent project design completed, as well as a description of efforts to be completed during 2022 to prepare to begin the next phase of work on the R Line during the 2023-2024 biennium;

~~((4))~~4. Efforts to secure grant or partner funding for capital improvements or operational costs and a timeline for when the Metro transit department plans to seek grant or partner funding for each line;

¹ [King County 2021-22 Biennial Budget, Section 113, Transit](#)

² [King County Amended 2021-22 Biennial Budget, Section 113, Transit](#)

~~((2))~~5. ~~((The status of))~~ A plan for ongoing partner and community engagement and planning efforts for these deferred lines during the 2023-2024 biennium;

~~((3))~~6. ~~((The status of))~~ A plan for ongoing alignment and capital planning efforts for these deferred lines during the 2023-2024 biennium; and

~~((4. The status of these deferred lines in the interim service network included in the proposed update to METRO CONNECTS, with the expectation that these three deferred lines will be prioritized for implementation in METRO CONNECTS and other proposed policy documents; and))~~

~~((5))~~7. A proposed timeline for implementation for each of the deferred lines based on the fact that both the K and R lines are proposed to be part of the Metro Connects interim network, as proposed through Proposed Ordinance 2021-0286.

C. ~~((Two of the three deferred RapidRide lines, the J line and t))~~The R line~~((; are))~~ is being implemented in partnership with the city of Seattle. As a result, although ~~((these lines have))~~ this line has been deferred, operational analysis and planning efforts have already been undertaken. The K line, however, is being implemented by King County, which has not yet completed operational analysis and planning. To ensure that preparation for the K line is at the same level ~~((as the other two deferred lines))~~ and that ~~((all three))~~ both lines are able to move forward when funding is available, the report shall summarize operational analysis and planning efforts that have been completed related to the RapidRide K line and the surrounding area, including, but not limited to:

1. Identification of a list of priorities and key projects in the area of the RapidRide K line that would support future interagency agreements or grant funding opportunities, as well as future environmental permitting requirements;

2. A description of the Metro transit department's work with Sound Transit regarding coordination between planning for the RapidRide K line with East Link light rail and I-405 bus rapid transit; ~~((and))~~

3. A description of the work already completed or planned to be undertaken during 2022 to make progress on planning for the K Line to reach three to five percent project design completed, based on the fact that work on the K Line was paused with approximately one percent project design completed;

4. A description of work to be undertaken during 2022 that will identify key improvements for the K Line that could feasibly be advanced during the 2023-2024 timeline; and

~~((3))~~5. A description of the next steps and needed budget that would be required to proceed ~~((further))~~ during the 2023-2024 biennium with design and environmental analysis for the RapidRide K line.

D. The executive should electronically file the report and the motion required by this proviso no later than March 30, 2022, with the clerk of the council, who shall retain an electronic copy and provide an electronic copy to all councilmembers, the council chief of staff and the lead staff for the mobility and environment committee, or its successor.

III. Executive Summary

This report responds to King County Ordinance 19210, Section 113, Transit, Proviso P1, as amended by King County Ordinance 19364. Prioritization of funding for future RapidRide lines will occur through the biennial King County budget process.

Since RapidRide A Line's launch in 2010, RapidRide has grown into the region's premier bus rapid transit system. RapidRide service provides the highest service levels, best reliability, and Metro's highest level of rider amenities. For Metro's customers, it creates a service where they can simply show up to a RapidRide station and within minutes be on bus heading towards their destination. In 2017, Metro Connects, Metro's long-range plan and policy document, established the vision for an expanded RapidRide network. In December 2021, the Council adopted an update to Metro Connects that refined but also continued support for the County's vision for an expanded RapidRide network.

As part of the Metro Connects update adopted in 2021, Metro will develop a prioritization plan to select the specific RapidRide lines for Metro's interim network. This prioritization effort will be informed by updated corridor analyses, partner engagement, and corridor studies. This approach will allow Metro to make decisions about the RapidRide network that are more informed by timely data and engagement. The network is planned to include 10 RapidRide lines in 2025, 13 to 15 lines in the interim network and 19 to 23 in the 2050 network. The RapidRide J Line will be implemented in partnership with the City of Seattle in 2025, and the RapidRide R and K Lines are included in the interim network and identified as the next two lines Metro will prioritize for implementation.

In response to the Covid-19 Pandemic and the associated reduction in forecast revenue, the RapidRide K and R Lines were paused and removed from Metro's capital improvement plan and indefinitely paused during the 2021-2022 budgeting process. The R Line was paused at approximately 10 percent design while the K Line was paused at approximately one percent design. Transit Proviso P1 directed Metro to advance planning and design of the K Line so that when funding was available it could be advanced.

In response to Transit Proviso P1, Metro has undertaken efforts to continue work on advancing the K and R Lines. This has been achieved through a combination of programmatic and project-specific efforts. The RapidRide program has developed revised R and K Line project delivery plans, continued partner engagement on the K and R Lines, is planning to increase staffing during 2022 to account for future RapidRide delivery needs, and has developed revised budget proposals for consideration in the 2023-2024 biennial budget process.

At the project level, The RapidRide K Line project team performed an additional \$600,000 of technical work in 2021, which advanced key areas of future improvement identification and conceptual design. These key improvements to the roadway and street frontage would allow for improved transit speed and reliability, better access to RapidRide K Line station areas for pedestrians and cyclists, and the identification of K Line station areas along the future route. This work culminated in the completion of the K Line Roadmap Report which is attached as Appendix A.

In 2022, Metro will perform an additional \$400,000 of technical work which will further advance a subset of the identified improvements. The improvements, which will be studied in 2022, are those that

have been deemed more technically challenging, such as how the K Line will integrate into key transit centers along the route.

The R Line was further along in planning when it was paused. As such, no additional project specific technical work was completed in 2021 or planned to be completed in 2022. Program staff have been working with the City of Seattle to continue to advocate for partnering opportunities where the Seattle Department of Transportation is a partner in the planning, design and/or delivery of the RapidRide R Line. Metro and the Seattle Department of Transportation have successfully partnered in the planning and delivery of the G, H and J Lines.

Throughout 2021 and into 2022, Metro has been working to understand possible funding plans, grant strategies and partnering opportunities for the delivery of the K and R Lines. This work included maintaining reliable cost estimates for the K and R Lines that account for construction cost inflation, which occurred throughout 2020 and 2021, and is still occurring in 2022. Additionally, Metro has been continually assessing the K and R Lines in terms of federal grant competitiveness to ensure that Metro's underlying RapidRide grant assumptions remain valid.

Both the R and the K Lines remain competitive candidates for grant funding from the Federal Transit Administration's Small Starts grant program. If competitive and successful in receiving Small Starts grants, those grants could provide approximately 50 percent of the capital project funding needed for both the K and R Lines. The Small Starts grant process and timeline is one of the key determinants in how Metro has planned to deliver RapidRide projects. The Small Starts grant process and the RapidRide project delivery approach are highly interrelated. Due to this interrelatedness, RapidRide projects require an upfront budgetary and capital improvement plan commitment to apply for Small Starts grant funding. The complexities of the Small Starts grant process is also a driving factor in Metro recommending against the use of a segmented or incremental implementation approach for any RapidRide lines for which Small Starts grant funding may be sought. However, RapidRide projects can be delivered without a Small Starts grant.

Nationally and locally, infrastructure projects are experiencing upward pressure on project costs. This is due to a variety of market forces including high inflation, labor shortages, material shortages, and delays due to local jurisdiction permitting capacity and staffing. The R Line is currently estimated to cost between \$90-100M in 2020 (pre-pandemic dollars) while the K Line cost estimate was updated in 2022 as part of this Transit Proviso P1 response at \$80-103M. Due to the influence of high inflation, which is a compounding year over year cost, the future K and R Line project costs will be dependent on, and highly sensitive to, when Metro plans to launch revenue service. Whenever the work to implement these lines is resumed and their revenue launch timelines are determined, there most likely will be a significant increase in cost due to these market factors.

As Metro works to resume the K and R Lines, Metro has continued to further jurisdictional and partner agency engagement. In 2021 and 2022 this included coordination with the Cities of Bellevue, Kirkland, and Seattle, as well as Sound Transit in relation to Link Light Rail integration tied to East Link and integration of Sound Transit's future I-405 Bus Rapid Transit Projects (STride). While the K and R Lines have been paused, broad community engagement on the efforts has also been paused. Metro is prepared to resume the projects' community engagement plans in alignment with the project's future design and environmental assessment needs.

Next steps to advance the budget requests for the K and R Lines include the development of a proposed agency (Metro) budget. This budget will balance a variety of needs and agency strategic goals. This will account for potential revenue sources, expenses, and grant strategies. This agency proposal will then be taken into consideration during the Executive's budget deliberations and development of the Executive's proposed budget. The Executive's proposed budget will then be sent to the King County Council for deliberation and adoption.

IV. Background

Department Overview: Founded in 1973, King County Metro (Metro) is one of the nation's ten largest transit agencies and the largest public transportation agency in the Puget Sound region, and under normal service conditions delivers more than 130 million rides per year through a variety of mobility options, including: fixed route services (bus, rail, streetcar, and water taxi), contracted services (Dial-A-Ride Transit and Access paratransit service), and shared and connected services (Vanpool, Vanshare, Rideshare, and Community Access Transportation). Metro was recognized as the number one transit agency in North America in 2018 by the American Public Transportation Association.

The Metro Transit Department performs the “metropolitan public transportation function” authorized in the Revised Code of Washington (RCW) 35.58. Metro is required to plan and operate transit services consistent with applicable county, regional, state, and federal policies. As a County agency, Metro complies with applicable County law and procedures. The Metropolitan King County Council approves Metro policies such as the Strategic Plan for Public Transportation, fund management policies, and Metro’s biennial budget.

Historical Context: Since RapidRide A Line’s launch in 2010, RapidRide has grown into the region’s premier bus rapid transit system. RapidRide service provides the highest service levels, best reliability, and Metro’s highest level of rider amenities. For our customers, it creates a service where they can simply show up to a RapidRide station and within minutes be on a bus heading towards their destination. Regionally, RapidRide is Metro’s investment in the regional high-capacity transit system. The regional high-capacity transit system includes Metro RapidRide, Sound Transit Link Light Rail, Sound Transit Sounder Commuter Rail, and Community Transit’s Swift bus rapid transit. Future expansion of regional bus rapid transit by Metro, Sound Transit, Community Transit and Pierce Transit will further increase regional transportation capacity for the region’s most traveled corridors. Development of the region’s high-capacity transit system is critical to supporting future growth and development throughout King County and the Puget Sound region.

In 2017, Metro Connects, Metro’s long-range plan and policy document, established the vision for an expanded RapidRide network. This vision built on the success of six existing RapidRide lines starting with the RapidRide A Line that launched in 2010. The plan called for the expansion of 20 lines by 2040. Following the adoption of Metro Connects, the Council approved a report titled “Implementation of New RapidRide Lines/Metro Connects RapidRide Expansion” via Motion 14956, which identified 13 RapidRide Lines to be implemented by 2025. The 2019-2020 Biennial Budget, Ordinance 18835, included adoption of capital projects for the first seven of these 13 lines. Planning and design work for six of the seven lines listed in the 2019-2020 Biennial Budget was underway when Metro, in response to the Covid-19 pandemic, reduced current and future operating and capital budgets. This included eliminating capital and expected future operating budgets for three named lines (RapidRide J, K, and R lines) and the seventh unnamed line. All preliminary planning and design work for the projects was suspended in conjunction with the adoption of the 2021-2022 Biennial Budget, Ordinance 19210. The adopted 2021-2022 biennium budget included Transit Proviso P1 requesting a RapidRide restart report due to Council in March 2022. This report responds to Transit Proviso P1 in Ordinance 19210, as subsequently amended by Ordinance 19364.

Current Context: In coordination with Council and local jurisdictional partners such as the Seattle Department of Transportation, Metro in 2020 established how to pause the three projects as quickly and effectively as possible. The City of Seattle and Metro realigned capital and operating budgets to continue planned delivery of a revised RapidRide J Line serving Downtown Seattle, Eastlake, and the U District. The RapidRide R Line, serving Downtown Seattle, Seattle’s International District, Columbia City and Rainier Beach, was paused at the conclusion of approximately 10 percent conceptual design, which the project was approaching at the time of the budget realignment. The RapidRide K Line, serving the Cities of Bellevue and Kirkland, was paused upon budget realignment prior to completion of conceptual design.

In December 2021, the Council adopted an update to Metro Connects¹. The update modified and provided Council direction on a number of RapidRide network elements. Such updates included revising the vision for the future expanded RapidRide network; designating the R and K Lines as the next two lines to be implemented after those lines currently in design and construction; and calling for a RapidRide Prioritization Plan to be submitted to Council by June 30, 2024.

Report Methodology: Metro’s System Expansion and Integration work group within the Mobility Division developed this report. This response is guided by existing County policy; specifically, policies such as the Service Guidelines¹, Metro Connects², and the Strategic Plan³, which were updated in 2021. Additionally, Metro retained the services of a consultant, KPFF Consulting Engineers and their subconsultants, to provide technical support, analysis, and development of technical reports around additional planning efforts related to the RapidRide K Line.

V. Report Requirements

This section is organized to align with the proviso request to detail the Metro Transit Department's efforts to implement deferred named RapidRide lines. Metro developed the following responses to the proviso requirements.

A. Transit Proviso P1, Section B: Planning for Implementation of Deferred RapidRide Lines

This section details implementation readiness for two deferred named RapidRide lines, RapidRide R and K. These lines were planned to be implemented during 2024 and 2025. Community engagement and capital planning efforts had been initiated for these lines.

As a background to the discussion regarding resumption of the K and R Lines, Figure 1 on page 13 documents the project roadmap template Metro uses to plan, design, and implement RapidRide projects. While each project varies in the project's individual requirements, this roadmap template provides a starting point for all RapidRide projects. This template conforms to the County's defined process for delivering capital improvement projects as defined by the Capital Project Management Working Group executive orders⁴ and Metro's internal framework for capital project delivery (Get Things Built Framework).

This project roadmap template documents the approximately 5–6-year project timeline required from project initiation to project completion. It further documents the key project activity categories into which project work has been subdivided. This roadmap was developed in part to show the complex interrelation of activities which must be coordinated to comply with all County and Metro policies and goals. An example of this is the interrelation of outreach activities to the project planning and design phases. The outreach, planning, and design efforts must then also be coordinated with State and Federal environmental policies such as the Washington State Environmental Policy Act (SEPA)⁵ and the National Environmental Policy Act (NEPA)⁶.

The roadmap template presented in Figure 1 is predicated on three primary requirements:

1. The project will be delivered as a singular project, and that the project will not be segmented or completed incrementally over a period of more than 8 years.
2. The project is budgeted and the anticipated project cost is accounted for within Metro's Capital Improvement Program (CIP) through the lifecycle of the project.
3. Metro can demonstrate within its operational budget plan that operating funding will be available to operate the new RapidRide service once revenue service begins.

When working with projects of the size and complexity of a new RapidRide line, items one and two provide for the fastest and lowest cost of delivery for the project. Item three ensures that the service will be operational once built.

While there are project types that lend themselves to segmented or incremental development, RapidRide projects are not good candidates for such an approach. An example of an incremental development approach is when a shopping center builds the largest buildings first, finds tenants, and

then after those larger tenants began operations, the development breaks ground on additional building types (e.g. standalone restaurants). Conceptually, this approach applied to a RapidRide line would be to build all the RapidRide stations in one five-year period and then in a subsequent five-year period, build all the transit speed and reliability roadway improvements. Applying this segmented or incremental approach to a RapidRide line would result in a higher overall cost and may impede Metro's ability to secure its desired 50 percent or better of federal funding share.

Higher costs from a segmented or incremental approach are primarily due to the extensive project costs required to complete external jurisdictional approval. The K Line for instance requires coordination with the jurisdictions of Bellevue and Kirkland, as well as the Washington State Department of Transportation (WSDOT), Sound Transit, and the Federal Transit Administration (FTA). Performing this interjurisdictional coordination and obtaining the required approvals for a RapidRide line is a substantial cost to the project because it requires significant staff and consultant time to complete. In a situation where a RapidRide line is delivered over a period of more than eight years using a segmented or incremental approach, the project would have to perform multiple phases of jurisdictional coordination and approval, which would be done at a substantial additional cost to the project. Jurisdictional coordination includes jurisdictional and agency engagement in the planning phase; approval and technical review of proposed roadway changes; supporting grant applications; approving permitting and right of way use; and exploration of transit-oriented development opportunities.

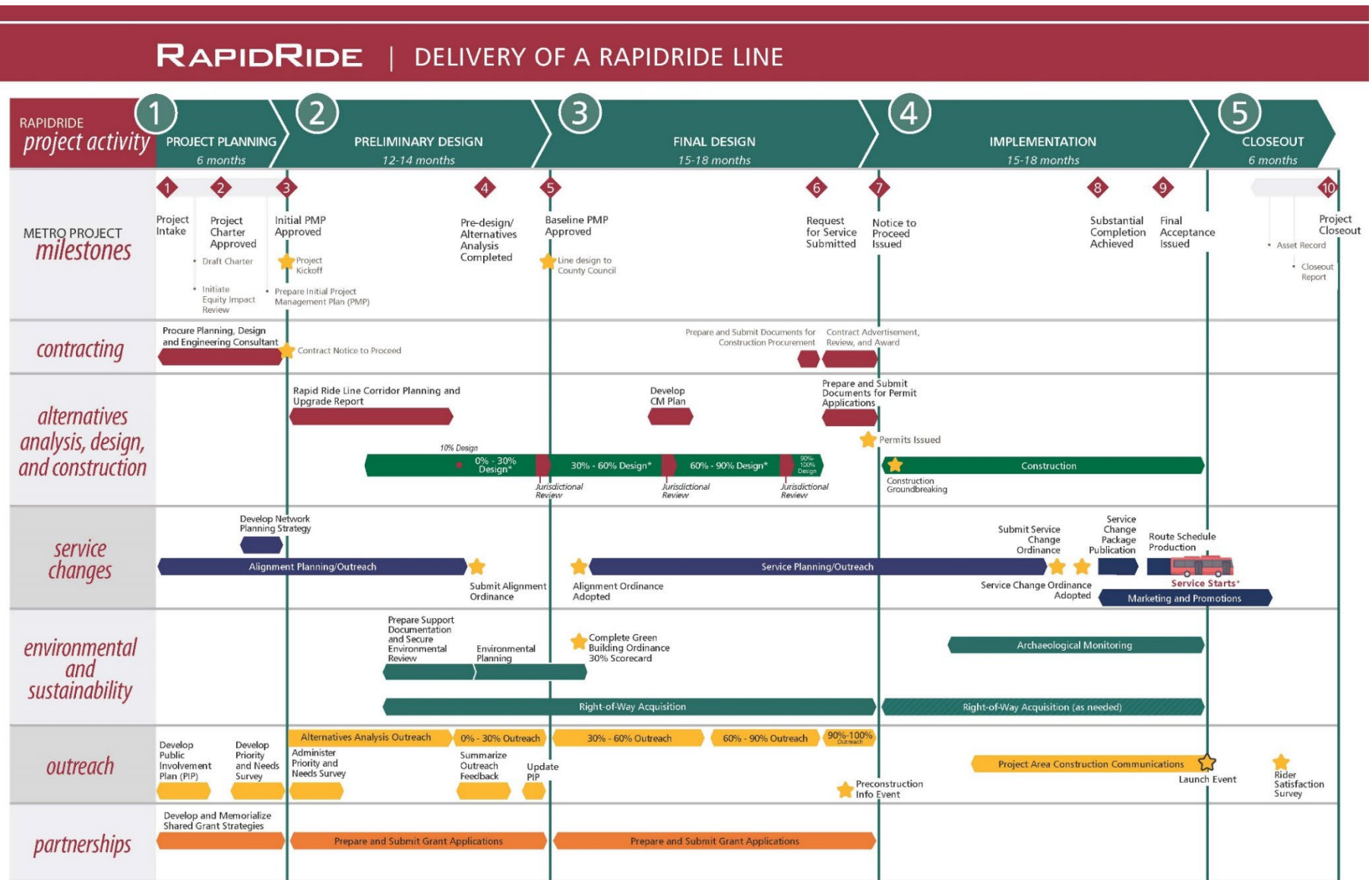
Additionally, approvals for projects within the public transportation right-of-way, regardless of which jurisdiction owns/maintains the right-of-way, are temporal in nature and can expire or the approval can become stale³. The support of these jurisdictions and entities are essential to completing the project. For example, when a previously approved roadway improvement becomes stale, the local jurisdiction may require Metro to provide additional technical analysis to confirm that the previous conditions of approval are still valid. Given the speed at which transportation infrastructure evolves and the pace of development, there is a substantial risk that approvals will require either significant additional technical analysis and coordination, or that the improvement will have to either be reduced in quality or its costs to implement will increase.

In addition to the costs associated with jurisdictional coordination, a segmented or incremental approach to implementation can make securing Metro's desired 50 percent or greater of project cost via federal grants more difficult. For example, the primary grant source available for bus rapid transit projects, like RapidRide, is the FTA's Capital Investment Grant (CIG) Small Starts Program. The Small Starts Program is a nationally competitive program used for transit capital projects that expand transit service in a region. The Small Starts Program covers projects less than \$400M dollars in value. Within the competitive framework of the Small Starts program, projects are scored on twelve criteria. In general, projects that use a segmented or incremental approach apply for federal grants for each segment or increment of the effort. In the case of RapidRide, if a segmented or incremental approach is pursued, there is a risk that Metro could receive competitive funding for the initial phase of a project but then in subsequent phases of the project be deemed to be uncompetitive according to the Small Starts scoring criteria.

³ Stale, in this context, is a conditionally or explicitly granted approval for a physical improvement (e.g., new traffic signal) within a jurisdiction's transportation right of way which due to the duration of time between approval and desired construction of the improvement may no longer be valid due circumstances beyond the project's control.

The third primary requirement for the roadmap template in Figure 1 is that the project is budgeted. This includes accounting for future operating costs within Metro’s operating budget forecasts and ensuring that the anticipated project cost is accounted for within Metro’s Capital Improvement Program (CIP) through the lifecycle of the project. The process of budgeting and accounting for a project’s capital costs is also described as the securing of local funding (or local match). It is a requirement of the Small Starts Program that any project that applies for a Small Starts grant must have secured the required local funding prior to applying for the grant.

Figure 1 - RapidRide Roadmap Template



* Revenue service must begin in conjunction with Metro service change schedule (March or September)
 Tasks other than Metro Project Milestones may be undertaken in phases and for durations other than those shown.

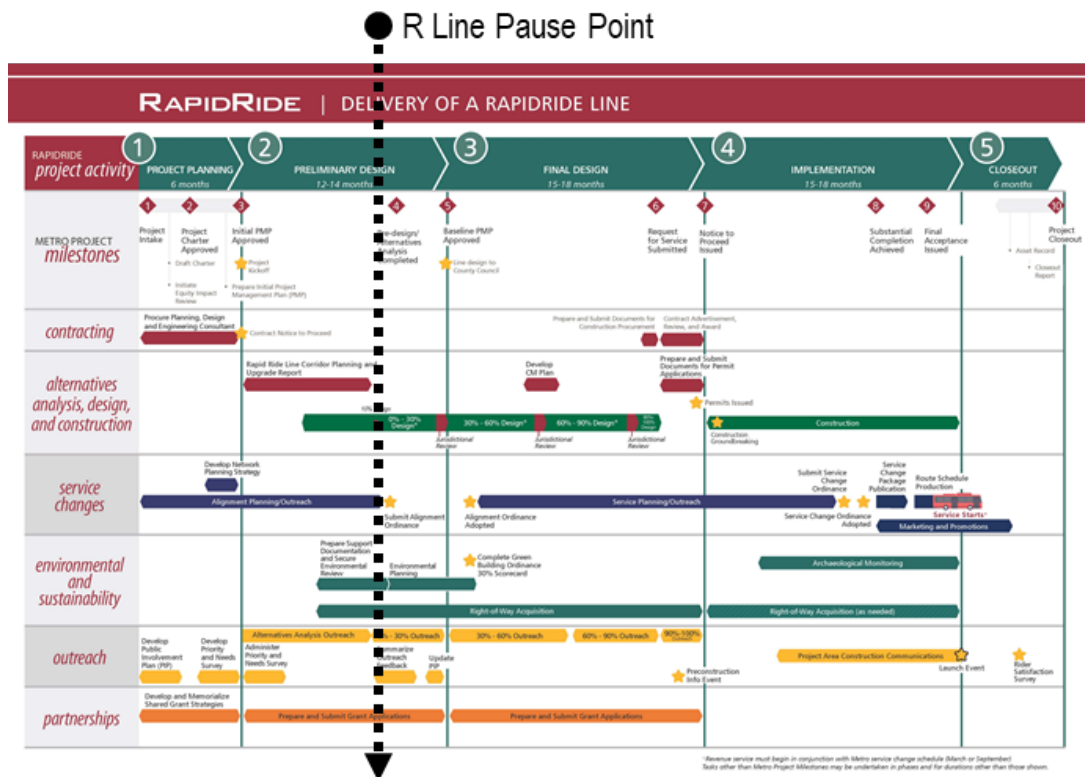
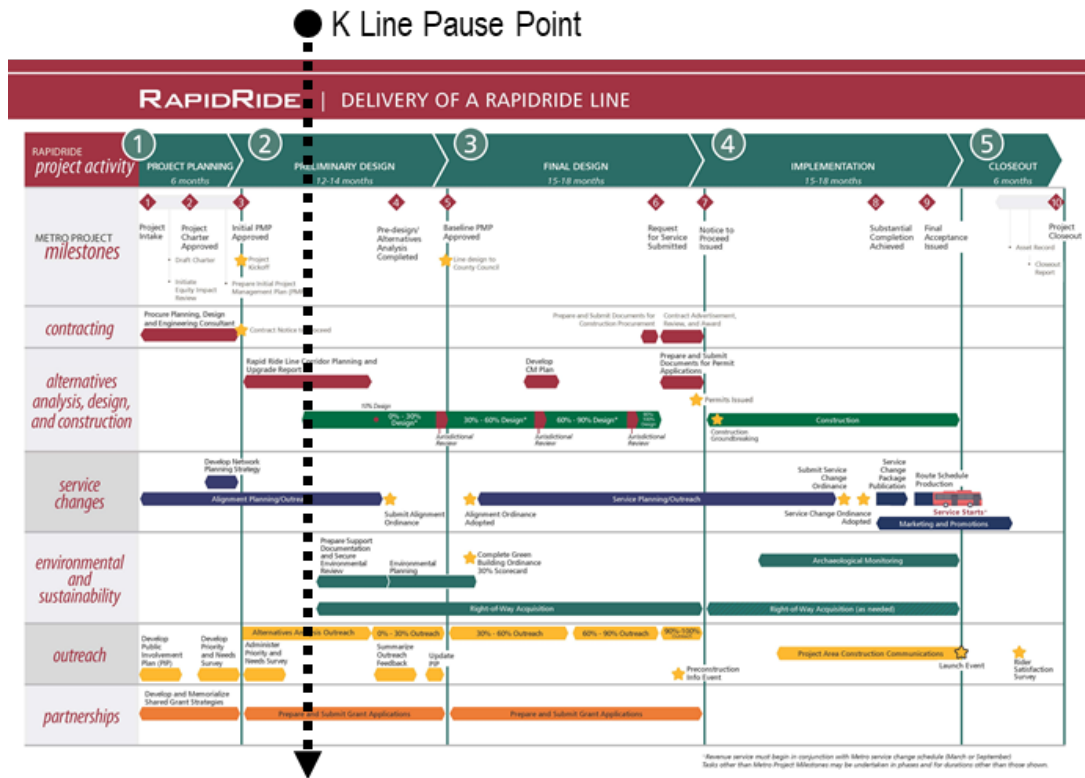
Pausing of RapidRide K and R Lines

The RapidRide R Line was paused at approximately the 10 percent design project milestone. This was chosen as the RapidRide R Line team was approximately 2-3 months away from the 10 percent design project milestone when it became evident that Metro's 2021-2022 capital improvement plan would be reduced by approximately 40 percent of its previous 10-year value due to revenue loss caused by the Covid-19 global pandemic. The K Line project was not approaching any of the project's defined milestones. It was set to increase monthly project expenses as the project team worked to produce the K Line's Corridor Planning and Upgrade Report. As such, the K Line was paused, and expenses were halted.

Pausing was used to control expenses and preserve the ability to resume the RapidRide K and R Lines. Figure 2 below visually depicts where each project was paused in relation to the RapidRide roadmap template depicted in Figure 1.

When a project is paused, staff working on the effort are reassigned to work on other projects. The pause is also communicated to local jurisdictional partners, who then reassign any local jurisdictional staff to other duties. These pauses were also communicated through Metro's senior leadership and government relations staff to the appropriate executive and legislative officials and staff members. This occurred for both the K and R Lines. However, to ensure that the work could be restarted, Metro staff archived and retained all by Metro and Consultant staff work related to these projects.

Figure 2 – RapidRide K and R Line Pause Points



Transit Proviso P1, Section B.1: 2021-2022 Programmatic Efforts

This section details current efforts to advance implementation planning of the RapidRide R and K Lines through the 2021-2022 biennium, including staffing, design, planning, engagement, and preparations for the 2023-2024 biennial budget.

Project Delivery Planning - Metro, via the Metro Connects update, is in the process of completing a RapidRide Prioritization Plan. The process began in 2022 and includes identifying the specific RapidRide lines to be developed as part of the Metro Connects interim network. This plan will identify the K and R Lines as agency priorities and show them as the next new RapidRide lines to be implemented. The RapidRide Prioritization Plan will consider the remainder of the RapidRide candidate corridors in the interim network. The plan will organize RapidRide candidate corridors into tiers by their priority. The top tier RapidRide candidate corridors will include those planned to be implemented for the interim network and the second tier will be the lines next to be developed if funded. This prioritization plan will include feasible implementation timelines for the top tier corridors and identify the funding necessary to achieve the developed timelines. These timelines and funding plans will include strategies for the K and R Lines.

Staffing Implications - With the adoption of Ordinance 19364 in 2021, three positions were restored for Metro to continue work on the K and R Lines. These positions include a planning lead and key project delivery staff to support the technical and project management work of the R and K Lines. Hiring for these positions is anticipated to occur in 2022 and will be done according to Metro's hiring priorities. Until these new staff members are hired, the RapidRide program staff will continue to advance Transit Proviso P1 and efforts on the K and R Lines.

Budgetary Planning - Additionally, this prioritization plan will be used as a resource to account for new RapidRide operating costs within Metro's operating planning and budgeting process. RapidRide lines are both a major capital cost and, for certain lines, a major new operating expense. The prioritization plan will be used in developing the future operating budgets based on revised revenue forecasts so new lines can be accounted for within the operating budget. Metro has begun preparing its 2023-2024 capital budget and developing its project and budget requirements for the Executive's consideration. The work completed as part of this report and continued planning efforts for the K Line and previous effort for the R line will be used as part of this budget proposal development. The subsection below further details budgetary planning and budgetary related activities.

Transit Proviso P1, Section B.2: 2021-2022 K Line Efforts

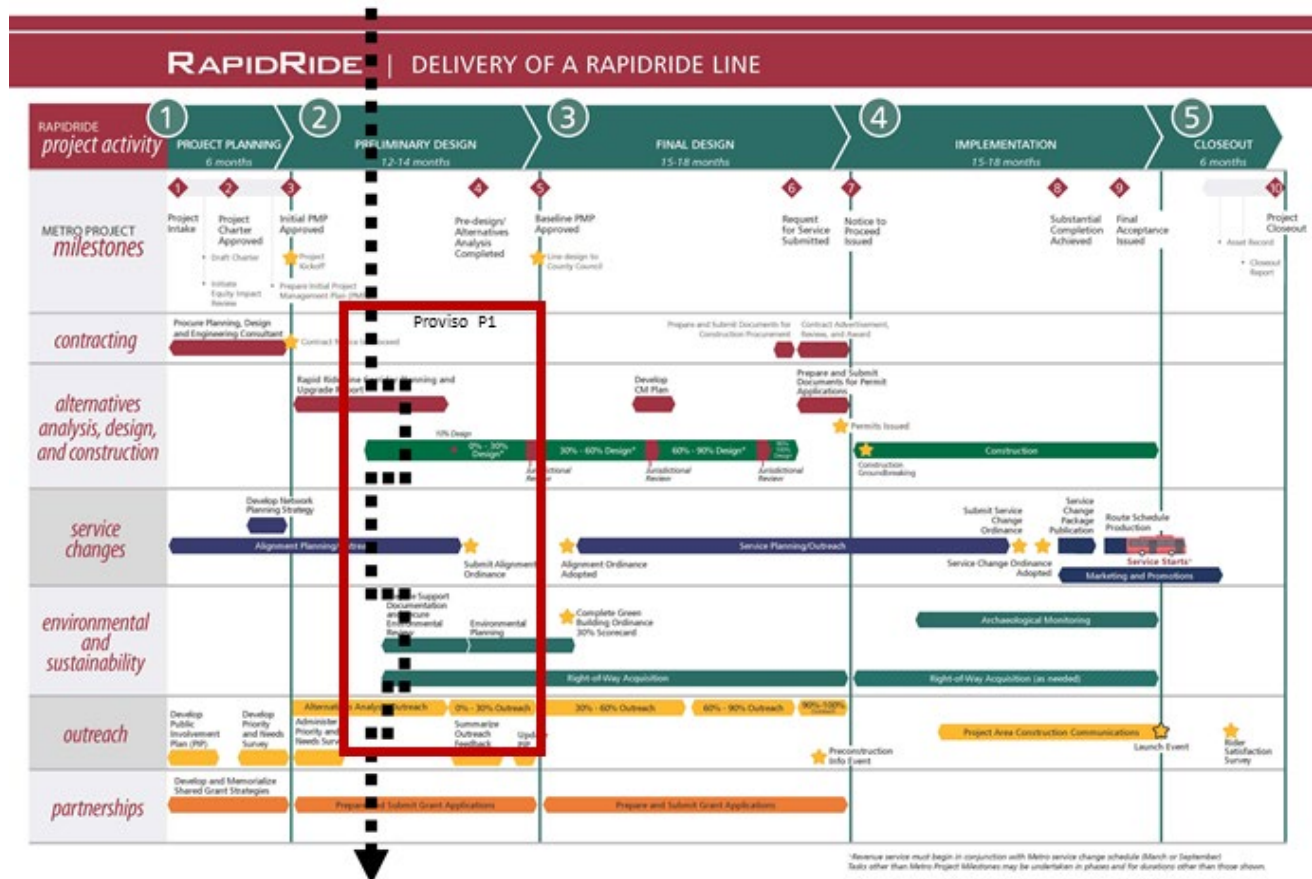
This section details work completed and planned during the 2021-2022 biennium to advance project design for the RapidRide K Line and preparations for the 2023-2024 biennial budget.

At the time of the budget realignment during summer 2020, the RapidRide K Line was in the preliminary design phase. Figure 2 documents where the K Line was paused at the time of 2021-2022 biennial budget adoption.

Metro resumed the planning efforts for the K Line at the beginning of 2021. Prior to the project pause, Metro worked with the cities of Bellevue and Kirkland and with the eastside community to establish a preferred route alignment. The preferred route alignment is a mutually agreed upon route along City of Kirkland and Bellevue streets from the proposed terminuses at Eastlake Park and Ride and Totem Lake

Transit Center. To reach this stage, the project team identified key roadway, intelligent transportation system (ITS) elements, station locations, and bike/pedestrian improvements. This included an initial concurrence from the jurisdictional partners that the proposed improvements and route alignment were appropriate to advance into the succeeding efforts for the K Line. Pre-pause, this work was planned to culminate in a 10 percent conceptual design milestone and a K Line Corridor Planning and Upgrade Report, which is standard at this stage. With funds allocated in Ordinance 19210, Metro performed an additional \$600,000 of technical work in 2021 to advance key areas of planning to further the K Line project. Figure 3 shows how K Line work was advanced with the funding. From Figure 2, the vertical dashed line indicates where the project was paused throughout the RapidRide roadmap figure. In Figure 3, the vertical dashed line shows advancement in several areas. Areas that were not advanced rely on the project's full funding being restored to advance the efforts in conjunction with the federal NEPA process.

Figure 3 – RapidRide K Line 2021-2022 Progress (Transit Proviso P1)



As shown in Figure 3, during 2021 Metro advanced project elements in the alternatives analysis and design portion of the work. These efforts included identifying key improvements along the corridor and conducting initial assessments regarding if the improvement can be implemented in agreement with the local jurisdiction's code and regulations. Improvements identified at this stage of the work are those that have been found to provide a valuable benefit to the future K Line. Benefits include the ability for a proposed improvement to reduce congestion and improve travel speeds for transit and increase

ridership by effectively locating future RapidRide station areas and reducing physical barriers for riders to reach the RapidRide stations. Metro is continuing this work in 2022 and is currently working through procurement for additional technical analysis on these identified improvements. This additional technical work, which is scheduled to start in May 2022, will further refine the conceptual design for a select number of the identified improvements. Improvements selected for this additional work in 2022 were those improvements that present more challenging technical questions around how best to implement them. An example of this furthering of work would be the plan to expand and further assess options for K Line integration at the South Kirkland Park and Ride and Totem Lake Transit Center. Section V.B of this document discusses this effort in more detail.

Transit Proviso P1, Section B.3: 2021-2022 R Line Efforts

This section details work completed and planned during the 2021-2022 biennium to advance project design for the RapidRide R Line and preparations for the 2023-2024 biennial budget.

Work on the RapidRide R Line during 2021 and into 2022 was limited to jurisdictional coordination with SDOT to continue to advocate for the R Line and to determine if a future project partnership is feasible with SDOT. This future project partnership could range from co-delivery of some or all physical improvement to a funding partnership like other RapidRide projects within the City of Seattle. Additionally, RapidRide program staff have also participated in internal Metro coordination for other Metro projects that may impact the future R Line or that the R Line could provide benefit to in the future.

At the time of the budget realignment, the RapidRide R Line was in the preliminary design phase. Metro was able to complete a near-final draft of the RapidRide R Line Corridor Planning and Upgrade Report in October 2020 (Appendix B). This planning document summarizes the major capital improvements identified during the pre-design analysis. These improvements address transit speed and reliability, passenger facilities, transit communications and technology, and pedestrian and bike access to transit. The RapidRide R Line Corridor Planning and Upgrade Report is shown in Appendix B. Once funding is restored to the RapidRide R Line, Metro is ready to advance the project into a NEPA environmental clearance process. Completing additional technical work prior to advancing into NEPA is not recommended at this time.

Transit Proviso P1, Section B.4: Funding

This section details the process, timing, and efforts to secure grant or partner funding for capital improvements or operational costs for the deferred lines.

Historically, RapidRide project capital funding has been achieved through a combination of local, state, and federal grant programs, partner agency funds, and County funds. Both the K and R RapidRide Lines were expected to be funded in a similar fashion. As discussed previously, the fastest and lowest cost project delivery approach requires securement of local (King County) funding and accounting for the entire project life cycle cost within Metro's operating and capital budgets and capital improvement plan. Metro has had some preliminary discussions with jurisdictions served by these potential two new RapidRide lines; however, Metro has not yet applied for grant funding because the capital costs associated with the new lines have not appropriated in the capital budget or capital improvement plan and the ongoing service costs have not been included in operational financial planning.

In addition to grant funds, Metro continues to seek out jurisdictional partnerships. Historically, the City of Seattle has been a consistent funding and delivery partner for the capital roadway and frontage improvements along RapidRide routes within Seattle. Metro continues to discuss and advocate for an opportunity to use that partnership model for the RapidRide R Line. However, without an appropriated budget in Metro's CIP, those discussions are conceptual in nature. Additionally, Metro continues to look for partnering opportunities along the K Line. Most recently this has included supporting the City of Kirkland's efforts to secure grants to make improvements which would benefit the K Line or K Line-adjacent transit services.

In 2021 and 2022 Metro worked to assess the RapidRide K and R Lines costs and funding plans given the changes that have occurred during the pandemic. Two primary activities were carried out: monitoring of construction cost trends and their potential impacts to K and R Line costs and evaluation of the K and R Line continued competitiveness for Small Starts funding.

Cost Estimate Maintenance and Budget Preparedness

During 2021 and 2022 Metro has been monitoring construction cost factors as they relate to the RapidRide program. With four current RapidRide lines in design or construction, Metro has access to the cost data and cost estimates for the G, H, I and J lines. From those projects, Metro understands that the construction market is going through a period of inflation. As Metro works to develop its budget submittals for the 2023-2024 biennial budget, price and inflation trends are being incorporated into those submittals to provide the best possible early cost estimates. This is critical as the R Line's cost estimate was developed prior to the pandemic and any new cost estimates need to account for the inflation that occurred in 2021 and will occur in 2022. The K Line's cost estimate was revised in 2021 as part of the technical work completed in 2021 and accounted for inflation during 2020 and 2021. The RapidRide R Line has an assumed cost of \$90 to \$100M in pre-Covid 2020 dollars; the RapidRide K Line estimated cost was \$80 to \$103M in 2021 dollars. As inflation is a major factor and is a compounding cost increase year over year, understanding the continued validity of these estimates and how to adjust them for budget submittals is crucial. Establishing cost forecasts and associated budget proposals becomes highly sensitive based on the planned year of opening for any future RapidRide Line.

Small Starts Grant Competitiveness

Metro has historically planned that approximately 45 percent of capital costs for the RapidRide expansion program need to be funded via local King County revenue. The remaining 55 percent of project costs would be funded through external funding sources such as a combination of federal and state grants and local funding sources. As previously noted, the primary source of grant revenue is FTA's Small Starts grant program. Metro currently assumes that competitive Small Starts projects can receive 50 percent or more of an individual project's cost via a federal Small Starts grant.

During 2021 and 2022 Metro has been monitoring the K and R Line's competitiveness for FTA's Small Starts grants. Small Starts grant competitiveness is heavily influenced by a project's ability to demonstrate that it will generate new ridership. For the R Line, the existing transit route and the adjacent land uses create a situation where the route is highly competitive for a Small Starts grant. Even with depressed ridership in the near/mid-term, the R Line will remain highly competitive for Small Starts funding due to the population density along the route. At present the Route 7, which the R Line would upgrade to a RapidRide route, has the second highest daily ridership within our system behind only the RapidRide E Line.

Without further ridership recovery, the K Line could be less competitive for FTA Small Starts grant funding under current FTA guidelines. The K Line is in an area of the County that is experiencing a more substantial short/mid-term shift in transportation demand and mode choice. With the increase in the prevalence of work from home and telecommuting, ridership has dropped more in the Bellevue and Kirkland area compared to other parts of the County (e.g., Southeast Seattle and South King County). Due to the sudden onset of these changes, it will be years before the region fully understands the long-term implications for travel patterns within King County. Prior to the pandemic, the K Line would have been a competitive Small Starts project. Today and into the future, the K Line's overall competitiveness for Small Starts funding is likely dependent on transit ridership recovery. However, if transit ridership stagnates or depresses further for the eastside cities, the K Line's competitiveness may be marginal and will need to be further evaluated as new trip patterns emerge and FTA guidance is updated. In 2022 as part of the additional technical work being performed, the K Line's competitiveness for Small Starts will be broadly assessed using a variety of transit ridership recovery scenarios.

Ultimately, receiving Small Starts grant funding is not a requirement to implement a RapidRide line. The H Line was implemented without a Small Starts grant. However, there are no other known or anticipated grant sources that could match the value of a Small Starts grant. If, in the future, a planned RapidRide line is determined to not be competitive for a Small Starts grant, then the County would have to determine if it should increase its local funding to account for a loss in planned federal funding or reduce project scope.

Transit Proviso P1, Section B.5: Potential 2023 – 2024 Biennium Partner and Community Engagement Efforts

This section addresses partner and community engagement. The deferred RapidRide lines included community engagement throughout the planning and design work completed to pause date. In coordination with the funding of the K and R Lines as described above, partner and community engagement efforts will be resumed. Outreach will also be performed as part of the RapidRide Prioritization Plan; some of that effort may extend into the 2023-2024 biennium and may involve the K and R Lines.

For the work performed on the K Line, partner and community engagement were aligned with the ability for the project to receive meaningful feedback. For the work completed under Proviso P1, this involved jurisdictional coordination and minimal outreach to potentially impacted businesses/properties and local community-based organizations. Additionally, the work prepared as part of Proviso P1 was made available to the Metro team working on additional efforts impacting the east side communities. This includes ST2/ST3 integration and the planned East Link Connections bus service restructure tied to East Link Light Rail⁷.

Metro's engagement activities in 2023-2024 are dependent upon resource prioritization and allocation actions that will be part of the 2023-2024 biennial budget development and adoption process. If funding is allocated to the projects, the community engagement plans previously developed for the K and R Lines will be resumed. If resumption of K Line project activities occurs in 2023, the project team will perform community engagement around the project's technical work, conceptual designs and required NEPA outreach. That work will take approximately 16 months and begin in approximately May of 2023. Once NEPA is secured, the outreach team will continue to final design (30%-100% design) outreach activities through the remainder of 2024 and into 2025. If resumption of R Line project activities occurs

in 2023, the project team will perform community engagement for the project's required NEPA outreach. That work will take approximately 10 months and could begin in May of 2023. Once NEPA is secured, the outreach team will continue to final design (30%-100% design) outreach activities through the remainder of 2024 and into 2025. RapidRide community engagement follows Metro's standard approach to inclusively connect with riders, non-riders, community-based organization, adjacent property owners and businesses and other key stakeholders who are potentially impacted by the future RapidRide line.

Transit Proviso P1, Section B.6: Potential 2023-2024 Biennium Alignment and Capital Planning Efforts

This section addresses ongoing alignment and capital planning efforts for the deferred lines. As detailed earlier, further project level activities for the K and R Lines would be resumed once the K and R Lines are incorporated into Metro's capital improvement plan. As part of the upcoming biennial budget development process, Metro will evaluate current and forecasted revenues, prioritize resource needs consistent with the Fund Management Policies for Public Transportation^{8,9} and develop a proposed 2023-2024 operating and capital budget as well as a 6-year capital improvement plan. This plan will be reviewed by the Executive Office for consistency with Executive priorities, and then an executive proposed budget will be transmitted for Council review. Should funding be established for K and R Lines in the 2023-2024 biennial budget and capital improvement plan, additional planning and design efforts will be conducted consistent with the project timelines established in the 6-year capital improvement plan and the RapidRide Roadmap presented earlier in this document.

If funding of the K and R Lines is not resumed as part of the 2023-2024 biennial budget, then no further efforts would be undertaken until the 2025-2026 biennial budget process in 2024 for these projects.

Transit Proviso P1, Section B.7: Implementation Timeline

This section addresses a timeline for implementation for the deferred lines. The RapidRide R and K Lines have been identified as being the next two lines to be implemented as part of the interim network. However, as noted above, additional planning and design work and development of an implementation timeline is dependent upon these lines being included in the 2023-2024 biennial budget 6-year capital improvement plan. If identified in the capital improvement plan, the implementation timeline would be consistent with that shown in the RapidRide Roadmap figures presented earlier in this report in conjunction with the timing for project resumption in the capital improvement plan. Decisions on priorities and timing of operating expenses and capital projects will be made as described above as part of the 2023-2024 biennial budget process.

B. Transit Proviso P1, Section C: RapidRide K Line Operational and Planning Efforts

This section addresses RapidRide K Line operational and planning efforts, which were less advanced than the RapidRide R Line when deferred. To ensure that preparations for the RapidRide K Line continue to progress so that the K and R Lines can move forward when funding is available, this section summarizes additional operational analysis and planning efforts that have been completed related to the RapidRide K Line. This planning effort has culminated in a RapidRide K Line Roadmap Report, shown in Appendix A.

Transit Proviso P1, Section C.1: Key Candidate Projects

This section is in response to Transit Proviso P1 Section C.1, detailing priority projects for the success of the RapidRide K Line. Figures 4-7 show key candidate projects which have been identified as part of the RapidRide K Line Roadmap Report. The RapidRide K Line Roadmap Report includes technical details around how these projects were identified and the analysis that led to them being included as key candidate improvements for the future success of the RapidRide K Line. These candidate projects serve as initial recommendations. Further coordination with the cities of Bellevue and Kirkland, WSDOT, Sound Transit, and Bellevue College is needed to advance planning assumptions and implementation for these candidate projects.

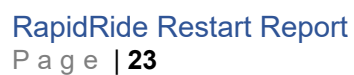
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Figure 5 – RapidRide K Line Candidate Improvement Segment B

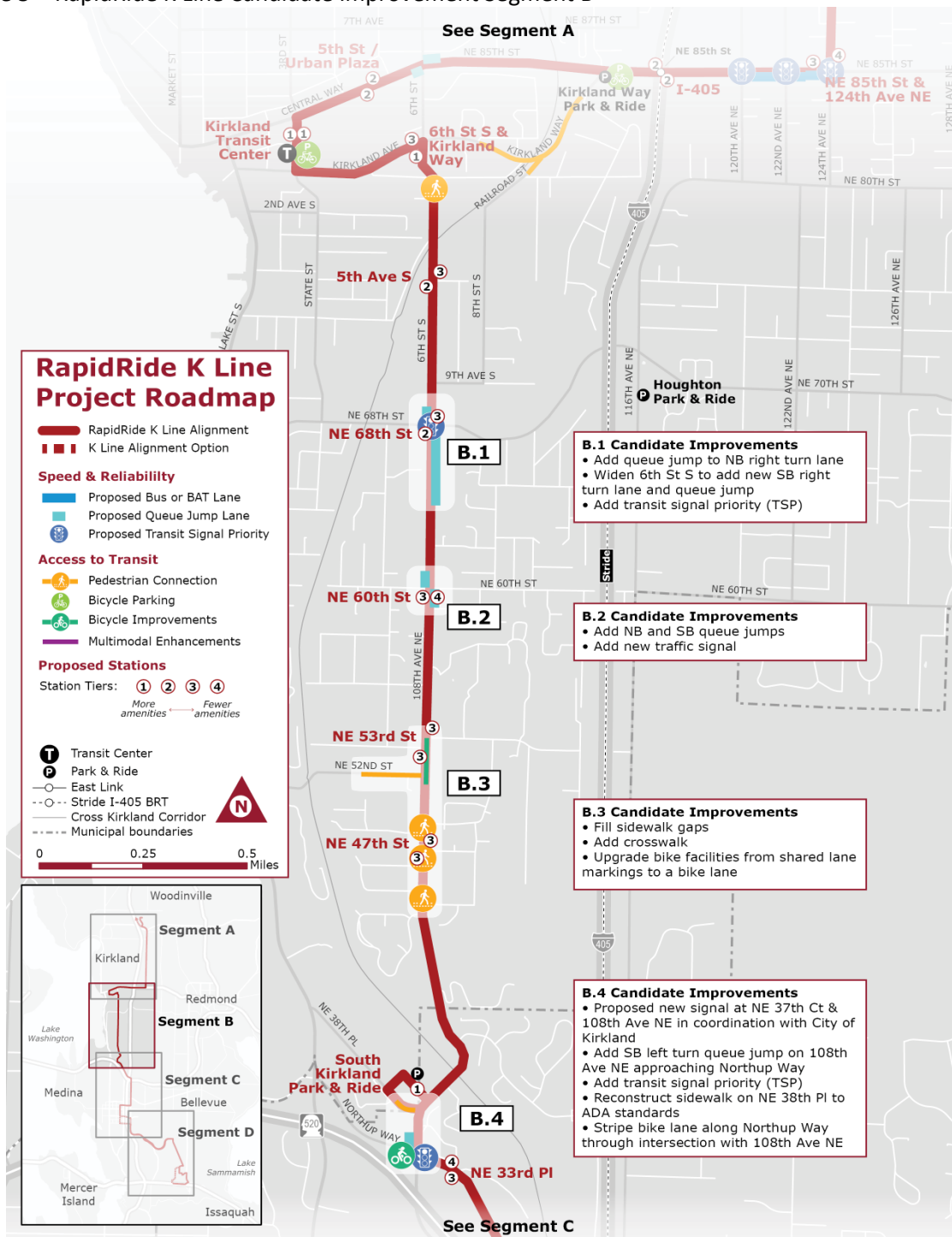


Figure 6 – RapidRide K Line Candidate Improvement Segment C

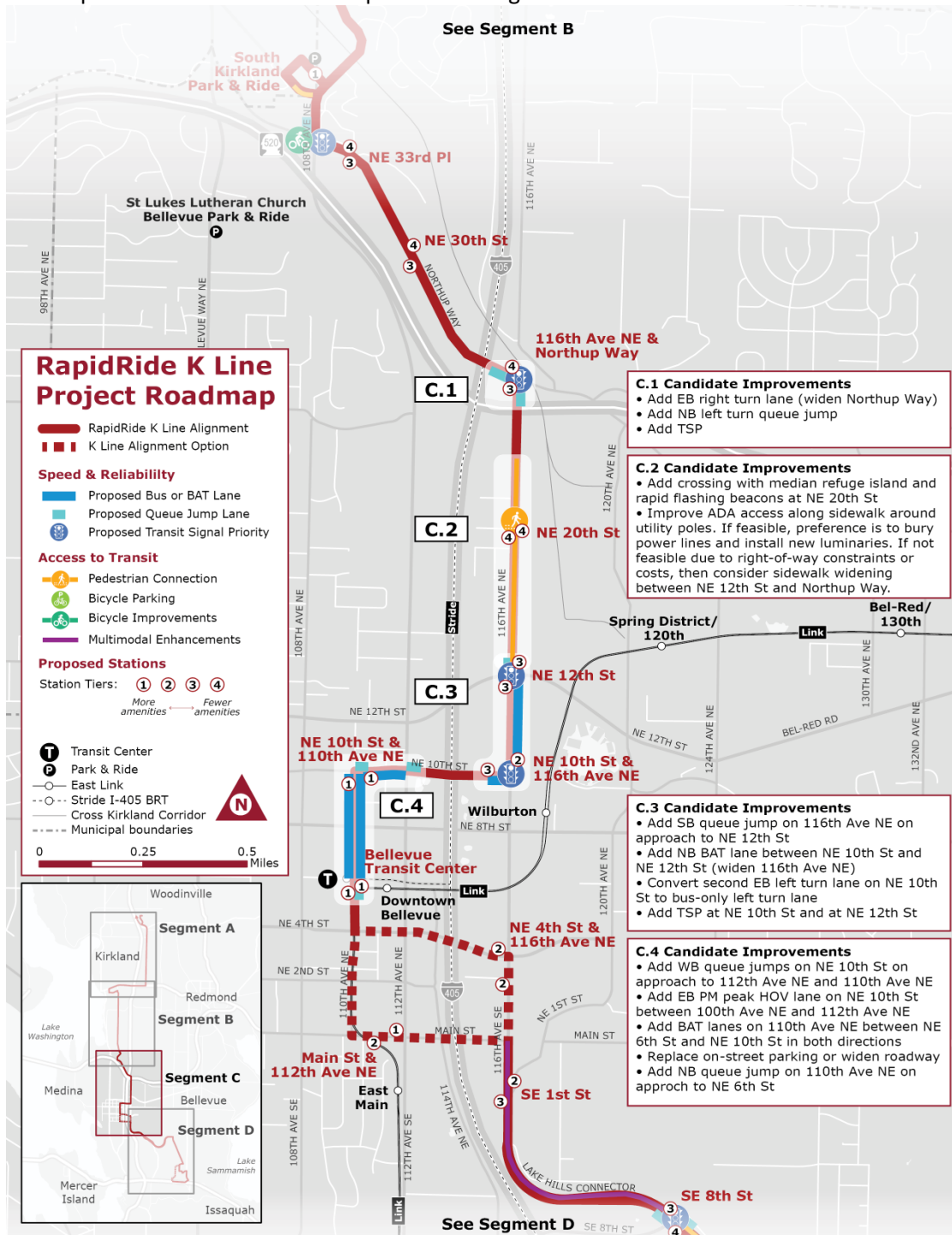
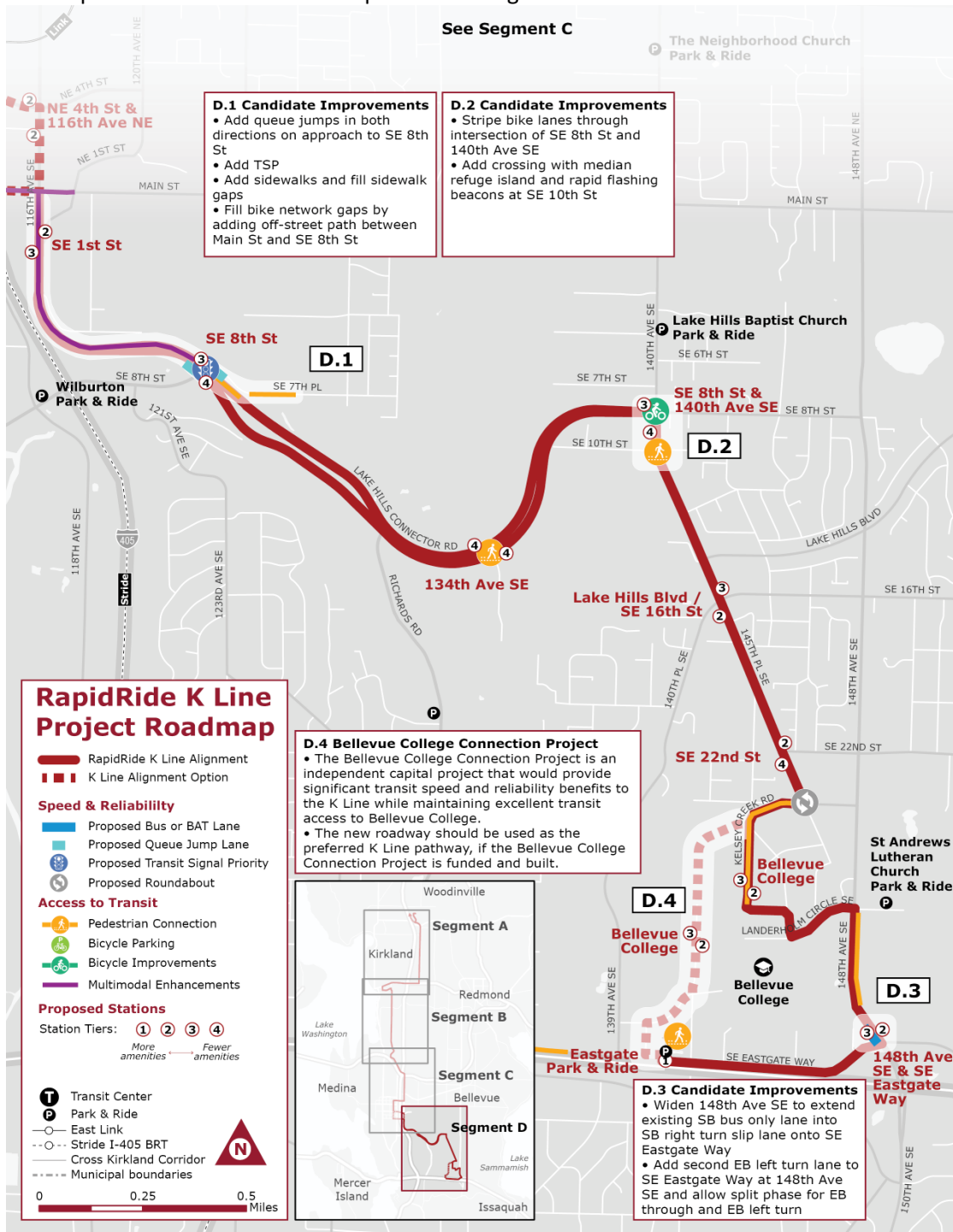


Figure 7 – RapidRide K Line Candidate Improvement Segment D



Transit Proviso P1, Section C.2: Sound Transit Integration

This section addresses the status of coordination between Metro and Sound Transit.

The RapidRide K Line will serve as a key component of an integrated transit network with Sound Transit's East Link light rail and I-405 bus rapid transit (STride BRT). Figure 8 shows these key integration points. Metro, working with partners at Sound Transit, WSDOT, and the cities of Bellevue and Kirkland, is ensuring these key transfer points focus on rider needs in achieving a seamless transfer environment between these high-capacity services through east King County.

Metro has two established forums for integration with Sound Transit regarding East Link and STride. During 2021 and 2022 Metro has met with Sound Transit approximately 60 times as an East Link / Metro integration team. These conversations cover any topics related to bus/rail integration between the two agencies. The K Line is discussed in these forums when necessary to ensure future system compatibility. In addition to the East Link meeting series, Metro also participates in a series of meetings tied to I-405 STride projects (I-405 North BRT and I-405 South BRT). As part of this meeting series, Metro and Sound Transit have met approximately 50 times since the beginning of 2021. Approximately 10 of these meetings have been specifically regarding the future NE 85th Station and interchange improvements. These improvements at the NE 85th interchange are the future site of the primary transfer location between the future K Line and I-405 North BRT. Both of these forums will continue to meet regularly through 2022.

Transit Proviso P1, Section C.3: Completed 2021-2022 K Line Efforts

This section details work completed during the 2021-2022 biennium to advance project design for the RapidRide K Line.

At the time of the budget realignment, the RapidRide K Line was in alignment setting and preliminary design. Figure 2 documents where the K Line was paused at the time of 2021-2022 biennial budget adoption. At the time of pausing, the K Line work was at the point of developing a project list of transit improvement that would improve transit speed and reliability and reduce physical barriers for pedestrians and cyclists to reach K Line station areas. Additionally, work was being performed to identify the preferred station locations along the future route.

Metro resumed the planning efforts for the K Line at the beginning of 2021. In 2019, prior to the project pause, Metro worked with the cities of Bellevue and Kirkland and the community to establish a preferred alignment. To reach this stage, the project team was working through identification of key roadway, intelligent transportation system (ITS) elements, station locations, and access projects. This pre-pause work was to culminate in a 10 percent conceptual design and K Line Corridor Planning and Upgrade Report. With Transit Proviso P1, Metro furthered the K Line project by investing an additional \$600,000 to advance key areas of planning that were paused. This work is documented in the RapidRide K Line Roadmap Report, Appendix A to this report. The below list summarizes the key areas of advancement which occurred as part of the work completed in 2021.

1. Potential next steps for K Line implementation
2. Transit speed and reliability investments within the proposed K Line corridor
3. Transit center operational recommendations
4. Future K line station locations

5. Access to transit investments to connect riders to future K Line stations
6. Communication system investments and local agency system modifications

At the end of 2021, work on the K Line was at the 2-5 percent conceptual design range. This 2-5 percent design range is based on how technically complex an activity was to complete. In general, improvements which are more technically challenging to implement are at the lower end of that range.

Transit Proviso P1, Section C.4: Planned 2022 K Line Efforts

This section details anticipated work during 2022 to advance RapidRide K Line improvements.

Metro will continue to advance key elements of the RapidRide K Line as identified in the RapidRide K Line Roadmap Report, Appendix A to this report (key elements summarized above). Candidate projects identified in the Roadmap report require further vetting with the cities of Bellevue and Kirkland, WSDOT, and Sound Transit. Metro will continue to assess funding and partnership opportunities including FTA Small Starts competitiveness.

Metro is in the process of completing a procurement for an additional \$400,000 of technical work planned to start in May of 2022. In general, this additional work will focus on proposed improvements that are more technically challenging to implement. The goal is for these technically challenging improvements to continue to advance towards 5 percent design. A key area of focus for this work will be advancing the technical design for the specific routing and integration of the route at the Totem Lake Transit Center, South Kirkland Park and Ride and Bellevue Transit Center. This work will also allow further advancement of siting preferred RapidRide station areas adjacent to these transit centers.

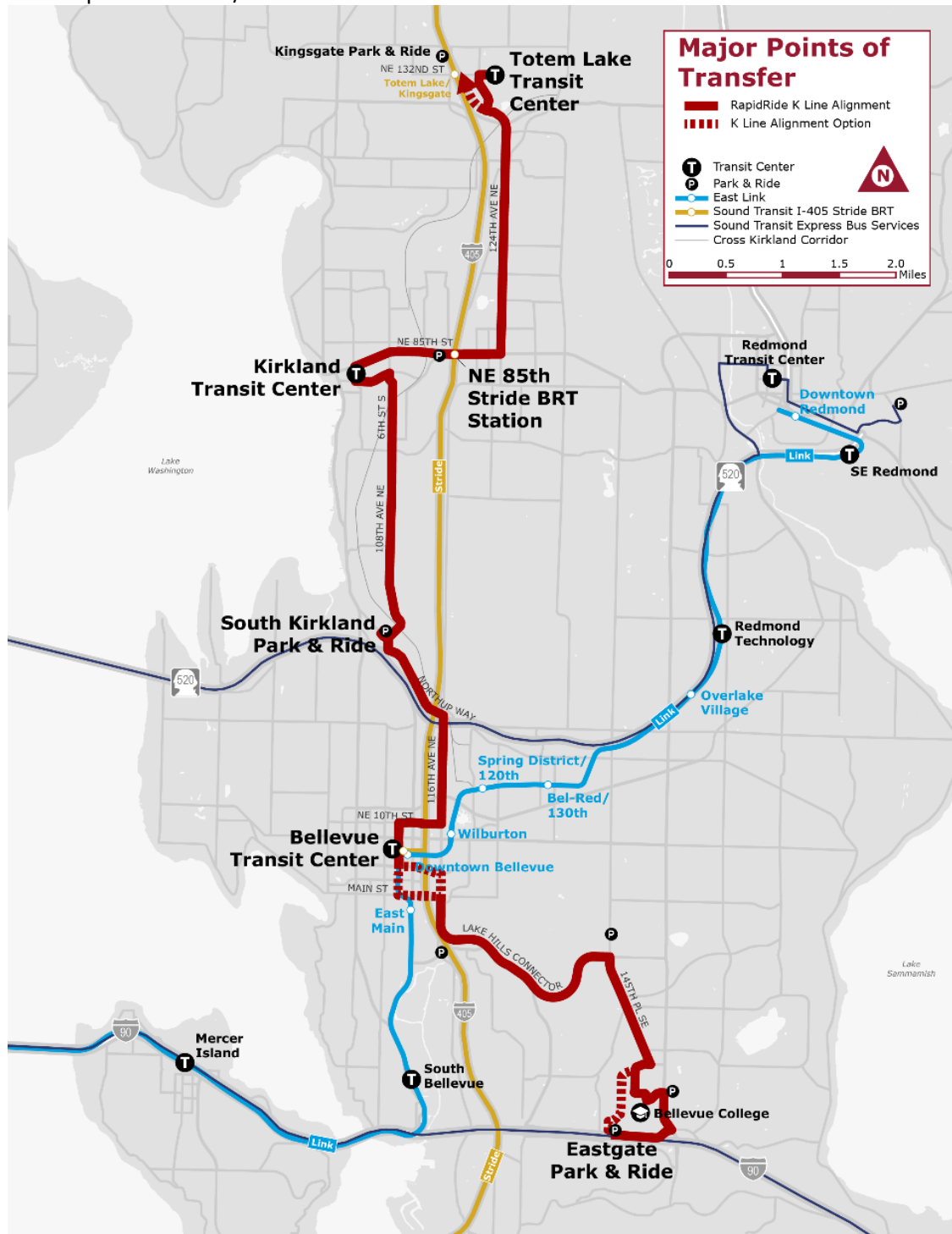
Transit Proviso P1, Section C.5: Project Implementation Costs

This section details anticipated budget needs for the RapidRide K Line.

Metro has developed standards for implementation of new RapidRide lines. These standards discuss minimum and desired requirements for the success of a project, ranging from branding to station amenities to service levels. These requirements guide the planning assumptions to date for the RapidRide K Line. Candidate projects identified in the RapidRide K Line Roadmap Report require further vetting with local jurisdictions and additional design work to understand implementation costs more accurately. However, at the current level of project planning, the Roadmap report shows estimated implementation costs of \$80-\$103M that identifies and includes those candidate improvements for the project to achieve the preferred performance goals of the RapidRide program. Further vetting of specific candidate project costs can better inform Metro of the relationship between level of investment, fundability, and overall project benefits.

Of that estimated \$80-\$103M, approximately \$3-\$5M would be required to complete the remaining technical work to reach 10 percent design and to prepare the needed environmental documentation. This is in addition to the \$2.5M that is forecasted to be spent by the close of 2022. However, submission of the environmental documentation to FTA for formal NEPA evaluation is not recommended prior to applying for the K Line's Small Start Grant, which is in turn contingent on the K Line's full project cost being appropriated within Metro's capital improvement plan. Next steps would be to go through the 2023-2024 budget process to understand resource needs and to prioritize needs within Metro's capital improvement plan. Costs and next steps would be identified in the proposed budget.

Figure 8 – RapidRide K Line / Sound Transit Transfer Points



VI. Next Actions

The 2021 update to Metro Connects moved to an approach of identifying and implementing future RapidRide lines through the establishment of a pool of candidate lines for the interim and 2050 RapidRide networks. Metro will develop a prioritization plan to select the specific RapidRide lines for the interim network, which will be informed by updated corridor analyses, partner engagement, and corridor studies. This approach will allow Metro to make decisions about RapidRide that are more informed by timely data and community input. The network is planned to include 10 RapidRide lines in 2025, 13 to 15 lines in the interim network and 19 to 23 in the 2050 network. The RapidRide J Line will be implemented in partnership with the City of Seattle in 2025, and the RapidRide R and K Lines are included in the interim network and identified as the next two lines Metro will prioritize for implementation.

Planning and operations work remains mainly paused for the RapidRide K and R Lines. The RapidRide R Line Corridor Planning Upgrade Report and the RapidRide K Line Roadmap Report discussed in this document will be used when an implementation timeline is established for these deferred lines, and they are included in the Metro CIP.

Next steps to advance the budget requests for the K and R Lines include the development of a proposed agency (Metro) budget. This budget will balance a variety of needs and agency strategic goals. This will account for potential revenue sources, expenses, and grant strategies. This agency proposal will then be taken into consideration during the Executive's budget deliberations and development of the Executive's proposed budget. The Executive's proposed budget will then be sent to the King County Council for deliberation and adoption in late 2022.

VII. Appendices

Appendix A: RapidRide K Line Roadmap Report

Appendix B: RapidRide R Line Corridor Planning and Upgrade Report

¹ King County Metro. (2021). *King County Metro Service Guidelines*. <https://kingcounty.gov/~media/depts/metro/about/planning/pdf/2021-31/2021/metro-service-guidelines-111721.pdf>

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⁴ King County. (2016). *Capital Project Management Work Group Phase 4 (CPMWG 4)*. <https://kingcounty.gov/~media/operations/policies/documents/cip85eo.ashx?la=en>

⁵ Washington State. (1971). *Washington State Environmental Policy Act*. <https://ecology.wa.gov/regulations-permits/SEPA-environmental-review>

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⁷ King County Metro. (2022). *East Link Connections*. <https://kingcounty.gov/depts/transportation/metro/programs-projects/fares-routes-and-service/east-link-connections.aspx>

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⁹ King County Metro. (2020). *Fund Management Policies for Public Transportation Fund (2020 amendment)*.
<https://mkcclegisearch.kingcounty.gov/View.ashx?M=F&ID=8874594&GUID=36B794AF-0789-4A13-B1C5-6DEBC1E2A2DF>

RAPIDRIDE

K Line Project Roadmap Report

King County Metro Transit

January 2022

King County Metro Transit

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1 Executive Summary

The K Line Roadmap Report describes King County Metro Transit's (Metro) strategy and vision for long-term implementation of Bus Rapid Transit (BRT) service for a north to south corridor within Bellevue and Kirkland. The future planned service, to be branded as RapidRide K Line, would serve as a major transit route connecting Totem Lake, Downtown Kirkland, South Kirkland Park & Ride, Downtown Bellevue, Bellevue College, and the Eastgate Park & Ride. In addition to connecting these regional and local centers, K Line implementation would also provide key transit connections to Sound Transit's Link Light Rail and BRT systems.

In 2021, Metro committed to a long-term delivery plan for the K Line project due to COVID-19 pandemic budget challenges without a defined delivery date. The K Line Roadmap Report identifies Metro's vision for the currently unfunded project, records work developed to date on the corridor that will be useful for future delivery and establishes high-value potential project elements and long-term implementation recommendations. The K Line Roadmap Report is intended to help Metro and partner agencies, such as Sound Transit and WSDOT, the Cities of Bellevue and Kirkland, and Bellevue College deliver mutually beneficial projects and provide forward compatibility for future K Line implementation.

The goals of the K Line Roadmap Report include:

- Document Metro's long-term vision for BRT service connecting Kirkland and Bellevue
- Identify forward compatibility considerations for future K Line stations, candidate speed and reliability investments, and access improvements
- Share recommendations to the Cities of Kirkland and Bellevue on potential capital investments with high value to planned and current transit service that can be delivered in coordination with Metro

This K Line Roadmap Report provides recommendations on the following:

- Potential next steps for K Line implementation
- Transit speed and reliability investments within the proposed K Line corridor
- Transit center operational recommendations
- Future K Line station locations
- Access to transit investments to connect riders to future K Line stations
- Communication system investments and local agency system modifications

The K Line Roadmap Report also highlights the work and coordination completed to date on the project, including:

- Public engagement completed prior to budget realignment in 2020
- Agency coordination, including political support for alignment selection
- High level geotechnical findings
- Topographical survey work
- Ridership projections

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2 Acronyms and Abbreviations

ADA	Americans with Disabilities Act
BAT	Business Access and Transit
BRT	Bus Rapid Transit
FTA	Federal Transit Administration
KC	King County
Metro	King County Metro Transit
K Line	RapidRide K Line
Project	RapidRide K Line
ST	Sound Transit
ROW	Right-of-Way
RRFB	Rectangular rapid flashing beacon
RTIS	Real-time information system
I-405 Stride BRT	Sound Transit I-405 Stride bus rapid transit service
TSP	Transit Signal Priority
WBS	Work Breakdown Structure
WSDOT	Washington State Department of Transportation

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3 Introduction

3.1 K Line Project Overview

Metro is planning to improve north-south transit connections between the Cities of Kirkland and Bellevue by expanding BRT service to these fast-growing communities with the addition of the K Line. The K Line corridor will traverse approximately 18 miles between Totem Lake Transit Center in Kirkland and Eastgate Park & Ride in Bellevue following portions of existing bus routes: 255, 250, 245, 239, and 271. Improvements will include an upgraded RapidRide bus fleet, stops upgraded to stations with additional passenger amenities, and increased speed and reliability delivered through transit priority projects, faster station boarding, more widely spaced stops, and signal improvements.

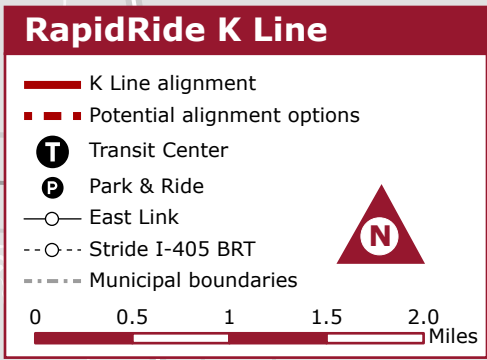
3.2 Study Corridor and Cities Served

The K Line study corridor is approximately 18 miles long and will serve two East King County cities, Kirkland and Bellevue, in a north-to-south alignment. The K Line is designed to serve multiple regional and local centers in addition to points of transfer to the regional transit system and other transportation services. The K Line will serve the downtown cores of both cities, providing excellent connections to other bus and light rail services at the Kirkland (bus-only) and Bellevue (bus and light rail) Transit Centers.

The corridor has been divided into four segments for analysis and planning purposes:

- **Segment A: Totem Lake** includes the portion of the corridor within the City of Kirkland from the Totem Lake Transit Center to Kirkland Transit Center extending to the southern end of Downtown Kirkland at Kirkland Ave and 6th St. S. This segment includes a transfer point to the future Sound Transit I-405 Stride BRT corridor at NE 85th St and I-405.
- **Segment B: Central and South Kirkland** incorporates the portion of the proposed K Line from Central to South Kirkland passing the Google Campus along 6th St. S culminating at South Kirkland Park & Ride.
- **Segment C: North and Central Bellevue** includes the section of the corridor from South Kirkland Park & Ride along Northup Way and 116th Ave NE providing service to Overlake Medical Center and continuing through north Downtown Bellevue to the Bellevue Transit Center. transfer points to the existing RapidRide B Line and to future connections to the East Link Light Rail and Sound Transit I-405 Stride BRT are proposed. The K Line alignment through downtown Bellevue has not been determined, but potential routes are currently displayed in Segment C.
- **Segment D: Eastgate** serves areas south of Downtown Bellevue and north of I-90 along Lake Hills Connector and 145th Pl SE adjacent to Bellevue College, terminating at Eastgate Park & Ride. An alternative alignment using the Bellevue College Connection Project is preferred for K Line, if funded and built.

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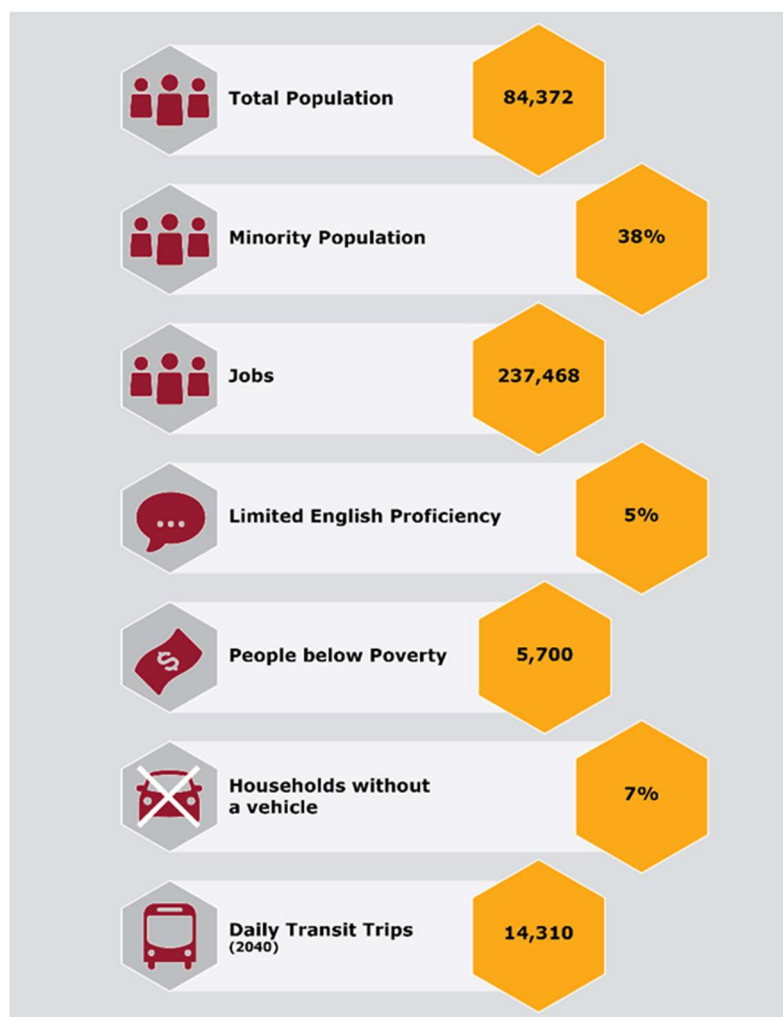
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The K Line operates primarily in a north-south direction and runs in parallel to the I-405 freeway. I-405 is a heavily congested highway corridor that acts as a regional bypass for long-haul vehicle and truck trips traveling through the Puget Sound region and a key access route for people traveling to jobs and services in East King County. Significant land use changes and job growth in Downtown Bellevue and Kirkland, and newly developing areas of Bellevue east of I-405 continue to increase travel pressures in the corridor and worsen congestion. Sound Transit is developing a highway running BRT route in the I-405 corridor, I-405 Stride BRT; the K Line will provide important connections from local neighborhoods to this high-capacity line.

Many people travel from residential neighborhoods along the corridor to jobs, education, and other services in Seattle. The I-90 and SR-520 bridges serve as the two main connections for people in vehicles and on bus transit. East Link Light Rail will use the I-90 Bridge to provide frequent rail transit to Seattle starting in 2023. As a fully grade-separated service, this will provide a highly reliable travel option and create demand for transfers from bus to light rail at Bellevue Transit Center. The K Line will serve as a reliable feeder for people connecting to the light rail system.

Figure 2 highlights key corridor context points. Values were calculated within a 10-minute walk (approximately 0.5 miles of the K Line corridor).

Figure 2 K Line Corridor Context



4 Roadmap Overview and Long-Term Delivery Next Steps

In 2021, Metro committed to a long-term delivery plan for the K Line project. The project had been removed from the Metro Capital Improvement Program in 2020 due to COVID-19 pandemic budget challenges and is currently unfunded. The K Line Roadmap Report describes Metro's strategy and vision for long-term implementation of BRT service within Bellevue and Kirkland, records work developed to date on the corridor useful for future delivery, establishes potential high-value candidate investments and provides long-term implementation recommendations.

The K Line Roadmap Report is intended to help Metro and partner agencies, such as Sound Transit and WSDOT, the Cities of Bellevue and Kirkland, and Bellevue College deliver mutually beneficial projects and provide forward compatibility for future K Line implementation.

5 Advancement Options

Advancement options for consideration by the King County Council include:

Establishment of an investment range and target delivery date for the project based on an evaluation of federal funding competitiveness

As of late 2021, federal funding opportunities appear much stronger for BRT investment and all transit programs nationwide in comparison to mid-2020 with the passage of a nationwide infrastructure spending program, known as the "Build America Act of 2021". The K Line project may be a candidate for potential federal funding. Further determination of project investment priorities, analysis of potential ridership, and more detailed capital costing will be needed to determine whether K Line is a strong candidate for FTA Capital Improvement Grant funding through the Small Starts program.

If federal funding is to be pursued, Metro should consider advocating for local agencies to delay delivery of local agency led speed and reliability improvements within the corridor. More travel time benefit captured within a federalized project helps to maximize the project's scoring under the FTA Capital Improvement Grant Program project justification criteria and improves the viability of federal funding.

Refine project scope and costs estimates by completing K Line project planning

Advancing planning and design efforts regarding the key project elements noted below would help clarify overall project scope, provide stronger confidence on project costs, and further advance this project towards delivery.

- Resolve routing decisions at the northern terminus, which may require capital investments and operational changes on NE 120th near Totem Lake
- Completing the corridor concept design phase, establishing a target range of investment, and formal identification of candidate improvements for advancement into final design
- Vetting of several proposed speed and reliability candidate improvements with local agencies with respect to implementation feasibility. Several of the higher ranking candidate speed and reliability projects propose significant operational modifications local agencies have requested more detailed discussion on.

Deliver high value transit service improvement investments early through spot improvement projects or in partnership local agency capital projects

If the King County Council does not wish to pursue federal funding for the project or wishes to deliver transit speed and reliability benefits for existing service in the corridor, this Roadmap identifies a wide range of investment options to improve current and future transit service in the study corridor.

Metro will continue to work collaboratively with local agencies to deliver investments which have long term value to the K Line program and existing transit service using the K Line Corridor.

Continue support for the Bellevue College Connection Project

The Bellevue College Connection Project is an independent capital project that would provide significant transit speed and reliable benefits to the K Line while serving Bellevue College. The project is being developed through a partnership between the City of Bellevue, Bellevue College and Metro. The project would reconstruct existing campus roadways to accommodate transit service through the heart of campus and would provide tremendous travel time benefits to the future K Line project between Bellevue and the Eastgate Park and Ride. Continued support of this project by the King County Council will likely enhance delivery options for this project.

6 Candidate Investments Options and Forward Compatibility

Candidate investments and station locations.

Based on work completed to date, Metro's K Line planning team has developed a summary of the highest value candidate speed and reliability, access to transit and communication investment opportunities in the corridor identified in the planning phase. The highest value candidate projects are presented in figures 3-6. The figures also identify potential station locations and potential type of station. Section 8 provides details on station type and proposed amenity investments



Preserve "forward compatibility" within the corridor for future transit speed and reliability and station investments

Rapid growth is expected in the project corridor over the next decade; with local agencies proposing a wide range of projects within the right of way and significant private development forecasted. Metro has developed a forward compatibility figure (Figure 7) to highlight:




- Space needs for the highest rated potential speed and reliability improvements evaluated for the corridor.
- Concept level K Line stations locations

Metro requests local agencies review and utilize these forward compatibility figures when advancing their own projects within the K Line Corridor.





RapidRide K Line Project Roadmap

-  RapidRide K Line Alignment
-  K Line Alignment Option

Speed & Reliability







-  Proposed Bus or BAT Lane
-  Proposed Queue Jump Lane
-  Proposed Transit Signal Priority

Access to Transit

-  Pedestrian Connection
-  Bicycle Parking
-  Bicycle Improvements
-  Multimodal Enhancements

Proposed Stations

Station Tiers:    
More amenities → *Fewer amenities*

-  Transit Center
-  Park & Ride
-  East Link
-  Stride I-405 BRT
-  Cross Kirkland Corridor
-  Municipal boundaries



0 0.25 0.5 Miles

A.1 Candidate Improvements

- Convert second SB left turn lane into a bus only left turn lane
- Add transit signal priority (TSP)

A.2 Candidate Improvements

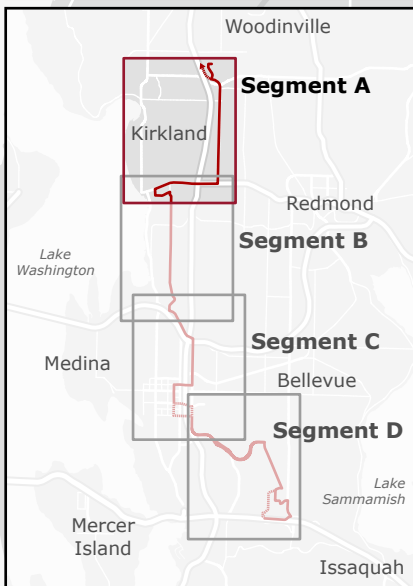
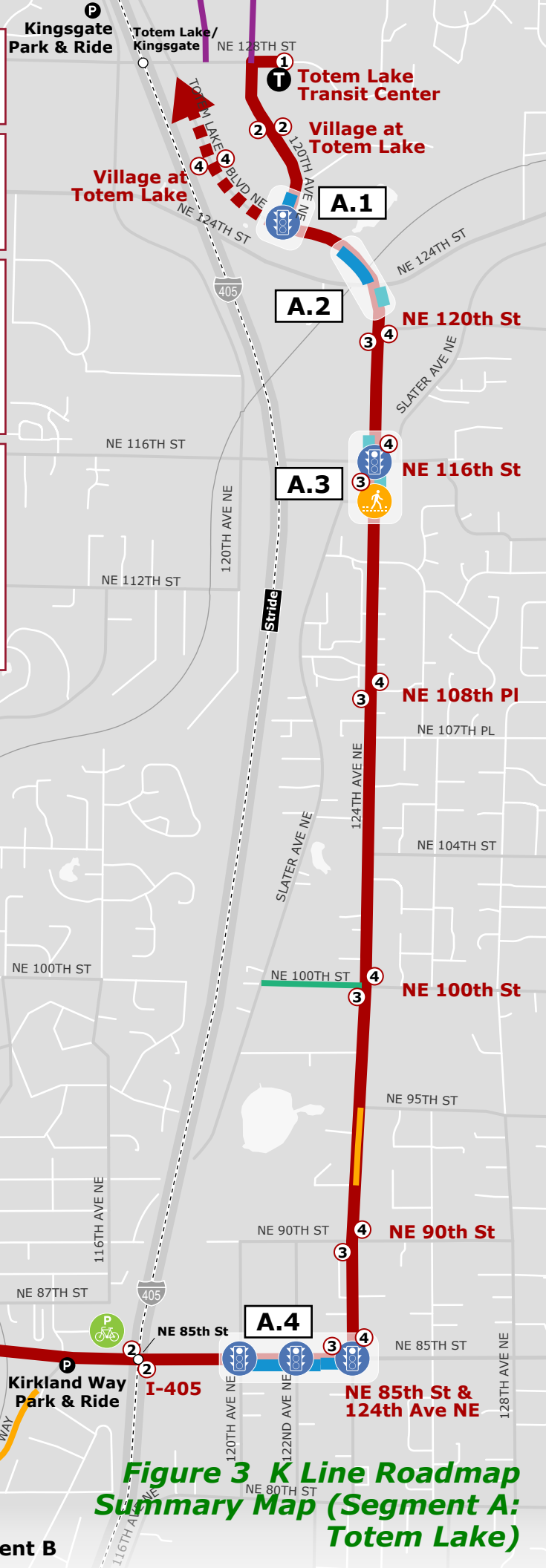
- Add SB bus only lane (widen Totem Lake Blvd NE)
- Convert NB right turn lane into NB queue jump

A.3 Candidate Improvements

- Convert SB right turn/through lane to SB right turn except bus
- Add NB queue jump (widen 124th Ave NE)
- Add transit signal priority (TSP)
- Add crossing of 124th Ave NE at Slater Ave NE

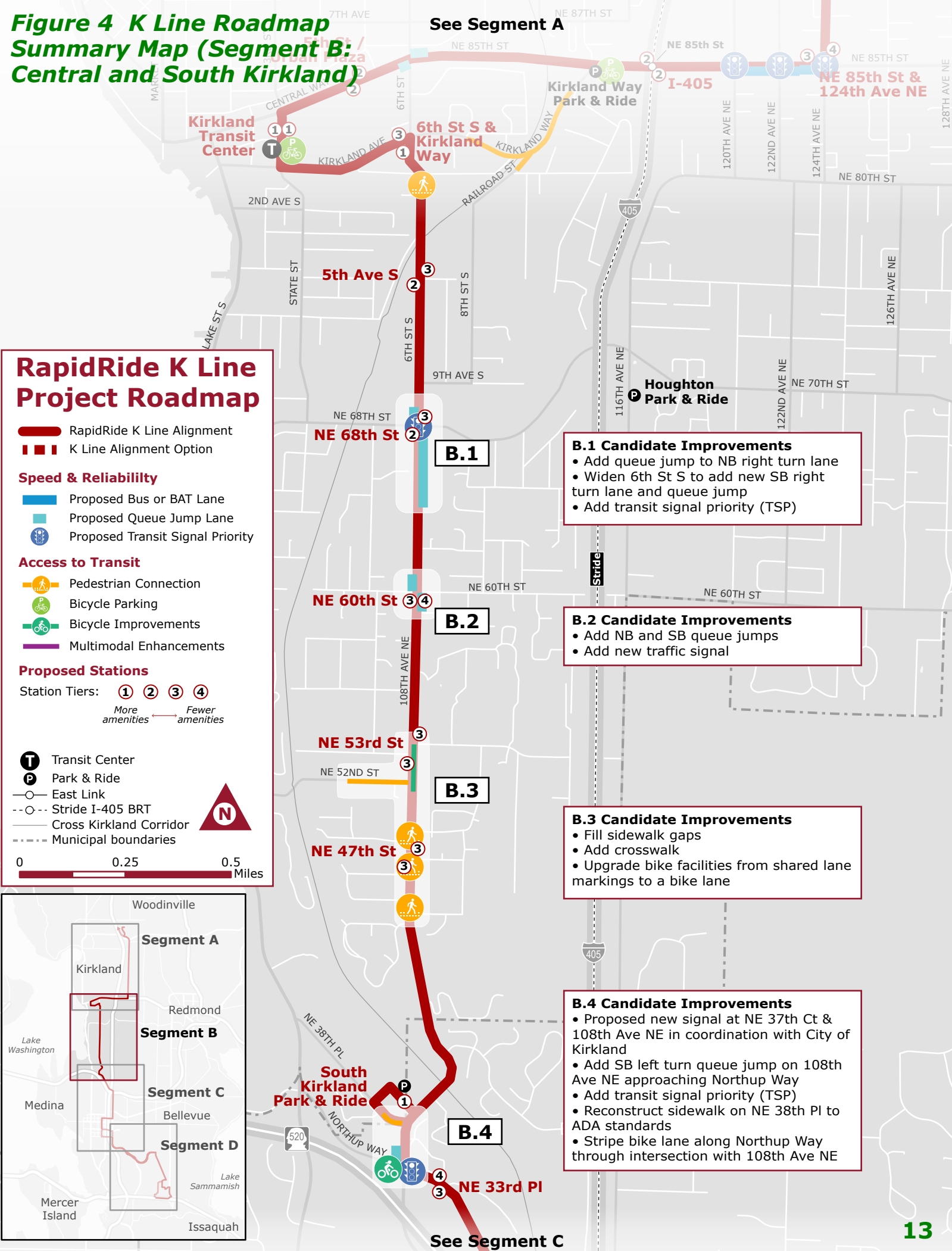
A.4 Candidate Improvements

- Convert second EB left turn lane to bus only left turn lane at 124th Ave NE
- Add EB BAT lane in coordination with planned roadway widening as part of I-405/NE 85th St Interchange and NE 85th Station Area Plan efforts.
- Add transit signal priority (TSP)



**Figure 3 K Line Roadmap
Summary Map (Segment A:
Totem Lake)**

Figure 4 K Line Roadmap
Summary Map (Segment B:
Central and South Kirkland)



See Segment B

**Figure 5 K Line Roadmap
Summary Map (Segment C:
North and Central Bellevue)**

RapidRide K Line Project Roadmap

- RapidRide K Line Alignment
- - - K Line Alignment Option

Speed & Reliability

- Proposed Bus or BAT Lane
- Proposed Queue Jump Lane
- Proposed Transit Signal Priority

Access to Transit

- Pedestrian Connection
- Bicycle Parking
- Bicycle Improvements
- Multimodal Enhancements

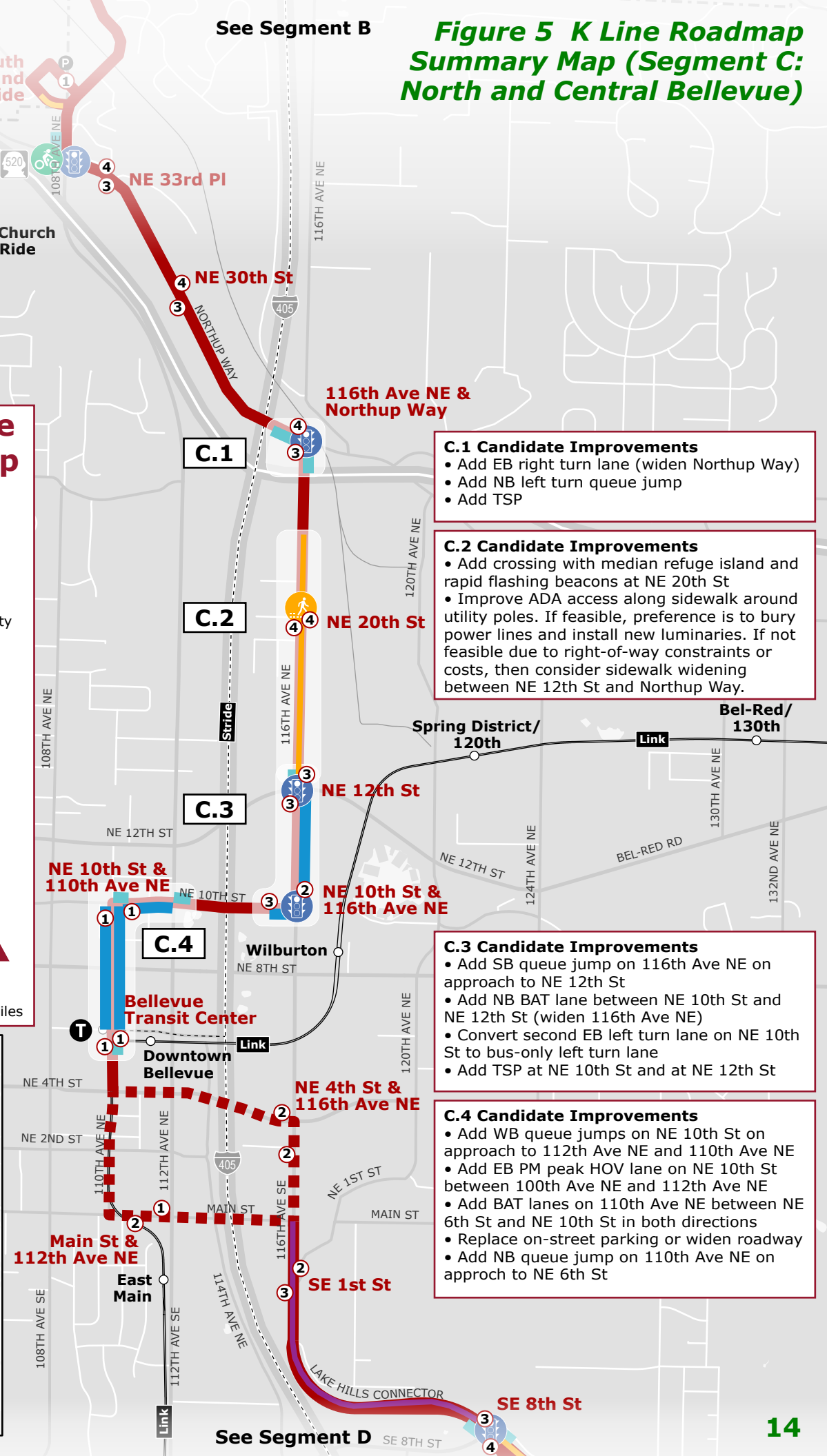
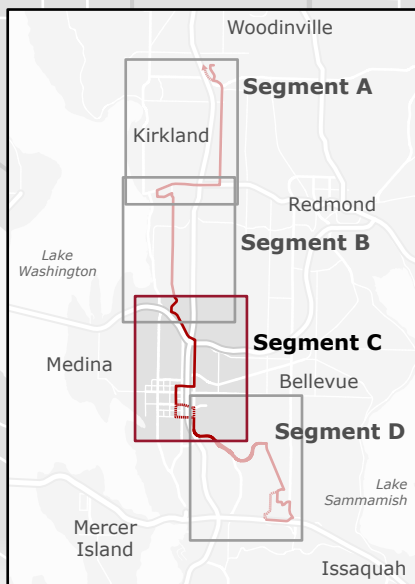
Proposed Stations

Station Tiers: 1 2 3 4
 More amenities ← Fewer amenities

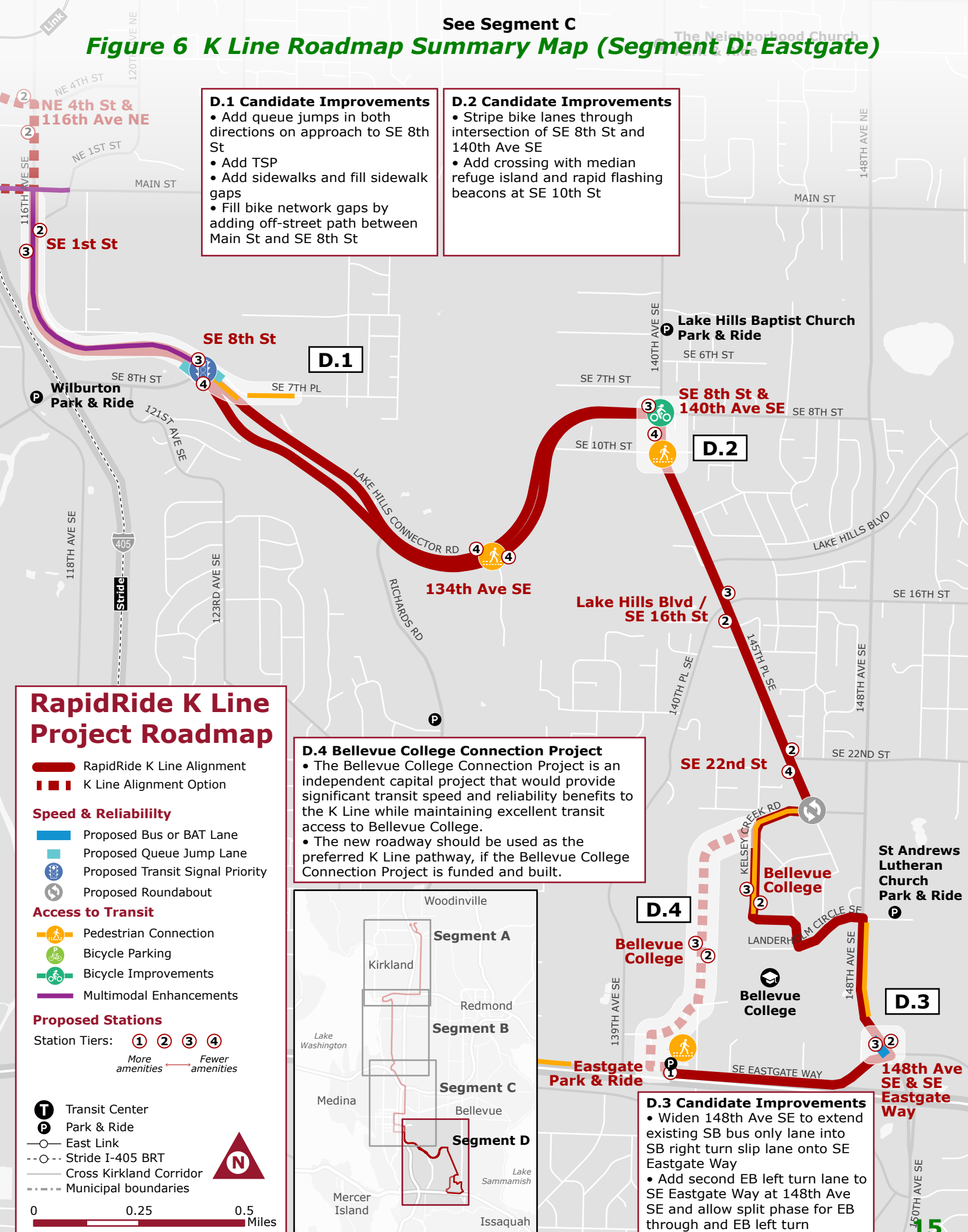
- T Transit Center
- P Park & Ride
- East Link
- - - Stride I-405 BRT
- Cross Kirkland Corridor
- - - Municipal boundaries



0 0.25 0.5 Miles



See Segment D

Figure 6 K Line Roadmap Summary Map (Segment D: Eastgate)

120th Ave NE: Preferred alignment will require changes to street design and operations to ensure reliable bus operations.

Totem Lake Blvd: SB transit priority approaching NE 124th St may require channelization changes and/or right-of-way.

124th Ave NE & 6th St S/108th Ave NE: These arterial streets have important on-street bike facilities. Design for stations and transit priority treatments should ensure continuity and safety for people biking.

NE 85th St: Assumed that property owner dedication for EB queue jump approaching 6th St will be realized.

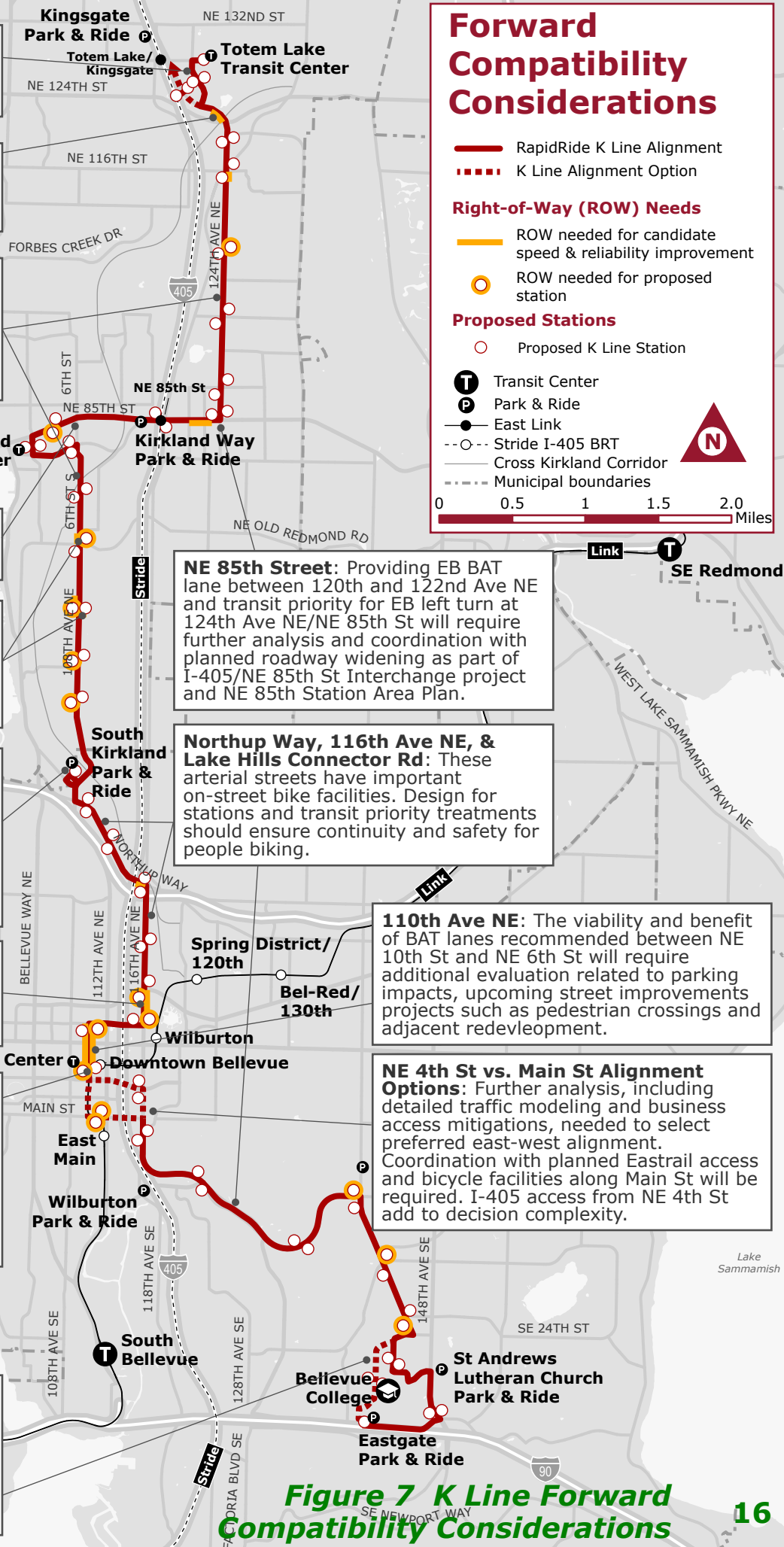
108th Ave NE: City of Kirkland Transit Implementation Plan prioritizes NB transit priority at NE 60th St and NE 68th St. Plans include a BAT lane and queue jump on the NB approach to NE 68th St.

South Kirkland Park & Ride: King County Metro is conducting a parallel study as part of the East Link Connections project that will determine operation and signal improvements. K Line is being considered and recommendations from that study will benefit future K Line operations.

116th Ave NE: Recommended transit priority NB between NE 10th St and NE 12th St will require additional right-of-way and coordination with overhead utilities.

Bellevue Transit Center (BTC) Stations: K Line stations are recommended on 110th Ave NE reducing time required to enter BTC. Recommended NB station location conflicts with Sound Transit station pick-up/drop-off zone. A new, viable location for the Sound Transit zone would need to be identified or this station location reconsidered.

Bellevue College Connection Project: The Bellevue College Connection Project is an independent capital project. This new roadway would provide significant benefit for K Line riders and should be used as the preferred pathway if funded and built.



7 Speed and Reliability Findings

Providing customers with a faster, more reliable ride is a key benefit of RapidRide service. The K Line project team conducted extensive planning and operations analysis to identify and screen potential projects that address bus delay and ensure reliable travel for K Line riders. That work included:

- Diagnosis of bus delay along the corridor using existing data from Metro buses
- Prediction of future delay using traffic modeling to project future conditions
- Identification of a broad suite of potential projects and operational improvements along the corridor
- Discussions with Metro operators to identify known points and causes of delay
- Development of conceptual projects to address delay
- Evaluation of conceptual projects using traffic modeling and other analytic tools

This Roadmap presents the speed and reliability investments deemed to have the highest value for the future K Line. Figure 3 through Figure 6 illustrate these candidate investments.

Details on project identification and ranking methods along with documentation of coordination with the Cities of Kirkland and Bellevue in developing speed and reliability improvements can be found in Appendix A: Speed and Reliability Technical Findings.

High-Value Candidate Speed and Reliability Investments

Table 1 describes major causes of delay along the corridor, priority investments to address delay, and key considerations for implementation. Because transit delay often occurs where traffic volumes are high or the street system is physically constrained, most beneficial projects also require tradeoffs with other street priorities. The implementation considerations listed in Table 1 are important to ensure K Line forward compatibility and coordination with the Cities of Kirkland and Bellevue.

Table 1 *Summary of High-Value Candidate Speed and Reliability Investments*

Corridor Segment	Major Causes of Delay	Investment Priorities	Implementation Considerations
Totem Lake Area (Kirkland)	Challenging operating conditions on narrow 120th Ave NE segment	Enhanced transit operations on 120th Ave NE	Metro will continue to work with the City of Kirkland and Totem Lake property owners to improve operating conditions Alternative pathways may need to be considered if bus operations cannot be improved on 120th Ave NE
124th Ave NE (Kirkland)	Traffic congestion and delay occurring at signalized intersections	NB and SB queue jumps at high delay intersections	Additional right-of-way may be needed at NE 124th St and NE 116th St.

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Corridor Segment	Major Causes of Delay	Investment Priorities	Implementation Considerations
			Coordination needed at NE 124th St with new Totem Lake Connector Bridge
NE 85th Street (Kirkland)	High traffic volumes and congestion caused by I-405	Dedicated EB transit lanes between 120th Ave NE and 124th Ave NE	Projects on the EB approach to 124th Ave NE could have localized impacts to general purpose traffic Implementation should be coordinated with I-405 interchange project and the 85th Street Station Area Plan
Downtown Kirkland	Traffic congestion and high volume of pedestrians at crossings	N/A	Coordinate with Metro and City of Kirkland on evaluation of new signalized pedestrian crossing at Park Lane
108th Ave NE (Kirkland)	Traffic congestion at major intersections and signal delay	Queue jumps and TSP at NE 68th St and NE 60th St	Additional right-of-way may be needed at NE 68th St and NE 60th St
South Kirkland Park & Ride	Multiple turns and one-way travel direction increase travel time and delay	Additional traffic signals and potential reversal of bus directional travel through the park & ride	Metro will continue to work with City of Kirkland and City of Bellevue to identify an optimal facility layout and operational approach
Northup Way (Bellevue)	Delay at traffic signals	New EB right turn lane on approach to 116th Ave NE	Additional right-of-way needed at Northup Way & 116th Ave NE
116th Ave NE (Bellevue)	Heavy traffic volumes and traffic congestion	New BAT lane on NB 116th Ave NE from NE 10th St to NE 12th St	Additional right-of-way needed to add new BAT lane. Right-of-way should be acquired as part of future redevelopment.
Downtown Bellevue	Heavy traffic volumes and traffic congestion	New BAT lanes on 110th Ave NE between NE 6th St and NE 10th St	Coordinate with City of Bellevue on potential impacts to general purpose parking or right-of-way, and upcoming street improvements projects such as pedestrian crossings and adjacent redevelopment.
Lake Hills Connector/ 145th Place SE (Bellevue)	High traffic volumes accessing I-405 via SE 8th St	New queue jumps and TSP at SE 8th St	Potential impacts to parks, open space, and other natural resources, as well as potential right-of-way acquisition.

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Corridor Segment	Major Causes of Delay	Investment Priorities	Implementation Considerations
Bellevue College/ Eastgate Park & Ride (Bellevue)	Travel through Bellevue College results in conflicts with pedestrians Congestion along 148th Ave SE resulting from proximity to I-90 ramps	Bellevue College Connection roadway project would provide substantial benefit	Metro strongly supports City of Bellevue and Bellevue College efforts to fund and construct the Connection roadway

7.1 Actions for Inclusion in Local Agency Capital Programs

Delivering speed and reliability investments along the K Line corridor will require continued and deliberate coordination between Metro and project partners, including the Cities of Bellevue and Kirkland. Project partners should leverage the K Line Roadmap Report recommendations when prioritizing capital investments and seeking local funding for projects that support K Line implementation. Many speed and reliability candidate projects may require additional right-of-way. Cities cannot require right-of-way from redevelopment until K Line requirements have been formally adopted into local agencies' Comprehensive Plans. K Line has not reached the stage of identifying a Locally Preferred Alternative (LPA). The Roadmap can, however, inform local agency partners about potential future right-of-way needs and help to ensure that land use or transportation projects do not preclude future K Line investment.

Metro recognizes that continued partnership with local agency partners are essential to developing and delivering RapidRide projects that deliver regional mobility benefits, meet Metro's commitments to equity and climate, and support local priorities. Metro is committed to serving as a project advocate and partner for capital projects delivered by local agencies with notable transit speed and reliability or access to transit benefits. Metro will continue strong coordination with local agency staff to preserve forward compatibility and advance infrastructure and technology projects that benefit K Line and other transit services. Depending on available funding, Metro may be able to provide project construction funding for projects along the K Line corridor. Projects identified in the K Line Roadmap Report will remain priorities for coordination and near-term implementation.

8 Proposed Station Summary

This section of the K Line Roadmap Report presents the future station types and locations for RapidRide K Line. The project team developed a future ridership forecast to determine the size and level of passenger amenities required at each station location. This section summarizes station locations with key implementation considerations for the success of the future K Line.

8.1 Station Elements based on Ridership Forecast

The K Line project team developed the future ridership forecast for K Line for opening year (2025) and a future year (2040). Given the uncertain timing for K Line implementation, 2040 ridership was used to inform station types (size and level of passenger amenities) in accordance with RapidRide Standards. Stations along the K Line corridor are anticipated to have a total of 10,980 daily boardings in 2025, and 14,310 daily boardings in 2040 according to pre-pandemic ridership forecasts. Transit centers are the highest boarding locations. More details on the K Line ridership forecast can be found in Appendix B: Proposed Station Summary Technical Findings.

8.2 Proposed Station Locations

The future K Line corridor includes 40 conceptual station locations; the final number of stations will vary based on pending alignment variations. Proposed station locations were informed by projected ridership, local land use context and nearby destinations, street connectivity, stop spacing thresholds, and density of households that may rely on transit. Proposed station locations achieve an average station spacing of approximately 0.4 miles and cover nearly 90% of existing wheelchair lift deployments.

The Roadmap documents issues and opportunities related to proposed station locations based on a 10 percent level of design. Additional technical work, community engagement, and analysis of right-of-way impacts will inform final placement of station locations. Figure 8 depicts proposed station locations and station amenity levels. Tier 1 stations have the most passenger amenities based on projected ridership and tier 4 stations have the fewest amenities. Refer to Table 1-1 in Appendix B: Proposed Station Summary Technical Findings for more information on RapidRide station tiers based on projected ridership thresholds and corresponding amenity levels.

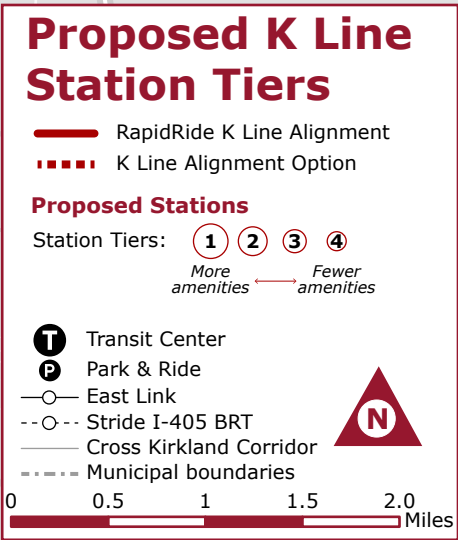


Figure 8 K Line Station Tiers 21

8.3 Issues and Opportunities

The K Line project team developed conceptual plans at a 10 percent design level for each proposed station pair along the K Line corridor. Table 2 lists station locations that may require right-of-way acquisition to fit the commensurate station type or where further study is needed.

Of the 40 conceptual K Line station locations, fifteen (15) proposed stations may require additional right-of-way. Coordination between Metro and the Cities of Bellevue and Kirkland on these locations will ensure forward compatibility for K Line implementation when funding becomes available.

Additionally, the project team identified station locations where design mitigations or a downgrade of station size could preclude the need for right-of-way acquisition. These locations are not detailed in Table 2; rather proposed stations with design mitigation recommendations are noted in Appendix B.

Conceptual design snapshots and implementation considerations for each future K Line station pair can be found in Appendix B: Proposed Station Summary Technical Findings. Station design will be refined and advanced as funding becomes available for preliminary design.

Table 2 *Summary of Proposed K Line Stations Key Implementation Considerations*

Proposed Station Location	Estimate of ROW Required	Key Implementation Considerations
SEGMENT A: Totem Lake		
124 th St NE and NE 108 th Pl, NB	N/A	No sidewalk connecting to proposed northbound station location. Adding sidewalk, curb ramps, and pedestrian crossing treatments would improve station access.
Central Way and 5 th St/Urban Plaza, SB	N/A	Southbound station upgrades an existing pull out stop with a transit island. Transit island requires parking removal and driveway relocation. This proposal creates shared bus-bike in-lane stop with adequate space for all station elements, removes conflict zone between buses and people biking, and creates shorter dwell time for buses.
SEGMENT B: Central and South Kirkland		
108 th Ave NE and NE 68 th St, NB	10'	No existing stop at this location. The proposed far-side in-lane station is being developed as part of the Kirkland 108 th Ave Queue Jump and BAT Lane implementation project that will widen the roadway.
108 th Ave NE and NE 60 th St, SB	5'	The proposed station location relocates existing stop to the far side of NE 60 th St. ROW line is at the back of sidewalk, and curb to ROW line is less than proposed 11'-wide station platform. Existing private driveway and crossing may require relocation.
108 th Ave NE and NE 53 rd St, SB	5'	The proposed station location relocates existing stop to the far side of NE 53 rd St. ROW line is at the back of sidewalk, and curb to ROW line is less than proposed 11'-wide station platform. Existing fence along private

Proposed Station Location	Estimate of ROW Required	Key Implementation Considerations
		property may require relocation to accommodate medium station footprint.
108 th Ave NE and NE 47 th St, SB	5'	The proposed station location relocates existing stop to the near side of NE 46 th St. ROW line is at the back of sidewalk, and curb to ROW line is less than proposed 11'-wide station platform. Recommend relocating existing RRFB crossing behind, or north of, proposed station.
SEGMENT C: North and Central Bellevue		
116 th Ave NE and NE 12 th St, SB	10'	The proposed station location maintains existing far-side in-lane stop location and extends station footprint to accommodate a large station. ROW line is at the curb line. Any work to add new station platform will be located beyond ROW line.
NE 10 th St and 116 th Ave NE, NB	10'	The proposed station relocates existing near-side stop to far side of 116 th Ave NE. Wider sidewalk required to accommodate large station. ROW line is shown at curb line. Any work to add new station platform will be located beyond ROW line.
NE 10 th St and 110 th Ave NE, NB	11'	No existing stop at this location. The proposed in-lane station is far side of 110 th Ave NE after turning onto NE 10 th St. ROW line is shown at curb line. Any work to add new station platform will be located beyond ROW line.
110 th Ave NE and 6 th St, SB	7'	No existing stop at this location. The proposed large in-lane station is far side of NE 6 th St between Bellevue Transit Center and new Downtown Bellevue light rail station. This location selected because frontage north of transit center is not available due to new construction. ROW is 4' from face of curb. Assuming curb line remains unchanged, curb to ROW line is less than proposed 11'-wide station platform.
Main St and 112 th Ave NE, NB	11'	Maintain existing far-side in-lane stop location. ROW line is shown at curb line. Any work to add new station platform will be located beyond ROW line.
Main St and 112 th Ave NE, SB	4'	No existing stop at this location. ROW is at back of sidewalk. Assuming curb line remains unchanged, curb to ROW line is less than proposed 11'-wide station platform.
SEGMENT D: Eastgate		
Lake Hills Connector and SE 8 th St, NB	N/A	The proposed station relocates the northbound stop to far side of SE 7 th Pl to improve proximity to controlled crossings and sidewalk. Relocation may trigger additional improvements to sidewalks and pedestrian crossings to improve access to nearby trails and school.
145 th Pl SE and SE 16 th St, NB	5'	Proposed station consolidates existing bus stops to create a merge in-lane station on far side of SE 16 th St. ROW is at face of sidewalk that is separated by a 6' landscape buffer from roadway. Assuming curb line

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Proposed Station Location	Estimate of ROW Required	Key Implementation Considerations
		remains unchanged, curb to ROW line is less than proposed 11'-wide station platform.
145 th Pl SE and SE 22 nd St, SB	4'	Maintain existing far-side stop location. ROW is at back of sidewalk. Assuming curb line remains unchanged, curb to ROW line is less than proposed 11'-wide station platform.

9 Transit Center Summary

K Line will serve five existing transit centers and park & rides: Totem Lake Transit Center, Kirkland Transit Center, South Kirkland Park & Ride, Bellevue Transit Center, and Eastgate Park & Ride. As illustrated in Figure 9, an important function of the K Line will be to provide access to major points of transfer, including several locations that provide critical access to transit services on major east-west regional pathways, including Link Light Rail service connecting to Redmond and Seattle and express bus services in the SR-520 corridor. K Line will include RapidRide station elements and operational improvements to maximize speed and reliability at these critical transfer points.

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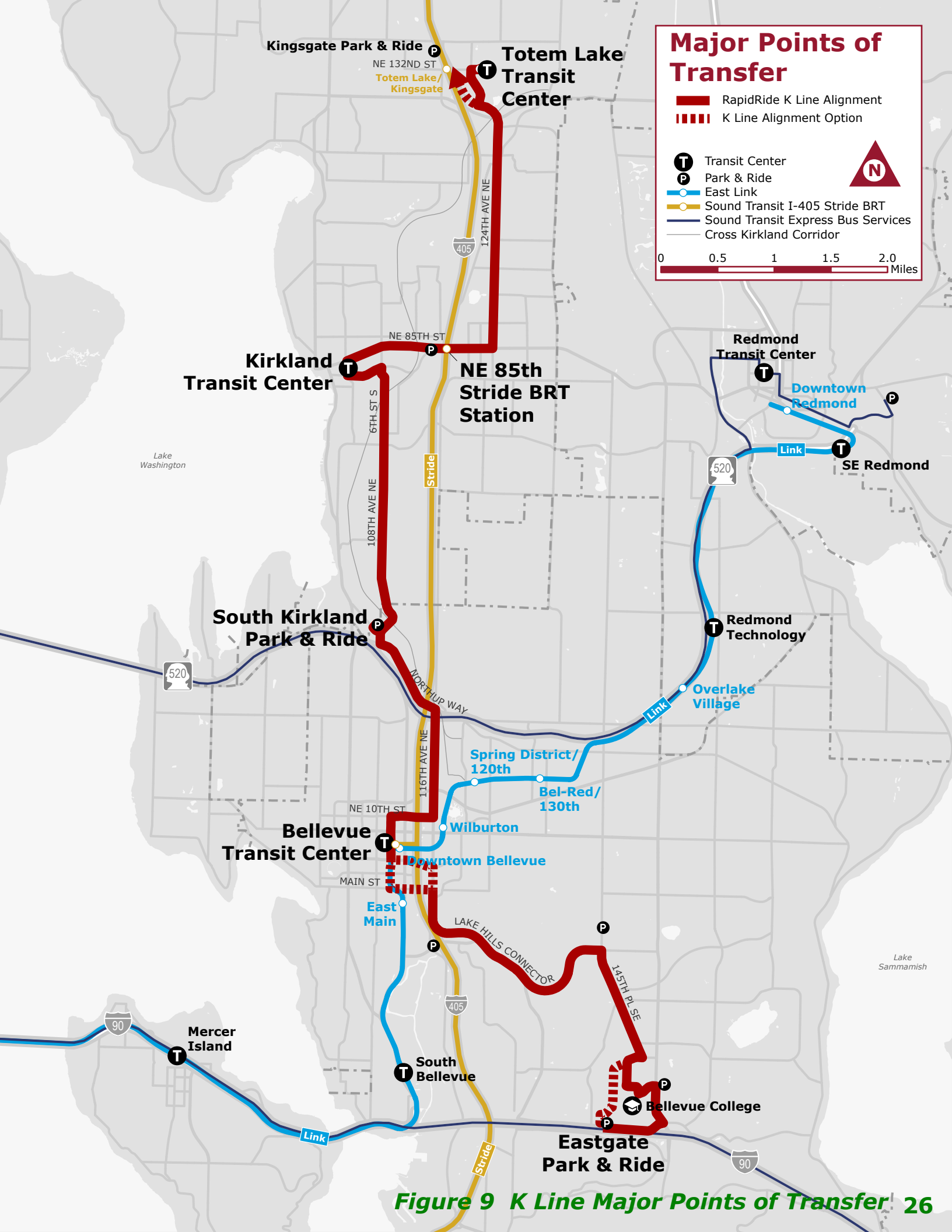


Figure 9 K Line Major Points of Transfer 26

Table 3 summarizes the passenger facilities, bus operations, key connections, and implementation considerations at the transit centers and park & rides that will be served by K Line. Details on K Line operations at each transit center and park & ride can be found in Appendix C: Transit Center Technical Findings.

Table 3 Summary of Passenger Facilities, Operations, Connections, and Implementation Considerations at Transit Centers and Park & Rides

Transit Center, Park & Ride, or Point of Connection	Bay Requirements	Passenger Facilities	Bus Operations	Connections	Implementation Considerations
Totem Lake Transit Center (Kirkland)	Shared use at Bay 2 recommended	Supplement existing transit center amenities with RapidRide branded signage, tech pylon, and ORCA reader	Clockwise operations per current operating pattern	Local connections Sound Transit I-405 Stride BRT is two blocks to west	Consider outcomes of City of Kirkland NE 128th St Corridor Study on K Line operations at transit center
I-405 and NE 85th St Interchange (Kirkland)	Shared use of bus bays on the middle level of the interchange per planned Sound Transit/WSDOT project	Large station elements with RapidRide branded signage and shelter, tech pylon with ORCA card reader, and other essential station elements	Through east-west operations using bus facilities provided in Sound Transit/WSDOT as part of interchange design	Sound Transit I-405 Stride BRT operating north-south on I-405	11' station footprint width required for RapidRide station
Kirkland Transit Center	Bay 2 Northbound Bay 4 Southbound	Supplement existing transit center amenities with RapidRide branded signage, tech pylon, and ORCA reader	Curbside bus only in each direction along two-way 3rd St per current operating pattern	Metro routes 230, 231, 239, 245, 250, and 255	Use of southbound Bay 4 critical to ensure RapidRide coaches can merge to eastbound left turn lane
South Kirkland Park & Ride	Shared use at Bay 1 recommended	Supplement existing transit center amenities with RapidRide branded signage, tech pylon, and ORCA reader	New routing and signalization now being evaluated in separate Metro study Recommendations from that study will inform K Line operations	Metro routes 249, 255, 981, and 986	This location provides access to 840 park & ride stalls

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Transit Center, Park & Ride, or Point of Connection	Bay Requirements	Passenger Facilities	Bus Operations	Connections	Implementation Considerations
Bellevue Transit Center <i>K Line will run adjacent to Bellevue Transit Center</i>	Northbound K Line station: 110th Ave NE/NE 6th St near-side, in-lane Large Raised Station Southbound K Line station: 110th Ave NE/NE 6th St far-side, in-lane Large Raised Station	Large Raised Station elements with RapidRide branded signage and shelter, tech pylon with ORCA card reader, and other essential station elements	K Line operates along 110 th Ave NE to avoid delays from entering Bellevue Transit Center	Candidate station locations adjacent to Bellevue Transit Center and Sound Transit Bellevue Downtown Link Light Rail station	Northbound K Line station may require new location for Sound Transit station pickup/dropoff bay on 110 th Ave NE. City of Bellevue is currently evaluating rechannelization of NE 6 th St between 112 th and 110 th Aves NE and conducting design work at and near Bellevue Transit Center, including a raised intersection at NE 6 th St/110 th Ave NE.
Eastgate Park & Ride (Bellevue).	Shared use at Bay 2 recommended	Supplement existing transit center amenities with RapidRide branded signage, tech pylon, and ORCA reader	Counterclockwise operations per current operating pattern	Over twenty local and regional express bus routes serve Eastgate	Eastgate has electric bus charging infrastructure and may be a good location for future charging if/when RapidRide coaches are electrified

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10 Access to Transit Summary

“Access to transit” in this project refers to the various ways people get to transit service. All transit riders start and end their trip on foot or with a mobility device. For this reason, Metro includes access to transit investments as part of each RapidRide project. These investments are intended to improve safety and convenience to walk, roll, or bike to the K Line. The K Line project team collaborated with the Cities of Kirkland and Bellevue to identify access needs and evaluate candidate access to transit investments. This work focused on areas within a short walk, roll, or bike ride of future K Line stations. This section of the K Line Roadmap Report presents high ranking candidate access to transit investments.

Details on project identification and ranking methods along with documentation of coordination with the Cities of Kirkland and Bellevue in developing access to transit improvements can be found in Appendix D: Access to Transit Technical Findings.

10.1 Issues and Opportunities

The K Line project team defined access “areas of need” to identify and prioritize candidate access improvements. Access sheds for people walking, rolling, and bicycling were defined as areas within a 10-minute walk or roll (½ mile) and 5-minute bike ride (1 mile) of future K Line stations. Access areas of need were those access sheds with the following factors: highest concentration of people with low incomes and people of color; gaps in the pedestrian and bicycle networks; concentration of current and future activity centers; crash hotspots; and opportunities to leverage planned improvements. The Cities of Kirkland and Bellevue confirmed access areas of need to guide investment identification. Maps of access areas of need by K Line segment can be found in Appendix D.

10.2 High-Ranking Candidate Access to Transit Investments

The K Line project team ranked candidate access to transit investments within each access area of need and reviewed results with City of Kirkland and City of Bellevue staff to ensure alignment with local priorities and capital programs. Of the 40 total candidate access to transit investments identified and evaluated, 27 total locations ranked highest across the thirteen areas of need. Table 4 presents high-ranking candidate investments locations with implementation considerations that are important for coordination with the Cities of Kirkland and Bellevue to ensure K Line forward compatibility.

Table 4 High-Ranking Access to Transit Project Locations with Key Implementation Considerations

Location	Project Description
SEGMENT A: Totem Lake	
Totem Lake Area	Through the NE 128th St Corridor Study , City of Kirkland identified street extensions and improvements to enhance multimodal connectivity along streets north of NE 128 th St. These new street connections and sidewalk and bike facility enhancements improve access to future K Line in the Totem Lake Area.
Stores to Shores Greenway	The City of Kirkland is seeking funding for the Stores to Shores Greenway, a neighborhood greenway that will connect Totem Lake and the Cross Kirkland Corridor to Downtown Kirkland. Two high-ranking candidate access to transit investments improve connections between the future greenway and K Line stations.
124th Ave NE	Construct missing sidewalks on the east side of 124 th Ave NE south of NE 95 th St in Kirkland to connect to future K Line station at NE 90 th St.
SEGMENT B: Central and South Kirkland	
Kirkland Way	Construct missing sidewalks along Kirkland Way between 2 nd Ave and Ohde Ave in Kirkland to connect to future K Line station at 6 th St S.
South Kirkland Park & Ride	Improve access to South Kirkland Park & Ride by completing bikeway connections through the Northup Way/108 th Ave NE intersection, and upgrading ADA curb ramp and sidewalks along NE 38 th Pl.
SEGMENT C: North and Central Bellevue	
116th Ave NE near NE 20th St	Improve ADA accessibility with sidewalk improvements where utility poles obstruct the sidewalk along 116 th Ave NE between NE 22 nd Pl and NE 12 th St. If feasible, preference is to bury power lines and install new luminaries. If not feasible due to right-of-way constraints or costs, then consider sidewalk widening between NE 12 th and Northrup Way.
116th Ave NE south of Main St	Construct an off-street path along the west side of 116 th Ave NE to improve access to the future K Line station at SE 1 st St.
SEGMENT D: Eastgate	
Lake Hills Connector Rd	Improve crossings and construct missing sidewalks along Lake Hills Connector Rd at SE 8 th St and 134 th Ave SE to improve access to the future K Line stations.
Bellevue College	Coordinate with future Bellevue College Connection investments to construct missing sidewalks connecting to future K Line stations on the Bellevue College campus.
Eastgate Park & Ride	Improve crossings of Eastgate Park & Ride driveway entrances and construct missing sidewalk along Eastgate Way west of 139 th Ave SE connecting to the new Eastside men's shelter to improve walking and rolling access to future K Line service at Eastgate Park & Ride.

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10.3 Actions for Inclusion in Local Agency Capital Programs

Delivering access to transit investments for the K Line will require close coordination with project partners including the Cities of Bellevue and Kirkland, Sound Transit, and Bellevue College. High-ranking candidate access to transit investments are aligned with and leverage planned active transportation network projects and connections identified by the two cities. Project partners can use the K Line Roadmap Report recommendations when prioritizing capital investments and seeking local funding for access investments that support K Line implementation. Metro will coordinate with local agency staff to facilitate decisions about K Line project element inclusion in local capital improvement plans.

11 Communication and Technology Summary

Preliminary planning efforts to establish communications and technology candidate investments within the corridor have been completed in 2021. The Communications and Technology Summary Report provided in Appendix E describes existing communication equipment conditions, proposed Transit Signal Priority (TSP) locations and conceptual communication design layouts in the corridor. The location of priority candidate transit signal priority upgrades and investments is included in Figure 3 through Figure 6 and are used to inform Speed and Reliability Technical Findings (Appendix A).

A work breakdown structure (WBS) for future planning, design, configuration, testing and implementation of communication and technology features for the K Line RapidRide corridor to support future implementation efforts was also developed and is included in Appendix E.

Communications technology is advancing rapidly and when project funding becomes available, communication investments noted in this report warrant re-evaluation against available communication technology.

Communication investment recommendations in the corridor

Investing in Transit Signal Priority (TSP) upgrades at key intersections in the corridor will result in reliability benefits to current and future transit along the alignment. Working hand in hand with Kirkland and Bellevue to deliver TSP and timing plans at recommended intersections noted in this report has speed and reliability benefits to current and future transit service. The field infrastructure in the corridor supports relatively low cost TSP implementation investments in comparison to other RapidRide Lines, but requires local agencies upgrades of central network communication systems to maximize TSP benefits. At the time of this report, this communication system is envisioned to be next generation TSP and further coordination is needed on this topic.

12 Project Implementation Costs

The cost to implement the K Line project will depend on the level of investment made in the corridor in terms of improvements to deliver speed and reliability and access to transit investments.

This Roadmap provides recommendations on speed and reliability and access to transit candidate investments to move forward into future project phases. These candidate investments require further development to establish construction costs and identify potential right of way costs. A substantial investment in speed and reliability benefits will be needed to meet Metro's RapidRide service guidelines and achieve a significant reduction in travel time for the corridor. A rough order of magnitude range of investment levels to achieve good performance and superior performance is noted below.

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Table 5 **Estimated Implementation Costs in 2021 dollars (millions)**

Investment	Good Performance	Superior Performance
Station Investments	\$10.5	\$10.5
Communication System Investments	\$0.9	\$0.9
Speed and Reliability Investment	\$17-\$25	\$30-\$40
Access to Transit	\$2-\$3	\$3-\$5
General / Soft Costs	\$12-\$16	\$19-25
Contingency Allowance (40%)	\$14-\$19	\$23-\$29
ROM Investment Range	\$56-\$75	\$86-\$111

This work does not identify a potential corridor long travel time savings, however more investment will reduce delay and improve reliability. The costs above do not include any bus fleet or operational expenses.

For context, good performance is the minimum level of service improvement for a RapidRide line and superior performance is the preferred service for a RapidRide line. Other Metro RapidRide lines scheduled for delivery in the near futures, such as G, H, J and I lines, have been planned and designed for superior performance.

More detailed technical work is needed to refine cost estimates for candidate Access to Transit and Speed and Reliability Investments. Metro will use this work to further understand the relationship between level of investment, fundability, and overall project benefits.

General Note - Further vetting of speed and reliability candidate implementation with local agencies is needed to know what specific level of investment is needed for benchmark performance gains, and which investments should be advanced into final design. At the time of this Roadmap publication, benefits in bus delay savings for candidate projects are further advanced, and have greater confidence, than candidate project construction cost estimates.

Cost Estimate for all Roadmap Candidate Projects – Preliminary concept level cost estimates have been developed for all candidate projects identified in this roadmap document, excluding the Bellevue College Connection. These preliminary cost estimates, in appendix I, provide a starting point for future prioritization and budget alignment work. The total cost of all candidate projects is above the superior performance target noted above. With that in mind, future planning efforts are expected to prioritize the best combination of candidate projects after completion of the planning process.

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13 Collected Data and Existing Conditions

The K Line project team collected a wide range of data to support planning efforts in 2019-2021. Data which may be of high value for future K Line efforts is noted in this chapter.

13.1 Photogrammetry Survey

A site survey was produced for the proposed project alignment by Survey Consulting Firm Lin and Associates and photogrammetry survey firm Miller Creek. The survey produced a three-dimensional topographical map and an aerial image of the corridor 200 feet on each side of the assumed alignment using photogrammetry technology. The survey collected existing visible channelization, curb faces, back of walk, and pavement edges and a current corridor aerial image taken in early 2020. KPFF Consulting Engineers produced a useable plan set of the corridor based on this information.

13.2 Existing Conditions Collection / Generation

Existing condition information was collected for project use including, but not limited to:

- Metro ridership data – boardings by stop – collected from on-bus automated passenger counters
- Metro bus locational data used to inform bus travel time, travel speed, and reliability; collected from on-bus GPS systems
- Field validation/investigation of existing ADA facilities and roadblocks in the corridor

K Line planners developed work products based on existing conditions including:

- Bike and Walk Shed development within the planned corridor
- Bike and Pedestrian networks within the project vicinity
- Demographic information in the corridor
- Crash data along corridor alignment

13.3 Geotechnical Work Completed to Date

A corridor draft geotechnical study was completed by the Consulting Firm HWA GeoScience in May of 2020 for use by the program. The soils and geology report documented information from available existing geological maps and known subsurface information. High-level findings included the proposed alignment appears feasible for planned investments in most locations, but had limited feasibility for stormwater infiltration. Small pockets of peat or soft silts and clays exist within the project corridor which may complicate construction. The report clearly stated additional investigation would be needed to verify and establish wall design recommendations,

and verify stormwater infiltration feasibility at a few spot locations where infiltration may be feasible.

14 Public Outreach Summary

In Fall 2019, Metro began engaging community members, businesses, service providers, and community-based organizations (CBOs) in Kirkland and Bellevue to understand their transit needs and priorities, and to gather input to inform the routing and design of K Line. Fall 2019 outreach had a major focus on collecting public feedback on multiple routing options between Totem Lake, Downtown Kirkland, and the South Kirkland Park & Ride. This input was instrumental in developing the recommendation to use the 124th Ave NE pathway north of NE 85th Street and the 108th Ave NE pathway south of Downtown Kirkland.

Overall key takeaways relevant to planned K Line investments are summarized below.

Community member priorities

- Community members want transit that will get them where they need to go
- Speed of travel is important to community members
- Community members want to be certain the bus will be there when they need it

K Line station locations, amenities, and accessibility

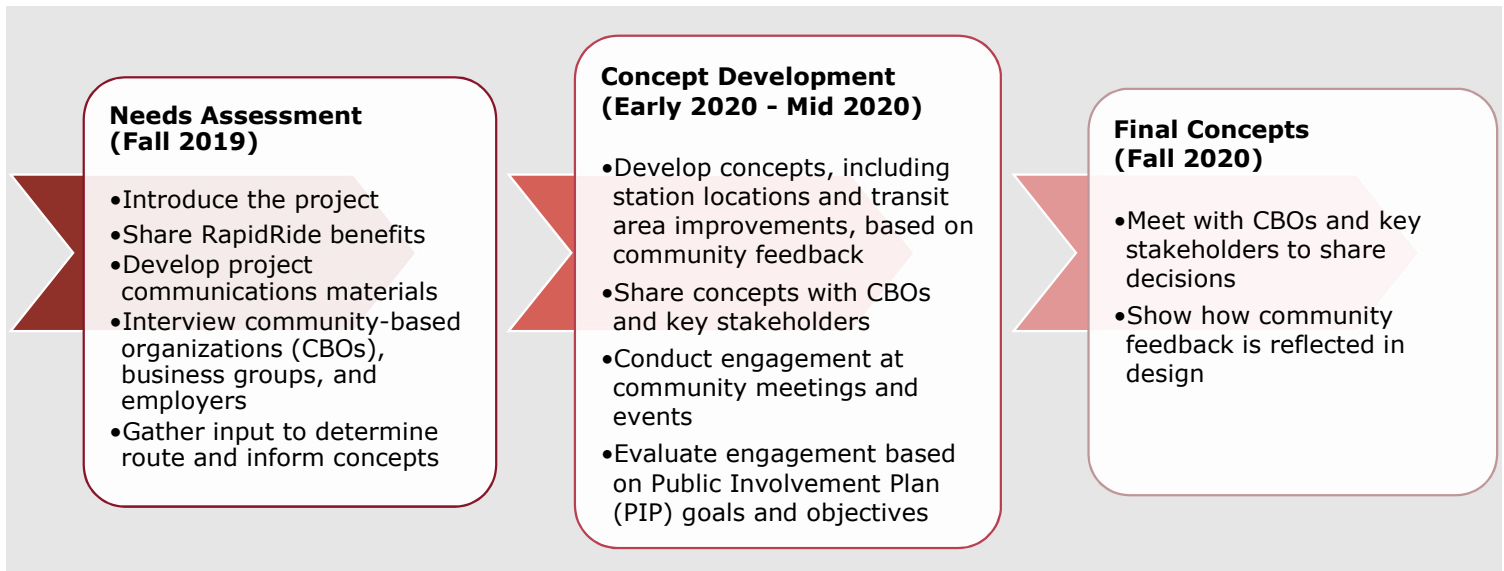
- Some people said Metro needs to better serve people with mobility, vision, hearing or other impairments
- Community members stressed the importance of safety at stations, including lighting and crosswalks, as well as sidewalks leading to stations
- Locating bus stations near community resources, such as medical centers, community centers, and grocery and shopping locations, is a priority for community members

Barriers to transit use

- Difficulty getting to and from the bus stop can make it hard for people to use transit
- When buses come infrequently, people are less likely to rely on them
- People are unlikely to use transit if it does not serve the places they want to go
- A barrier exists when using transit takes significantly longer than other transportation methods
- Many transit riders expressed concerns about the then planned changes to Route 255, which took place in March 2020, and the resulting lack of direct connections to Downtown Seattle
- People unfamiliar with using light rail expressed concern about the process of transferring from the bus to light rail at the University of Washington Station

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Figure 10 Engagement Timeline



Engagement timeline

The timeline shown above highlights community engagement activities through 2020, when community engagement was paused on this project due to the COVID-19 pandemic. Future efforts by the project team will continue to involve and inform the community when the K Line is programmed and funded for implementation.

Future Community Engagement Goals

When the project is funded for implementation, community engagement goals include:

- Conduct and document an intentional, inclusive, and equitable community engagement process.
- Ensure stakeholders are aware of K Line and understand how RapidRide will impact and benefit their communities.
- Establish and grow positive relationships between Metro and community organizations, businesses, cities, and community members in Kirkland and Bellevue.
- Utilize engagement efforts to refine project investments, with special consideration for priority population needs and social equity.

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15 Alignment Selection Summary

The K Line alignment has been selected following:

- extensive technical evaluation of current and future transit needs on the East Side of Lake Washington through long-term study planning efforts, including Metro Connects, the North Eastside Mobility Project (2018), and the RapidRide Expansion Program Corridor Evaluation Report – Corridor 1027 (2019).
- outreach and coordination with the community and partner agency technical staff, including the Cities of Bellevue and Kirkland, Bellevue College, and Sound Transit.
- Executive level briefing and communication to the elected leadership of Bellevue and Kirkland and executive level Bellevue College leadership
- Kirkland and Bellevue City Council documented support for the proposed K Line route.

In December of 2020, Metro documented the recommended alignment within the Corridor Concept Report. This report documents Metro’s recommended K Line alignment and presents a high level alignment alternative analysis for options reviewed and advanced forward. This report is included as Appendix H in this report.

Three areas of the corridor continue to have outstanding alignment options under consideration: Totem Lake, south of downtown Bellevue and across I-405, and the potential for routing along the Bellevue College Connection Project. All three are important considerations for K Line routing. Significant follow-up between City of Kirkland staff, City of Bellevue staff, King County Metro, Sound Transit, and other stakeholders will be required.

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RAINIER BEACH
COMMUNITY CENTER

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Corridor Planning and Upgrade Report

King County Metro Transit

October 2020

King County Metro Transit

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Parametrix

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Acronyms and Abbreviations

ACS	American Community Survey
ADA	Americans with Disabilities Act
APE	Area of Potential Effect
ARC	Architectural Review Committee
AVL	automatic vehicle location
BAT	business access and transit
BRT	bus rapid transit
CBD	central business district
CFR	Code of Federal Regulations
COA	Certificate of Approval
DAHP	Department of Archaeology and Historic Preservation
dBA	a-weighted decibel
EJ	Environmental Justice
FTA	Federal Transit Administration
HOV	high occupancy vehicle
I-90	Interstate 90
ISRD	International Special Review District
Ldn	day-night equivalent noise level
Leq	noise equivalency level
LFA	Locally Funded Alternative
LOS	Level of Service
Metro	King County Metro Transit
MLK	Martin Luther King

NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
OBS	on-board systems
OCS	overhead catenary system
ORCA	One Regional Card for All
PSRC	Puget Sound Regional Council
RCW	Revised Code of Washington
R Line	RapidRide R Line
RPZ	restricted parking zone
RTIS	real time information sign
SCL	Seattle City Light
SDOT	Seattle Department of Transportation
SEPA	Washington State Environmental Policy Act
SIP	Street Improvement Permit
Standards	King County Metro's RapidRide Expansion Program Standards and Implementation Guidance
TAZ	transportation analysis zone
TNC	Transportation Network Company
TSP	transit signal priority
TWLTL	two-way left turn lane
VdB	vibration decibels
WSDOT	Washington State Department of Transportation



ES Executive Summary

King County Metro (Metro) is planning to upgrade the existing Route 7 to RapidRide R Line (R Line) bus rapid transit service. The planned R Line, located entirely in the City of Seattle, would provide service between downtown Seattle in the north and the Rainier Beach Link Station in the south, connecting communities along S. Jackson Street and Rainier Avenue S., including the Chinatown-International District, Columbia City, and Rainier Beach. The communities surrounding the study corridor are among the most diverse in King County, with a wide variety of cultural, economic, racial, and language diversity. They also include a high number of traditionally transit-dependent persons. The percentage of persons of color, low-income households, households with members of limited-English speaking communities, and zero vehicle households along the study corridor are all above the King County average. The existing Route 7 is among Metro's highest ridership routes.

The planned R Line improvements include additional service along the route, upgraded RapidRide branded coaches, stops upgraded to stations, additional passenger amenities, access to transit improvements, and capital investments along the route to improve transit speed and reliability. Development of capital improvements to support R Line service are expected to compliment those planned by the City of Seattle Department of Transportation (SDOT) as part of their Route 7 Transit-Plus Multimodal Corridor project.

This report summarizes the Pre-Design evaluation, which included early design definition of R Line. The major capital improvements identified during the pre-design analysis address speed and reliability, passenger facilities, communications and technology, and access to transit. The culmination of this analysis was development of the R Line Unconstrained Alternative which represents the complete suite of improvements that would serve to provide the greatest benefit for transit operations, ridership increases, and passenger safety and comfort. Development of the Unconstrained Alternative was predicated on a series of improvements planned by SDOT.

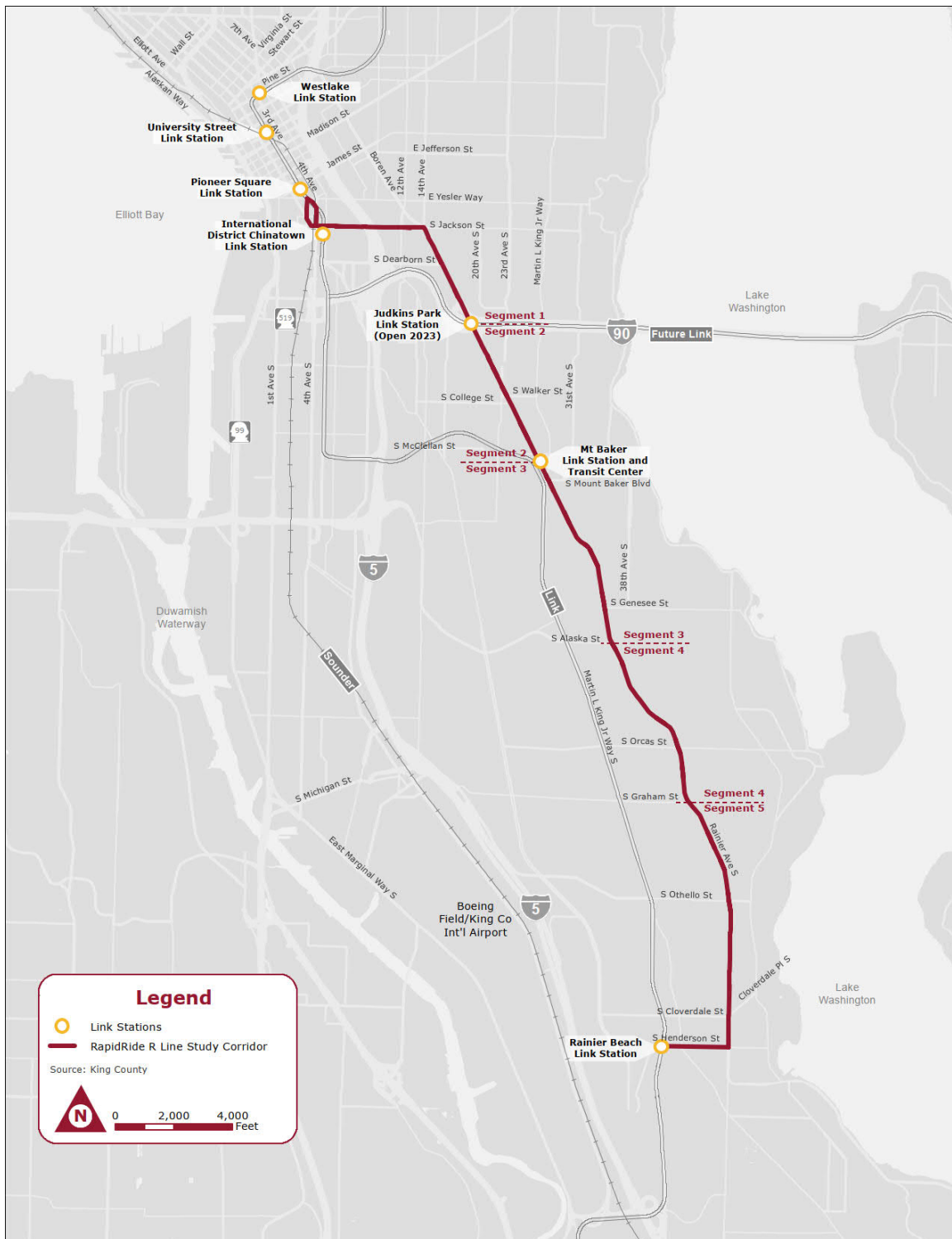
The Unconstrained Alternative was developed as an iterative process among tasks, with the Speed and Reliability and Passenger Facilities tasks serving as the primary factors for identification of improvements. Development of recommended speed and reliability and passenger improvements was a concurrent and coordinated effort in which projects were identified and confirmed for consistency to ensure there were no conflicts. Access to transit improvements followed the location of stations, including the station rebalancing process. Similarly, communications and technology investment recommendations were related to the identified locations for transit signal priority (TSP) as part of the speed and reliability

improvements and stations with real-time arrival data and off-board fare transactions.¹ The Unconstrained Alternative also includes targeted investments to improve the pavement conditions, overhead catenary system (OCS) investments to provide trolley bus power in areas where it is not currently provided and passing wire, and improvements to support layover needs at the northern and southern termini.

For the purpose of the pre-design analysis, the study corridor was divided into five segments, shown in Figure ES-1. Improvements included in the Unconstrained Alternative are described in the following sections.

¹ *This report assumes off-board fare collection at all stations, including off-board ORCA readers and related infrastructure upgrades. Upon implementation, Metro may choose to install on-board ORCA readers, enabling all-door, on-board fare payment, resulting in a change to the project cost estimate and making off-board fare payment upgrades unnecessary.*

Figure ES-1. R Line Study Corridor



Speed and Reliability

The Unconstrained Alternative includes speed and reliability improvements in all segments of the study corridor. They comprise business access and transit (BAT) lanes, TSP, and queue jumps, all of which were selected based on their potential to reduce transit travel time without significant impacts to general purpose traffic, improve transit reliability, and improve safety. TSP was identified at all signals or transit approaches forecast to operate at level of service (LOS) C or worse (with the exception of those forecast to operate at LOS F) in 2040. Table ES-1 summarizes the improvements by segment.

The improvements in the Unconstrained Alternative result in transit travel time savings over the No-Build conditions in all segments, in both directions, and during both peak hours in both 2024 and 2040. The most significant transit travel time savings along the length of the corridor, 9.4 minutes in 2024 and 11.7 minutes in 2040, are forecast for northbound travel during the AM peak period. This is primarily attributed to installation of the northbound BAT lanes from S. Alaska Street to Martin Luther King (MLK) Jr Way S. With the activation of TSP, southbound transit travel times are forecast to decrease in the PM peak hour compared to forecast No-Build conditions in each study year, saving 8.5 and 7.3 minutes along the length of the corridor in 2024 and 2040, respectively.

The Unconstrained Alternative includes revised northbound routing from S. Jackson Street along 5th Avenue S. The analysis of this routing was performed to identify potential speed and reliability solutions to address delay at the intersection of 4th Avenue S. and S. Jackson Street. It was an internal analysis and neither the results nor the potential alignment and station location changes were presented for community input. Confirmation of R Line routing will be required during a future phase of the R Line project.

Table ES-1. R Line Unconstrained Alternative Speed and Reliability Improvements

Segment	From	To	Proposed Improvement
1	3rd Avenue/ Yesler Way	I-90	<ul style="list-style-type: none"> Develop a northbound path from 5th Avenue S. and S. Jackson Street to 3rd Avenue and Yesler Way via 5th Avenue S., Terrace Street, and Yesler Way^a Construct a northbound center-running BAT lane on Rainier Avenue S. from S. Lane Street to S. Jackson Street Convert the high occupancy vehicle (HOV) bypass lane on southbound Rainier Avenue S./I-90 eastbound ramp to a general-purpose lane^b Apply TSP at S. Dearborn Street
2	Rainier Avenue S./ S. King Street	Rainier Avenue S./ S. Forest Street	<ul style="list-style-type: none"> Apply TSP at I-90 eastbound off-ramp, S. Massachusetts Street, 23rd Avenue S., S. McClellan Street Installation of a pedestrian half-signal at S. Walker Street^b
3	Rainier Avenue S./ S. Forest Street	Rainier Avenue S./ S. Alaska Street	<ul style="list-style-type: none"> Convert the curbside general-purpose lane to a northbound BAT lane from S. Genesee Street to MLK Jr Way S. Remove on-street parking and add a northbound BAT lane from S. Alaska Street to S. Genesee Street Apply TSP at S. Walden Street, Letitia Avenue S., S. Andover Street, S. Genesee Street, S. Alaska Street Modification of signal phasing at S. Charlestown Street/Letitia Avenue S.

Segment	From	To	Proposed Improvement
4	Rainier Avenue S./ S. Alaska Street	Rainier Avenue S./ S. Graham Street	<ul style="list-style-type: none"> Convert on-street parking to a northbound BAT lane from S. Mead Street to 39th Avenue S. Apply TSP at S. Edmunds Street, S. Orcas Street, S. Graham Street
5	Rainier Avenue S./ S. Graham Street	Rainier Avenue S./ S. Henderson Street	<ul style="list-style-type: none"> At the intersection of Rainier Avenue S. and S. Henderson Street, change the northbound approach from a shared left turn/through, and shared through/right turn to a left, through, and right turn lane. Allow through buses to pass through the intersection from the right turn lane. Convert the curbside general-purpose lane to a northbound BAT lane connecting to the existing northbound BAT lane Rechannelize the EB approach on S. Henderson Street to include an EB left turn lane for general purpose traffic, an EB bus-only left turn lane, and an EB shared through/right turn lane Apply TSP at S. Holly Street, S. Othello Street, S. Cloverdale Street

Notes:

^a Final routing from S. Jackson Street to 3rd Avenue and Yesler Way to be determined in a future project phase.

^b The HOV bypass lane would not be converted until it is no longer used by Sound Transit Express bus service.

^c This improvement responds to proposed access to transit improvements.

Passenger Facilities

The stop rebalancing and station placement process was iterative and highly coordinated with the development of speed and reliability improvements. During the rebalancing process, the team acknowledged and considered the unique nature of the R Line study area and study corridor among Metro service areas and routes because of its concentration of high ridership stops, large number of social services along the corridor, and high number of traditionally transit-dependent populations. Feedback received during community engagement informed the rebalancing process.

The Unconstrained Alternative includes 45 stations (23 inbound and 22 outbound). They include 13 medium, 26 large, and 6 large raised stations, with amenities that reflect King County Metro's RapidRide Expansion Program Standards and Implementation Guidance (Standards). The average inbound and outbound spacing for stations included in the Unconstrained Alternative are 1,698 feet (0.32 miles) and 1,685 feet (0.32 miles), respectively. Only 14 outbound and 14 inbound stops would have spacing greater than one-quarter mile. Figure ES-2 shows the location and type of stations included in the Unconstrained Alternative.

Figure ES-2. Unconstrained Alternative Station Locations by Type (1 of 3)

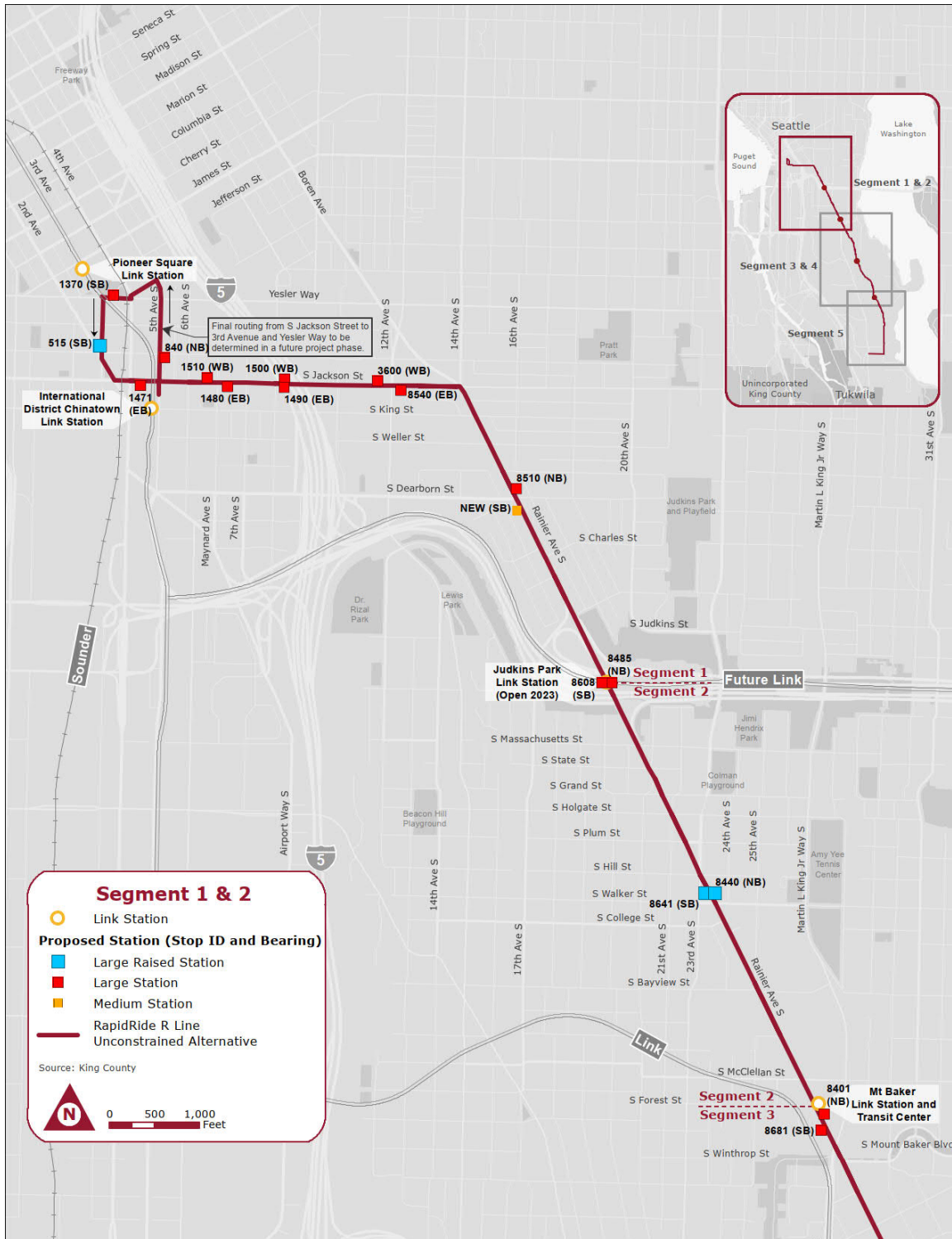


Figure ES-2. Unconstrained Alternative Station Locations by Type (2 of 3)

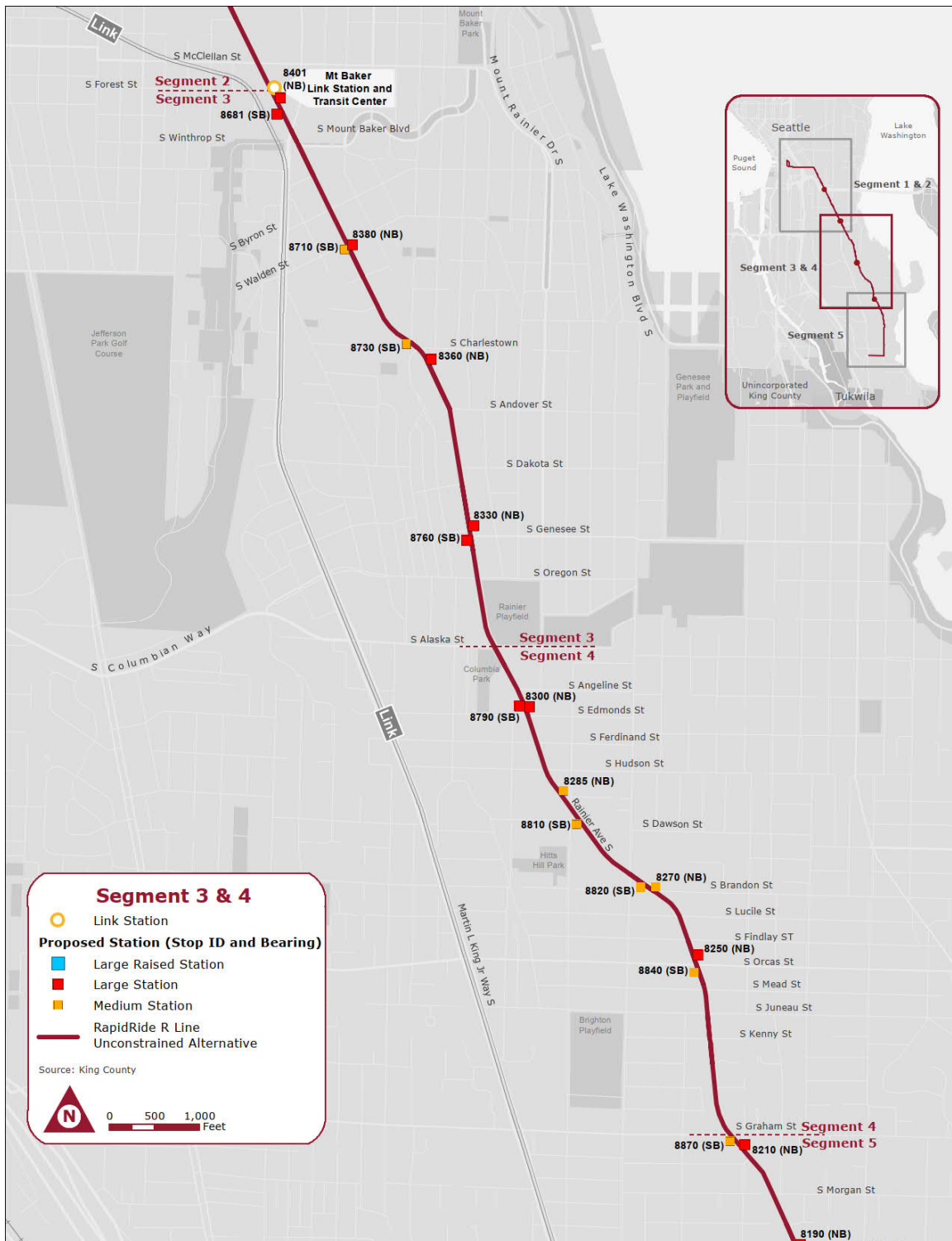
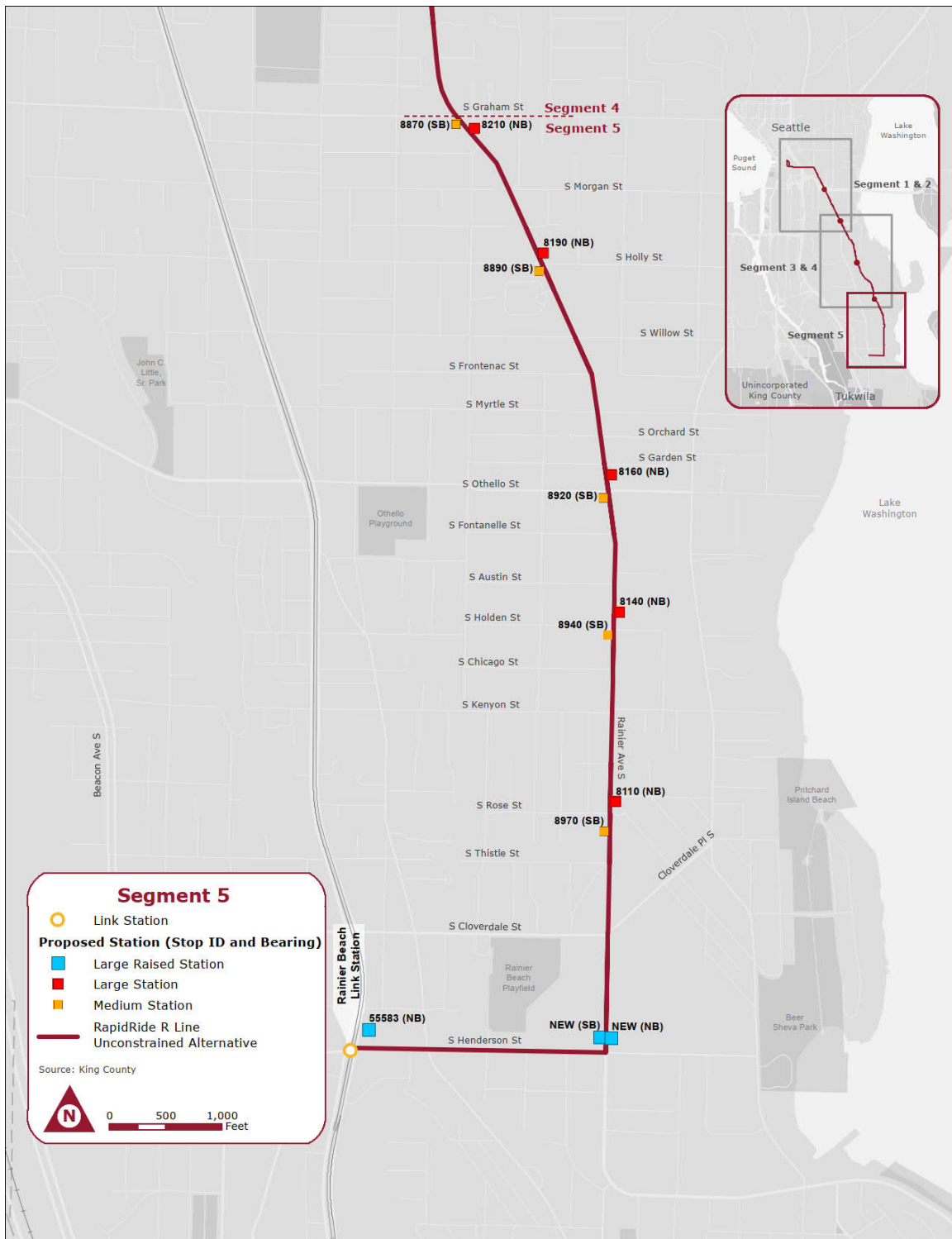


Figure ES-2. Unconstrained Alternative Station Locations by Type (3 of 3)



Communications and Technology

Communications and technology improvements are integral to deploying TSP at signalized intersections to improve transit speed and reliability and for providing real-time arrival information and off-board fare collection at RapidRide station locations. Based on the analysis undertaken as part of the Speed and Reliability Task, 16 of the 48 signalized intersections along the study corridor were recommended for TSP as a part of the Unconstrained Alternative. Three of these intersections were previously equipped with existing TSP for the Route 7 and meet Metro's operational requirements, thus a total of 13 new TSP intersections are included in the Unconstrained Alternative.

All stations included in the Unconstrained Alternative include technology pylons with real time information signs, which will require communication connections between Metro's central system and the station to provide next bus arrive information to the signs. Large raised and large stations will also include stand-alone fare transaction processors for off-board fare collection, which also require communication connections to the station.

Access to Transit

The Unconstrained Alternative includes 14 access to transit improvements, as summarized in Table ES-2. Access to transit improvements included in the Unconstrained Alternative were determined using the King County Metro Access to Transit Improvement Methodology as well as community feedback.

Table ES-2. Access to Transit Projects Included in the Unconstrained Alternative

Access to Transit Project	
Segment 1 – 3rd Avenue and Yesler Way to I-90	
1	Pedestrian crossing improvements at I-90 on- and off-ramps
Segment 2 - I-90 to S. Forest Street	
2	Sidewalk spot improvements along the east side of Rainier Avenue S. from the I-90 eastbound on-ramp to S. Holgate Street
3	ADA crossing improvements at S. Hill Street/23rd Avenue S./Rainier Avenue S. connecting to the Lighthouse for the Blind

Access to Transit Project

- 4 Pedestrian crossing improvements at S. Walker Street/Rainier Avenue S.
- 5 Sidewalk spot improvements along both sides of Rainier Avenue S. between S. Walker Street and S. McClellan Street

Segment 3 - S. Forest Street to S. Alaska Street

- 6 Sidewalk and crossing improvements at the Mount Baker Link Station and Transit Center
- 7 Improve pedestrian crossings of Rainier Avenue S. at Letitia Avenue S. and S. Charlestown Street; Construct new sidewalk along north side of S. Charlestown Street from 34th to 35th Avenue S
- 8 Sidewalk spot improvements along both sides of Rainier Avenue S. between S. Charlestown Street and S. Genesee Street

Segment 4 - S. Alaska Street to S. Graham Street

- 9 Pedestrian improvements between the Washington State Department of Services for the Blind and the future S. Edmunds Street Station
- 10 Improve pedestrian crossings of S. Brandon Street; Install a neighborhood greenway connection along S. Brandon Street between Rainier Avenue S. and the protected bike lanes along Wilson Avenue S.

Segment 5 - S. Graham Street to S. Henderson Street

- 11 Upgrade ADA curb ramps and stripe crosswalks across all legs of the S. Holden Street intersection; Improve the S. Wildwood Lane pedestrian path; Install a neighborhood greenway connection along S. Holden Street between the future R Line station at Rainier Avenue S. and the Rainier Valley North-South Greenway along 46th Avenue S.
- 12 Pedestrian crossing improvements at S. Henderson Street/Rainier Avenue S.
- 13 New sidewalks along 46th Avenue S., 48th Avenue S., 50th Avenue S., and S. Director Street
- 14 Sidewalk spot improvements along the east side of Rainier Avenue S. from S. Henderson Street to 52nd Avenue S.

In addition to the projects summarized in Table ES-2, the following access to transit improvements are integrated into passenger facilities improvements.

- Construct sidewalk improvements along west side of Rainier Avenue S. near the future R Line station at S. Dearborn Street.
- Shorten pedestrian recall time to improve signal responsiveness at pedestrian crossings near the future Columbia City R Line stations at S. Edmunds Street and S. 39th Street.
- Shorten pedestrian recall time to improve signal responsiveness at pedestrian crossings near the future S. Graham Street R Line stations.
- Improve pedestrian lighting at S. Holly Street and Rainier Avenue S.

Additionally, an improved pedestrian crossing at the Chief Sealth Trail near the southern terminus at the Rainier Beach Link station is included in the Unconstrained Alternative.

Other Investments

In addition to the improvements noted above, the Unconstrained Alternative includes the following:

- Improvements at the northern and southern termini to support layover needs, including OCS infrastructure and comfort stations.
- Extension of the OCS system along S. Henderson Street from Rainier Avenue S. to MLK Jr Way S.
- Installation of passing wire at the northbound and southbound stations at S. Bayview Street and S. Walker Street to allow R Line buses to travel around other trolley buses stopped at these zones.
- Extension of the OCS system along 5th Avenue S., Terrace Street, and Yesler Way to support the revised northbound routing from S. Jackson Street.²

Project Capital Costs

Cost estimates were developed based on the 10 percent conceptual plans prepared for the Unconstrained Alternative. Cost estimates include construction, contingency, and inflation costs. The total cost for all improvements included in the Unconstrained Alternative is \$90.8 million in 2020 dollars. Table ES-3 summarizes estimated costs for the project by task.

² Final routing from S. Jackson Street to 3rd Avenue and Yesler Way to be determined in a future project phase.

Table ES-3. R Line Unconstrained Alternative Cost Estimate

Project Element	Estimated Cost (2020 dollars)
Speed and Reliability	\$10,995,000
Passenger Facilities	\$17,592,500
Communications and Technology	\$17,113,000
Access to Transit	\$17,951,000
Trolley and Traction Power	\$15,226,000
Pavement Rehabilitation	\$11,709,500
Property Acquisition	\$182,000
Total	\$90,769,000

Future Project Considerations

Development of R Line capital investments are anticipated to be implemented in accordance with Metro's Capital Project Management Work Group project schedule template, including its project phases and milestones. At the onset of Pre-Design, Metro anticipated final design and bidding services would immediately follow the completion of Pre-Design, which would subsequently support opening of R Line in 2024. Due to fiscal impacts resulting from the COVID-19 pandemic, all work subsequent to Pre-Design was deferred indefinitely and a year of opening for service was undetermined at the time of this report. The analysis and conclusions documented in this report may need to be revisited in future phases of R Line project development to ensure they reflect existing and/or forecast conditions at that time. Additionally, Metro will want to continue to coordinate with SDOT to understand if and when their assumed improvements will advance to construction. Other projects not anticipated during this analysis could also be advanced by SDOT prior to implementation of R Line improvements and should be considered during future R Line project phases.



1 Introduction

1.1 RapidRide R Line Project Overview

King County Metro Transit (Metro) is working to transform its transit system so riders can rely on buses with service so frequent they will not need to consult a schedule to determine when to catch a bus. Metro's RapidRide Expansion Program puts into action the [METRO CONNECTS](#) Long Range Plan vision (Metro 2017a) for a major expansion of frequent service.

Compared to the bus routes they replaced, the combined existing RapidRide Routes A through F carry approximately 65 percent more riders, which equates to 63,000 passenger trips per weekday. Travel on RapidRide is as much as 20 percent faster and most lines save between 1 and 5 minutes per trip.

METRO CONNECTS envisions an expanded network of RapidRide lines throughout King County. This network will help to create better connections and provide service that is faster, more comfortable, and easier to use than traditional bus service. Where a new RapidRide line goes into service, Metro may look for opportunities to consolidate, restructure, or otherwise reorganize existing service to ensure an efficient transportation system that works toward the vision in METRO CONNECTS. Investments in RapidRide will help to bring frequent transit service to 70 percent of King County residents by 2040.

Metro is planning to upgrade the existing Route 7 to RapidRide R Line (R Line) bus rapid transit (BRT) service. The existing Route 7 provides service between downtown Seattle, the Chinatown-International District, Columbia City, and Rainier Beach. The planned R Line improvements include additional service along the route, upgraded RapidRide branded coaches, stops upgraded to stations, additional passenger amenities, access to transit improvements, and capital investments along the route to improve transit speed and reliability. Development of capital improvements to support R Line service are expected to complement those planned by the City of Seattle Department of Transportation (SDOT) as part of their Route 7 Transit-Plus Multimodal Corridor project.

Development of R Line capital investments are anticipated to be implemented in accordance with Metro's Capital Project Management Work Group project schedule template, including its project phases and milestones. This report summarizes the Pre-Design evaluation, which included early design definition of R Line. At the onset of Pre-Design, Metro anticipated final design and bidding services would immediately follow the completion of Pre-Design which would subsequently support opening of R Line in 2024. Due to fiscal impacts resulting from the COVID-19 pandemic, all work subsequent to Pre-Design was deferred indefinitely and a year of opening for service was undetermined at the time of this report. The decision to defer further work on R Line was issued after all technical analysis required to develop the Unconstrained Alternative for the

project was completed. Given the advanced nature of the analysis and the unknown future year of opening, Metro directed the project team to complete this report and incorporate all analysis based on the original anticipated year of opening. The analysis and conclusions documented in this report may need to be revisited in future phases of R Line project development to ensure they reflect existing and/or forecast conditions at that time.

1.2 Prior Studies

SDOT previously led design, construction and outreach as part of their RapidRide Rainier project.³ Through 2017 and early 2018, SDOT led broad community engagement efforts to gather community input on transportation needs and priorities along Rainier Avenue S. These efforts included evaluation of speed and reliability improvements as well as stop rebalancing efforts. Metro participated in this process, providing feedback to SDOT regarding the investments under consideration. Metro began the Pre-Design phase of the R Line project in Spring 2019.

Early work that has provided a framework from which to develop a detailed plan for R Line includes the following King County documents and studies:

- METRO CONNECTS (Metro 2017a)
- RapidRide Program Vision, Goals, and Performance Measures (Metro 2019b)
- RapidRide Expansion Program Standards and Implementation Guidance (Metro 2019a)
- King County Equity and Social Justice Plan (King County 2016)
- Transit Speed and Reliability Guidelines and Strategies (Metro 2017b)
- RapidRide Rainier S. Jackson Street Preferred Concept and Corridor Stop Consolidation – Metro Feedback Memorandum (Metro 2018c)

³ SDOT subsequently reprogrammed the RapidRide Rainier project as the Route 7 Transit-Plus Multimodal Corridor project. In early 2019, Metro took over as lead agency for development of RapidRide improvements.

The following local jurisdiction plans were reviewed to more completely understand on-going and planned initiatives within the study area that might influence project decisions. Documents that were reviewed included:

- RapidRide Rainier Line Public Engagement Report (SDOT 2019e)
- Seattle Transit Master Plan (SDOT 2016b)
- Vision Zero Action Plan (SDOT 2015)
- 2019-2024 Implementation Plan Seattle Bicycle Master Plan (SDOT 2019a)
- Seattle Capital Improvement Program (2019-2014) (SDOT 2018)
- Judkins Park Station Access Study (SDOT 2019c)
- Accessible Mt. Baker (SDOT 2019b)
- City of Seattle Freight Master Plan (SDOT 2016a)
- VISION 2040 Plan (Puget Sound Regional Council [PSRC] 2008)

1.3 Study Corridor Overview

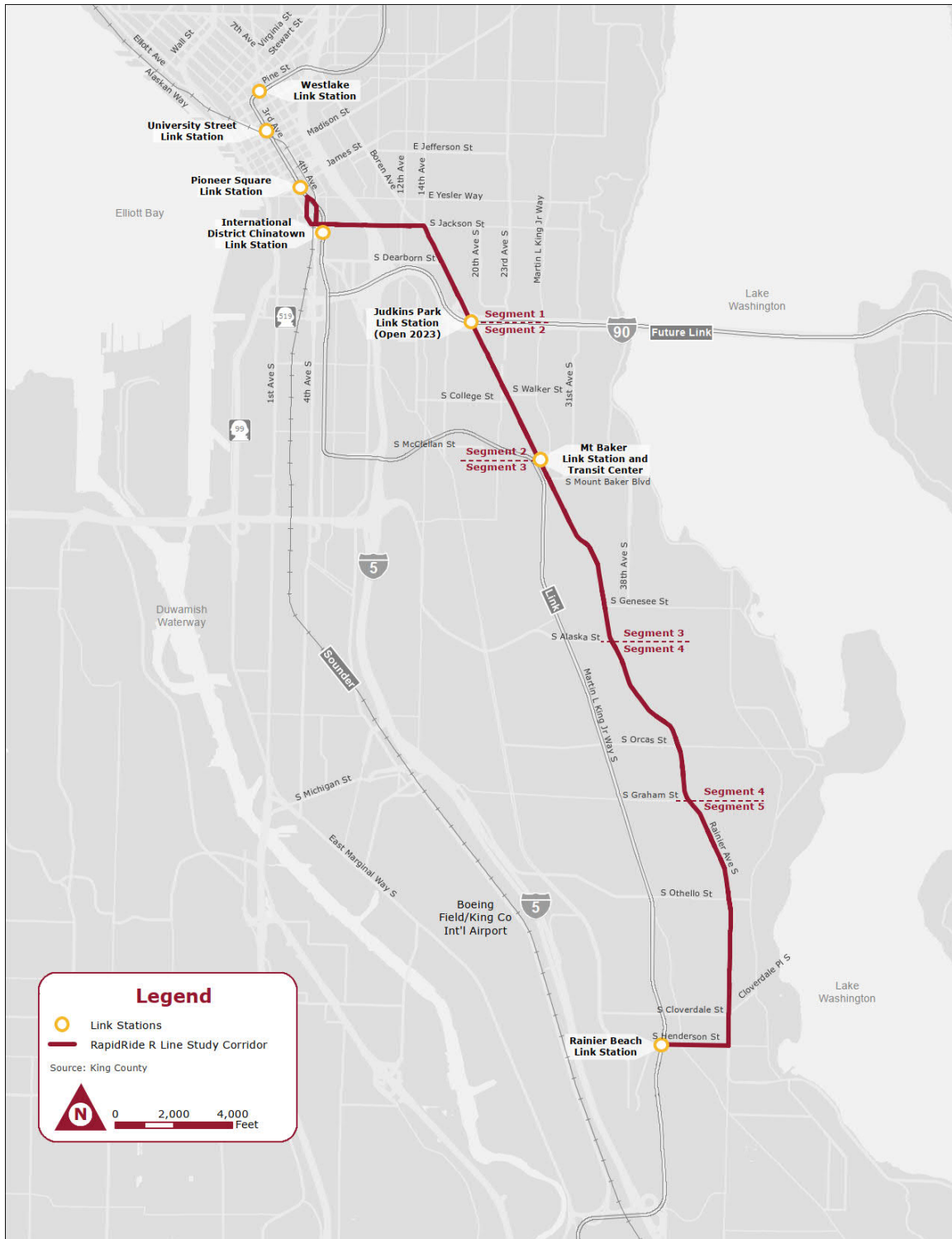
The existing Route 7 is approximately 9.4 miles long and provides service between downtown Seattle, the Chinatown-International District, Columbia City, and Rainier Beach, and serves multiple neighborhoods and transit transfer points in the City of Seattle. The R Line study corridor would replicate the majority of the Route 7 alignment, with the exception of the existing southernmost segment, commonly referred to as the “Prentice Loop.” The R Line study corridor is 7.1 miles long and has been divided into five areas, shown in Figure 1-1⁴. From north to south, the study segments are delineated as follows:

- Segment 1 begins in downtown Seattle at the intersection of 3rd Avenue and Yesler Way, passes through Pioneer Square, the Chinatown-International District, and Little Saigon on S. Jackson Street, and continues on Rainier Avenue S. through the Central District, Judkins Park neighborhoods, and North Beacon Hill to Interstate 90 (I-90). This segment includes the International District/Chinatown Link Station, King Street Station (Sounder, Amtrak), and First Hill Streetcar, as well as the future Judkins Park Link Station, scheduled to open in 2023, at I-90.
- Segment 2 continues along Rainier Avenue S. through the North Rainier Valley and North Beacon Hill from I-90 to the Mount Baker Link Station and Transit Center at S. Forest Street.
- Segment 3 extends from the Mount Baker Link Station and Transit Center to S. Alaska Street, serving the Mount Baker and Columbia City neighborhoods.

⁴ The R Line study corridor is shorter than the existing Route 7 corridor because the R Line Pre-Design analysis included only limited evaluation of the existing Route 7 and planned R Line alignment south of 3rd Avenue and Yesler Way. However, the northern terminus of the R Line would remain near the existing layover at 4th Avenue and Virginia Street.

- Segment 4 serves the Brighton and Hillman City neighborhoods from S. Alaska Street to S. Graham Street.
- Segment 5 continues south on Rainier Avenue S. from S. Graham Street to S. Henderson Street and includes S. Henderson Street between Rainier Avenue S. and the Rainier Beach Link Station at its southern terminus. The connection to the Rainier Beach Link Station reflects the vision for this RapidRide line as shown in METRO CONNECTS as well as earlier planning documents that envisioned a connection to Link at this location. In addition to the stations in Segments 1 and 3, the connection to the Rainier Beach Link Station will improve access for riders to the expanding Link system, as well as the broader local and regional transit network.

Figure 1-1. R Line Study Corridor



1.4 Corridor Planning and Upgrade Report Overview

This Corridor Planning and Upgrade Report is the culmination of Pre-Design work that includes 10 percent design for the R Line study corridor and is a comprehensive report of the work completed, processes used, and outcomes reached. It also describes the R Line Unconstrained Alternative, which is the complete suite of preferred capital investments identified for R Line through the Pre-Design analysis. This report is divided into chapters that cover the following topics:

- Executive Summary
- Chapter 1 – Introduction
- Chapter 2 – Methods, Approaches, and Project Decisions
- Chapter 3 – Existing Conditions
- Chapter 4 – Environmental Assessment
- Chapter 5 – Community Engagement
- Chapter 6 – Alternatives Analysis
- Chapter 7 – Project Definition – Unconstrained Alternative
- Chapter 8 – Consistency with RapidRide Standards
- Chapter 9 – Conceptual Design and Cost Estimates
- Chapter 10 – Conclusions and Next Steps
- Chapter 11 – References
- Appendices

Activities for the R Line Pre-Design phase (Planning, Alternatives Analysis, Environmental Documentation, and 10 percent Pre-Design) were divided into multiple tasks. Reports and technical memoranda developed by other R Line tasks include the following:

- RapidRide R Line Speed and Reliability Upgrade Report (Metro 2020n) (Appendix A)
- RapidRide R Line Passenger Facilities Upgrade Report (Metro 2020l) (Appendix B)
- RapidRide R Line Communications and Technology Inventory Upgrade Report (Metro 2020j) (Appendix C)
- RapidRide R Line Access to Transit Upgrade Report (Metro 2020i) (Appendix D)
- RapidRide R Line Community Engagement Summary Phase 1 (Metro 2019c) (Appendix E)
- RapidRide R Line Community Engagement Summary Phase 2 (Metro 2020k) (Appendix F)
- RapidRide R Line Service Planning Report (Appendix G)

Environmental Memoranda (Appendix H)

- RapidRide R Line Project Preliminary Cultural Resources Scan (Metro 2020m)
- Hazardous materials memorandum (Metro 2020e)
- FTA Region 10's ESA screening checklist (Metro 2020d)

- Acquisitions and displacements memorandum (Metro 2020a)
- Noise and vibration memorandum (Metro 2020h)
- Environmental justice and equity and social justice memorandum (Metro 2020c)
- Soils and geology memorandum (Metro 2020o)
- Air quality hotspot memorandum (Metro 2020b)
- NEPA screening level Environmental Classification Checklist (Metro 2020g)

Because the overall implementation schedule for R Line was revised late in the Pre-Design phase of the project development process, the four upgrade reports in the appendices include language reflecting modified timeline and rationale for incorporating data associated with the originally forecast year of opening (2024) as part of the analysis. Additionally, the following reports associated with completion of Phase 1 were modified from the standard RapidRide content and format to reflect and address the project delay as follows:

- The Investment Strategy and Reconciliation Report (Appendix I) summarizes and compares the projects included in the R Line Unconstrained Alternative and the R Line Locally Funded Alternative (LFA). The LFA represents the highest priority projects for R Line that ensure it incorporates the capital investments needed to provide the minimum level of service for a RapidRide line. The report describes the process and methodology employed for development of the LFA as well as the process to “build up” from the LFA to the Unconstrained Alternative via a prioritized list of projects. Finally, the Investment Strategy and Reconciliation Report identifies interim projects which could be developed in advance of R Line should funding become available. These projects include improvements that would benefit existing service in the corridor and would be retained as part of the eventual R Line development.
- In the place of the 10 Percent Design Report, the following appendices have been included as part of the Corridor Planning and Upgrade report.
 - Conceptual plan set for the Unconstrained Alternative (10 percent design), including a basis of design memorandum
 - Cost estimating methodology memorandum and 10 percent design cost estimates

1.5 Alignment with King County Equity and Social Justice Strategic Plan

The communities surrounding the R Line study corridor are among the most diverse in King County, with a wide variety of cultural, economic, racial, and language diversity. Demographic features of the communities include:⁵

- The percentage of persons of color along the entirety of the corridor is above the King County average. The percentage of persons of color is particularly high around the southern portion of Rainier Avenue S., near the Rainier Beach Light Rail Station.
- The percentage of low-income households along the corridor is more than one and a half times the King County average.
- The percentage of households with members of limited-English speaking communities is more than two times the King County average throughout the study corridor, excluding one portion of Columbia City.
- The percentage of households with zero vehicles along the corridor is above the King County average, excluding the Seward Park neighborhood and portions of Columbia City. There are high concentrations of zero car households near the Mount Baker Link station, the Rainier Beach Link station, I-90 (the future Judkins Park Link station), and the International District/Chinatown Link station.
- The population of persons with disabilities tends to be clustered around Link stations, where there is the greatest ability to access destinations. Persons with disabilities are congregated around the the International District/Chinatown Link station, Mount Baker Link station, Rainier Beach Link station, and the Columbia City neighborhood. Lift deployments are evenly distributed at stops throughout the study corridor.

The [King County Equity and Social Justice Plan](#) (King County 2016) is a blueprint for change meant to address deep and persistent inequities—especially by race and place—in King County. The plan establishes strategies and shared values to advance equity and social justice in King County. Strategies include investing upstream and where needs are greatest, in community partnerships, and in employees, with accountable and transparent leadership.

King County has identified 13 determinants with 67 community-level indicators that are used to understand and measure equity throughout the county. Several of the indicators are directly determined by the provision of Metro Transit service, particularly those that measure the Transportation Determinant. The following determinants will be influenced by the provision of R Line service.

⁵ The reported values are based on calculated population estimates in American Community Survey block groups within a half-mile buffer from the study corridor. For block groups that are not entirely in the study area or on land, the totals are adjusted based on the percentage of the block group that is within the study area or on land.

- Passenger crowding and schedule reliability, measured as the percent of estimated service needed to reduce passenger crowding, improve schedule reliability and meet target service levels on routes serving communities with persons of color or low-income people, and on-time performance, are two indicators of the Transportation Determinant. R Line service will represent an improvement in schedule reliability over the existing Route 7, resulting from the investment in right-of-way improvements, such as Business Access and Transit (BAT) lanes.
- Proximity to Metro Transit, measured as the percent of housing units per census tract that are located within a quarter mile of a transit stop or a two-mile drive to a park-and-ride, is one indicator of the Transportation Determinant. R Line service will represent a minimal decrease in the number of households located within a quarter mile of a transit stop. Currently, there are an estimated 16,046 households within a quarter mile of stops along the R Line study corridor. Twelve stops, including 5 stop pairs, would be closed and 13 stops, including 5 stop pairs, along the study corridor would only be served by local (non-RapidRide) routes in association with conversion to R Line. Due to the close proximity of existing stops along the corridor, the closures would only result in a decrease of approximately 202 households within a quarter mile of a transit stop. No changes to park-and-rides are proposed as part of the R Line project.
- Reliance on Metro Transit is important for persons whose only means of mobility is public transit. Capturing the rate of transit dependency for people of color and those who are low income is important for promoting equitable service delivery in transportation. Several preliminary measures or determinants of equity are directly represented in the King County Metro Access to Transit Improvement Methodology (Metro 2018a) that was used to prioritize access to transit projects along the R Line corridor including:
 - Percent of low-income households
 - Percent of communities of color
 - Percent of zero-vehicle households
 - Percent of persons with a disability
 - Percent of lift deployments
- Median household income by race is weighted most highly in the equity-focused scenario of the Access to Transit Improvement Methodology to prioritize investments in areas with greatest unmet need as defined by the [King County Metro Mobility Framework](#) (Metro 2020f). These are geographic areas with a high proportion of low-income people, people of color, people with disabilities, members of limited-English speaking communities, and those that have limited mid-day and evening transit service to schools, jobs, and child care centers and other ways to build wealth and opportunities. The high proportion of communities with unmet need throughout the future R Line corridor informed an equity-centered prioritization process to focus access to transit improvements particularly in Rainier Beach (Segment 5) where reliance on Metro Transit is greatest.

While not directly measured, provision of R Line service can contribute to the advancement of other determinants and indicators, such as:

- The ability to reliably and affordably access employment and education opportunities via transit can contribute to the reduction of unemployment and poverty rates and the increase of household incomes. Access to reliable transit service can support the advancement of education, including improved high school graduation rates, reduced dropout rates, and expanded access to two- or four-year colleges.
- Reliable transit service can also contribute to the success of early childhood development, as it allows parents and caregivers who rely on transit service to plan for time with families, to read nightly to children, or participate in Early Achievers programs.
- Proximity to transit influences total travel times for transit riders. Close proximity to transit stops results in lower overall travel times than stops that require long walks, bicycle rides, or drives, allowing persons to dedicate to other pursuits, such as education and time with families.

The R Line Equity Impact Review, detailing how the policies and goals laid out in the King County Equity and Social Justice Strategic Plan were applied in the R Line evaluation process, will be prepared in advance of the R Line alignment being advanced to the King County Council for approval.

2

Methods, Approaches, and Project Decisions

The purpose of Pre-Design was to determine which civil infrastructure projects should be implemented as part of the R Line Unconstrained Alternative. This includes the necessary planning, analysis, alternatives development, concept design, and cost estimation, leading to the identification of a preferred set of infrastructure elements to move into final design. The focus of the Pre-Design effort addressed the following topical areas:

- Speed and reliability
- Passenger facilities
- Communications and technology
- Access to transit
- Service planning
- Environmental considerations
- Trolley and Traction Power
- Northern and southern termini
- Community engagement

As part of their analysis, the project team was asked to evaluate potential improvements without the constraint of a set project budget. The intent of this direction was to facilitate unrestricted thinking in the identification of improvements that would serve to provide the greatest benefit for transit operations, ridership increases, and passenger safety and comfort.

The following sections summarize the methodologies and technical approaches used to evaluate and select which civil infrastructure projects included in the R Line Unconstrained Alternative.

2.1 Study Corridor Definition

The R Line study corridor was defined at the onset of the Pre-Design phase. It mirrors the existing Route 7 alignment between the intersection of 3rd Avenue and Yesler Way to the intersection of Rainier Avenue S. and S. Henderson Street and includes a connection to the Rainier Beach Link station via S. Henderson Street. This reflects the vision for this RapidRide line as shown in METRO CONNECTS as well as earlier planning documents that envisioned a connection to Link at this location. Additional rationale for this routing includes:

- Enables new connection from Rainier Avenue S. to Link. As the Link system expands, access to the Rainier Beach Link Station will improve connectivity for riders to the local and regional transit network.

- Provides a stronger southern anchor and destination for R Line than the current Route 7 southern terminus, with an anticipated increase in bi-directional travel to and from Link
- Improves connections to Link for communities of color in the Rainier corridor, particularly those south of the Mount Baker Link station
- Enables redeployment or simplification of other routes, such as Route 9, that currently provide a connection between Rainier Avenue S. and to Martin Luther King (MLK) Jr Way S. Without the R Line connection to the Rainier Beach Link station, adjustments to other routes becomes much more difficult without degrading the overall connection⁶

Limited analysis of alternative routing options was performed during Pre-Design including:

- Evaluation of an alternate northbound pathway from S. Jackson Street to the intersection of 3rd Avenue and Yesler Way to avoid existing transit travel time delays due to congestion at 4th Avenue S. and S. Jackson Street. This evaluation was undertaken as part of the speed and reliability analysis for the study corridor and resulted in a proposed revised routing for R Line along 5th Avenue S., Terrace Street, and Yesler Way.
- Comparison of the project costs and ridership impacts associated with continued use of the existing Route 7 layover to the east of Rainier Avenue S. and the associated routing along S. Henderson Street, Seward Park Avenue S., and Rainier Avenue S. (does not include the Prentice Loop).
- Evaluation of pathways associated with potential layover locations at the northern terminus. The northern terminus is not contiguous with the R Line study corridor; however, it was assumed R Line would travel along the existing 3rd Avenue transit spine in downtown Seattle to a terminus in the vicinity of the existing Route 7 layover at 4th Avenue and Virginia Street. Pathways were analyzed to determine operational feasibility and costs. Identification of the northern terminus and layover location will occur in a future project phase.

2.2 Ridership Analysis

R Line ridership forecasts were developed using an incremental data-driven ridership forecasting approach. This approach is based on the current Puget Sound Region Incremental Transit Ridership Model, further described in the Transit Ridership Forecasting Methodology Report (Sound Transit 2018b), which has been recently used to support ridership forecasting analyses for the Sound Transit 3 Plan, Community Transit Green Line BRT Small Start grant application, and the Lynnwood Link Extension Environmental Impact Statement and its New Starts grant application for federal funding. The 2024 and 2040 ridership forecasts assumed the revised

⁶ During community engagement undertaken during the Pre-Design phase, community members expressed a strong desire for the R Line to connect with light rail at the Rainier Beach Link station.

transit networks identified in Section 2.7 as a background transit network, with the Route 7 replaced with RapidRide service on R Line. The assumed R Line headways for modeling purposes included:

- Peak period – 7.5 minutes (bi-directional)
- Off-peak – 10 minutes
- Night – 15 minutes

The forecasts also account for expected population and employment growth in the corridor based on the PSRC LUV.2 forecasts produced in 2017 (PSRC 2018a). The forecasts account for an additional land use growth, a change to the southern R Line terminus, and significant other changes to the background transit network. R Line's northern terminus was assumed to be in proximity to the existing Route 7 terminus. Link Light Rail extensions were included in the background transit networks. Some services were slightly adjusted to account for five years of less growth. Zone-by-zone ridership estimates for R Line service for both years are shown below.

Existing Route 7 ridership data and the demographic composition of the communities surrounding the study corridor were reviewed to better inform project decisions. ORCA data (Metro 2016) was used to understand the travel patterns of riders, including origins, destinations, and transfer activity. The ORCA data also provided insight into the profile of riders as indicated by the passenger type of the ORCA card – adult, youth, senior, disabled, or low-income. The project team used on-board systems (OBS) data provided by Metro for Spring 2018 to understand boardings and alightings at Route 7 stops. Demographic data reviewed from the 2014-2018 American Community Survey data at the block group level included:

- People of color
- Low-income households
- Persons with limited-English proficiency
- Zero vehicle households
- Persons with a disability

2.3 Speed and Reliability

The speed and reliability analysis employed three separate modeling tools for each specific analysis in the evaluation of operations: travel demand forecasting software (EMME), traffic microsimulation software (VISSIM), and traffic operations analysis software (Synchro). The Synchro and VISSIM models evaluated the same study area, beginning at 3rd Avenue/James Street and concluding at MLK Jr Way/S. Henderson Street.

Synchro models were developed to evaluate the operations with respect to the delay and level of service at each study area intersection. VISSIM allows for more detailed operational analysis than Synchro by more accurately capturing the traffic operations resulting from transit lanes, transit vehicle interactions, turning vehicle interaction, pedestrian crossing, transit signal priority

and queue jumps. VISSIM models were developed to examine the R Line corridor in greater detail for travel time comparisons and queuing analysis. An annual growth rate of 0.5 percent was applied to existing conditions to simulate growth in general purpose traffic volumes.

- For future-year analysis, the PSRC's EMMÉ models for travel demand forecast modeling were used to determine 2024 and 2040 future-year volumes for the study area.

Proposed transit treatments and improvements identified in the Unconstrained Alternative were prioritized using performance criteria specific to speed and reliability measures. The following criteria were used in the prioritization process:

- Reduces Transit Travel Time
- Balances Impacts to General Purpose Traffic
- Improves Transit Reliability
- Improves Safety

For each performance criteria, the treatment and improvement were scored on a numerical scale of 1 to 3, representing the least- to most-effective at achieving the criteria's goal. All potential treatments or improvements were evaluated in the northbound and southbound direction for both peak periods to create a combined score for each improvement. Their performance or benefits were compared to the R Line Project Baseline (See Section 6.1 for additional details about the R Line Project Baseline).

2.4 Passenger Facilities

One of the key activities in developing the R Line Unconstrained Alternative was rebalancing of existing bus stops along the route. Rebalancing for the Unconstrained Alternative included removal, creation, or relocation of bus stops and identification of those to be converted to RapidRide stations. Bus stop rebalancing was based on Metro's previous experience associated with converting a route to RapidRide, the guidelines established in the Standards (Metro 2019a), input from Metro staff and consultants, and public comments.

The Standards identify the following four categories to consider when determining stop spacing and location in the right-of-way, including applicable desired and minimum standards and additional implementation guidance for each category.

1. Station spacing
2. Station location at intersections
3. Bus zone location in the right-of-way
4. In-lane stopping

In addition to the standards, supplemental criteria were applied to further support the process of stop rebalancing. Many of the supplemental criteria are interrelated to each other as well as the standards in one or more ways. In order to properly factor equity considerations, equity was

analyzed individually through metrics involving target populations, as a facet of other criteria, such as through walking conditions, infrastructure condition, and mobility concerns, and based on feedback from the community. The equity criterion serves as an individual metric for analysis, as well as an overarching consideration to frame the analysis of the remaining criteria. The Standards and supplemental criteria are detailed in the RapidRide R Line Passenger Facilities Upgrade Report (Appendix B).

2.5 Communications and Technology

Communication and technology improvements are integral to deploying transit signal priority (TSP) at signalized intersections to improve transit speed and reliability and for providing real-time arrival information and off-board fare collection at RapidRide station locations.⁷ While the communication and technology improvements support the deployment of TSP and communication to station amenities, the evaluation and selection of TSP locations was completed by the R Line Speed and Reliability Task and the evaluation and selection of station locations, sizes and associated amenities was completed by the R Line Passenger Facilities Task. The Communication and Technology Task then evaluated what equipment and technology is needed to provide functioning TSP at signalized intersections and real-time arrival data and off-board fare transactions at station locations based on the locations identified by the other tasks. The methodology used to conduct the communication and technology evaluation included:

- Coordinating with Metro's on-going Next Generation Wireless and Next Generation TSP projects to identify the types of equipment and communication infrastructure that will be needed to support TSP and station communications,
- Conducting field reviews and equipment inventories of existing traffic signal equipment and infrastructure to identify if the existing signal equipment can support TSP functionality,
- Conducting field reviews and record drawing research to identify existing fiber communication networks available to support TSP functionality and to provide potential communications to stations,
- Reviewing the results of data collection tasks to identify gaps and opportunities in terms of use of existing equipment versus investment in new infrastructure to support TSP at selected intersections and real-time data and off-board fare collections at selected stations, and
- Identifying communication and technology investments/upgrades needed to provide functioning TSP and communication to stations amenities.

⁷ This report assumes off-board fare collection at all stations, including off-board ORCA readers and related infrastructure upgrades. Upon implementation, Metro may choose to install on-board ORCA readers, enabling all-door, on-board fare payment, resulting in a change to the project cost estimate and making off-board fare payment upgrades unnecessary.

2.6 Access to Transit

Identification of potential access to transit projects for the R Line Unconstrained Alternative began with a thorough review of existing conditions within the quarter-mile walkshed and one-mile bikeshed of the study corridor including:

- Presence of sidewalks
- Sidewalk conditions (lifting, cracking, etc.)
- Americans with Disabilities Act (ADA) compliance
- Bicycle facility presence and type
- Protected pedestrian crossings (or lack thereof)
- Lighting conditions
- Safety assessment

Review of demographics, existing and planned facilities, crash history, on-street parking, community assets, existing Route 7 ridership, origin and destination data, and local planning documents contributed to development of a baseline understanding of access to transit needs along the study corridor.

Access to transit projects were identified through systematic assessment of the existing walking and bicycling facilities within the R Line study corridor walk- and bikesheds. Access deficiencies and network gaps near proposed R Line stations that warranted improvement concepts included:

- Missing sidewalks within the quarter-mile walkshed of proposed R Line stations
- Sidewalk segments in poor condition and where ADA accessibility was a concern within proposed R Line station walksheds. Special focus was given to mitigating the impact of Route 7 stop rebalancing for future R Line stations. Access to transit projects were identified along routes where riders will likely have a longer walk to future R Line stations.
- Intersections lacking crosswalks or controlled crossings near proposed R Line stations
- Locations with a history of collisions involving people walking and bicycling within R Line study corridor station walk- and bikesheds
- Street segments connecting directly to proposed R Line stations where the Seattle Bike Master Plan identified a bike facility for implementation

Following project identification, all projects were assessed using the King County Metro Access to Transit Improvement Methodology (2018a) and associated Project Ranking Tool. The Access to Transit Project Ranking Tool allows for rule-based ranking of access improvement project locations using up to 22 different input measures of potential project benefits. Prioritization scenarios include safety-, equity- and ridership-focused scenarios to elevate project locations most beneficial for improving safety, serving areas of greatest need, and benefiting the most transit riders. The Access to Transit Project Ranking Tool supports the prioritization of project locations rather than specific project treatments and conceptual designs. The Access to Transit

team designed access to transit improvements with recommended facilities and treatments based on professional judgement, community feedback, and understanding of the safety and access challenges at each location.

Outputs from the Access to Transit Project Ranking Tool informed the selection of access to transit project locations along with community feedback received during Phase 2 engagement and in collaboration with the R Line team and jurisdictional partners. Projects were selected for inclusion in the Unconstrained Alternative based on the results of the project ranking tool, community input on access to transit priority projects, and the professional judgment of the project team.

2.7 Service Planning

In order to analyze future transit operations, perform station rebalancing, and assess access to transit needs, Metro developed an assumed routing for R Line and conceptual transit networks for 2024 and 2040. The conceptual 2024 and 2040 service networks were developed for planning and analysis purposes only. Any future modifications to service in southeast Seattle will be developed in accordance with Metro's service change protocols, including solicitation of public feedback. It is important to note this assumed routing was identified for the analysis during the Pre-Design phase only. The final alignment will be determined in a future project phase. The RapidRide R Line Service Planning Report (Appendix G) and the RapidRide R Line Speed and Reliability Upgrade Report (Appendix A) include additional discussion of this routing analysis.

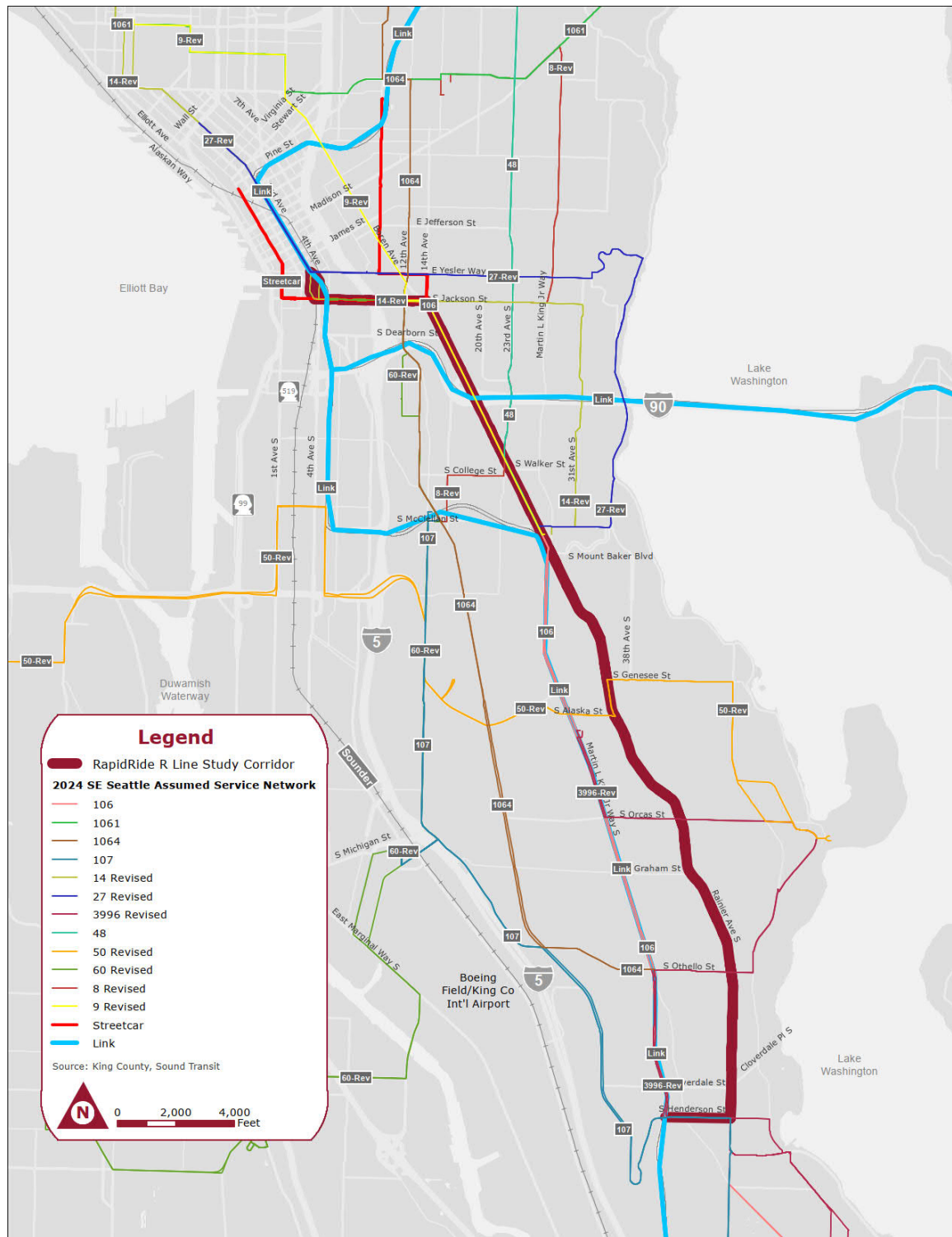
The assumed routing for R Line service generally replicates the existing Route 7. R Line would serve the 3rd Avenue transit spine and continue southbound on 3rd Avenue S. and 2nd Avenue Extension S. to S. Jackson Street. The assumed routing continues eastbound on S. Jackson Street until it intersects with Rainier Avenue S., where it turns to the south. R Line would continue southbound on Rainier Avenue S. for almost 6 miles, until the intersection with S. Henderson Street, where it would turn and continue west to its southern terminus at the Rainier Beach Link Station. The assumed northbound routing follows the southbound routing, with the exception of the segment between the intersection of 4th/5th Avenue S. and S. Jackson Street and the intersection of 3rd Avenue and Yesler Way. The assumed routing identified in the Unconstrained Alternative turns north from S. Jackson Street at 5th Avenue S. and continues to Terrace Street, where it then turns west. It would remain on Terrace Street to its intersection with Yesler Way and continue west on Yesler Way to 3rd Avenue.

The conceptual 2024 service network is summarized in Table 2-1 and displayed in Figure 2-1. **METRO CONNECTS** serves as the foundation for this network; however, some route pathways and frequencies differ. The conceptual 2024 service network assumes major transit projects planned in southeast Seattle, including Sound Transit's East Link extension and RapidRide G Line, will be implemented in advance of R Line service.

Table 2-1. Conceptual 2024 Southeast Seattle Area Service Network

Route	Service Type	To/From	Via
3996 Revised	Local, All-Day	Prentice-Rainier Beach/Columbia City	Othello/Seward Park
8 Revised	Local, All-Day	Kaiser Permanente & Madison Valley/Beacon Hill Station	MLK Jr Way S., 23rd Avenue S.
9 Revised	Frequent, All-Day	Uptown/ Mount Baker Station	Boren Avenue S.
14 Revised	Frequent, All-Day	Kinnear (Queen Anne)/ Mount Baker Transit Center	Downtown Seattle
27 Revised	Local, All-Day	Downtown Seattle/Mount Baker Transit Center	Yesler Way
1064	Frequent, All-Day	University District/Othello Station	Beacon Hill, Capitol Hill
48	Frequent, All-Day	University District/ Mount Baker Transit Center	23rd Avenue S.
50 Revised	Frequent, All-Day	Alki/Seward Park	SODO
60 Revised	Frequent, All-Day	International District/White Center	Beacon Hill
106	Frequent, All-Day	Chinatown-International District/Renton	MLK Jr Way S.
107	Local, All-Day	Beacon Hill Station/Renton	Renton Avenue S.
1061	Frequent, All-Day	Madison Park/Uptown	Denny Way, E. Madison Street, E. John Street
Link	Light Rail, All-Day	Lynnwood/Downtown Seattle Lynnwood/Downtown Redmond Downtown Seattle/Federal Way Transit Center	

Figure 2-1. Conceptual 2024 Service Network



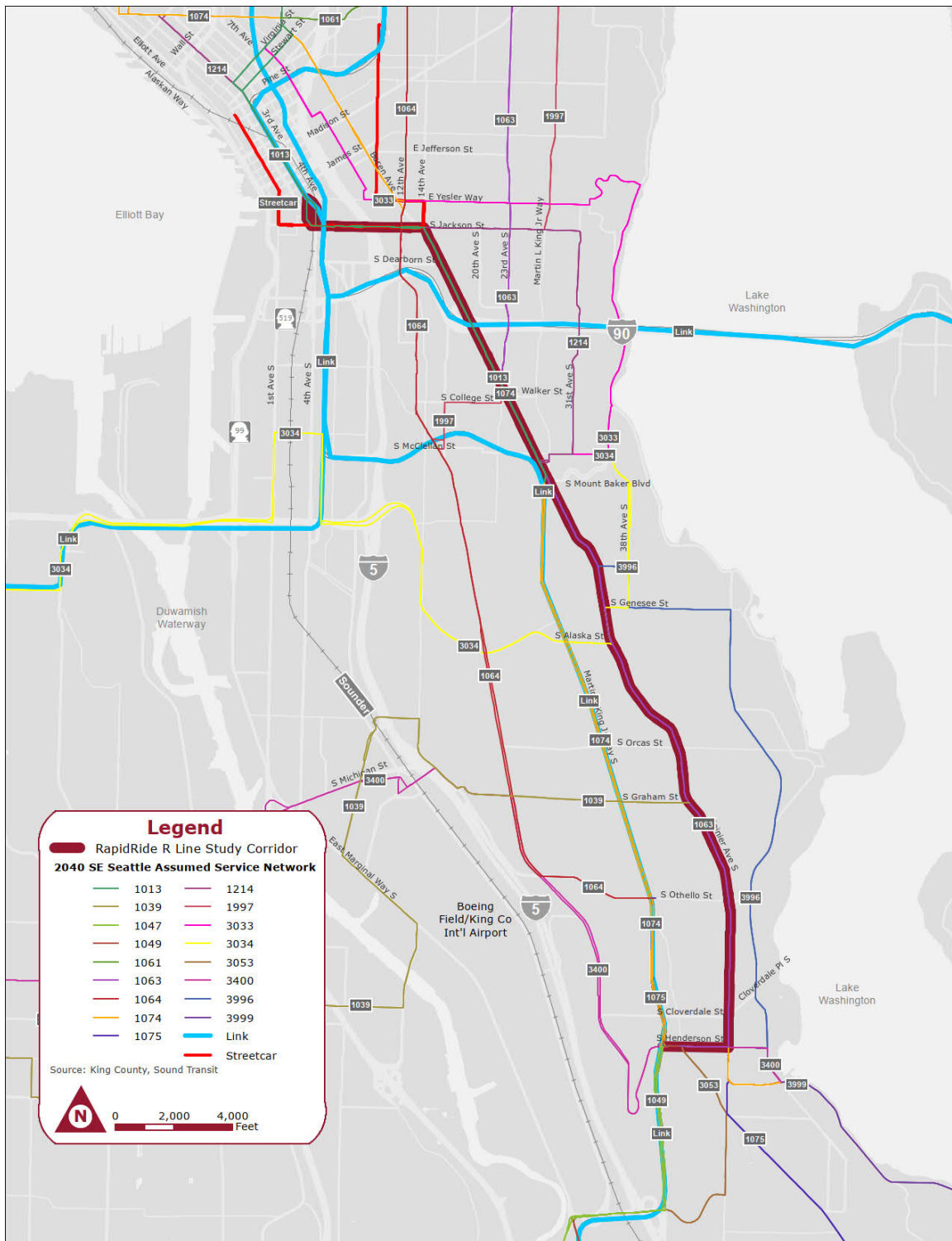
The conceptual 2040 service network is summarized in Table 2-2 and reflects the vision described in METRO CONNECTS. As with the conceptual 2024 service network, the conceptual 2040 network also assumes the completion of major regional transit projects, including opening of the Graham Link Station and extensions of Link to West Seattle, Ballard, Everett, and Tacoma. The conceptual 2040 service network is displayed in Figure 2-2.

Table 2-2. Conceptual 2040 Southeast Seattle Area Service Network

Route	Service Type	To/From	Via
1013	RapidRide, All-Day	Northgate Transit Center/Mount Baker Transit Center	Rainier Avenue S./Fairview Avenue E./11th Avenue NE./5th Avenue NE
1039	Frequent, All-Day	White Center/Graham Link Station	S. Graham Street/Corson Avenue S./SW. Roxbury Street
1047	RapidRide, All-Day	Rainier Beach/Tukwila	International Blvd S./Pacific Hwy S.
1049	Frequent, All-Day	Kent/Rainier Beach	68th Avenue S./Andover Park W./Interurban Avenue S.
1061	RapidRide, All-Day	Interbay/Madison Park	15th Avenue W./Denny Way/E. Madison Street
1063	RapidRide, All-Day	University District/Rainier Beach	23rd Avenue S./NE. 3rd Street
1064	RapidRide, All-Day	University District/Othello	Beacon Avenue S./12th Avenue E.
1074	Frequent, All-Day	Interbay/Rainier Beach	MLK Jr Way S./Rainier Avenue S./Boren Avenue S.
1075	RapidRide, All-Day	Renton Highlands/Rainier Beach	Renton Avenue S./NE. 3rd Street
1214	Frequent, All-Day	Queen Anne/Mount Baker Transit Center	10th Avenue W./S. Jackson Street/32nd Avenue S.

Route	Service Type	To/From	Via
1997	Frequent, All-Day	Madison Valley/Beacon Hill	MLK Jr Way S/23rd Avenue S.
3033	Local, All-Day	Eastlake/Mount Baker Transit Center	Fairview Avenue E./E. Yesler Way/Lakeview Avenue S.
3034	Local, All-Day	Alki/Mount Baker Transit Center	California Avenue SW./SW. Genesee Street/S. Columbian Way/38th Avenue S.
3053	Local, All-Day	Normandy Park/Rainier Beach	S. 200th Street/42nd Avenue S./Renton Avenue S.
3400	Local, All-Day	Burien Transit Center/SODO	California Avenue S./SW. Thistle Street/S. Michigan Street/Beacon Avenue S.
3996	Local, All-Day	Rainier Beach/Mount Baker Transit Center	Rainier Avenue S./S. Genesee Street/Seward Park Avenue S./S. Henderson Street
3999	Local, All-Day	Renton Highlands/Rainier Beach	SE. 128th Street/Sunset Blvd N./S. 3rd Street/Rainier Avenue S.
Link	Frequent, All-Day	Everett/West Seattle Everett/Downtown Redmond Ballard/Tacoma	N/A

Figure 2-2. Conceptual 2040 Service Network



2.8 Environmental Considerations

During the Pre-Design phase of the R Line project, a limited amount of research and reporting on environmental conditions and potential areas of impact was performed. The evaluations responded to the project elements identified in the R Line Unconstrained Alternative. Some efforts, including hazardous materials and historic resources assessments informed planning decisions. Areas of environmental assessment included:

- Cultural resources
- Hazardous materials
- Endangered species
- Acquisitions and displacements
- Noise and vibration
- Environmental justice and equity and social justice
- Soils and geology
- Air quality
- NEPA screening

2.9 Trolley and Traction Power

Metro plans to operate R Line using electric trolley buses. The existing Route 7 is an electric trolley bus and the majority of the overhead catenary system (OCS) is in place to support future R Line operations. Evaluation of trolley bus infrastructure needs focused on the following locations and considerations:

- S. Henderson Street and the southern terminus. S. Henderson Street is not currently served by trolley buses and OCS infrastructure is not present. Routing R Line to the southern terminus at the Rainier Beach Link station would require an extension of the existing OCS system from Rainier Avenue S., including passing wire to facilitate bus ingress and egress at the layover spaces. Concept level cost estimates were prepared for all infrastructure required for this extension. This analysis included an assessment of the need for a supplemental traction power substation in order to maintain the minimum allowable electric trolley bus voltage along the extension.
- 5th Avenue S. to Terrace Street. This analysis was performed in response to the proposed revised routing for R Line along 5th Avenue S., Terrace Street, and Yesler Way as part of the speed and reliability analysis. As with the S. Henderson Street extension, concept level cost estimates were prepared for all infrastructure required to support the revised routing.

- Passing wire. Potential passing wire locations were identified to correspond with the station locations included in the Unconstrained Alternative. A concept level cost estimate was developed for a single location (Walker Avenue S.) as a representative cost for all passing wire needs along the study corridor and subsequently integrated into the overall cost estimate for the Unconstrained Alternative.
- Northern terminus. Evaluation of potential northern terminus locations included identification of OCS needs to support the pathways. A representative estimate, based on a conceptual level design for the S. Henderson Street extension, was applied to determine the highest cost associated with the potential layover locations, and subsequently integrated into the overall cost estimate for the Unconstrained Alternative

2.10 Northern and Southern Termini

The existing Route 7 uses three layover spaces at the northern terminus in downtown Seattle on Virginia Street between 3rd and 7th Avenues and four layover spaces at the southern terminus in Rainier Beach. Early service planning analysis indicated that the planned frequency of R Line would require four layover spaces for 60-foot coaches at each terminus. The Pre-Design analysis evaluated layover options at the northern and southern termini including siting options, routing, OCS needs, operational feasibility, and concept level costs.

2.11 Community Engagement

R Line represents a major capital investment in a diverse and growing community. Successful implementation will require thoughtful and deliberate engagement with stakeholders, riders, community groups, and residents throughout all phases of project development.

Community engagement was initiated and maintained throughout the Pre-Design phase of the R Line project. Feedback was solicited through a two-phase process undertaken from June 2019 through March 2020. Engagement activities were conducted in multiple languages and with a focus on accessibility, reflecting the expressed needs of the community. A detailed summary of the community engagement process can be found in the RapidRide R Line Community Engagement Summary Phase 1 (Metro 2019c) and RapidRide R Line Community Engagement Summary Phase 2 (Metro 2020k).

The Seattle Department of Transportation (SDOT) previously led design, construction and outreach as part of their RapidRide Rainier project.⁸ Through 2017 and early 2018, SDOT led

⁸ SDOT subsequently reprogrammed the RapidRide Rainier project as the Route 7 Transit-Plus Multimodal Corridor project. In early 2019, Metro took over as lead agency for development of RapidRide improvements.

broad community engagement efforts to gather community input on transportation needs and priorities along Rainier Avenue S. These efforts included face-to-face and online engagement tactics, with an online open house and survey, in-person surveys, and participation in community-led events. Metro began community engagement for the Pre-Design phase of R Line in June 2019, representing the first re-engagement associated with RapidRide since the completion of SDOT's final round of work in early 2018.

Phase 1

Conducted from June through October 2019, Phase 1 of R Line Community Engagement was focused on a needs assessment with three key objectives:

1. Reintroduce R Line and highlight opportunities for interested parties and community members to get involved
2. Report back on what was heard through previous engagement efforts and learn more about community interests and concerns
3. Gather input to inform design concepts

Phase 1 community engagement consisted of:

- Stakeholder interviews: The project team interviewed 14 community-based organizations and groups along the corridor to build relationships, understand the needs of communities they serve or represent, and gather input on recommended outreach and engagement strategies.
- In-person outreach: The project team tabled and conducted outreach at community events to inform community members about R Line and ask about where people want to go (to inform station locations) and access to transit needs/improvements. The project team also hosted community briefings in partnership with several priority stakeholders to talk with their members about the project and gather feedback.
- Online survey: The project team surveyed community members to help inform service design and station locations. The survey was conducted in five languages and included questions on current Route 7 use, barriers to using transit and issues or concerns around using or accessing transit, origins and destinations using Route 7, desired improvements to using and accessing transit, demographic information, and preferred communication and outreach methods.

Phase 2

During Phase 2, conducted November 2019 through March 2020, the project team presented the R Line Preliminary Unconstrained Alternative to the public. This effort included sharing information and gathering input about the improvements comprising the Preliminary Unconstrained Alternative, including station locations and options, speed and reliability improvements, and access to transit improvements. This phase also provided the opportunity to demonstrate how previously received feedback was reflected in the Preliminary Unconstrained Alternative.

The Phase 2 engagement approach included:

- Community partner engagement: The project team continued engaging with community-based organizations and community groups to build and grow relationships. These included interviews with staff, community briefings, and walking tours.
- In-person engagement:
 - Open houses – Metro held open houses to share project information and gather feedback on the preferred concept at Hillman City Collaboratory in Hillman City and Dunlap Elementary School in Rainier Beach.⁹
 - Tabling outreach – The project team hosted information tables at gathering places, housing communities, and community events to build trust, raise awareness of the project, and gather feedback.
 - Drop-in visits – Project team members conducted drop-in visits to community-based organizations to strengthen relationships, distribute materials, and spread awareness about upcoming opportunities to share feedback.
 - Bus stop outreach – Metro’s team of transit educators engaged with Route 7 bus riders at various stops along the route to share R Line upgrades and encourage participation in upcoming open houses.
- Online engagement – An online open house was conducted in six languages and ran from February 19 through March 31. This online platform allowed community members to learn about the project and provide feedback on the preferred concept.
- Route 7 operator engagement – The project team engaged with Route 7 operators directly and organized a guided tour of the current route for project planners to hear from veteran operators about areas for improvement and existing route features valued by the route riders. This also provided an opportunity for planners to consider elements of the Preliminary Unconstrained Alternative from the operator perspective.
- Briefings with city and county councilmembers – Metro met with three local councilmembers and their staff, King County Councilmember Zahilay and City of Seattle Councilmembers Morales and Lewis to provide an overview of the RapidRide program, including R Line-specific updates.

2.12 Project Decisions

As the Pre-Design work progressed, the project team issued several decisions that directed the analysis and evaluation. Those decisions are summarized in Appendix J.

⁹ A third open house was planned in the Chinatown-International District. This open house was postponed in response to the COVID-19 public health crisis.

3 Existing Conditions

3.1 Transit Infrastructure

3.1.1 Passenger Facilities

There are 67 stops along the study corridor. Most are served by Route 7, with the exception of stops in Segment 5 on S. Henderson Street. Table 3-1 summarizes these stops by segment and direction. In addition to stops along the study corridor, 12 stops (5 inbound and 7 outbound) are currently served by Route 7 north of 3rd Avenue and Yesler Way. Existing stop locations, shown on Figure 3-1, were provided through King County Metro inventories.

Table 3-1. Existing Study Area Stops

Segment	Extent	Inbound Stops	Outbound Stops	Total
1	3rd Avenue and Yesler Way to I-90	9	8	17
2	I-90 to S. Forest Street	4	3	7
3	S. Forest Street to S. Alaska Street	6	6	12
4	S. Alaska Street to S. Graham Street	6	6	12
5	S. Graham Street to S. Henderson Street	10	9	19

Along the study corridor, the average existing stop spacing for inbound Route 7 is 1,125 feet (0.21 miles). The shortest distance is between existing stops along Rainier Avenue S., with 620 feet (0.12 miles) between S. Andover Street and 33rd Avenue S. The largest gap is between stops from S. Rose Street to S. Holden Street, with a spacing of 1,520 feet (about 0.30 miles). There are 8 inbound stops along Route 7 that have stop distances greater than one-quarter mile.

Figure 3-1. Study Area Existing Stops (1 of 3)

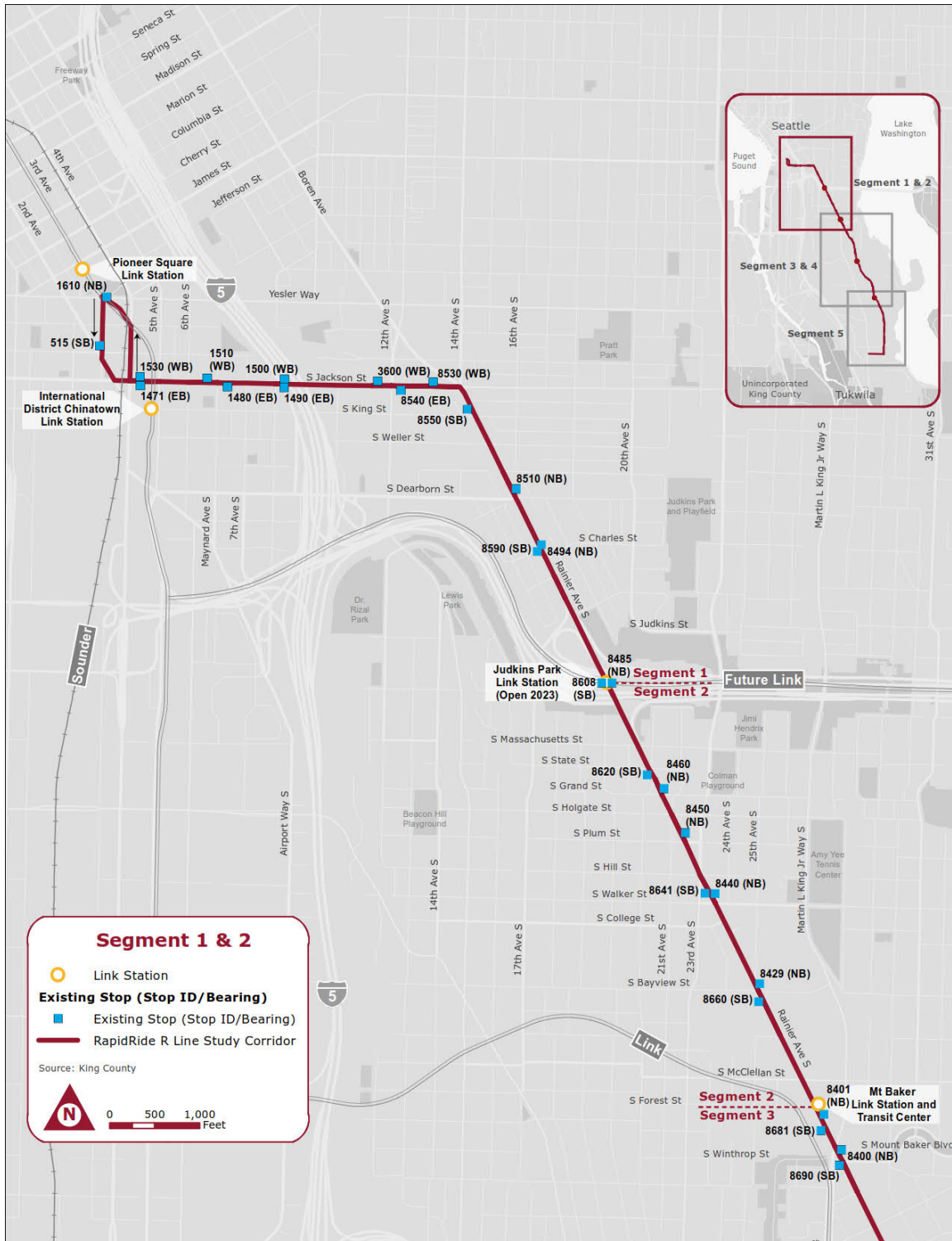


Figure 3-1. Study Area Existing Stops (2 of 3)

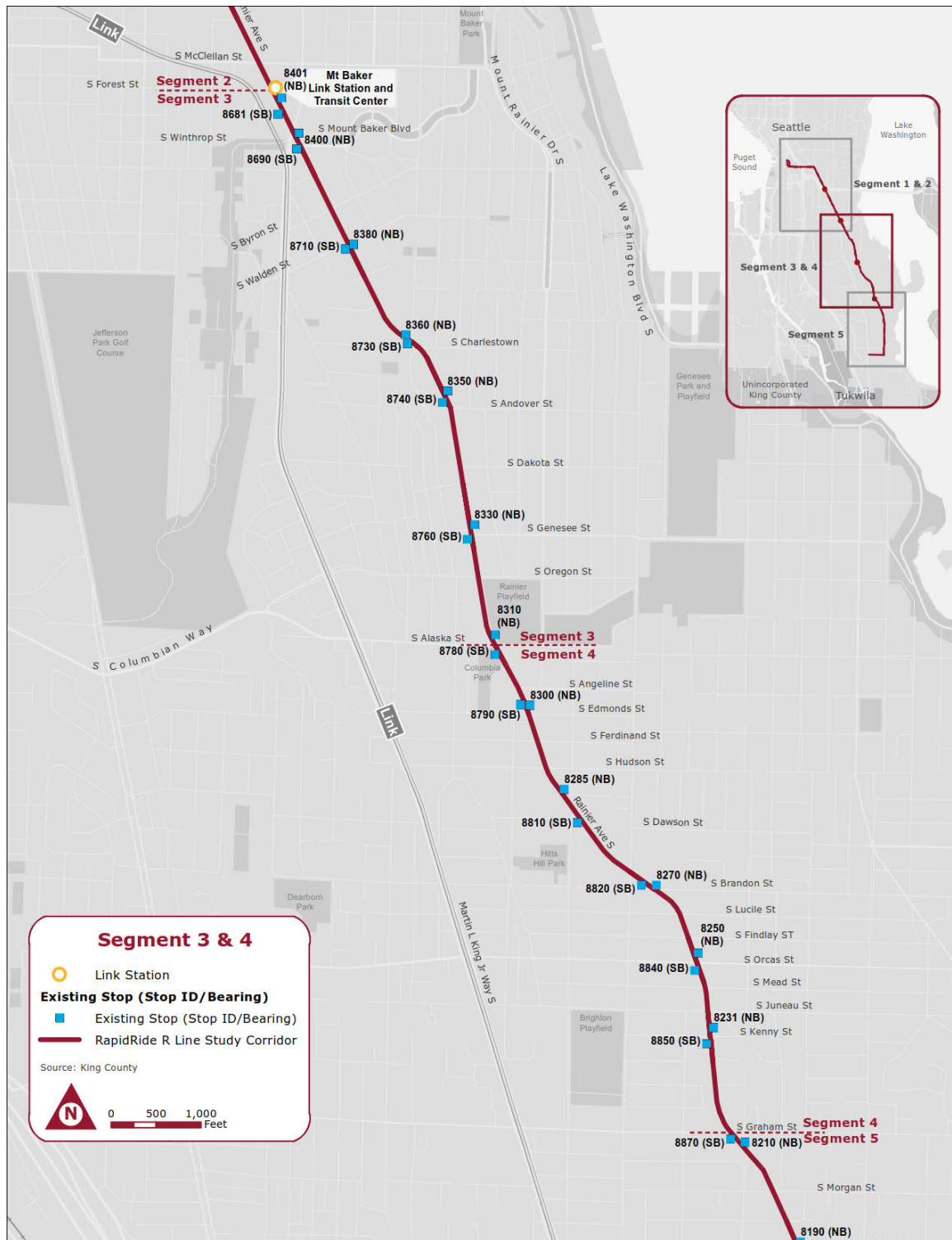
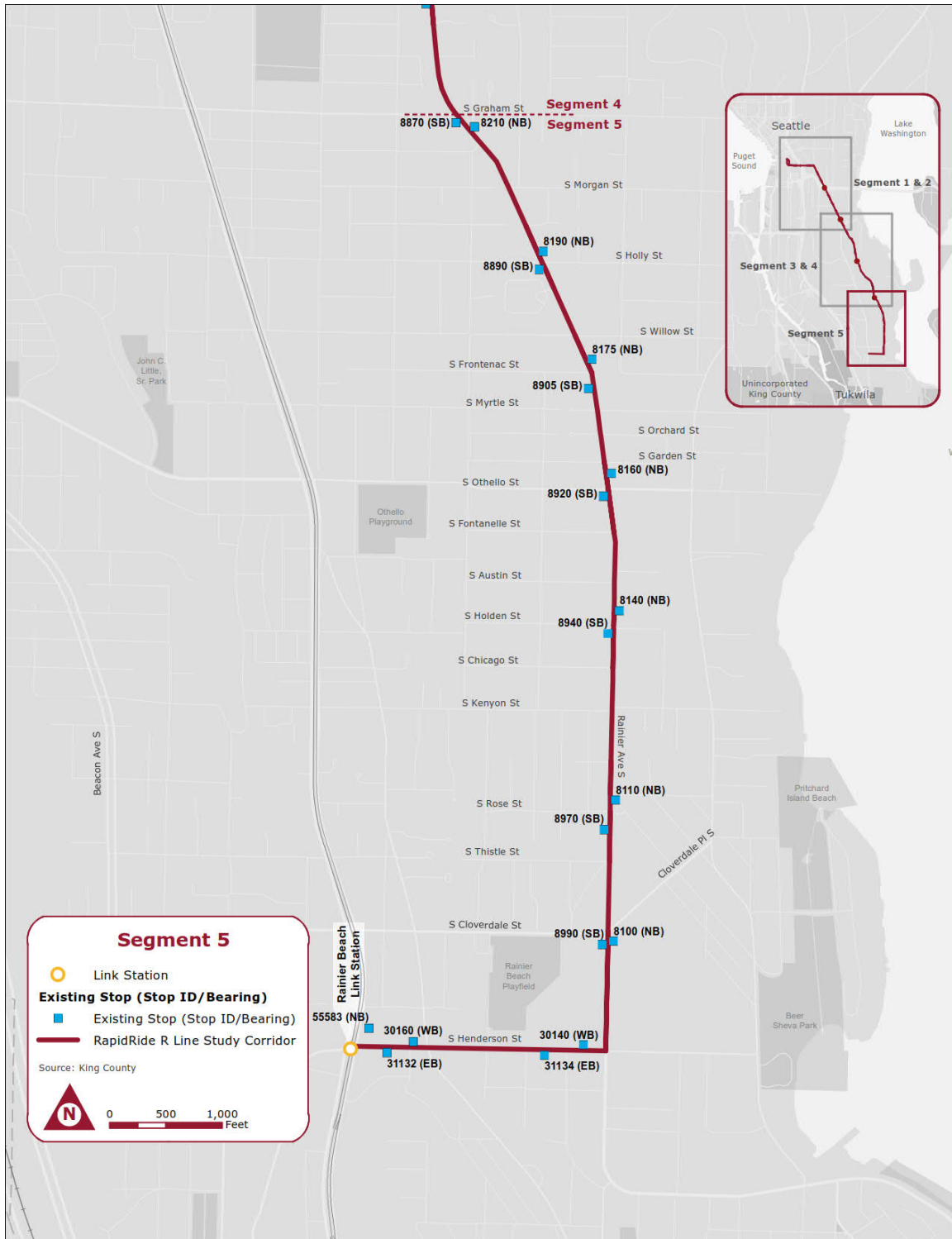


Figure 3-1. Study Area Existing Stops (3 of 3)



The average existing stop spacing for outbound Route 7 along the study corridor is 1,150 feet (0.22 miles). The shortest distance is between existing stops along Rainier Avenue S., with 400 feet (0.08 miles) between S. Forest Street and Rainier Avenue S./MLK Jr Way S., near the Mount Baker Transit Center. The largest gap is between stops from S. King Street to S. Charles Street, with a spacing of 1,770 feet (0.33 miles). There are 10 outbound stops along Route 7 that currently have stop distances greater than one-quarter a mile.

3.1.2 Roadway Features

The study corridor varies in width, lane channelization and directionality throughout its extents. Table 3-2 provides a description of the typical characteristics for each street section along the corridor. Typical roadway and right-of-way widths along the corridor are shown in Table 3-3.

From north to south, Route 7 begins at 6th Avenue and Virginia Street and travels on 3rd Avenue through the Seattle CBD. Segment 1 begins at Yesler Way/3rd Avenue, where the route travels southbound on 3rd Avenue S. and northbound on 4th Avenue S./Prefontaine Place S. For most of the southbound segment, 3rd Avenue S. is approximately 42 feet wide with two travel lanes and on-street parking on both sides of the street. Along the northbound segment, 4th Avenue S. is approximately 50-60 feet wide with four travel lanes, one of which is a bus-only lane between S. Jackson Street and S. Main Street. When 4th Avenue S. transitions to Prefontaine Place S., it is approximately 36 feet wide with two travel lanes that are bus-only from 6 am to 7 pm.

The portion of S. Jackson Street from 3rd Avenue S. to Rainier Avenue S. includes tracks and stations for the First Hill Streetcar. S. Jackson Street is typically 60 feet wide from curb to curb with two travel lanes in each direction. On-street parking is allowed on both sides of the street between 6th Avenue S. and 7th Avenue S. On-street parking is permitted on the south side of the street between 8th Avenue S. and 10th Avenue S. but is restricted from 3 pm to 7 pm. Streetcar platforms are in the center of the street and the streetcar tracks are on the inside travel lanes in both directions to facilitate access to the center island platforms. All lanes are shared with general purpose traffic on S. Jackson Street. Curbs were extended to provide larger in-lane bus stops in several locations along S. Jackson Street during construction of the First Hill Streetcar.

The route then turns south onto Rainier Avenue S., which has a curb-to-curb width of approximately 52 feet and a five-lane configuration for much of the Route 7 length. This lane configuration typically includes two northbound and two southbound travel lanes and either a center left turn lane or a single parking lane on one side of the street. Notable departures from the typical five-lane configuration include the segment between S. Dearborn Street and S. Massachusetts Street (Segment 1), which is approximately 64 feet wide and varies from four to six lanes. This section includes several I-90 on- and off-ramps. Rainier Avenue S. is also wider than typical between S. Bayview Street and S. Hanford Street (Segment 2 and 3) in the

Mount Baker neighborhood at 60 feet. This section includes a third southbound lane to carry traffic bound for southbound MLK Jr Way S.

Several segments of Rainier Avenue S. include on-street parking. Most of these were developed as part of the City of Seattle's Vision Zero Rainier Avenue S. Corridor Improvements Project. Phase 1 of the Vision Zero project, in 2015, converted the roadway configuration to three traffic lanes, including a center turn lane plus two parking lanes between S. Edmunds Street and S. Kenny Street (Segment 4) through the Columbia City neighborhood. This project also added transit lanes in both directions along a short segment between S. Alaska Street and S. Edmunds Street (Segment 4). South of Columbia City, Rainier Avenue S. currently has two travel lanes in each direction and one parking lane, which alternates sides several times in the section that extends from S. Graham Street to S. Cloverdale Street (Segment 5). The configuration of this section of Rainier Avenue S. is likely to change with implementation of Phase 2 of the Rainier Avenue S. Corridor Improvements Project in 2019-2020. A small section of on-street parking also currently exists north of Columbia City between S. Dakota Street and S. Angeline Street (Segment 3 and 4).

The study corridor turns onto S. Henderson Street. The street is typically 48 feet wide with one travel lane in each direction. These lanes are shared by buses and general-purpose auto traffic. Both sides of the street have bicycle lanes and on-street parking. To the west of Renton Avenue S., S. Henderson Street widens to incorporate several turning lanes and a bus layover pullout as it approaches MLK Jr Way S.

Table 3-2. Typical Channelization and Corridor Characteristics

Segment	Channelization and Characteristics
1: 3rd Avenue and Yesler Way to I-90	<ul style="list-style-type: none">Two travel lanes in each direction with intermittent two-way left turn lane (TWLTL) and left turn pockets along S. Jackson StreetStreetcar tracks on the inside lanes with raised platforms in the center lane on S. Jackson StreetOn-street parking allowed in some locations along S. Jackson StreetTwo travel lanes in each direction with TWLTL and left turn pockets along Rainier Avenue S., with additional lanes for on- and off-ramps at I-90Average lane width of 10-11 feetSidewalks on both sides of the streetNo protected or marked bike lanes

Segment	Channelization and Characteristics
2: I-90 to S. Forest Street	<ul style="list-style-type: none"> Two travel lanes in each direction with TWLTL and left turn pockets along Rainier Avenue S., with an additional lane between S. Bayview Street and S. Forest Street Average lane width of 10-11 feet Sidewalks on both sides of the street No parking allowed in either direction No protected or marked bike lanes
3: S. Forest Street to S. Alaska Street	<ul style="list-style-type: none"> Two travel lanes in each direction with intermittent TWLTL and left turn pockets along Rainier Avenue S., with an additional lane between S. Forest Street and S. Hanford Street Average lane width of 10-11 feet Sidewalks on both sides of the street On-street parking allowed in one direction along S. Rainier Avenue S. between South Dakota Street and S. Alaska Street No protected or marked bike lanes
4: S. Alaska Street to S. Graham Street	<ul style="list-style-type: none"> One travel lane in each direction with a center lane for TWLTL, left turn pockets or an additional travel lane One transit-only lane in each direction between S. Alaska Street and S. Edmunds Street along Rainier Avenue S. Average lane width of 11-12 feet Sidewalks on both sides of the street On-street parking allowed in both directions along Rainier Avenue S. for most of the segment No protected or marked bike lanes
5: S. Graham Street to S. Henderson Street	<ul style="list-style-type: none"> Two travel lanes in each direction with intermittent TWLTL and left turn pockets along Rainier Avenue S. Average lane width of 10-11 feet Sidewalks on both sides of the street On-street parking allowed in one direction along Rainier Avenue S. No protected or marked bike lanes along Rainier Avenue S. Marked bike lanes along S. Henderson Street

Table 3-3. Typical Right-of-Way Characteristics

Segment	Beginning and End of Segment	Typical Roadway Width (feet)	Typical Right-Of-Way Width (feet)
1: 3rd Avenue and Yesler Way to I-90	3rd Avenue and Yesler Way to I-90/Rainier Avenue S.	60	80-96
2: I-90 to S. Forest Street	I-90/Rainier Avenue S. to S. Forest Street/Rainier Avenue	54	80
3: S. Forest Street to S. Alaska Street	S. Forest Street/Rainier Avenue S. to S. Alaska Street/Rainier Avenue S.	52	80
4: S. Alaska Street to S. Graham Street	S. Alaska Street/Rainier Avenue S. to S. Graham Street/Rainier Avenue S.	52	80
5: S. Graham Street to S. Henderson Street	S. Graham Street/Rainier Avenue S. to S. Henderson Street/Rainier Avenue S.	52	80

3.2 Existing Intersection Operations

To accurately model the existing conditions on the roadway network, turning movement counts were collected in the AM and PM peak hours for all signalized intersections in the study area. Most of the movement count data was supplied by SDOT; additional counts were taken to supplement data received from SDOT. Volumes were balanced between intersections, with the network reflecting the typical weekday AM and PM peak-hour traffic conditions.

Figure 3-2 shows the existing operations for the AM and PM peak periods along the study corridor.¹⁰ Currently, 19 signalized intersections operate worse than LOS C during the AM peak period and 22 signalized intersections operate at worse than LOS C during the PM peak period.

¹⁰ This figure also includes two signalized intersections not on the study corridor that were analyzed to determine routing from S. Jackson Street to the intersection at 3rd Avenue and Yesler Way.

Figure 3-2. Existing AM and PM Peak Period Operations (1 of 3)

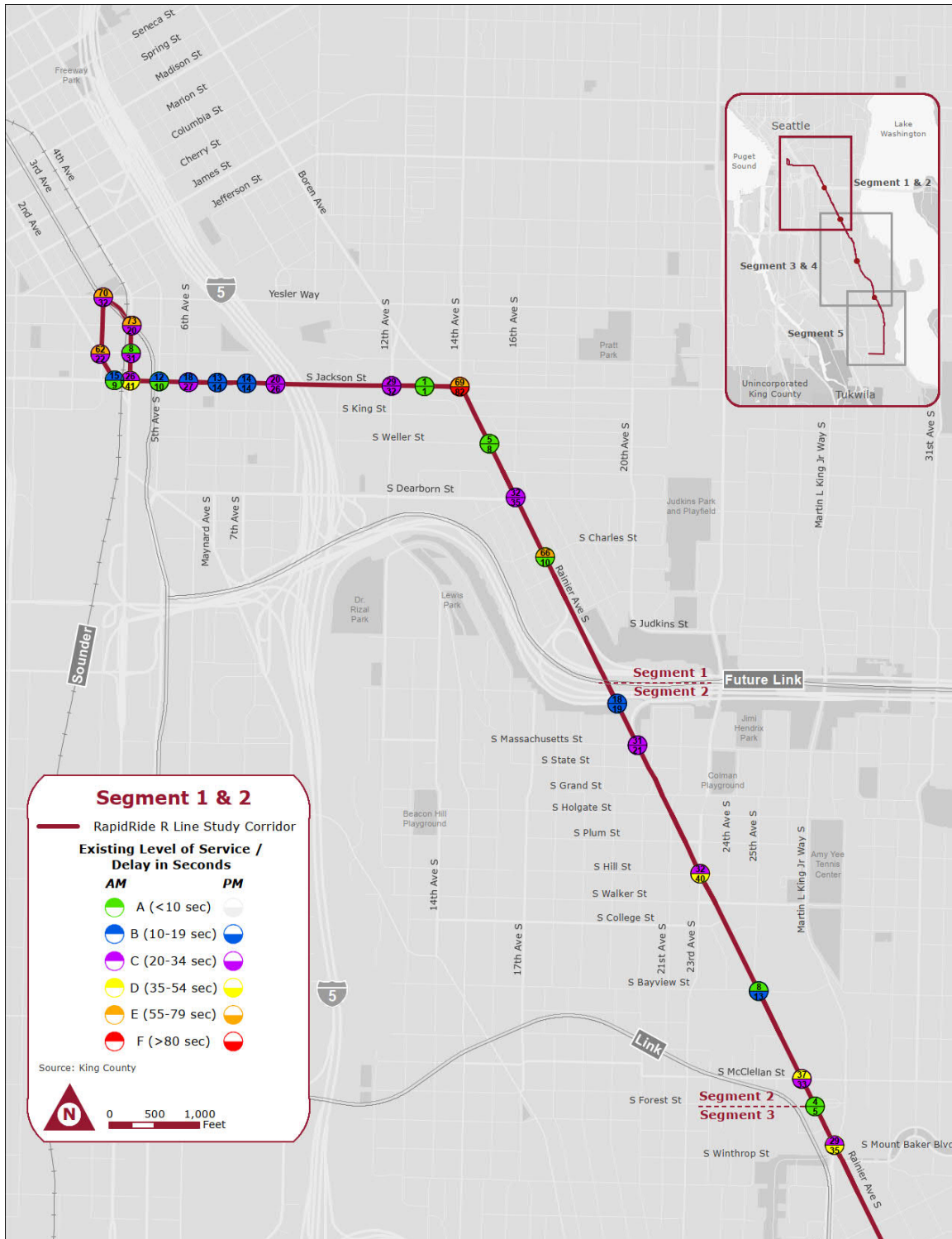


Figure 3-2. Existing AM and PM Peak Period Operations (2 of 3)

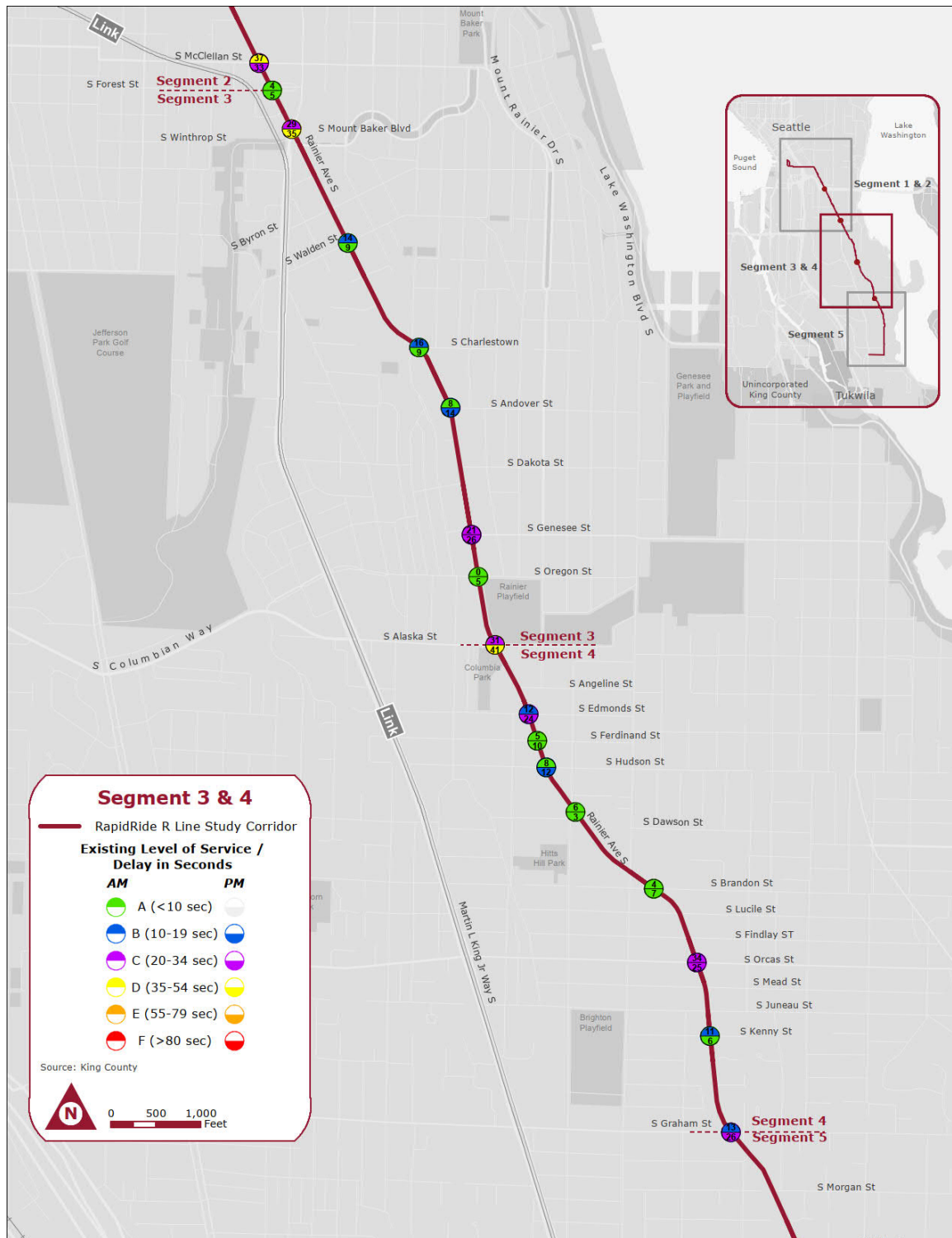
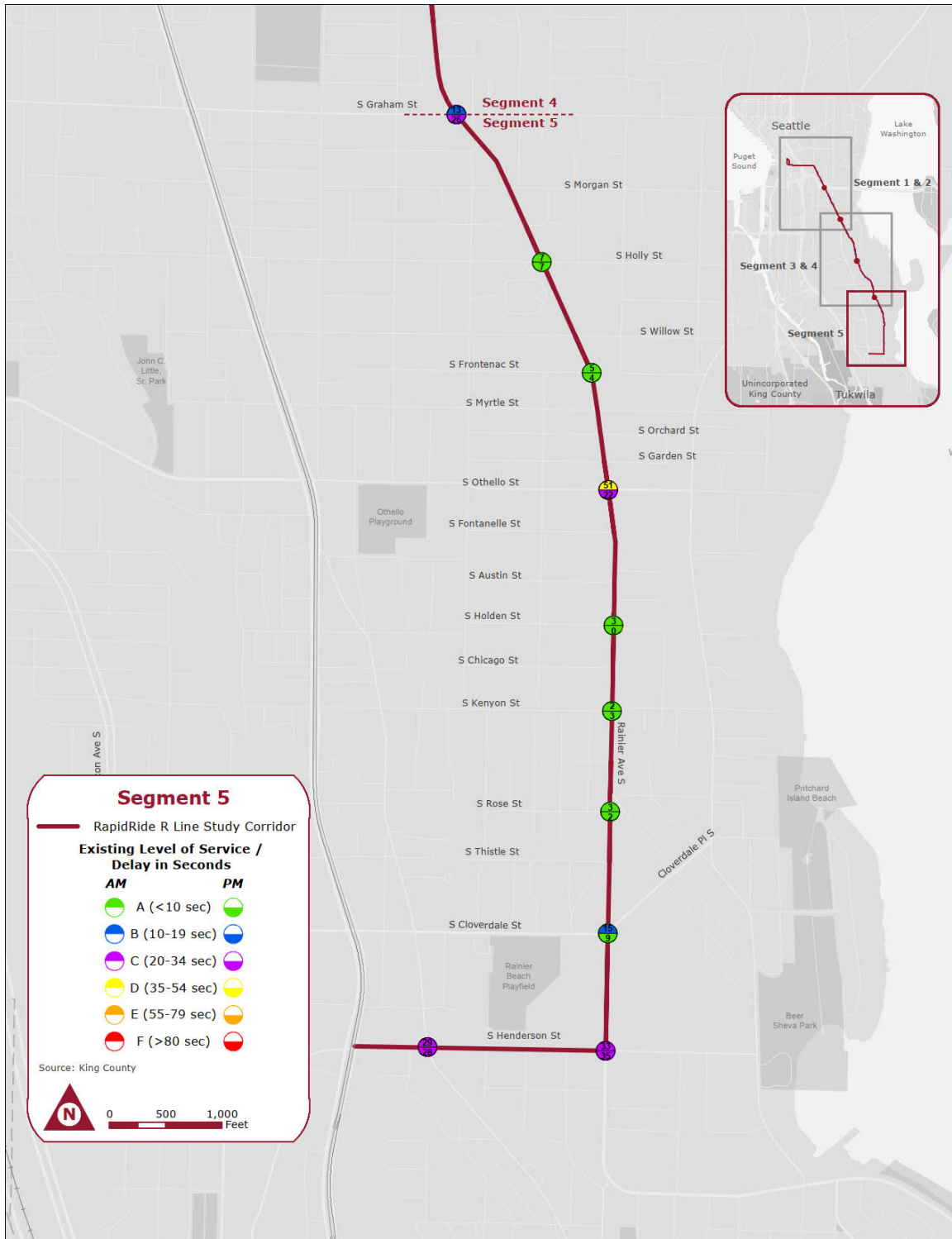


Figure 3-2. Existing AM and PM Peak Period Operations (3 of 3)



3.3 Transit Operations Overview

Route 7 provides daily service from the Rainier Valley to downtown Seattle at least hourly for a 24-hour period both on weekdays and weekends. Service headways are:

- 7.5 minutes during peak periods (7 am to 9 am and 3 pm to 6 pm)
- 10 minutes during midday hours (9 am to 3 pm)
- 15 minutes at early morning and night (6 am to 7 am and 10 pm to 1 am)
- At least hourly between 1 am until 5 am

3.3.1 Transit Service Performance

Existing transit and general-purpose travel times were analyzed and compared along the study corridor.¹¹ The northbound and southbound Route 7 travel times in the AM and PM peak hours are summarized in Tables 3-4 through 3-7. Travel times were summarized from three sources. Metro's automatic vehicle location (AVL) data and the VISSIM model were used to determine transit travel times. Google Maps, a web-based mapping service that can be used to provide travel times between two points, was used to calculate general-purpose travel times. The travel time for Google Maps is often presented as a range of times because the travel time data is aggregated. For this study, the lowest and highest travel times from the peak hour on a typical midweek data were used.

Table 3-4. Southbound Transit Travel Time by Segment – AM Peak Hour

Southbound			AM Peak Hour ^a		
Segment	From	To	AVL Travel Time (Minutes)	VISSIM Travel Time (Minutes)	Google Maps Travel Time (Minutes)
1	3rd Avenue and James Street	Rainier Avenue S. and S. King Street	11.1	10.3	5-14
2	Rainier Avenue S. and S. King Street	Rainier Avenue S. and S. Forest Street	8.5	8.5	4-12

¹¹ For travel time calculations, the boundaries of Segments 1 and 2 vary from those for the overall project.

Southbound			AM Peak Hour ^a		
Segment	From	To	AVL Travel Time (Minutes)	VISSIM Travel Time (Minutes)	Google Maps Travel Time (Minutes)
3	Rainier Avenue S. and S. Forest Street	Rainier Avenue S. and S. Alaska Street	6.3	5.7	3-6
4	Rainier Avenue S. and S. Alaska Street	Rainier Avenue S. and S. Graham Street	4.8	5.7	3-6
5	Rainier Avenue S. and S. Graham Street	S. Henderson Street and Rainier Avenue S.	7.3	8.3	4-7
Total Travel Times			38.0	38.5	19-45

Notes:

^a Representative AM Peak hour is 7am to 8 am.

Table 3-5. Northbound Transit Travel Time by Segment – AM Peak Hour

Northbound			AM Peak Hour ^a		
Segment	From	To	AVL Travel Time (Minutes)	VISSIM Travel Time (Minutes)	Google Maps Travel Time (Minutes)
5	Rainier Avenue S. and S. Henderson Street	Rainier Avenue S. and S. Graham Street	7.6	8.0	3-9
4	Rainier Avenue S. and S. Graham Street	Rainier Avenue S. and S. Alaska Street	6.7	6.2	3-9
3	Rainier Avenue S. and S. Alaska Street	Rainier Avenue S. and Mount Baker Transit Center	7.2	7.3	3-8
2	Rainier Avenue S. and Mount Baker Transit Center	S. Jackson Street and Boren Avenue S.	14.7	12.7	8-22
1	S. Jackson Street and Boren Avenue S.	Prefontaine Place S. and Yesler Way	8.5	6.8	4-12
Total Travel Times			44.7	41.0	21-60

Notes:

^a Representative AM Peak hour is 7am to 8 am.

Table 3-6. Southbound Transit Travel Time by Segment – PM Peak Hour

Southbound			PM Peak Hour ^a		
Segment	From	To	AVL Travel Time (Minutes)	VISSIM Travel Time (Minutes)	Google Maps Travel Time (Minutes)
1	3rd Avenue and James Street	Rainier Avenue S. and S. King Street	12.2	10.6	5-14
2	Rainier Avenue S. and S. King Street	Rainier Avenue S. to S. Forest Street	13.4	10.0	6-18
3	Rainier Avenue S. and S. Forest Street	Rainier Avenue S. and S. Alaska Street	7.8	7.0	3-10
4	Rainier Avenue S. and S. Alaska Street	Rainier Avenue S. and S. Graham Street	7.5	5.9	4-10
5	Rainier Avenue S. and S. Graham Street	S. Henderson Street and Rainier Avenue S.	9.0	7.9	4-9
Total Travel Times			49.9	41.4	22-61

Notes:

^a Representative PM Peak hour is 4:30 pm to 5:30 pm.

Table 3-7. Northbound Transit Travel Time by Segment – PM Peak Hour

Northbound			PM Peak Hour ^a		
Segment	From	To	AVL Travel Time (Minutes)	VISSIM Travel Time (Minutes)	Google Maps Travel Time (Minutes)
5	Rainier Avenue S. and S. Henderson Street	Rainier Avenue S. and S. Graham Street	7.6	7.9	3-8
4	Rainier Avenue S. and S. Graham Street	Rainier Avenue S. and S. Alaska Street	6.1	7.0	3-8
3	Rainier Avenue S. and S. Alaska Street	Rainier Avenue S. and Mount Baker Transit Center	6.9	6.9	3-8
2	Rainier Avenue S. and Mount Baker Transit Center	S. Jackson Street and Boren Avenue S.	12.1	12.2	5-16
1	S. Jackson Street and Boren Avenue S.	Prefontaine Place S. and Yesler Way	9.4	6.0	4-12
Total Travel Times			42.1	40.0	18-52

Notes:

^a Representative PM Peak hour is 4:30 pm to 5:30 pm.

3.4 Transit Boardings

Route 7 averages 11,734 weekday trips¹² (Metro 2018d). Weekday boardings are distributed throughout the day as follows:

- Morning (5 am to 9 am) = 17 percent
- Midday (9 am to 3 pm) = 38 percent
- Evening (3 pm to 7 pm) = 29 percent
- Late evening/night (7 pm to 5 am) = 16 percent

In spring 2018, Route 7 averaged over 6,000 daily boardings outbound and over 5,700 daily boardings inbound. A majority of outbound boardings occurred in downtown Seattle. Other high outbound boarding stops include Rainier Avenue S. and S. Stevens Street (Mount Baker Link Station) and 12th Avenue S. and S. Jackson Street. Inbound boarding activity is generally distributed along Rainier Avenue S., with the highest activity occurring at stops on Rainier Avenue S. at S. Henderson Street, S. Genesee Street, S. Dearborn Street, and S. Fisher Place.

Almost 6,300 daily alightings and over 5,200 daily alightings occurred outbound and inbound, respectively, during the spring 2018 service period. Outbound alightings were distributed along the corridor with the highest alighting activity at the intersection of 12th Avenue S. and S. Jackson Street and stops along Rainier Avenue S. at Genesee Street, Letitia Avenue S., and S. Henderson Street. Inbound alightings were concentrated at downtown Seattle stops, with additional high activity occurring at the Mount Baker Link Station on Rainier Avenue S. at S. Forest Avenue.

Table 3-8 and Figure 3-3 summarize existing boarding and alighting activities for stops along the corridor.

¹² Existing ridership information was collected via Metro Automated Passenger Count (APC) technology during the spring 2018 service period. These counts were gathered through onboard APC electronic count units that use sensors at the front and rear bus doors. APC units are precise enough to provide a gross level of ridership, which, when used in conjunction with Automated Vehicle Locator (AVL) technology, can provide zone or stop level ridership.

Table 3-8. Existing Boarding and Alighting Activity for R Line Study Corridor Stops

Stop Number	Primary Street	Cross Street	Average Daily Boardings	Average Daily Alightings	Routes Serving This Zone
Segment 1: 3rd Avenue and Yesler Way to I-90					
1610	Prefontaine Pl S.	Yesler Way	1,910	745	DN, EN, 1, 2, 3, 4, 7, 13, 14, 15, 29, 36, 49, 70
515	3rd Avenue S.	S. Main Street	1,671	1,760	DN, EN, 1N, 2N, 4N, 5EN, 5N, 7 10N, 11N, 13N, 14, 21, 36, 43N, 47N, 49N, 70N, 116E, 118E, 119E, 124, 131, 132
1530	S. Jackson Street	5th Avenue S.	192	505	1, 2N, 3N, 4N, 7, 13, 14N, 36N, 49, 62, 70N
1471	S. Jackson Street	5th Avenue S.	714	241	7, 14, 36, 106
1510	S. Jackson Street	Maynard Avenue S.	75	148	1, 7, 14N, 36, 49, 70, 106N
1480	S. Jackson Street	Maynard Avenue S.	211	145	7, 14, 36, 106, 554E
1500	S. Jackson Street	8th Avenue S.	44	78	1, 7, 14N, 36, 49, 70, 106
1490	S. Jackson Street	8th Avenue S.	53	73	7, 14, 36, 106
3600	S. Jackson Street	12th Avenue S.	253	278	1, 7, 14N, 36, 49, 70, 106, 984EN
8540	S. Jackson Street	12th Avenue S.	428	472	7, 9E, 14, 106

Stop Number	Primary Street	Cross Street	Average Daily Boardings	Average Daily Alightings	Routes Serving This Zone
8530	S. Jackson Street	Boren Avenue S.	163	246	7, 14, 106
8550	Rainier Avenue S.	S. King Street	126	191	7, 9E, 106
8510	Rainier Avenue S.	S. Dearborn Street	266	104	7, 9E, 106, 630
8590	Rainier Avenue S.	S. Norman Street	118	229	7, 9E, 106, 212, 217, 554E
8494	Rainier Avenue S.	S. Charles Street	113	58	7, 9E, 106, 212, 217, 554E
8485	Rainier Avenue S.	I-90 Ramp	87	117	7, 9E, 106
8608	Rainier Avenue S.	I-90 Ramp	109	74	7, 9E, 106
Segment 2: I-90 to S. Forest Street					
8460	Rainier Avenue S.	S. Grand Street	87	21	7, 106
8620	Rainier Avenue S.	S. State Street	27	108	7, 106
8450	Rainier Avenue S.	S. Plum Street	68	33	7, 106
8440	Rainier Avenue S.	S. Walker Street	176	113	4, 7, 9E, 48, 106
8641	Rainier Avenue S.	S. Walker Street	183	230	7, 9E, 48, 106

Stop Number	Primary Street	Cross Street	Average Daily Boardings	Average Daily Alightings	Routes Serving This Zone
8429	Rainier Avenue S.	S. Bayview Street	112	85	7, 48, 106
8660	Rainier Avenue S.	S. Bayview Street	83	132	7, 48, 106
Segment 3: S. Forest Street to S. Alaska Street					
8401	Rainier Avenue S.	S. Forest Street	173	461	7, 9E, 106, 987EN
8681	Rainier Avenue S.	S. Stevens Street	516	192	7, 9E, 106
8400	Rainier Avenue S.	S. Mount Baker Blvd	89	199	7
8690	Rainier Avenue S.	MLK Jr Way S.	119	68	7
8380	Rainier Avenue S.	S. Walden Street	136	84	7
8710	Rainier Avenue S.	S. Walden Street	97	152	7
8360	Rainier Avenue S.	33rd Avenue S.	224	61	7
8730	Rainier Avenue S.	Letitia Avenue S.	53	262	7
8350	Rainier Avenue S.	S. Andover Street	207	134	7, 9E
8740	Rainier Avenue S.	S. Andover Street	130	148	7, 9E

Stop Number	Primary Street	Cross Street	Average Daily Boardings	Average Daily Alightings	Routes Serving This Zone
8330	Rainier Avenue S.	S. Genesee Street	280	99	7, 9E
8760	Rainier Avenue S.	S. Genesee Street	100	283	7, 9E, 50
Segment 4: S. Alaska Street to S. Graham Street					
8310	Rainier Avenue S.	S. Alaska Street	79	40	7, 50
8780	Rainier Avenue S.	S. Alaska Street	56	86	7
8300	Rainier Avenue S.	S. Edmunds Street	210	105	7, 9E
8790	Rainier Avenue S.	S. Edmunds Street	115	210	7, 9E
8285	Rainier Avenue S.	39th Avenue S.	89	37	7
8810	Rainier Avenue S.	S. Dawson Street	40	98	7
8270	Rainier Avenue S.	S. Brandon Street	123	33	7
8820	Rainier Avenue S.	S. Brandon Street	25	114	7
8250	Rainier Avenue S.	S. Orcas Street	141	38	7, 9E
8840	Rainier Avenue S.	S. Orcas Street	36	186	7, 9E

Stop Number	Primary Street	Cross Street	Average Daily Boardings	Average Daily Alightings	Routes Serving This Zone
8231	Rainier Avenue S.	S. Kenny Street	77	26	7
8850	Rainier Avenue S.	S. Kenny Street	15	71	7
8210	Rainier Avenue S.	S. Graham Street	202	83	7, 9E
Segment 5: S. Graham Street to S. Henderson Street					
8870	Rainier Avenue S.	S. Graham Street	74	208	7, 9E
8190	Rainier Avenue S.	S. Holly Street	173	57	7, 9E
8890	Rainier Avenue S.	S. Holly Street	53	172	7, 9E
8175	Rainier Avenue S.	S. Frontenac Street	62	23	7, 9E
8905	Rainier Avenue S.	S. Myrtle Street	24	65	7, 9E
8160	Rainier Avenue S.	S. Othello Street	138	51	7, 9E
8920	Rainier Avenue S.	S. Othello Street	53	142	7, 9E
8140	Rainier Avenue S.	S. Holden Street	169	58	7, 9E
8940	Rainier Avenue S.	S. Holden Street	39	152	7, 9E

Stop Number	Primary Street	Cross Street	Average Daily Boardings	Average Daily Alightings	Routes Serving This Zone
8110	Rainier Avenue S.	S. Rose Street	203	66	7, 9E
8970	Rainier Avenue S.	S. Rose Street	32	180	7, 9E
8100	Rainier Avenue S.	Cloverdale Pl S.	88	16	7, 9E
8990	Rainier Avenue S.	S. Cloverdale Street	5	94	7, 9E
30140	S. Henderson Street	Rainier Avenue S.	311	143	9E, 106, 107
31134	S. Henderson Street	48th Avenue S.	42	73	9E, 106, 107
31132	S. Henderson Street	MLK Jr Way S.	565	101	106, 107
30160	S. Henderson Street	Renton Avenue S.	38	124	106, 107
55583	MLK Jr Way S.	S. Henderson Street	50	205	9E, 106

Figure 3-3. Average Daily Boardings and Alightings at stops along existing Route 7 and S. Henderson Street (1 of 3)



Figure 3-3. Average Daily Boardings and Alightings at stops along existing Route 7 and S. Henderson Street (2 of 3)

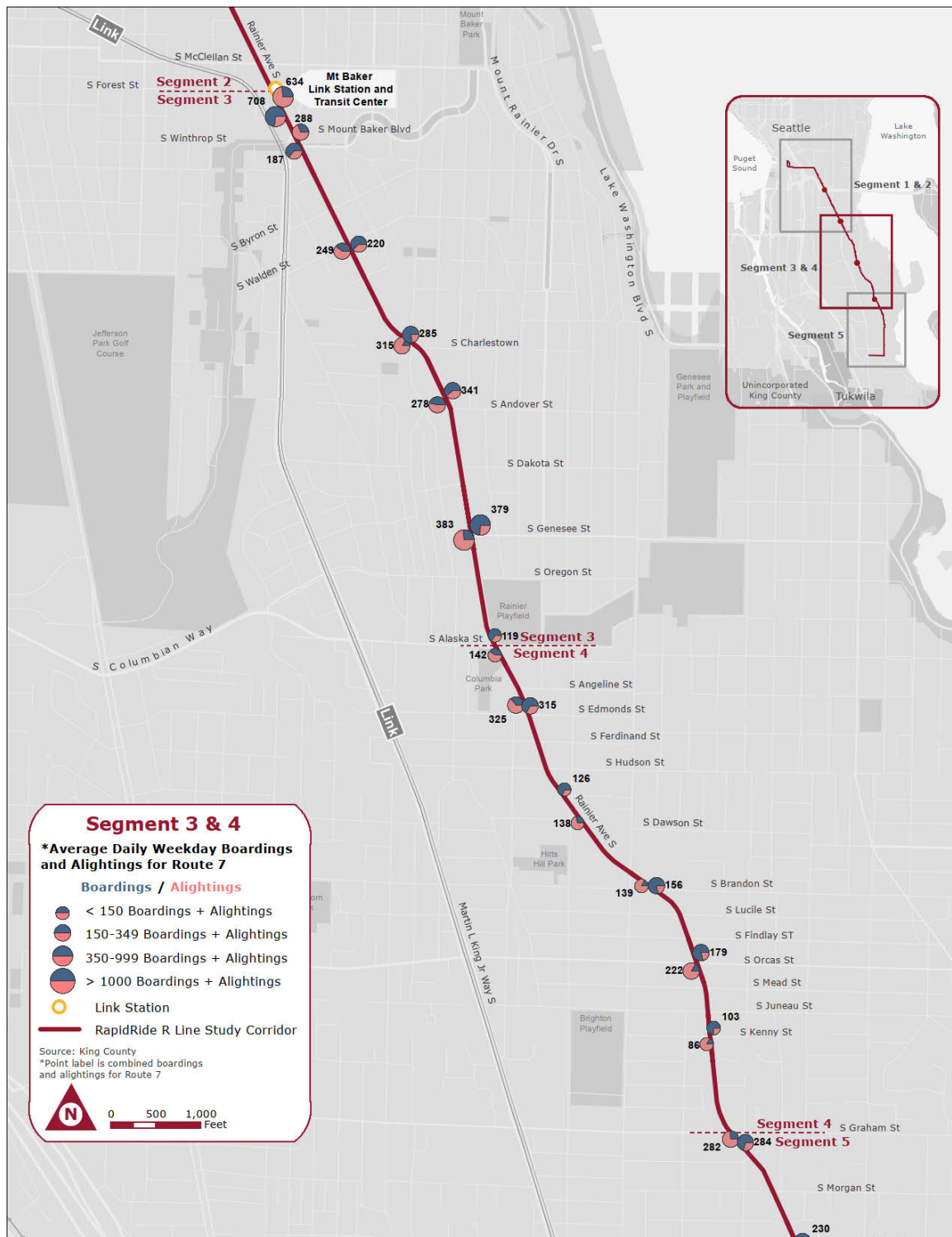
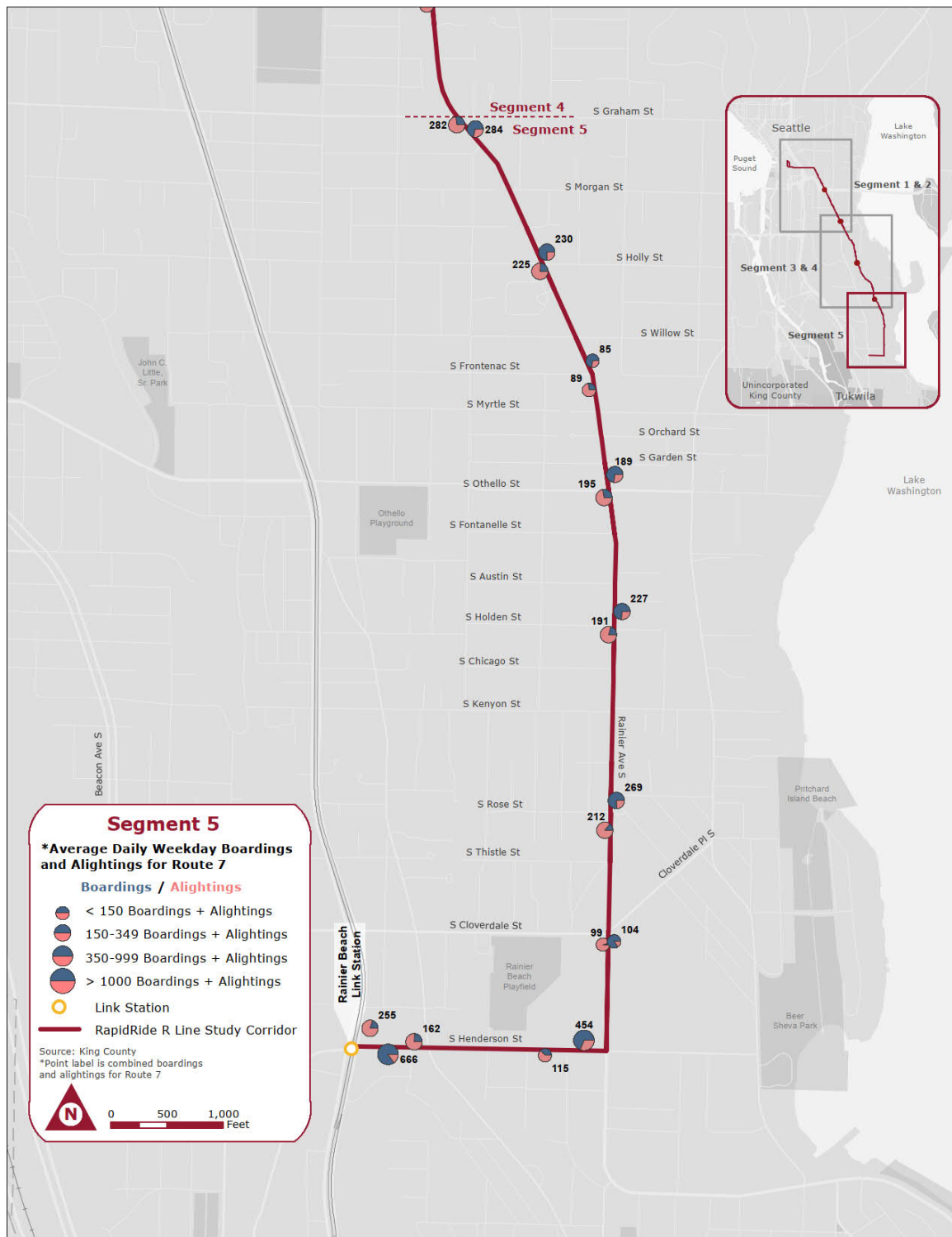


Figure 3-3. Average Daily Boardings and Alightings at stops along existing Route 7 and S. Henderson Street (3 of 3)



3.4.1 Transfer Activity

Transfers to and from Route 7 occur along the length of the route. Most transfers occurred on Route 7 itself, indicating that many trips are taken along the corridor, with return trips occurring within the transfer window. Other transfer routes of interest include Link light rail and Route 36. Areas of high transfer activity along Route 7 in the study area include:

- Chinatown-International District
- S. Jackson Street and 12th Avenue S.
- Mount Baker Link Station
- S. Henderson Street and Rainier Avenue S.

The percentage of daily transfers by route are shown in Table 3-9.

Table 3-9. Route 7 Transfer Activity

Transfers to Route	Percent of Daily Transfers
7	24%
Link	12%
36	6%
9	4%
48	4%
38*	3%
550 (Sound Transit)	3%
106	3%
60	2%
Sounder	2%
14	2%

Notes:

* Route 38 was discontinued in September 2016.

3.4.2 Origins and Destinations

Riders use Route 7 to access destinations along the route as well as connect to regional destinations.¹³ During the PM peak period, most trips both start and end along the corridor, which is consistent with the ORCA transfer data. Other destinations for trips originating along the corridor include Sea-Tac International Airport, the University of Washington, Boeing Renton, and the SODO neighborhood of Seattle. Riders with destinations within a half mile of the corridor begin their trips at the University of Washington, the downtown, First Hill, and Capitol Hill neighborhoods of Seattle, Sea-Tac International Airport, downtown Renton, and downtown Bellevue. Figures 3-4 and 3-5 display destinations and origins, respectively, for trips originating in transportation analysis zones (TAZs) within one-half mile of the study corridor.

¹³ PM peak origin and destination data from the regional travel model was analyzed for all trips originating in the study area TAZ to determine the destinations of those trips. Similar data was reviewed for trips whose destination is a TAZ within a half-mile of the study corridor.

Figure 3-4. Destinations for Trips Originating in TAZs Within One-Half Mile of the Study Corridor (2016 network)

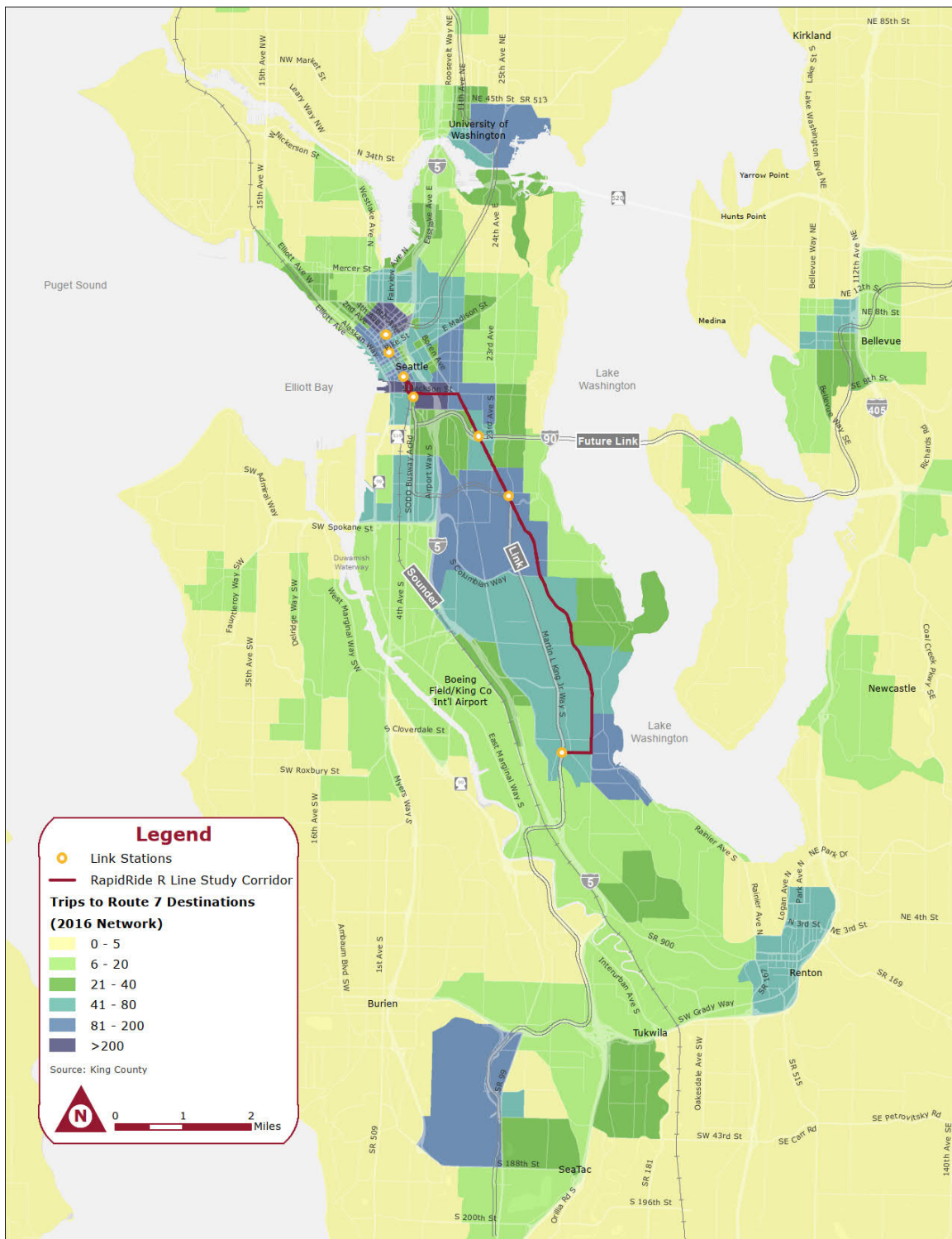
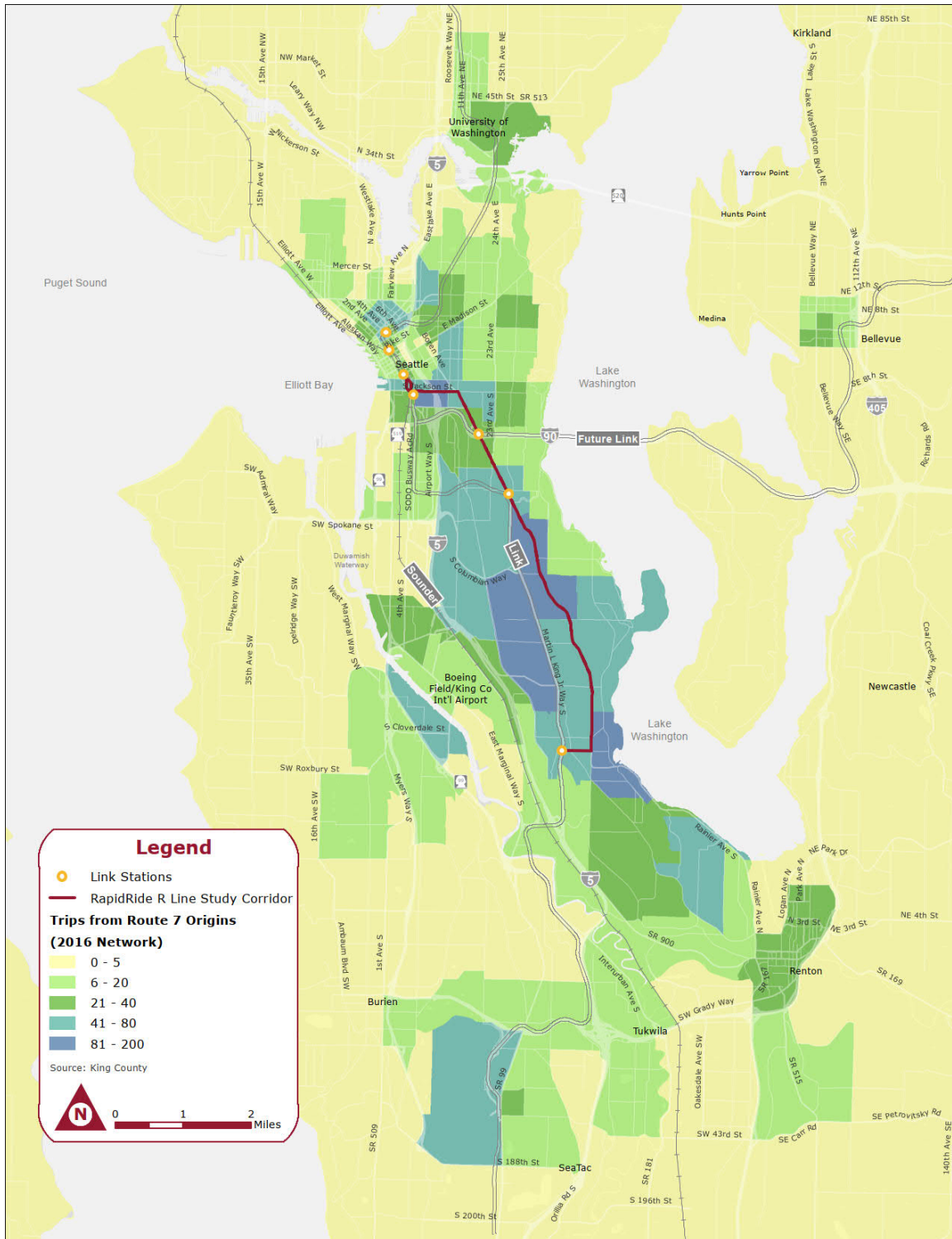


Figure 3-5. Origins for Trips Ending in TAZs Within One-Half Mile of Corridor (2016 network)



3.5 Nonmotorized Access

3.5.1 Pedestrian Facilities

A one-quarter mile walkshed – the distance a person can walk in five minutes – was calculated around the R Line study corridor. The walkshed was calculated on the street network regardless of the presence of pedestrian facilities (excluding limited access freeways and ramps).

In general, walksheds are larger within downtown Seattle due to the highly connected street network of relatively short blocks. Walksheds are relatively consistent through the R Line study corridor, though steep slopes to the west of the corridor between Rainier Avenue S. and Beacon Hill reduce the walkshed in that vicinity. I-90 creates a significant barrier for pedestrians traveling north-south in the northern portion of the study corridor.

The presence and condition of sidewalks and crosswalks in the R Line study corridor and quarter-mile walkshed are shown in Figure 3-6. Sidewalks in the downtown portion of the corridor walkshed are generally in fair to excellent condition using SDOT Sidewalk Condition Assessment Report definitions (SDOT 2018b). Sidewalks are present for the length of Rainier Avenue S., with the majority in acceptable condition, but some segments in poor or very poor condition.

The broader pedestrian network along the R Line study corridor has poor connectivity and many missing sidewalk segments outside of the Downtown Seattle area. Missing sidewalks and discontinuous streets are particularly prevalent west of Rainier Avenue S. between I-90 and S. Alaska Street. These gaps in the pedestrian network reduce the safety of people walking in the project corridor and hamper access to transit.

Curb ramps are provided at all intersections along the corridor and all are in good or fair condition. The majority of curb ramps appear to be compliant with ADA requirements and have white or yellow truncated dome mats present. However, curb ramps in many locations along Rainier Avenue S. are only provided in one direction or are misaligned with crossings; these do not facilitate crossing Rainier Avenue S. or cross streets. These sometimes coincide with locations where crossing is otherwise difficult or unsafe because there are no marked or signalized crosswalks. High traffic volumes and speeds contribute to difficulty crossing at intersections along Rainier Avenue S. that do not have crosswalks.

Signals are present at the majority of crosswalks that cross the R Line study corridor. Those without signals are generally at cross streets of the study corridor or in neighborhood intersections beyond the study corridor but within the quarter-mile walkshed. The crossing of Rainier Avenue S. at S. Findlay Street and several crossings of Henderson Street have a Rectangular Rapid Flashing Beacon or other warning device.

Figure 3-6. Existing Pedestrian Facilities (1 of 3)

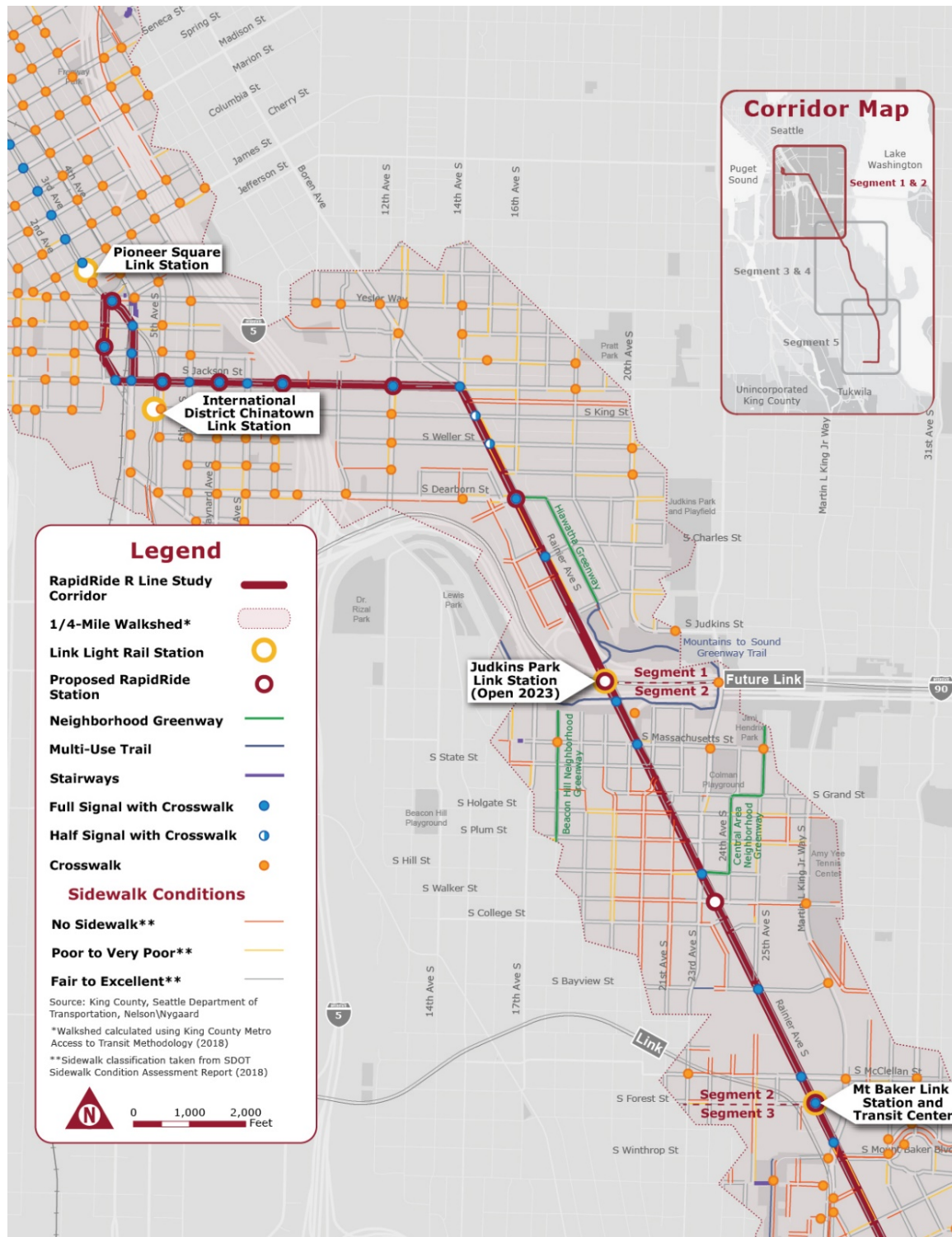


Figure 3-6. Existing Pedestrian Facilities (2 of 3)

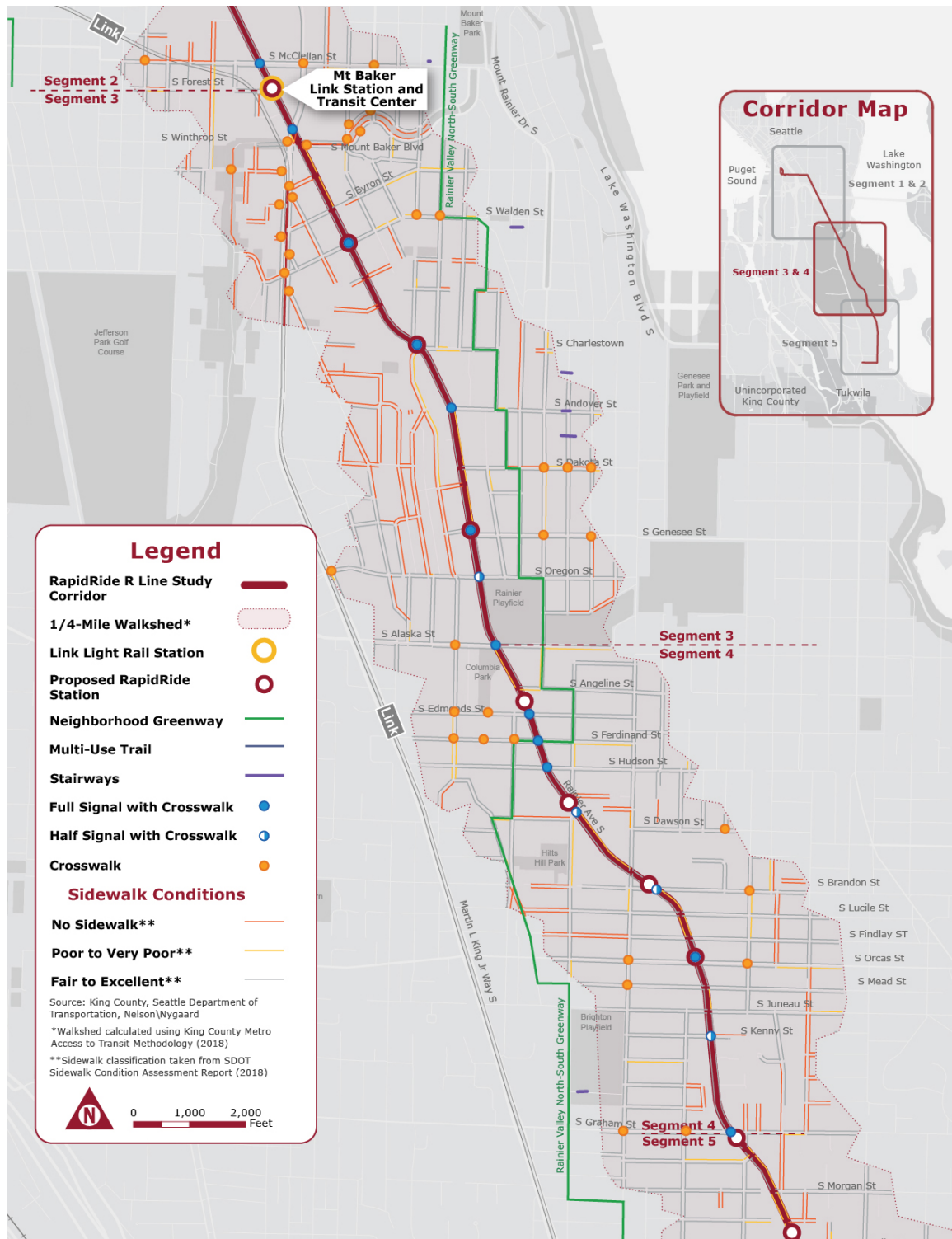
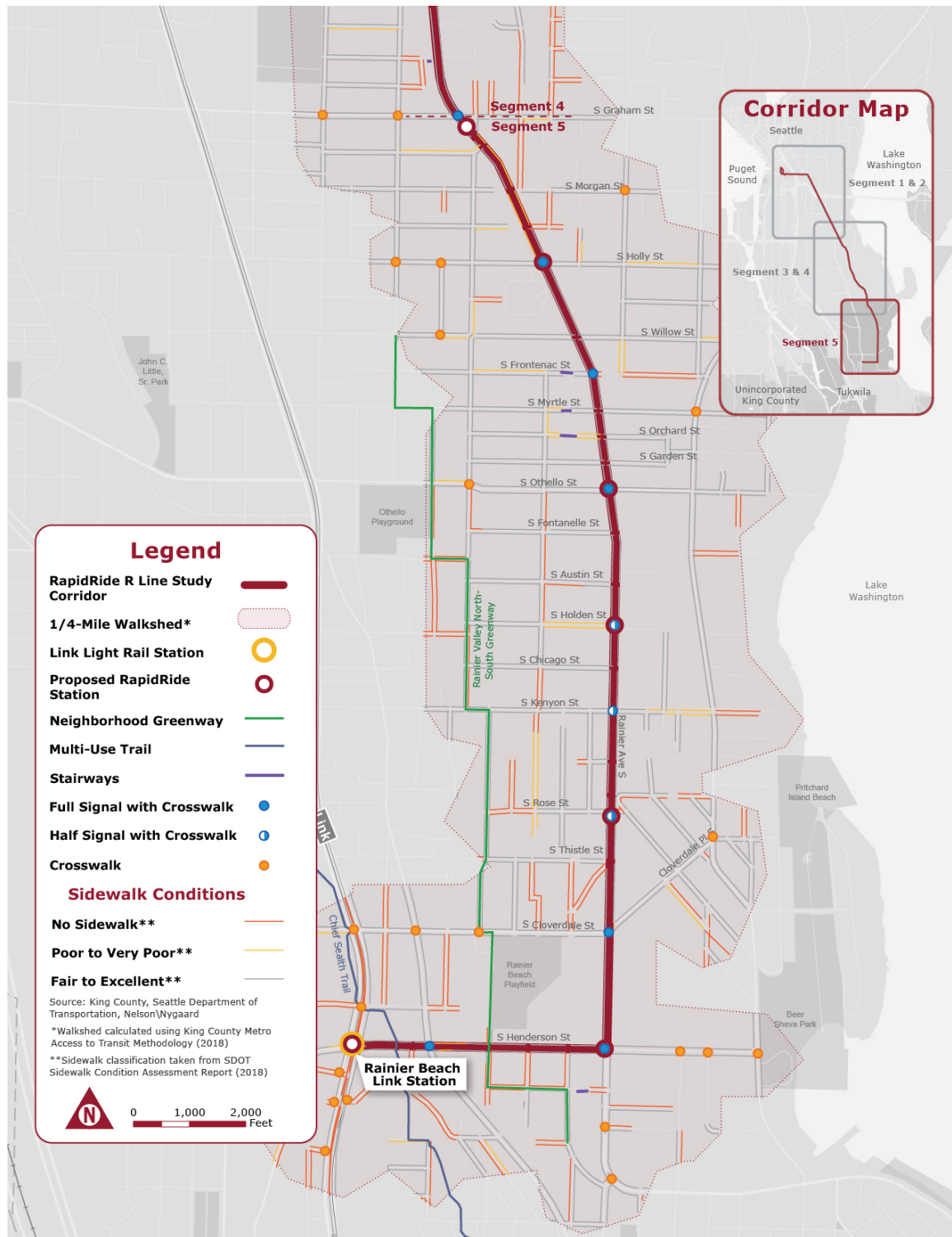


Figure 3-6. Existing Pedestrian Facilities (3 of 3)



3.5.2 Bicycle Facilities

A one-mile bikeshed—the distance a person can ride a bicycle in five minutes--was calculated around the R Line study corridor. The R Line study corridor bikeshed demonstrates the topographical challenges and difficulties facing people riding bicycles within the study corridor bikeshed. In particular, access to the areas west from the R Line study corridor is difficult because of steep slopes and limited network connectivity. However, the bikeshed to the east of the corridor is larger, reaching the shores of Lake Washington for most of the area south of I-90.

Bicycle facilities in the one-mile bikeshed of the R Line study corridor are shown in Figure 3-7. Outside of downtown Seattle there are bicycle-oriented treatments in the north and south ends of the R Line study corridor. Shared pavement markings (sharrows) are provided along S. Jackson Street. These markings provide no protection or separation from traffic; they intend to remind drivers to share the road with cyclists, and can sometimes confuse both people driving and those bicycling. Bicycle lanes are provided along the S. Henderson Street portion of the R Line study corridor between the Rainier Beach Link Station and Rainier Avenue S. These bicycle lanes, indicated by a painted lane marking, are located between parked cars and general-purpose travel lanes with no buffer. No bicycle facilities are provided on Rainier Avenue S., and the bicycle network is generally limited throughout southeast Seattle.

Several existing off-street trails and neighborhood greenways connect to the R Line study corridor. The Mountains to Sound Greenway Trail connects to Rainier Avenue S. under I-90 and at S. Dearborn Street via a neighborhood greenway on Hiawatha Place S. The Rainier Valley North-South Neighborhood Greenway extends from I-90 to Rainier Beach via a connected network of low-speed residential streets and crossing Rainier Avenue S. in Columbia City. The Central Area Neighborhood Greenway crosses I-90 and reaches Rainier Avenue S. at S. Hill Street; this greenway connects to the Mountains to Sound Greenway Trail. An east-west greenway also crosses Rainier Avenue S. at S. Holly Street connecting the Chief Sealth Trail with Lake Washington and the protected bike lanes along Seward Park Avenue S. and Wilson Avenue S.

Corridor Map

Seattle
Puget Sound
Lake Washington
Segment 1 & 2
Segment 3 & 4
Segment 5
Unincorporated King County
Tukwila

Legend

- RapidRide R Line Study Corridor** (Thick red line)
- 1-Mile Bikeshed*** (Dashed red line)
- Link Light Rail Station** (Yellow circle)
- Proposed RapidRide Station** (Red circle)
- Neighborhood Greenway (Under Construction)** (Dashed green line)
- Neighborhood Greenway** (Solid green line)
- Multi-Use Trail** (Blue line)
- In-Street, Major Separation (Physical Barrier)** (Thick blue line)
- In-Street, Minor Separation (Pavement Marking, Signage)** (Thin blue line)
- Sharrow (Shared Lane Marking)** (Orange line)
- Full Signal with Crosswalk** (Blue dot)
- Half Signal with Crosswalk** (Light blue dot)
- Crosswalk** (Orange dot)

Source: King County, Seattle Department of Transportation, Nelson\Nygaard
*Bikeshed calculated using King County Metro Access to Transit Methodology (2018)

0 1,000 2,000 Feet

Map Labels:

- Pioneer Square Link Station
- International District Chinatown Link Station
- Judkins Park Link Station (Open 2023)
- Future Link
- Mt Baker Link Station and Transit Center
- Central Area Neighborhood Greenway
- Beacon Hill Neighborhood Greenway
- Rainier Valley North-South Greenway
- Mountains to Sound Greenway Trail
- Dr. Rizal Park
- Lincoln Park
- Jim Hendon Park
- Colman Playground
- Army Vets Tennis Center
- S McClellan St
- S Mount Baker Blvd
- S Winthrop St
- S Forest St
- S Bayview St
- S College St
- S Walker St
- S Hill St
- S Plum St
- S Holgate St
- S State St
- S Massachusetts St
- S Judkins St
- S Charles St
- S King St
- S Dearborn St
- S Weller St
- Yesler Way
- 12th Ave S
- 14th Ave S
- 16th Ave S
- 20th Ave S
- 21st Ave S
- 23rd Ave S
- 25th Ave S
- 24th Ave S
- Martin L King Jr Way
- Rainier Ave S
- 5th Ave S
- 6th Ave S
- 7th Ave S
- 8th Ave S
- 9th Ave S
- 10th Ave S
- 11th Ave S
- 13th Ave S
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- 98th Ave S
- 100th Ave S

Figure 3-7. Existing Bicycle Facilities (2 of 3)

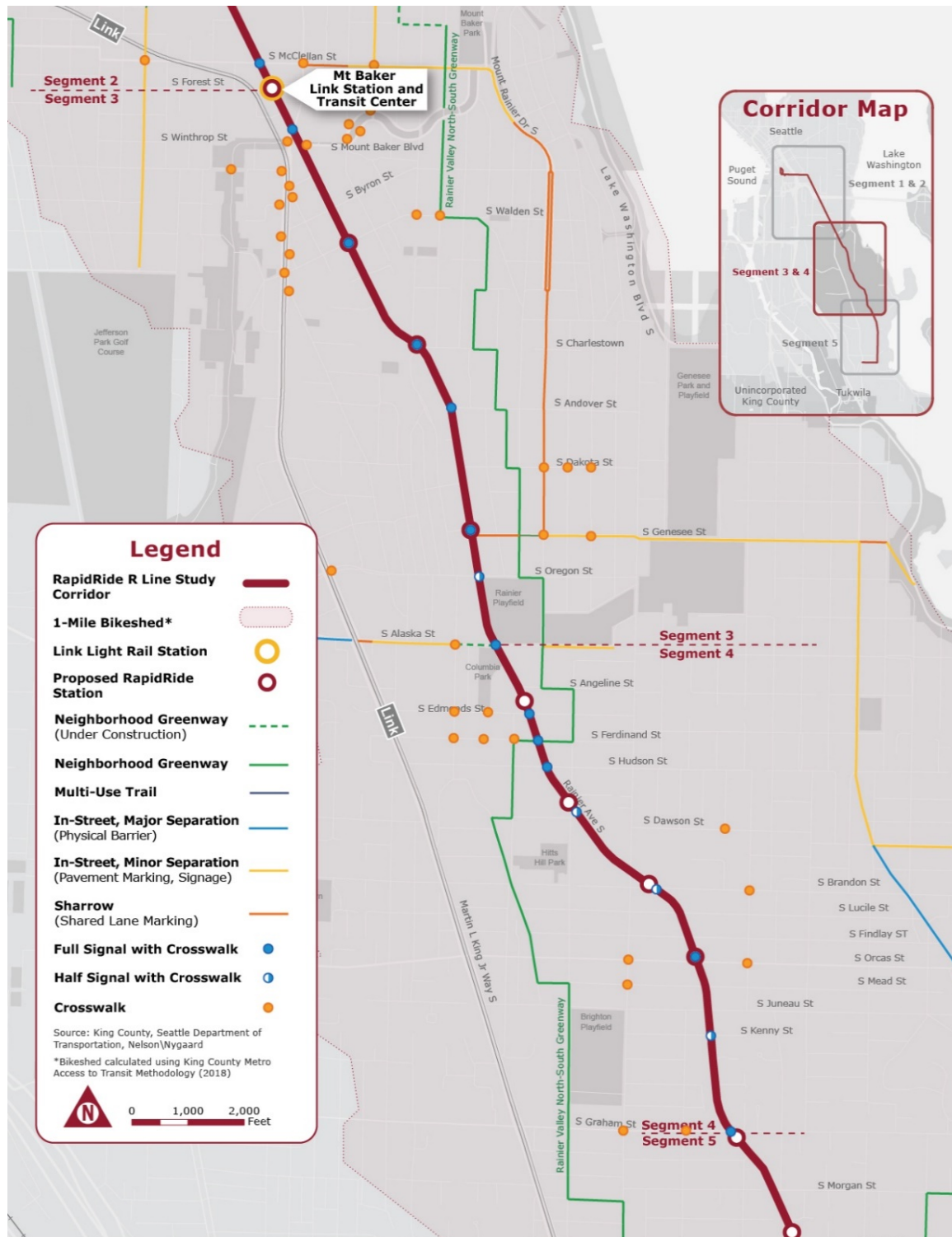
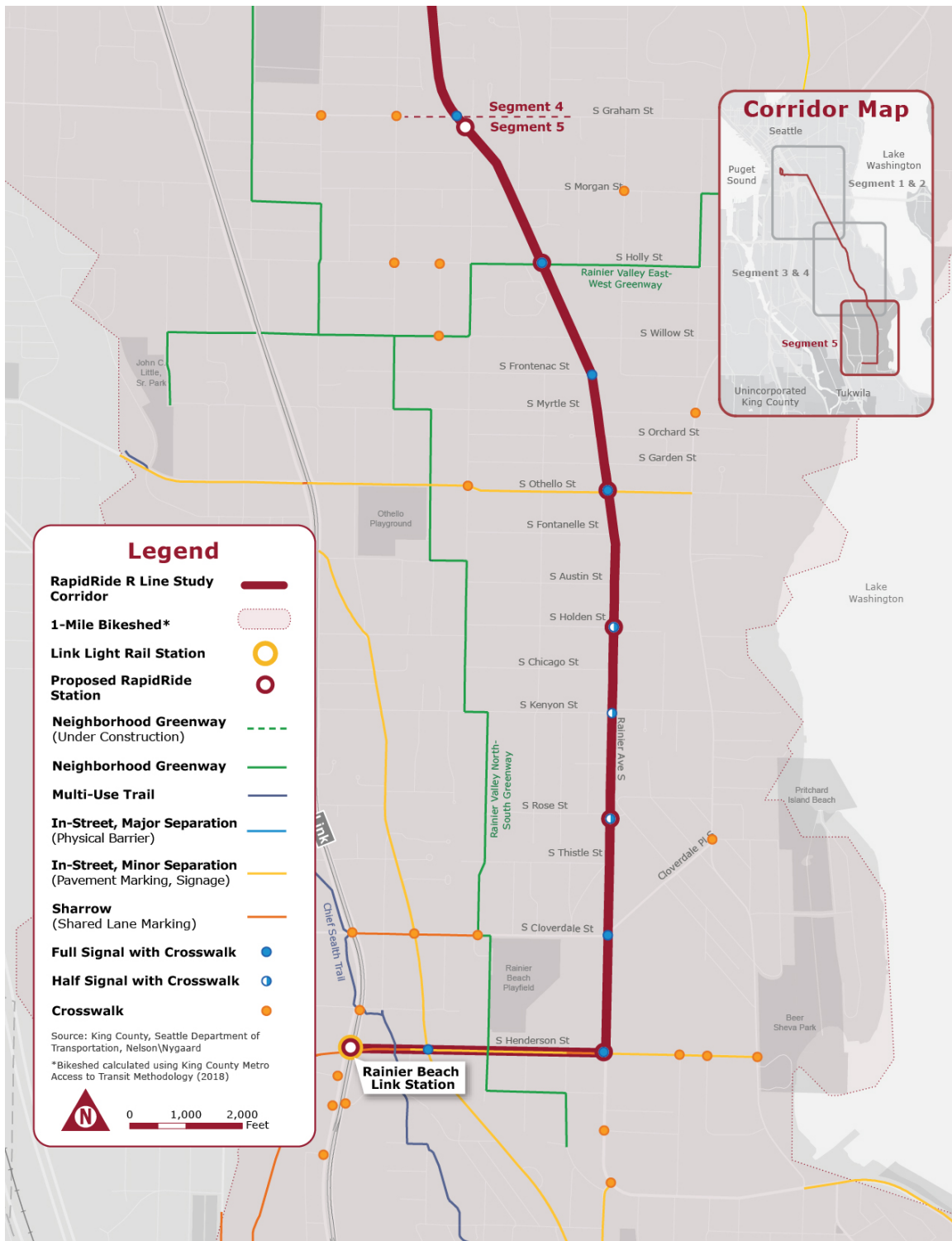


Figure 3-7. Existing Bicycle Facilities (3 of 3)



3.5.3 Parking Supply Along the Study Corridor

The on-street parking supply along the R Line study corridor is a combination of unrestricted, paid, time-limited, and restricted parking zones (RPZs). Along all segments of the corridor there are portions of unrestricted parking as well as areas with no parking allowed. There are areas of paid parking and time-limited parking in downtown Seattle, International District-Chinatown, and Columbia City. Within the corridor, RPZs exist in small portions of the Yesler Terrace and Dunlap neighborhoods. There are also several neighborhoods with RPZs directly adjacent to the corridor, including Columbia City, Mount Baker, and North Beacon Hill.

3.5.4 2012 – 2018 Pedestrian and Bicycle Crashes

To inform where access to transit projects could improve safety for people walking and bicycling, recent crash history was compiled and summarized with a focus on both crashes resulting in fatalities and serious injuries and crashes involving people walking and bicycling. SDOT provided crash data from the last 7-year period (January 1, 2012 through December 31, 2018) along the R Line study corridor. During this period, a total of 3,207 crashes were reported at intersections and along segments. Figure 3-8 displays the location of crashes at intersections along the study corridor.

3.5.4.1 Crashes at Intersections

A total of 1,229 crashes during the 7-year period occurred at R Line study corridor intersections, representing 37 percent of all crashes along the corridor. Thirteen of the study area intersections had an annual crash rate that was more than double the average rate.

Between 2012 and 2018, 35 serious injury crashes and 3 fatal crashes occurred at R Line study corridor intersections and over half of these crashes that occurred involved people walking. A total of 149 pedestrian crashes occurred at intersections, representing 12.1 percent of all crashes. Five percent of the total serious or fatal crashes involved people bicycling.

3.5.4.2 Crashes along Segments

SDOT identified seven segments along the study corridor to report crashes¹⁴. Between 2012 and 2018, 1,978 non-intersection-related crashes were along the study corridor. Eighty-four percent of these crashes occurred within three of the seven crash segments, with the highest percentage of fatal or serious injury crashes occurring on Rainier Avenue S. between S. Bayview Street and S. Alaska. The segment of Rainier Avenue S. between S. Alaska Street and S. Kenny Street experience the highest crashes per year per mile, with 52 crashes per mile per year since 2012. Forty-eight crashes along segments involved pedestrians, representing 2.4 percent of crashes; 1.3 percent of crashes involved bicycles.

¹⁴ *The boundaries of the seven crash segments differ from the boundaries of the five project segments.*

Figure 3-8. Intersections with Highest Serious or Fatal Injury Crashes (1 of 3)

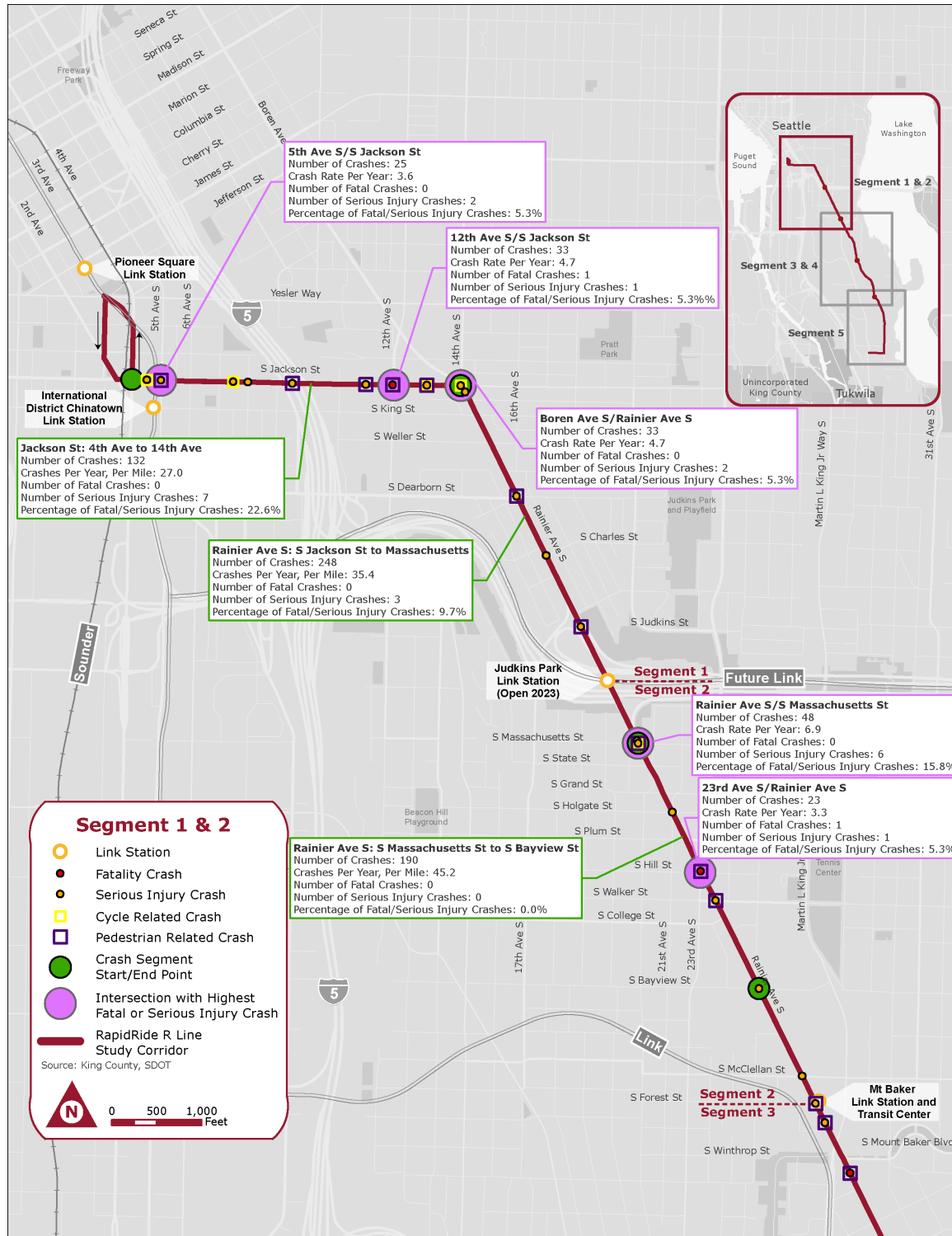


Figure 3-8. Intersections with Highest Fatal or Serious Injury Crashes (2 of 3)

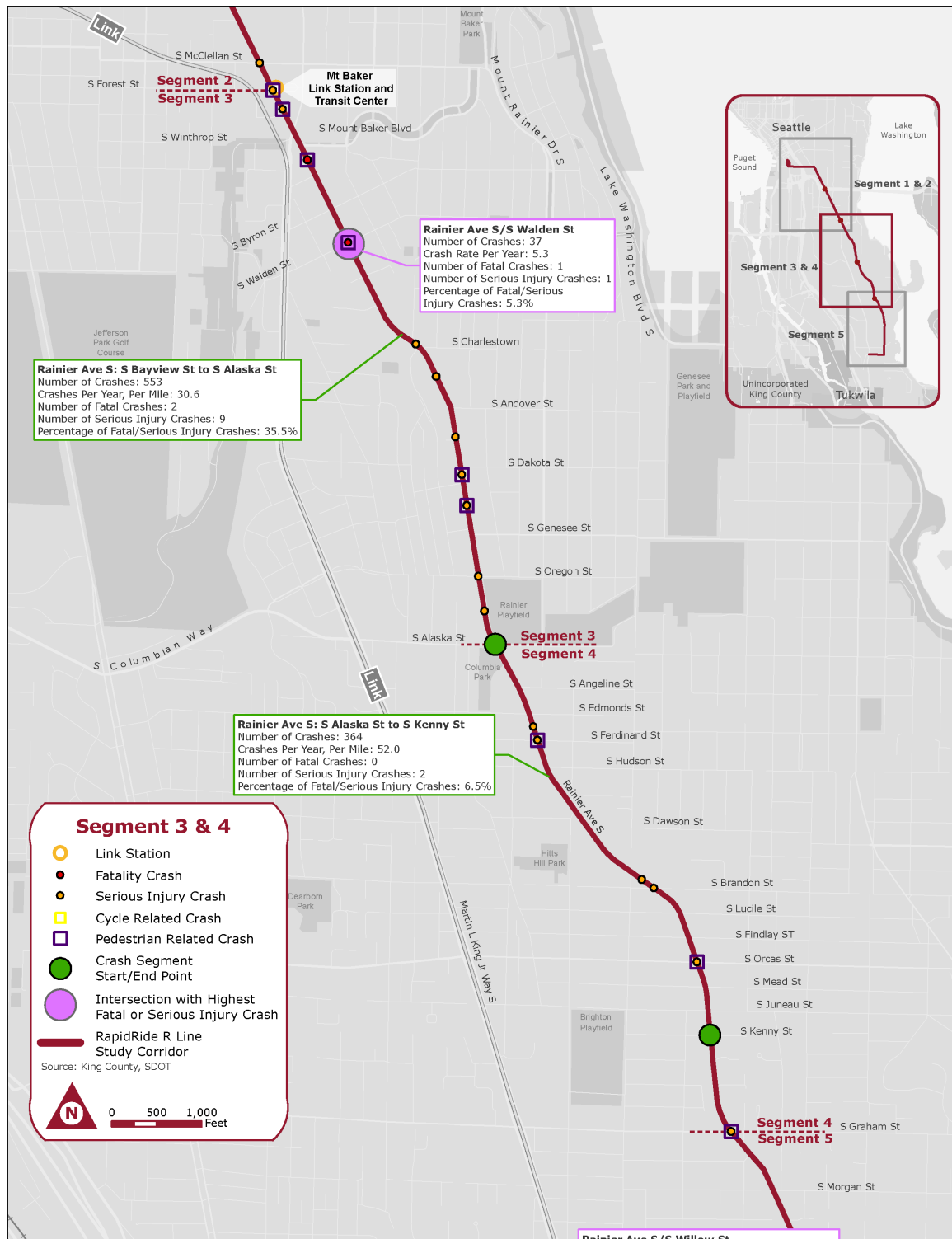
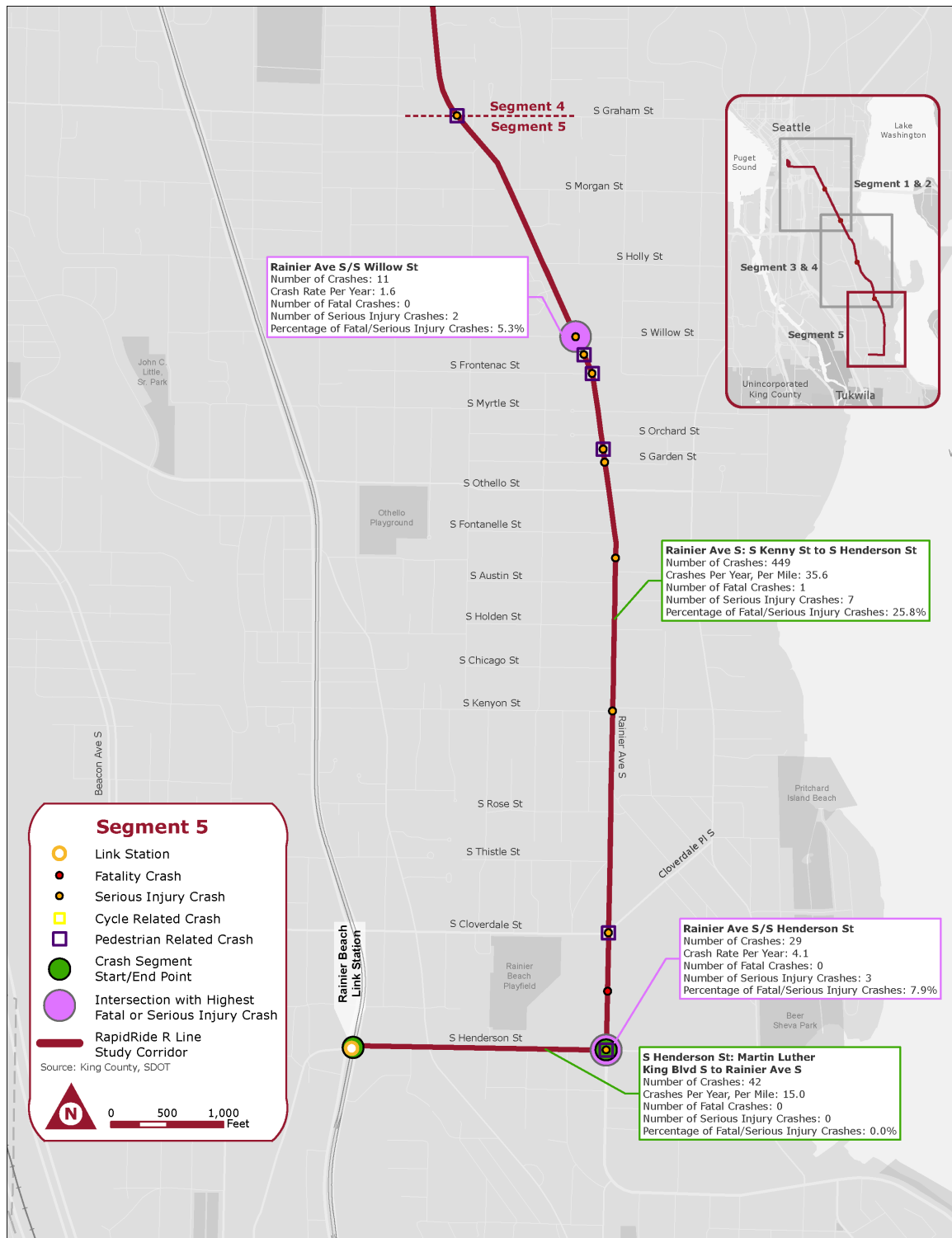


Figure 3-8. Intersections with Highest Fatal or Serious Injury Crashes (3 of 3)



3.6 Demographics

The study corridor passes through a densely developed, urbanized area containing a wide variety of land uses. There are approximately 37,000 households and 44,200 jobs within a one-half mile of the study corridor (PSRC 2018).¹⁵ Housing densities range from single family residential to high-density multi-family residential, including supportive housing facilities. Diverse commercial uses are present in the study area, ranging from small, locally owned businesses to large, national chain stores and restaurants. Social services, schools, houses of worship, senior centers, libraries, and medical facilities are all present near the study corridor. Figures 3-9 and 3-10 display household and job densities, respectively, near the study corridor. Figure 3-11 shows the locations of community assets near the study corridor.

The R Line study area includes some of the most diverse communities in King County, as well as a high number of traditionally transit-dependent persons.

The percentage of persons of color along the entirety of the corridor is above King County average (American Community Survey [ACS 2018]). The percentage of persons of color is particularly high around the southern portion of Rainier Avenue S., near the Rainier Beach Link Station. Figure 3-12 displays the distribution of persons of color census tracts in the study area. Along the study corridor, 95 percent of Route 7 boardings occur in persons-of-color census tracts¹⁶.

The percentage of low-income households along the corridor is also above the King County average (ACS 2018). The percent of low-income households is more than one and a half times that of the King County. Along the study corridor, 97 percent of Route 7 boardings occur in low-income tracts.¹⁷ Figure 3-13 displays the distribution of low-income households by census tract in the study area.

The percentage of households with limited English proficiency is more than two times the King County average throughout the study corridor, excluding one portion of Columbia City (ACS 2018). The percentage of households with zero vehicles along the corridor is also above King County average, excluding the Seward Park neighborhood and portions of Columbia City (ACS 2018). There are high concentrations of car-free households near the Mount Baker Link Station, the Rainier Beach Link Station, I-90 (the future Judkins Park Link Station), and the International

¹⁵ The reported demographic values are based on calculated population estimates in American Community Survey block groups within a half-mile buffer from the study corridor. For block groups that are not entirely in the study area or on land, the totals are adjusted based on the percentage of the block group that is within the study area or on land.

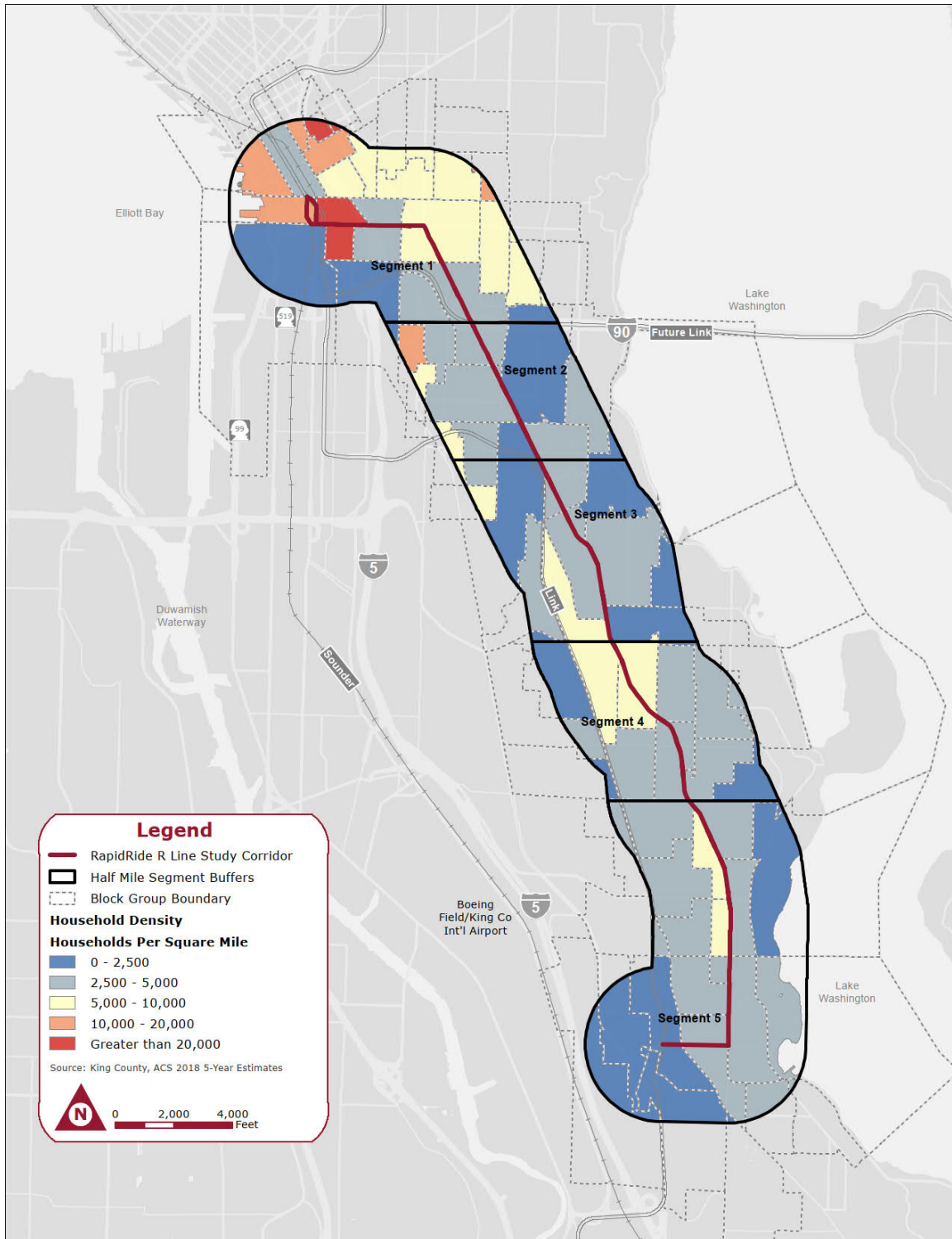
¹⁶ Persons-of-color tracts are defined as those where a greater percentage of the population than the countywide average is people of color (all groups except White, non-Hispanic), based on current census data.

¹⁷ Low-income tracts are those where a greater percentage of the population than the countywide average has low incomes (less than 200 percent of the federal poverty level depending on household size), based on current ACS data.

District/Chinatown Link Station. Percentage of limited English proficiency and transit-dependent households are shown in Figures 3-14 and 3-15, respectively.

The population of persons with disabilities tends to be clustered around Link stations, where there is the greatest ability to access destinations (ACS 2018). Persons with disabilities are congregated around the the International District/Chinatown, Mount Baker, and Rainier Beach Link Stations, and the Columbia City neighborhood. Lift deployments are evenly distributed at stops throughout the study corridor (Metro 2018b). Percentage of the population with a disability is shown in Figure 3-16.

Figure 3-9. Households per Square Mile Near Study Corridor (2019)



Legend

- RapidRide R Line Study Corridor
- Half Mile Segment Buffers
- Block Group Boundary

Employment Density
Estimated Employees Per Square Mile

- 0 - 2,500
- 2,500 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- Greater than 20,000

Source: King County, ACS 2018 5-Year Estimates

0 2,000 4,000 Feet

Figure 3-11. Community Assets (2019) (1 of 3)



Legend

- RapidRide R Line Study Corridor
- 1/4-Mile Walkshed*
- Link Light Rail Station

Community Assets

- Community/Senior Center
- Primary/Secondary School
- Emergency Shelter
- Grocery Store
- Health Center(FQHC/Tribal)
- Library
- ORCA Lift
- Place of Worship
- Subsidized Housing
- WIC
- Work Source Site

Corridor Map

Seattle, Puget Sound, Lake Washington, Segment 1 & 2, Segment 3 & 4, Segment 5, Unincorporated King County, Tukwila

Source: King County, Seattle Department of Transportation, Nelson\Nygaard

***Walkshed calculated using King County Metro Access to Transit Methodology (2018)**

0 1,000 2,000 Feet

Figure 3-11. Community Assets (2019) (3 of 3)

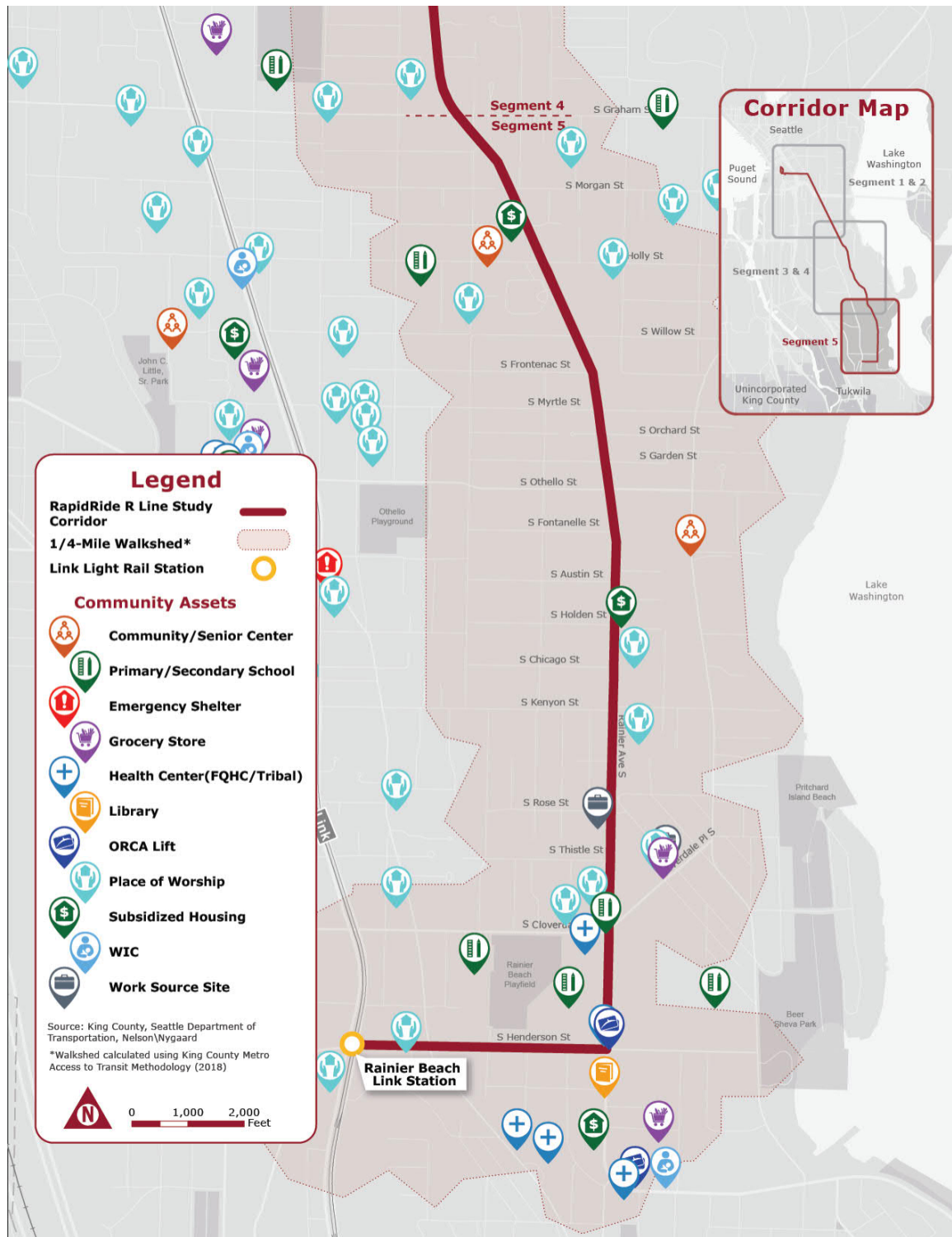


Figure 3-12. Percent Persons of Color

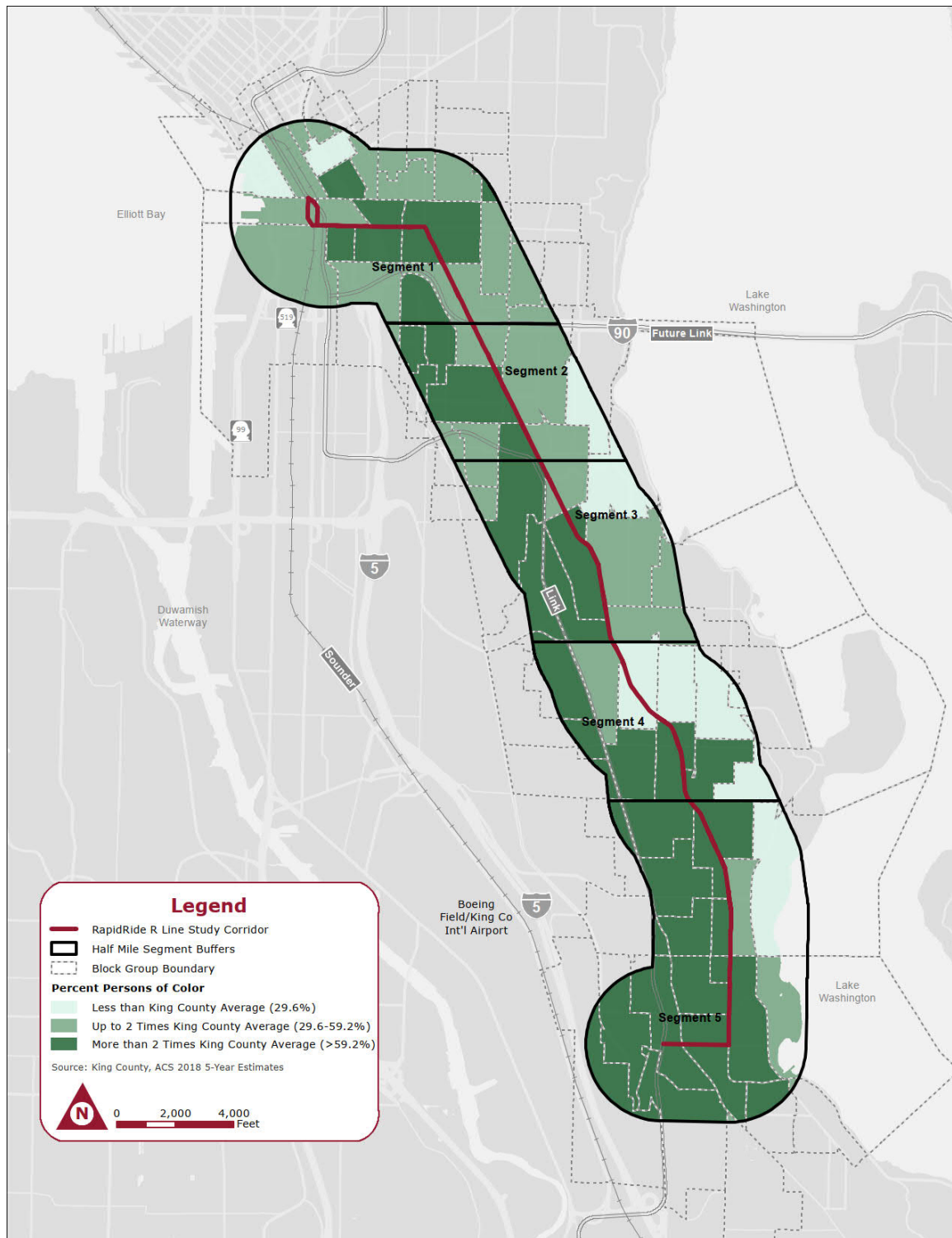


Figure 3-13. Percent Low-Income Households

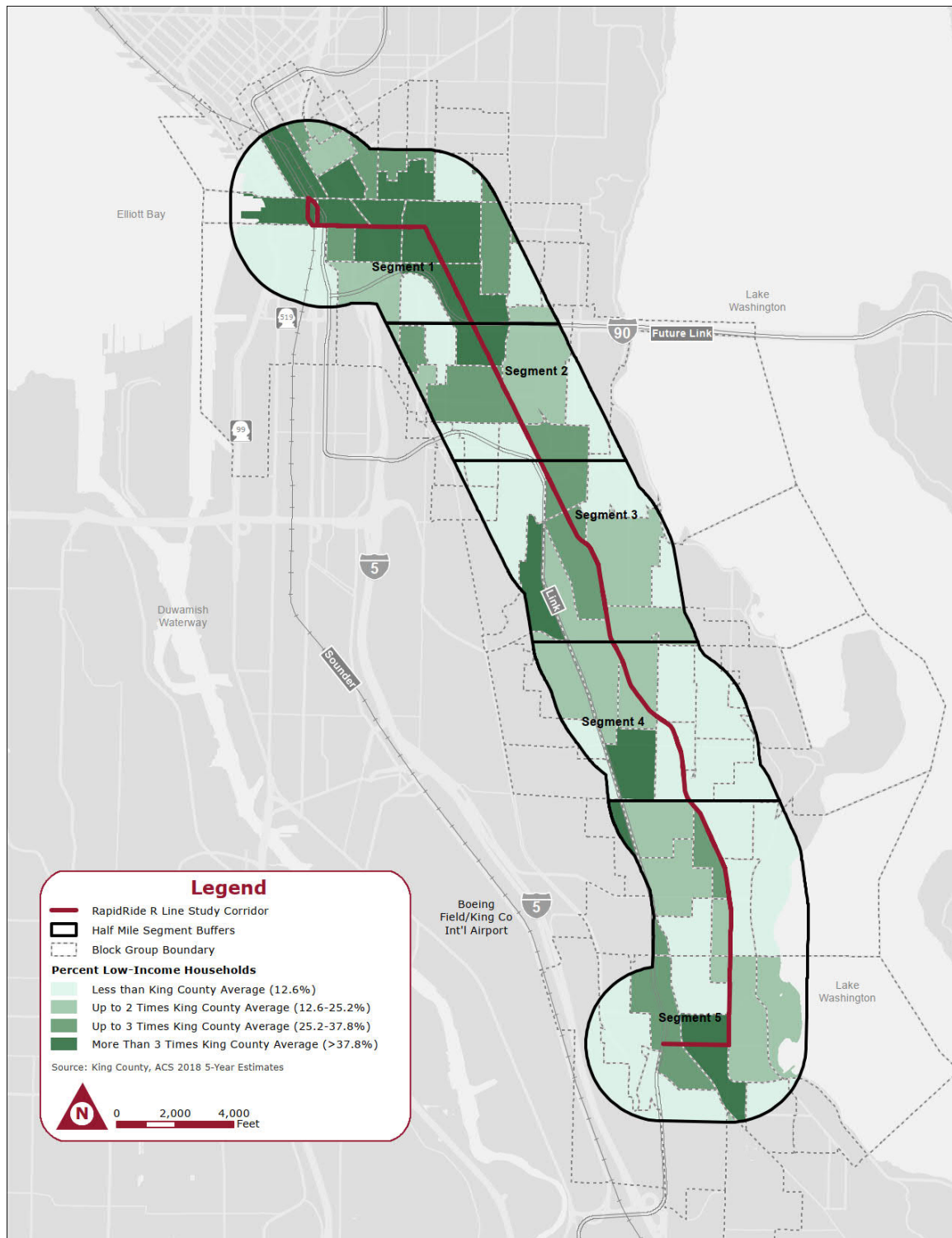


Figure 3-14. Percent of Households with Limited English Proficiency

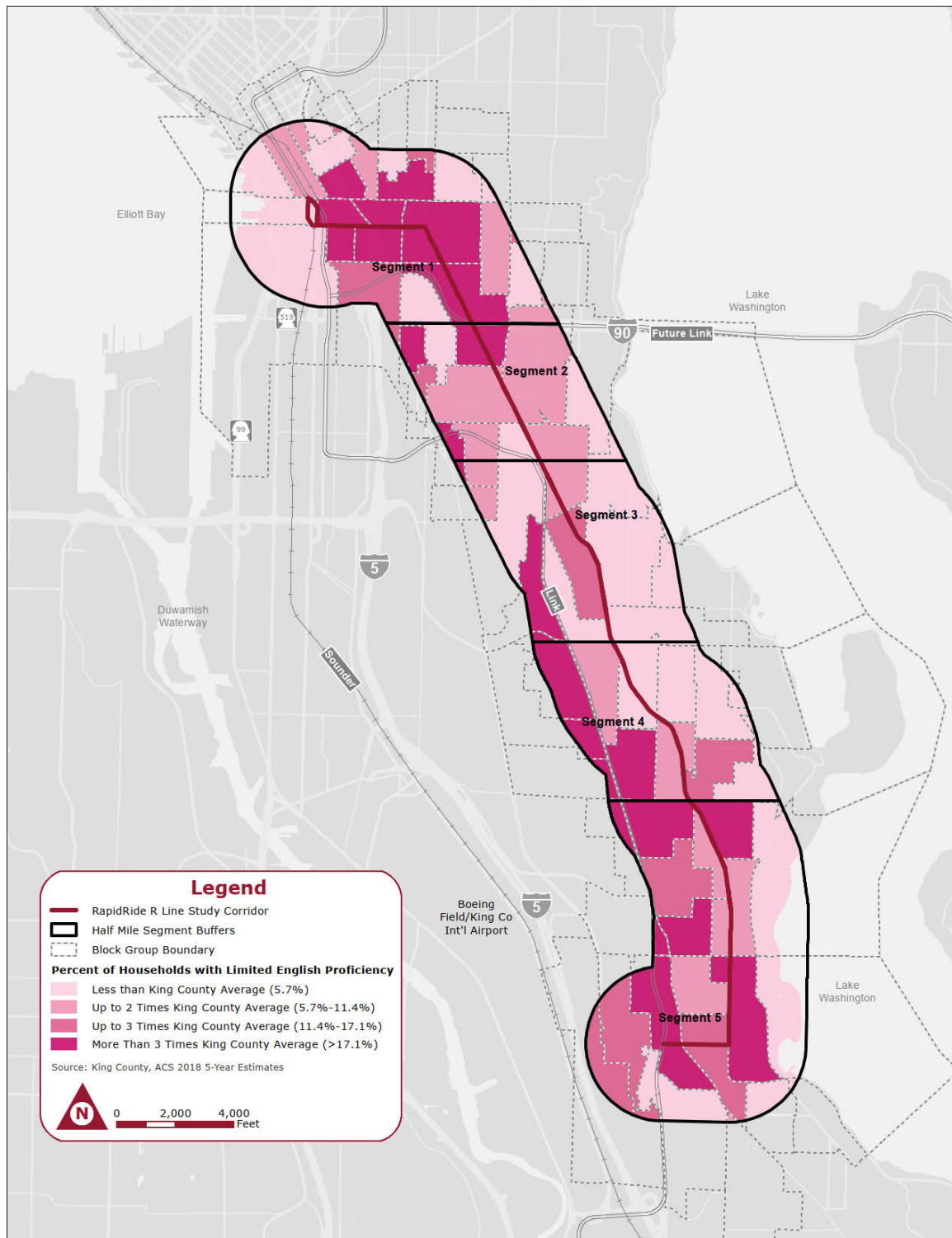
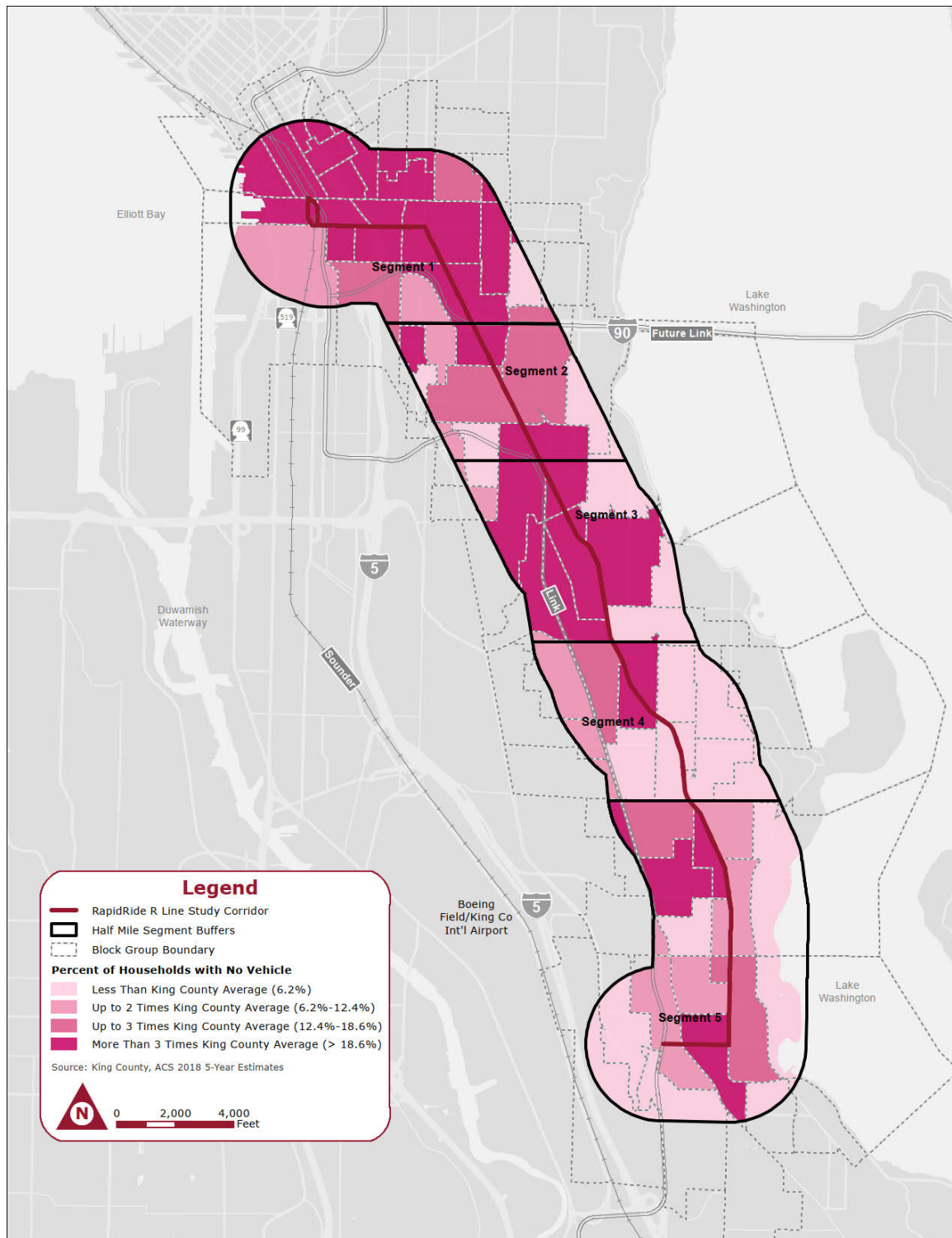


Figure 3-15. Percent Zero Vehicle Households



Legend

- RapidRide R Line Study Corridor
- Half Mile Segment Buffers
- Tract Boundary

Percent Persons with Disabilities

- Less than King County Average (9.5%)
- Up to 2 Times King County Average (9.5%-19%)
- More than 2 Times King County Average (>19%)

Source: King County, ACS 2018 5-Year Estimates

0 2,000 4,000 Feet



4 Environmental Assessment

The following sections describe, and graphically depict, existing conditions summaries of key environmental subject areas. A more complete environmental assessment will be completed during final design.

4.1 Environmental Justice

An Environmental Justice (EJ) Analysis was conducted to determine if any low-income households or minority¹⁸ populations would be disproportionately impacted by the R Line project and if it will uphold and improve the determinants of equity as defined by King County Ordinance 16948. Low-income and minority groups as defined by the Federal Transit Administration (FTA) as follows:

- Low-income: A person whose median household income is at or below the Department of Health and Human Services poverty guidelines.
- Minority: Any readily identifiable group or groups of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed or transient persons such as migrant workers or Native Americans who will be similarly affected by a proposed United States Department of Transportation program, policy or activity. Minority includes persons who are American Indian and Alaska Native, Asian, Black or African American, Hispanic or Latino, and Native Hawaiian, and Pacific.

Population estimates were calculated within a 1/2-mile buffer from the study corridor¹⁹.

4.1.1 Minority Populations

The 2014-2018 ACS data show that approximately 59.8 percent of the study area's population self-identifies as a racial minority, which is approximately twice the minority population of King County. Similarly, all segments in the study area contain a larger percentage of minority populations than King County, with Segment 5 containing the highest percentage of minority

¹⁸ The term "Minority" is used in this section as it is used by the FTA.

¹⁹ The reported values are based on calculated population estimates in American Community Survey block groups within a half-mile buffer from the study corridor. For block groups that are not entirely in the study area or on land, the totals are adjusted based on the percentage of the block group that is within the study area or on land.

persons at 74.6 percent. Table 4-1 summarizes the minority population by segment and includes the City of Seattle and King County populations for comparison.

Table 4-2 summarizes populations by race in the corridor study area. The largest populations in the corridor are Asian alone or in combination (25.2 percent), Black or African American (20.6 percent), and Hispanic or Latino of any race (9.6 percent). Black or African American persons represent the largest racial disparity between the study area and the city of Seattle and King County. The percentage of Black or African American persons is 16.1 percent in the study area compared with less than half that percentage (6.3 percent) in King County.

Table 4-1. Minority Populations in the R Line Study Area

Geography	Total Population	Minority Population	Percent Minority
Segment 1	23,617	12,010	50.9
Segment 2	8,895	4,891	55.0
Segment 3	11,888	7,005	58.9
Segment 4	11,257	6,347	56.4
Segment 5	20,435	15,245	74.6
Study Area	76,091	76,091	59.8
King County	2,163,257	639,607	29.6

Source: 2014-2018 ACS 5 Year Estimate

Table 4-2. Race and Ethnicity in the R Line Study Area

Race	Study Area		King County	
	Population	Percent	Population	Percent
White Alone	30,594	40.2	1,404,974	64.9
Black or African American	15,703	20.6	136,054	6.3
American Indian and Alaskan Native Alone or in Combination	736	1.0	13,743	0.6
Asian Alone or in Combination	19,181	25.2	370,908	17.2
Pacific Islander Alone or In Combination	347	0.5	16,779	0.8
Some Other Race Alone	3,877	5.1	84,956	3.9
Two or More Races Alone	5,652	7.4	135,843	6.3
Total	76,091	100.0	2,163,257	100
Hispanic or Latino of Any Race ^a	7,319	9.6	206,735	9.6

Source: 2014-2018 ACS 5 Year Estimate

Notes:

^a Hispanics may be of any race, so also are included in applicable race categories.

4.1.2 Low-Income Populations

In 2018, the federal poverty threshold for a family of four was \$25,701. The median household income of King County is \$89,418, \$14,000 higher than that of the study area (\$75,285). The study area contains a larger percentage of low-income people than King County as a whole. Segment 1 contains the highest percentage of low-income households (22.0 percent), which is almost 10 percentage points higher than King County (12.6 percent). The percentage of low-income households in the study area (19.2 percent) is 6.6 percent more than the King County average (12.6 percent).

Table 4-3 summarizes the distribution of low-income households by segment, along with that of the study area and King County.

Table 4-3. Low-Income People in the R Line Study Area

Geography	Total Households	Median Household Income	# of Households with Income <\$25,000	% of Households with Income <\$25,000
Segment 1	12,228	\$62,599	2,685	22.0
Segment 2	3,583	\$82,995	634	17.7
Segment 3	4,354	\$84,459	702	16.1
Segment 4	4,312	\$82,471	753	17.5
Segment 5	6,751	\$75,404	1,221	18.1
Study Area	31,228	\$75,285	5,995	19.2
King County	865,627	\$89,418	109,069	12.6

Source: 2014-2018 ACS 5 Year Estimate

4.2 Equity and Social Justice Populations

In addition to minority and low-income people, this analysis considered other populations within the study area to evaluate R Line's equity per the County's Equity and Social Justice determinants and potentially adverse effects to these populations to ensure nondiscriminatory practices. These include limited English proficiency populations, zero-vehicle households, and persons with disabilities within the study area.²⁰ Figures 3-14 through 3-16 display the distribution of these populations within the study area. The study area contains higher percentages of all of these populations than King County as a whole.

Limited English proficiency refers to as anyone above the age of five who reported speaking English less than "very well", as classified by the United States Census Bureau. Within the study corridor, the percentage of households with limited English proficiency is 12.9 percent, more than two times the King County average (5.7 percent) (ACS 2018).

The percentage of households with zero vehicles along the corridor is also above King County average, excluding the Seward Park neighborhood and portions of Columbia City (ACS 2018). There are high concentrations of car-free households near the Mount Baker Link Station, the

²⁰ The term "Limited English proficiency" is used in this section as it is used by the ACS.

Rainier Beach Link Station, I-90 (the future Judkins Park Link Station), and the International District/Chinatown Link Station.

Within the study area, the population of persons with disabilities is clustered around the International District/Chinatown, Mount Baker, and Rainier Beach Link Stations, and the Columbia City neighborhood. (ACS 2018).

Table 4-4. Equity Indicators in the R Line Study Area

Equity Indicator	Study Area	King County
Limited English Proficiency	12.9%	5.7%
Zero Vehicle Households	25.6%	6.2%
Persons with Disabilities	13.0%	9.5%

Source: 2014-2018 ACS 5 Year Estimate

4.3 Noise and Vibration

In the northern end, land uses directly adjacent to the study corridor²¹ are a mix of higher density uses including residential uses, commercial and service uses, hotels, government offices, a theater, a museum, a church, and urban squares. The central and southern parts of the corridor include a mix of low to high-density residential uses, commercial and service uses, churches, a hospital, a library, a theater, a funeral home, schools, fire stations, and parks and recreation facilities.

Background noise levels were measured at five locations along the study corridor. The noise monitoring is used to provide an understanding of the existing environment along the corridor and establish the FTA noise impact criteria. Currently, noise levels along the study corridor will continue to be dominated by traffic along downtown roadways, S. Jackson Street and along Rainier Avenue S. The existing 24-hour day-night equivalent noise levels (Ldn) range from 64 to 74 dBA, with 1-hour noise equivalency levels (Leq) ranging from 63 to 73 a-weighted decibel (dBA) during peak hours

Under the Build alternative, noise levels along this corridor will continue to be dominated by traffic along downtown roadways, S. Jackson Street and along Rainier Avenue S. Noise levels from the all-electric fleet of buses for R Line are predicted to produce an Ldn of 57 dBA, and a

²¹ For the Noise and Vibration analysis, the study corridor included the assumed R Line alignment along 3rd Avenue through downtown Seattle to the current Route 7 northern terminus.

peak hour Leq of 55 dBA, at 25 feet from a four lane roadway (assuming 10 foot lanes), with R Line operating on the curb lanes on each side of the roadway, at a speed of 35 miles per hour. Based on these noise levels, there are no noise impacts predicted under the FTA criteria, and no potential increase to the existing Ldn or peak hour Leq predicted as a result of the project.

The R Line project will use rubber-tired vehicles and all bus pullouts will be newly paved slabs to prevent wear and maintain a smooth surface. In addition, the maximum predicted vibration levels from the project were projected to range from 60 vibration decibels (VdB) to 68 VdB at the nearest residences. Therefore, the FTA vibration criteria of 72 VdB would not be exceeded and no vibration impacts are predicted.

4.4 Hazardous Materials

A Hazardous Materials Analysis Report was prepared to assess the potential for adverse environmental impacts to the planned project from current or historical property uses in the vicinity of the R Line study area, and to provide potential mitigation measures for those impacts. For this evaluation, hazardous materials means hazardous substances, hazardous wastes, and contaminated soil and/or ground water. The focus of the Hazardous Materials Analysis Report was to research existing information available through state and federal environmental regulatory databases and historical documentation. This research study would identify properties within and adjacent to the project area with a history of, or potential for, hazardous materials to be present that could affect R Line during project design and construction, or result in environmental liability associated with potential property purchase. A reconnaissance of the R Line area, conducted from public rights-of-way or publicly accessible properties, was also completed to identify areas of potential concern.

Data collection, field reconnaissance, and evaluation activities identified evidence of potential hazardous materials conditions potentially impacting the soil and/or ground water of the study area were identified. These conditions include:

- **Contaminated Sites:** A total of 1,287 regulatory-listed properties were identified on multiple regulatory databases. Of these, 1,224 were considered to be no impact properties and were eliminated from further consideration, due to the nature of the database listing, media affected, property status, distance from, or inferred ground water flow direction relative to the Project Area. The remaining 63 regulatory-listed properties, shown on Figure 4-1, were further evaluated for their potential risk to the study area. Twenty-one of these 63 properties are considered low impact properties that are not anticipated to result in contamination being encountered during construction. Twenty-eight properties are considered to be moderate impact properties that have a reasonable potential for contaminants to migrate to and impact the study area, but there is no conclusive evidence. The remaining 14 properties are considered high impact and anticipated to pose a risk of contamination being encountered in the study area during construction.

- Historical and/or Current Adjoining Property Uses: Several properties adjacent to the Project Area were identified as having historical and/or current commercial, industrial, or railway uses that could have resulted in potential releases of hazardous materials to the surrounding environment. The contaminants with highest probability to be associated with these historic and/or current property uses include metals, solvents, and petroleum hydrocarbons. Several of these historical uses could result in potential abandoned underground storage tanks located within or close to the study area.
- Physical Environment: Placement of “artificial fill” or “landfill debris” (including garbage, slag, and other debris) containing potential contaminants was noted to have occurred in the vicinity of several portions of the study area, with possible placement of these fill materials adjacent to or on portions of the study area.

Segment 1 & 2

- Link Station
- RapidRide R Line Study Corridor

HazMat Parcel Impacts

- High Impact
- Moderate Impact
- Low Impact

Source: King County

0 500 1,000 Feet

Inset Map: Shows the location of the study corridor within the greater Seattle area, including segments 1 & 2, 3 & 4, and 5.

Figure 4-1. Regulatory Listed Properties (2 of 3)

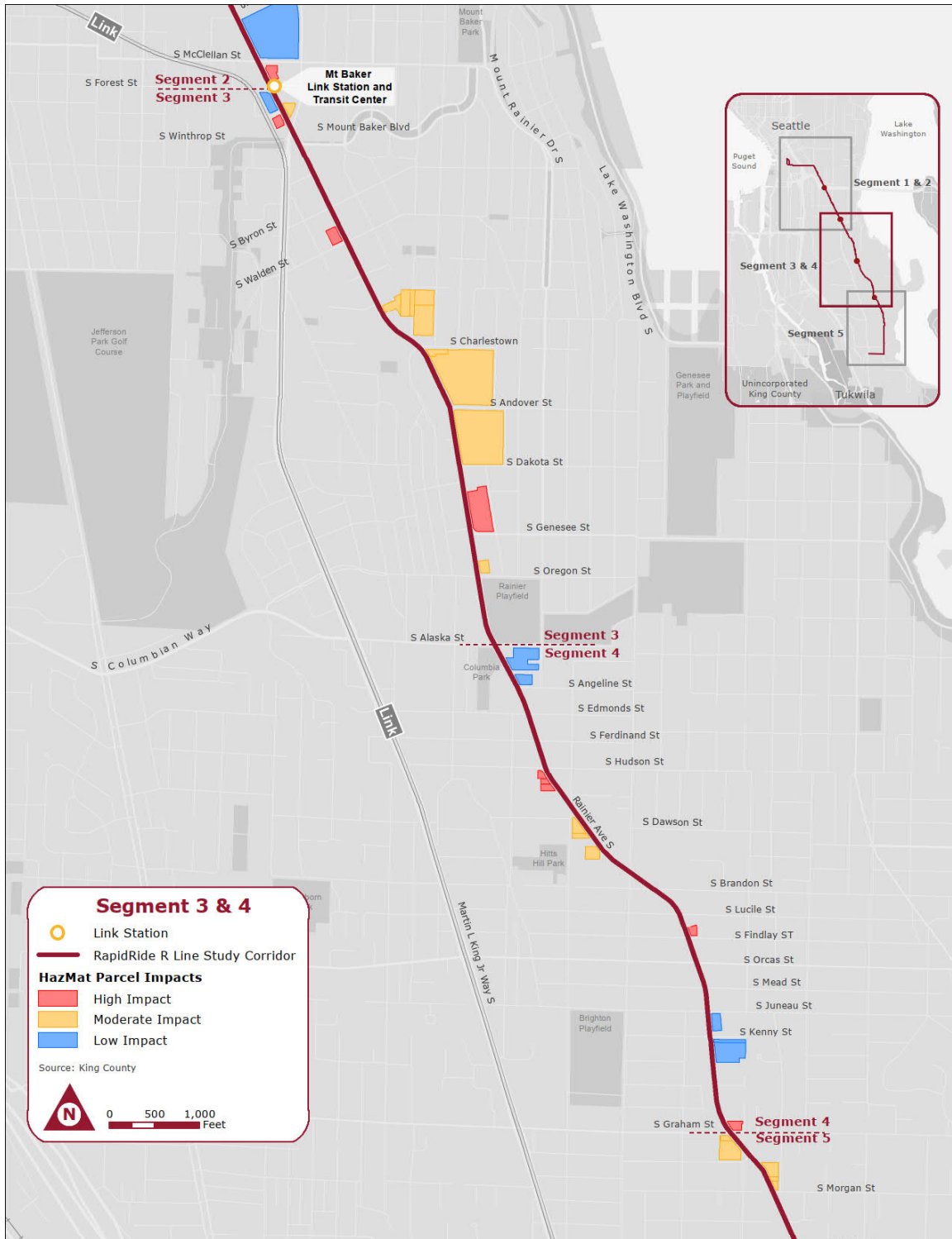
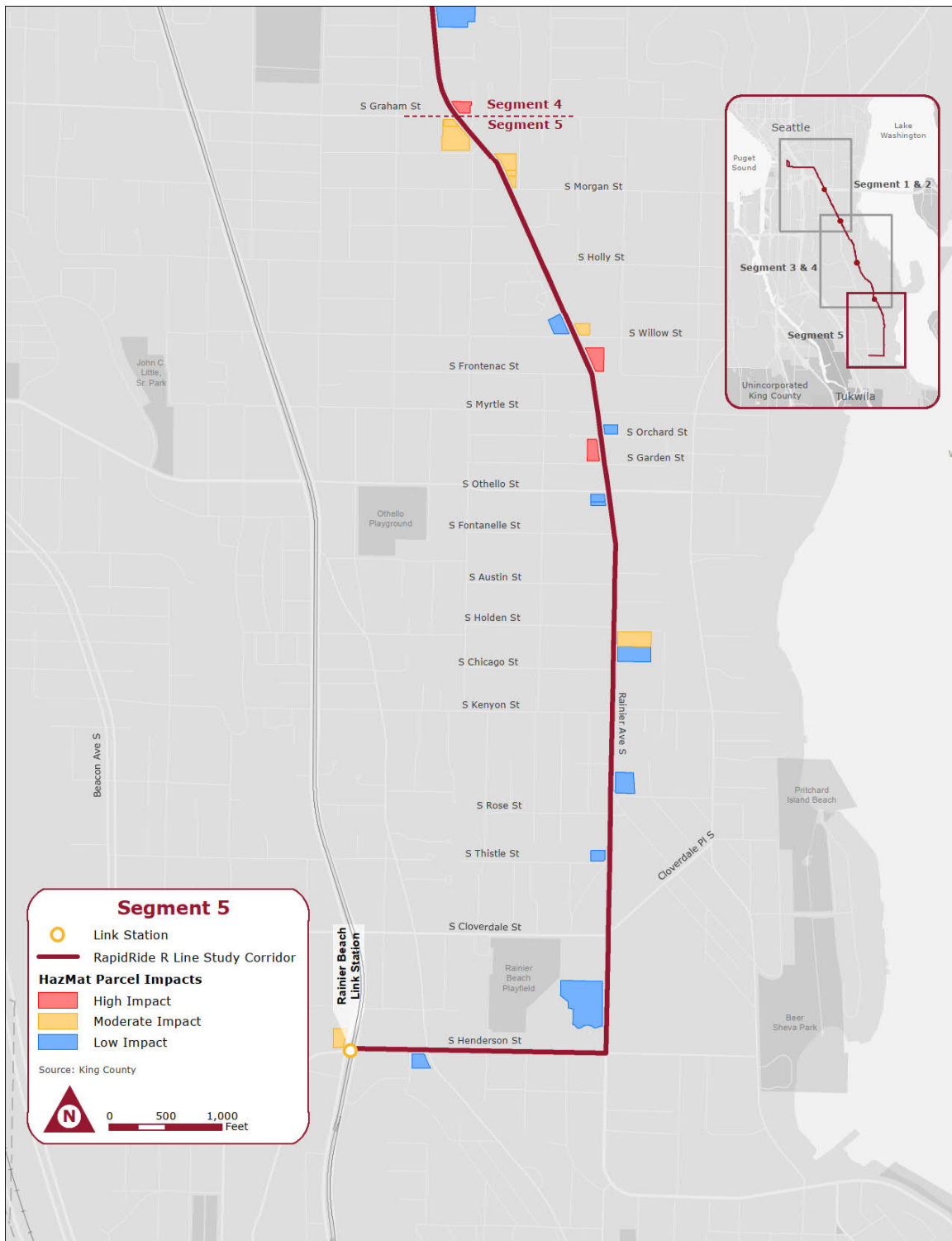


Figure 4-1. Regulatory Listed Properties (3 of 3)



The R Line Project has the potential to encounter hazardous materials during construction activities, with the most likely being petroleum hydrocarbons, metals, and solvents. Potential construction impacts could include the exposure of workers or the public to:

- Contaminated soil and ground water within the study area;
- Potential abandoned underground storage tanks within or in proximity to the study area that could potentially contain hazardous substances and may have releases to the environment; and/or
- Unintentional alteration of contaminant migration pathways, e.g., in utility trench permeable backfill below the ground water table.

In areas where “artificial fill” and/or “landfill debris” has been placed, low levels of contaminants could be present in soil and ground water.

Construction impacts could be mitigated through the following actions:

- Conduct visual and olfactory screening of soils and ground water during excavation activities for indications of contamination. If suspect soils and/or ground water are encountered during project construction, or in areas of known contamination, perform sampling and laboratory analysis to characterize the materials for proper management, handling, and disposal (as needed), including appropriate health and safety measures and compliance with applicable local, state, and federal regulations.
- Develop protocol and select areas for field screening, sampling, and laboratory analysis based on the evaluation of adjoining known contaminated sites presented herein.
- Utilize best management practices for stormwater and erosion control.
- Follow Washington State Department of Ecology underground storage tank reporting and removal regulations if abandoned or unreported regulated underground storage tanks are encountered during construction.
- Apply appropriate health and safety measures.
- Develop a contaminated media management plan and project specifications that outline proper testing, handling, and disposal of any contaminated soil or water encountered during project construction.

At the time of this report, no known temporary or permanent easement or full property acquisitions were identified. However, right-of-way and/or permanent easement or full property purchases could occur as part of the R Line project. Mitigating potential liability from property purchases is typically accomplished via the due diligence process by completing Phase I Environmental Site Assessments and/or Phase II Subsurface Investigations.

Ongoing and future remediation of properties in the study area could be impacted by the operation of new facilities installed underground as part of the project construction. Potentially contaminated soil or ground water on adjacent properties and within the right-of-way could also affect maintenance activities for the completed project. Operation and maintenance of R Line

features is not expected to result in the release of hazardous materials into the environment from unintentional spills.

4.5 Cultural and Historic Resources

Potential cultural resources and archaeological sensitive areas were identified near the study corridor. The analysis was informed by reviewing readily available data and field survey information, and its conclusions will include input on whether the potential improvements included in the R Line Unconstrained Alternative would have potentially adverse impacts on cultural resources that could eliminate improvements from consideration.²²

The environmental baseline review effort supports compliance with the National Environmental Policy Act (NEPA). The County is the lead agency for the Washington State Environmental Policy Act (SEPA) compliance purposes. Project documentation under the following cultural resources laws and regulatory compliance requirements that will likely be required as part of this undertaking:

- Section 106 of the National Historic Preservation Act (NHPA)
- Section 4(f) of the Department of Transportation Act
- City of Seattle Historic Landmarks and Special Review Districts, Certificate of Approval (COA) (Seattle Municipal Code 22.66)

4.5.1 National Historic Preservation Act

The R Line project will be subject to Section 106 of the NHPA, as amended, and the implementing regulations in 36 Code of Federal Regulations (CFR) Part 800. Section 106 requires federal agencies to consider the effects of their undertakings on historic properties. A historic property is typically 50 years of age or older. It is defined in 36 CFR part 800.16(I)(1), as follows:

... any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria.

²² *The cultural and historic resources analysis was limited to a preliminarily defined Area of Potential Effect (APE), which did not include all access to transit improvements included in the Unconstrained Alternative. The APE will need to be revised during future phases of project development in order to fully assess all potential improvements.*

The procedures under Section 106 generally require the federal agency involved in the undertaking to identify an Area of Potential Effect (APE), inventory any historic properties that may be located within the APE, and determine if the identified historic properties located within the APE may be eligible for listing in the National Register of Historic Places (NRHP).

One-hundred and twenty cultural resource assessments have been previously completed within the one-mile radius area reviewed for the preliminary APE. Of the 120 cultural resource assessments completed, one was located within the preliminary APE, 8 were located adjacent to the preliminary APE, and 20 intersected the project preliminary APE.

There are no known pre-contact (pre-1850) archaeological sites within the project's APE. However, there are five known historic archaeological sites consisting of historic building foundations and structural remains associated with King Street Station, the New Richmond Hotel, and the James Street Tunnel, all within or near the Pioneer Square Preservation District. Given the minimal amount of construction activity anticipated in this area the construction of the R Line project is not anticipated to impact any of these sites.

As the project development continues, areas where ground-disturbing activities and placement of structures in the viewshed of or directly adjacent to NRHP eligible or listed historic properties especially those within historic districts, may require further evaluation. The formal project APE will be established in consultation with the federal lead agency, SDOT, Metro, Department of Archaeology and Historic Preservation, and the consulting tribes. It may also have to be adjusted to consider setting effects (such as new transit-related shelters, structures, and signs), noise impacts, and other indirect effects with the potential to cause changes to districts and individual structures as a result of this undertaking.

4.5.2 Section 4(f) Compliance Process

Section 4(f) requirements stipulate that Federal Highway Administration, FTA, and other Department of Transportation agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless the following conditions apply:

- There is no feasible and prudent avoidance alternative to the use of land; and the action includes all possible planning to minimize harm to the property resulting from such use; OR
- The Administration determines that the use of the property will have a de minimis²³ impact.

²³ *De minimis* is defined as "lacking significance or importance: so minor as to merit disregard.

For projects that may have an effect on Section 4(f) lands, the compliance process typically has three steps:

1. **Determining Significance.** For historic properties, significance is determined through consultation with the federal, state, or local officials having jurisdiction over the property, Department of Archaeology and Historic Preservation (DAHP). Once a property's significance has been determined, Section 4(f) prohibits both the actual taking of land from the protected property and *constructive use* of the property—where a project's *proximity* to the Section 4(f) resource substantially impairs the normal use of the land.
2. **Developing Alternatives.** Parklands are to be protected unless unusual factors or unique problems are present, or the cost, environmental impacts, or community disruption resulting from proposed project alternatives are particularly large. For historic properties, in evaluating an alternative, one must consider whether the alternative uses Section 4(f) property, whether it is prudent and feasible, and to what extent it harms the resource. If several project alternatives include the use of land from a Section 4(f) resource, the alternative which is prudent and feasible and which has the least overall impact on the resource, including mitigation measures, must be selected.
3. **Section 4(f) Evaluation.** Whenever Section 4(f) property is used for a project, documentation must be prepared that demonstrates that there are unique problems or unusual factors that prevent alternatives that don't use 4(f) property, or that the costs and social, economic, and environmental impacts, or community disruption resulting from the alternatives are particularly large. The evaluation must contain the following information, developed by the applicant in cooperation with FTA:
 - A description of the proposed action
 - A description of the resource
 - The impacts of each alternative on the resource
 - Alternatives to avoid using the resource
 - Measures to minimize harm
 - Coordination with the agency having jurisdiction over the Section 4(f) property

As noted in the previous section, the R Line project is not anticipated to impact historic properties in the study corridor. Similarly, the project does not anticipate impacts to other Section 4(f) properties.

4.5.3 City of Seattle Historic Districts

The City of Seattle has eight established historic districts. They represent historic, cultural, architectural, and social importance and are viewed as valuable cultural assets in the city. The designation and protection of these districts help to promote the aesthetic, cultural, and

economic strength of Seattle. The city has established processes and criteria to regulate the appearance and historical integrity of structures and public spaces within each district, including rights-of-way. Improvements within these districts is subject to review by a citizens board and/or the City of Seattle Landmarks Preservation Board.

The R Line study corridor crosses through three historic districts in the City of Seattle: the Pioneer Square Preservation District, the International Special Review District (ISRD), and the Columbia City Landmark District. The boundaries of these districts are shown on Figure 4-2. As shown on Figure 4-2, the boundaries of the Pioneer Square Preservation District and the International Special Review District overlap along 4th Avenue S. They also overlap between 4th Avenue S. and 5th Avenue S. from S. Jackson Street to midblock between S. King Street and S. Weller Street. This area includes Union Station, the entrances to the International District/Chinatown Link Stations, and the surrounding plazas. Potential improvements in the overlap areas will require review by the boards of each district.

Each district has established review processes and protocols. The following processes and protocols apply to all three districts through which R Line will pass. District-specific processes and protocols are described in the following sections.

- A Certificate of Approval is the official notice of approval for consistency with the guidelines and standards for an historic district. It is required before the city will issue permits for modifications within these districts. A complete application must be submitted to the City of Seattle Department of Neighborhoods and review by the applicable board is required in order to obtain a Certificate of Approval.
- Each application is reviewed by City of Seattle Department of Neighborhoods staff prior to transmittal to the respective historic district committee and/or board. A determination of completed application must be issued within 28 days of its submittal. If an application is deemed incomplete, a checklist is returned to the applicant specifying the additional information that is required. A hearing before the historic district board will not be scheduled until an application is deemed complete and all applicable fees submitted. A determination of a complete application does not imply approval by the historic district committee and/or board nor does it preclude the board or staff from requesting additional information during the review process.
- Project applicants can meet with City of Seattle Department of Neighborhoods staff prior to submittal of their application to review project plans and designs. This is highly encouraged as it can help to identify possible issues of concern that can be corrected or modified prior to submittal of an application.
- 100 percent complete construction drawings must accompany a complete application. Specific materials will be required to illustrate how the final project will integrate with the historic district. It is important to note that applications should look beyond building or structural form; they should also consider function and activity flow that may be influenced by the final project.

- All board meetings are open to the public as is all information that is submitted with an application. Public comment is allowed for any application.
- Applicants may request a briefing to a board in advance of a hearing. This is strongly recommended as it allows for early input by the board which can be used to refine project elements prior to the hearing. A briefing packet may be submitted by an applicant prior to or with an application. It is advisable to submit a request for a briefing as early as possible, as applications have priority with the boards and there could be delays associated with scheduling briefings, depending on the volume of applications received in a district.
- Upon completion of a hearing, the respective board will make a recommendation to the Director of Neighborhoods to approve, approve with conditions, or deny an application. The Board can also request additional information prior to developing a recommendation.
- The Director of Neighborhoods (Pioneer Square and ISRD) or the Landmarks Preservation Board (Columbia City Landmark District) issues the final Certificate of Approval for the project. Any conditions included as part of the Certificate of Approval must be adhered to in order to obtain development permits for the project.

4.5.3.1 Pioneer Square Preservation District

Applications for projects in the Pioneer Square Preservation District undergo evaluation by the Architectural Review Committee (ARC) prior to the Pioneer Square Preservation Board. The ARC issues a recommendation to the Pioneer Square Preservation Board. The ARC may request additional information from the applicant prior to rendering their recommendation. ARC meetings are regularly scheduled meetings held one week prior to the Pioneer Square Preservation Board at which the application will be reviewed. Upon receipt of the ARC recommendation, the Pioneer Square Preservation Board will review the application and issue a recommendation to the Director of the Department of Neighborhoods to approve, approve with conditions, or deny the application. Board meetings are held on the first and third Wednesdays of each month. Applicants present the project at both the ARC and Pioneer Square Preservation Board meetings.

The [Pioneer Square Preservation District Guidelines](#) describe the general guidelines for evaluation of proposals, including the architectural elements that will be used by the Board in the evaluation of applications.

Application instruction, the fee schedule, board meeting schedules, and documentation requirements can be found in the [Pioneer Square Preservation Board Application for Certificate of Approval](#). Applications must currently be submitted to the City of Seattle as hard copies; however future program updates may allow for electronic submittal. A request for a briefing and the accompanying packet may be submitted via email.

4.5.3.2 International Special Review District

The ISRD Board reviews applications for Certificates of Approval in the ISRD and issues a recommendation to the Director of the Department of Neighborhoods to approve, approve with conditions, or deny the application.

The ISRD Board may request additional information from the applicant prior to rendering their recommendation. ISRD Board meetings are held on the 2nd and 4th Tuesdays of each month. Architectural Review Committee meetings are scheduled, as needed.

The [International District Guidelines](#) describe the requirements for awnings and canopies, façade alternations, security, and signs within the ISRD.

Application instruction, the fee schedule, board meeting schedules, and documentation requirements can be found in the [Application for Certificate of Approval - International Special Review District](#). Applications must be submitted to the City of Seattle as hard copies.

4.5.3.3 Columbia City Landmark District

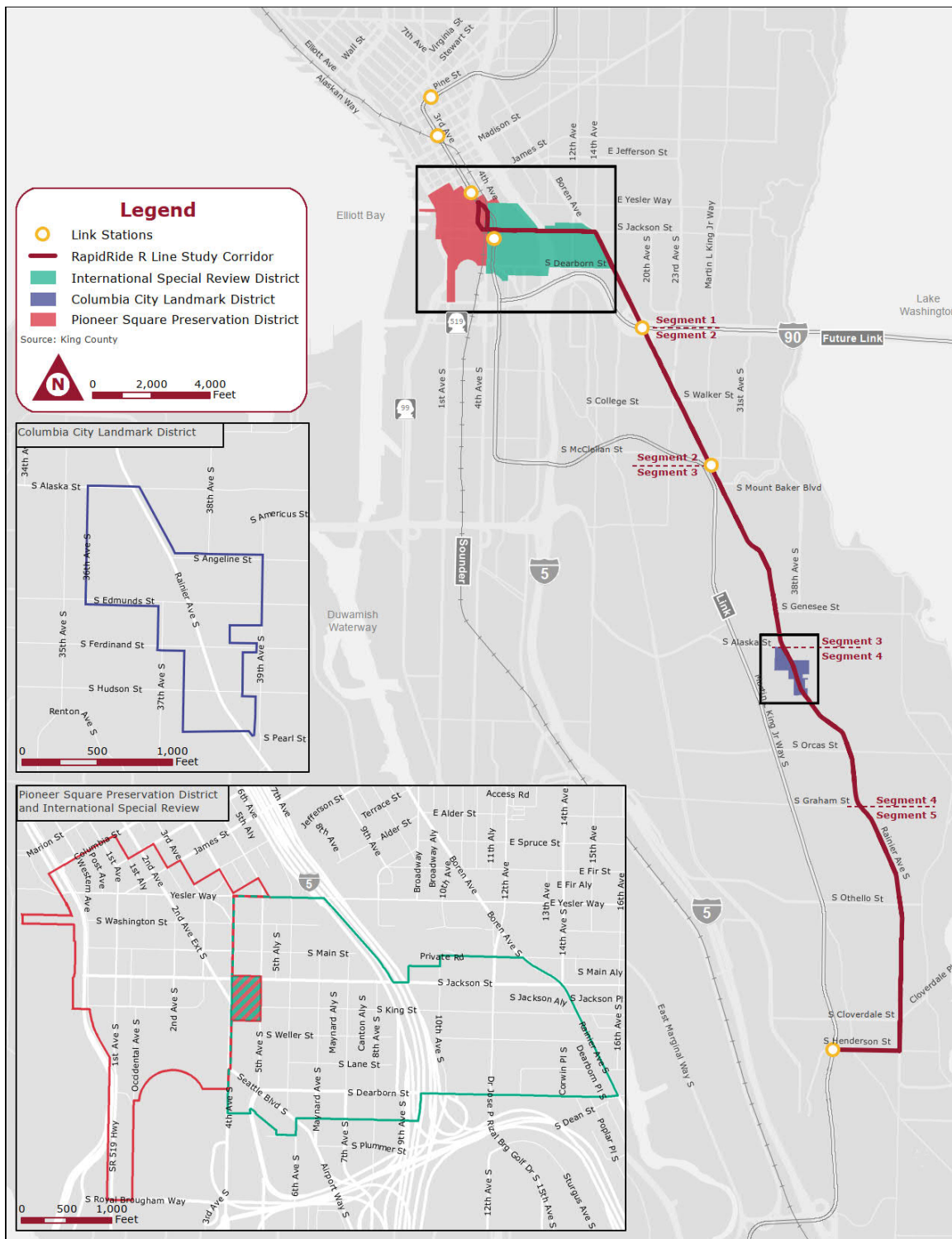
Applications for projects in the Columbia City Landmark District are first scheduled for review by the Columbia City Landmark District Review Committee. The Columbia City Landmark District Review Committee issues a recommendation to the City of Seattle Landmarks Preservation Board for issuance or denial of a Certificate of Approval. The Columbia City Landmark District Review Committee may request additional information from the applicant prior to rendering their recommendation. Columbia City Landmark District Review Committee meetings once a month.

Upon receipt of the Columbia City Landmark District Review Committee recommendation, the City of Seattle Landmarks Preservation Board will review the application and approve, approve with conditions, or deny the application. The City of Seattle Landmarks Preservation Board meets on the first and third Wednesdays of each month.

The [Columbia City Landmark District Guidelines](#) describe the criteria and guidelines the Columbia City Landmark District Review Committee and the City of Seattle Landmarks Preservation Board will apply when reviewing applications.

Application instruction, the fee schedule, board meeting schedules, and documentation requirements can be found in the [Certificate of Approval Application for Columbia City](#). Applications must be submitted to the City of Seattle as hard copies.

Figure 4-2. International Special Review District, Pioneer Square Preservation District, and Columbia City Landmark District





5 Community Engagement

5.1 Public Involvement and Community Engagement Strategy

Community engagement was conducted through a two-phase process undertaken from June 2019 through March 2020. Throughout this project, Metro intentionally sought to hear from people and groups who have been historically underserved or overlooked when it comes to transportation planning. Engagement activities were conducted in multiple languages and with a focus on accessibility reflecting the expressed needs of the community. A detailed summary of the community engagement process can be found in the RapidRide R Line Community Engagement Summary Phase 1 (Metro 2019c) and RapidRide R Line Community Engagement Summary Phase 2 (Metro 2020k).

5.2 Community Engagement Phase 1

Conducted from June through October 2019, Phase 1 of R Line Community Engagement was focused on needs assessment with three key objectives:

1. Reintroduce R Line and highlight opportunities for interested parties and community members to get involved.
2. Report back on what was heard through previous engagement efforts and learn more about community interests and concerns.
3. Gather input to inform design concepts.

Phase 1 community engagement consisted of 14 stakeholder interviews, in-person outreach that reached 644 people, and an online survey completed by 227 respondents.

Key themes that emerged during Phase 1 included:

- Community members rely on Route 7 to access essential services including food, work, school, medical appointments, and more. They highly value this local service.
- Many people were unfamiliar with RapidRide and fear changes to Route 7 service.
- Community members want more reliable service to travel to places within the Rainier Valley, South King County, downtown Seattle, and to other transit.
- Participants were concerned about bus stop consolidation.
- Many community members supported RapidRide upgrades, especially increased lighting, station upgrades, safety improvements, and roadway and intersection improvements to help prevent bus delays.

- Some people were concerned about personal safety while waiting for and riding buses within the Rainier Valley.
- Fare enforcement and affordability were significant concerns.
- Participants supported better and safer access to bus stations especially for people with mobility challenges.
- Metro should clearly communicate how and when community members can influence decision making. Many Rainier Valley residents are willing to engage but fatigued from ongoing transportation and other work happening in their community.

5.3 Community Engagement Phase 2

During Phase 2, conducted November 2019 through March 2020, the project team presented the R Line Preliminary Unconstrained Alternative to the public. This effort included sharing information and gathering input about the improvements comprising the Preliminary Unconstrained Alternative, including station locations and options, speed and reliability improvements, and access to transit improvements. This phase also provided the opportunity to demonstrate how previously received feedback was reflected in the Preliminary Unconstrained Alternative.

The Phase 2 engagement approach included in-person engagement in the form of open houses, tabling, drop-in visits, and bus stop outreach; online engagement; Route 7 operator engagement; and briefings with city and county councilmembers. Community partner engagement was also performed. Participation included:

- 1,373 online open house visitors
- 14 in-person engagement events
- 27 drop-in visits
- 887 people engaged in-person
- 13 community partner engagement activities

Key theme of Phase 2 feedback include:

- Station consolidation continued to be a key area of interest. Many people were concerned about access to transit especially for people who are older and those who have limited mobility. Stations placed further apart, even by a block, can have a significant effect on riders' ability to access stations. People also expressed concerns about how station consolidation may affect community members seeking essential services, transit-dependent riders, and riders who are limited English-speaking. People shared support for the team's efforts to engage these groups to date and encouraged continued efforts to equitably engage with these communities.

- Community members were looking forward to more reliable bus service and most understand the trade-offs needed to increase reliability, such as station consolidation.
- Most people supported the proposal to remove on-street parking in favor of adding BAT lanes, but some expressed concerns that these changes may impact small businesses.
- People supported and want Metro to prioritize sidewalk improvements and safer pedestrian crossings across the entire route.
- Lacking bike infrastructure on and connecting to Rainier Avenue S. remained a significant area of concern.
- Concerns remained around how Metro plans to serve riders who currently access the Route 7 south of S. Henderson Street.

6

Alternatives Analysis

6.1 Speed and Reliability Analysis

Future No-Build scenarios for 2024 and 2040 were analyzed to determine the future intersection operations with the current roadway conditions, planned SDOT improvements, and future volumes. The purpose of these scenarios is to provide a comparison for future build scenarios, rather than comparing the future project with the existing conditions.

6.1.1 City of Seattle Baseline Scenario

SDOT is planning a series of investments that will improve bus speed and reliability, as well as access to transit, through their Route 7 Transit-Plus Multimodal Corridor project. Key features of this project include bus-only lanes, roadway crossing improvements, signal upgrades, and safety improvements. Additionally, SDOT is planning a series of safety and bus reliability projects in the south end of the corridor as part of its Vision Zero program, which are scheduled for completion in 2020. Table 6-1 summarizes all planned SDOT improvements along the study corridor. The Route 7 Transit-Plus Multimodal Corridor improvements reflect the projects identified at 30 percent design, with one exception.²⁴ All SDOT improvements are subject to change in response to available funding or modified agency priorities. Selection of final R Line improvements by Metro will need to reflect corridor conditions at that time.

²⁴ The BAT lane from S. College Street to S. Grand Street was removed from the SDOT list of improvements after completion of 30 percent design. This change is reflected in the Future No-Build scenario.

Table 6-1. Planned SDOT Improvements

Segment	From	To	Proposed Improvement
1	3 rd Avenue/ Yesler Way	I-90	<ul style="list-style-type: none"> Modify phasing at S. Jackson Street and Rainier Avenue S. to a lagging NB left turn
2	Rainier Avenue S./S. King Street	Rainier Avenue S./S. Forest Street	<ul style="list-style-type: none"> Add a north crosswalk to the Rainier Avenue S. and I-90 eastbound ramps intersection Install a SB queue jump at Rainier Avenue S. and I-90 eastbound ramps Remove high occupancy vehicle (HOV) bypass at I-90 NB to eastbound on-ramp Construct SB BAT lane from Lowe's driveway to S. Forest Street
3	Rainier Avenue S./S. Forest Street	Rainier Avenue S./S. Alaska Street	<ul style="list-style-type: none"> Remove NB right turn pocket at Rainier Avenue S. and MLK Jr Way S. Construct a signalized pedestrian crossing at S. Adams Street
4	Rainier Avenue S./S. Alaska Street	Rainier Avenue S./S. Graham Street	<ul style="list-style-type: none"> Install curb bulbs on S. Findlay Street at Rainier Avenue S. Install curb bulbs on S. Mead Street at Rainier Avenue S. Remove one SB lane from S. Kenny Street to S. Spencer Street Remove NB parking and construct a center turn lane from S. Bateman Street to S. Mead Street Construct a center turn lane from S. Spencer Street to S. Bateman Street Construct a SB queue jump lane, install turn pockets and protected left turns, and install curb bulbs, ramps, sidewalks, and crosswalk improvements at S. Graham Street

Segment	From	To	Proposed Improvement
5	Rainier Avenue S./S. Graham Street	Rainier Avenue S./S. Henderson Street	<ul style="list-style-type: none"> Remove one SB lane and construct a center turn lane from S. Eddy Street to S. Garden Street Replace a NB general purpose lane with a NB BAT lane from S. Cloverdale Street to S. Mead Street Reduce the speed limit to 25 mph from S. Kenny Street to S. Henderson Street Remove one SB lane and construct a center turn lane from S. Eddy Street to S. Garden Street Install protected left turns NB and SB at S. Frontenac Street Remove SB parking from S. Frontenac Street to S. Garden Street Widen crosswalk lines, move pole and add pedestrian signage at S. Othello Street Replace a SB general purpose lane with a SB BAT lane from S. Myrtle Street to S. Holden Street Improve signage at S. Austin Street Remove SB parking from S. Othello Street to S. Wildwood Ln Remove center turn lane from S. Wildwood Ln to S. Chicago Street Restrict all left turns at S. Kenyon Street except SB to eastbound Upgrade pedestrian signal and crosswalk north of S. Elmgrove Street Remove one SB lane from S. Holden Street to S. Thistle Street Convert the pedestrian signal at S. Rose Street to a full signal and provide protected NB and SB left turns Construct a SB queue jump lane at S. Cloverdale Street Install protected NB and SB left turns at S. Cloverdale Street

SDOT's planned improvements were incorporated with the current built conditions to develop the Baseline Scenario (No-Build) for the analysis described in this report. The R Line Baseline Scenario is shown in Figure 6-1.

Figure 6-1. Planned SDOT Improvements (1 of 3)

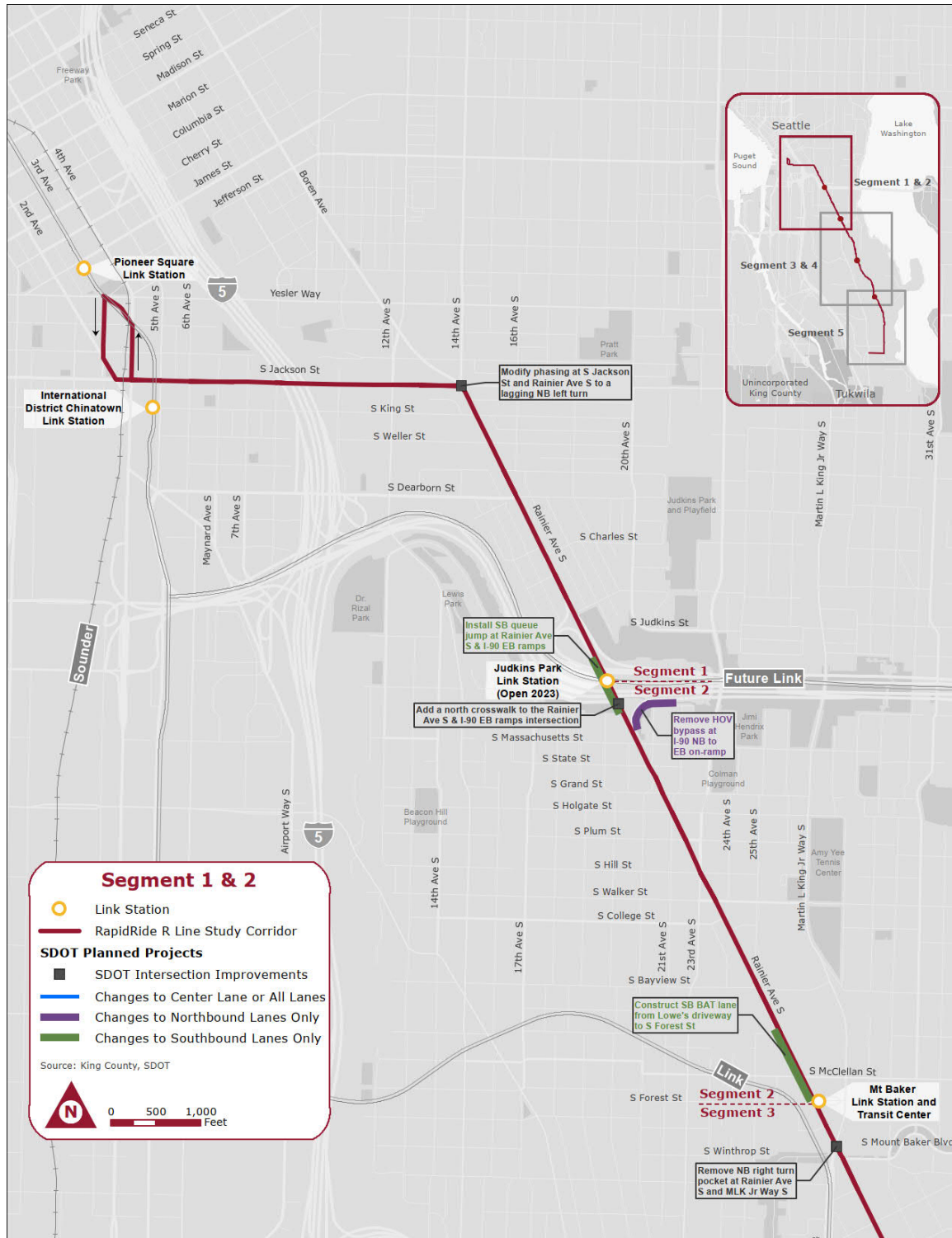


Figure 6-1. Planned SDOT Improvements (2 of 3)

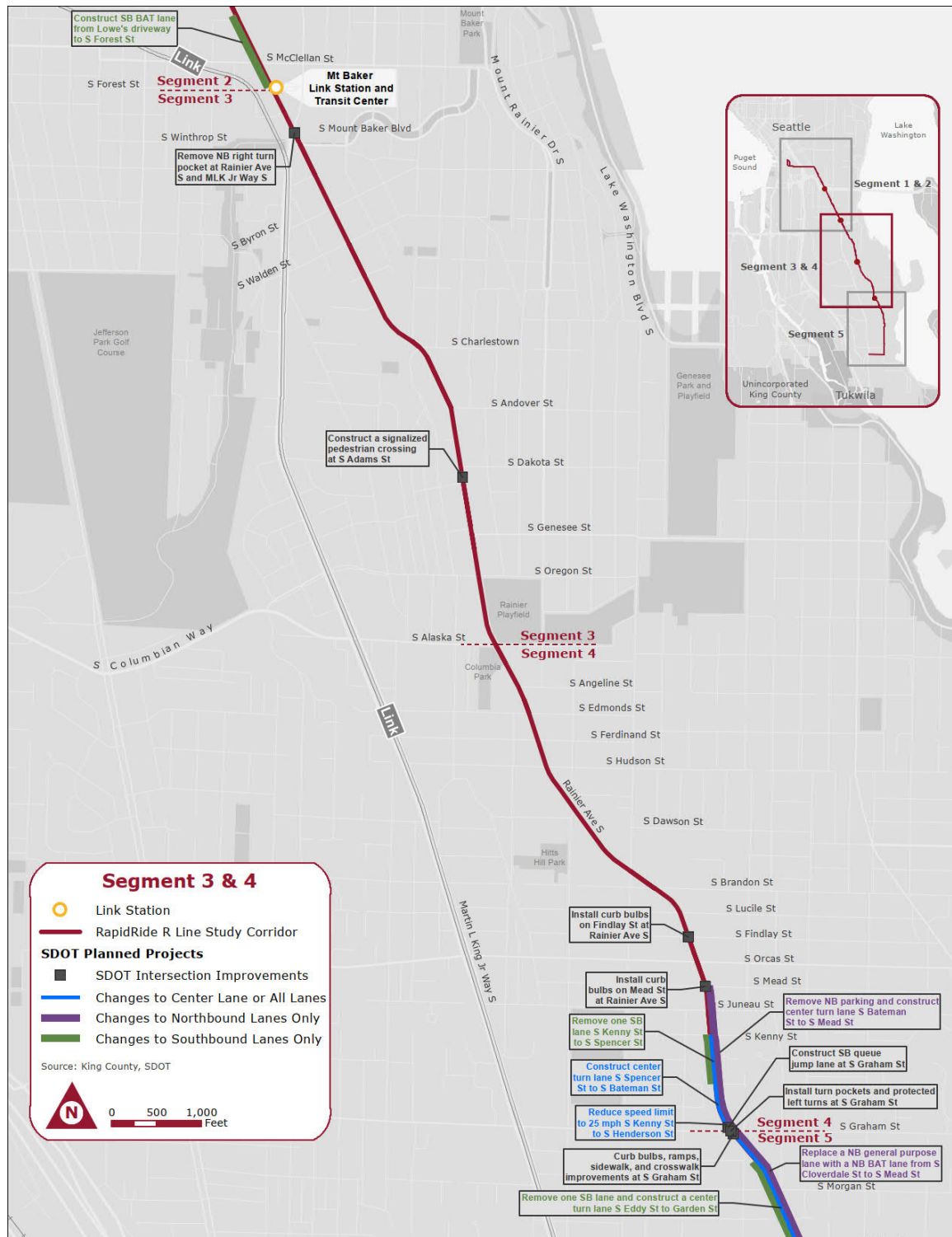
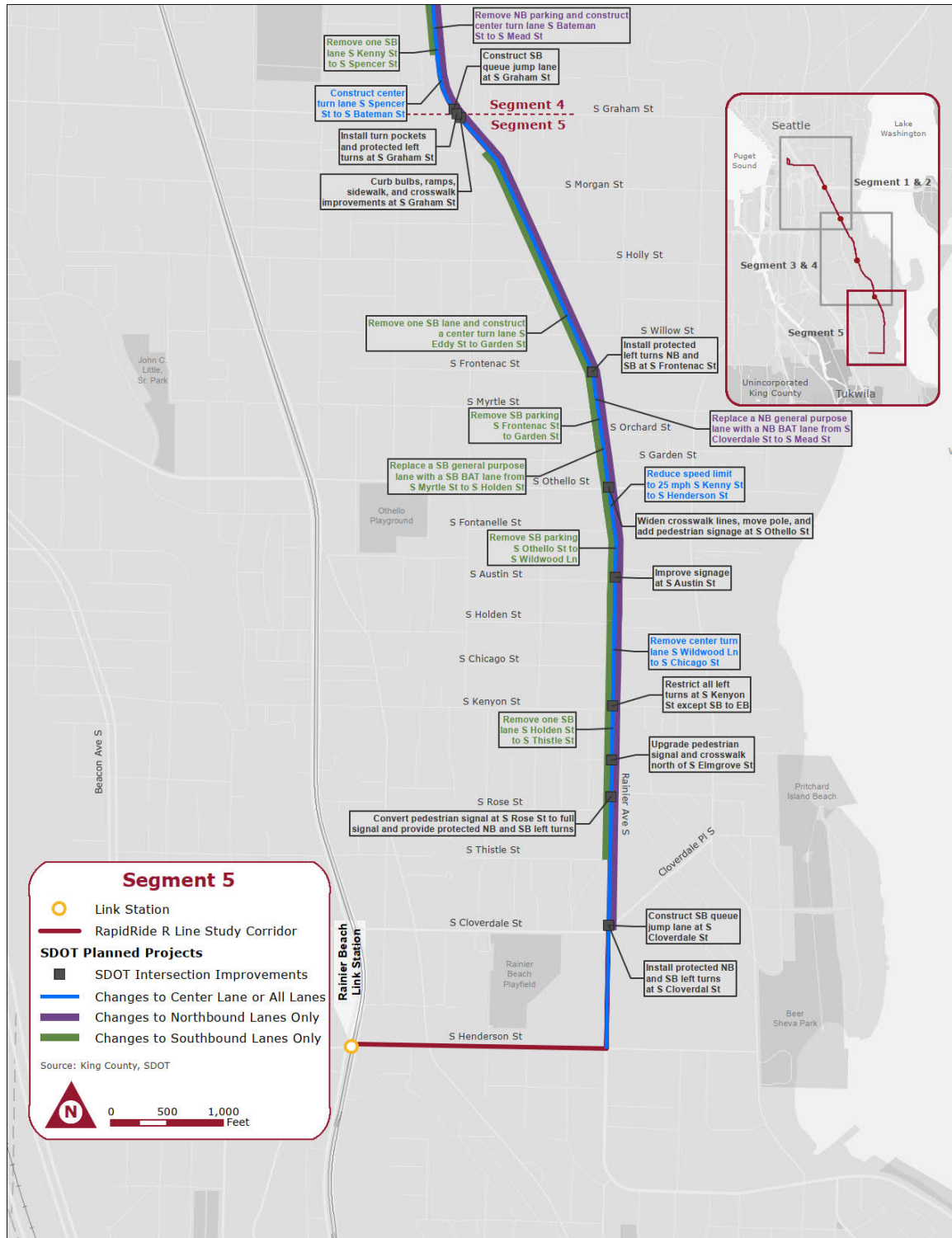


Figure 6-1. Planned SDOT Improvements (3 of 3)



6.1.2 Future No-Build Intersection Operations

Intersection operations in 2024 and 2040 are forecast to operate similarly to existing conditions. In 2024, 21 signalized intersections are forecast to operate at LOS C or worse during the AM peak period and 22 signalized intersections are forecast to operate at LOS C or worse during the PM peak period. Under the 2040 No-Build alternative, 22 signalized intersections are forecast to operate at LOS C or worse during the AM peak period and 22 signalized intersections are forecast to operate at LOS C or worse during the PM peak period.

Figures 6-2 and 6-3 show the operations for the Year 2024 and 2040 No-Build scenarios in the AM and PM peak periods, respectively.

Figure 6-2. Year 2024 No-Build AM and PM Peak Period Operations (1 of 3)

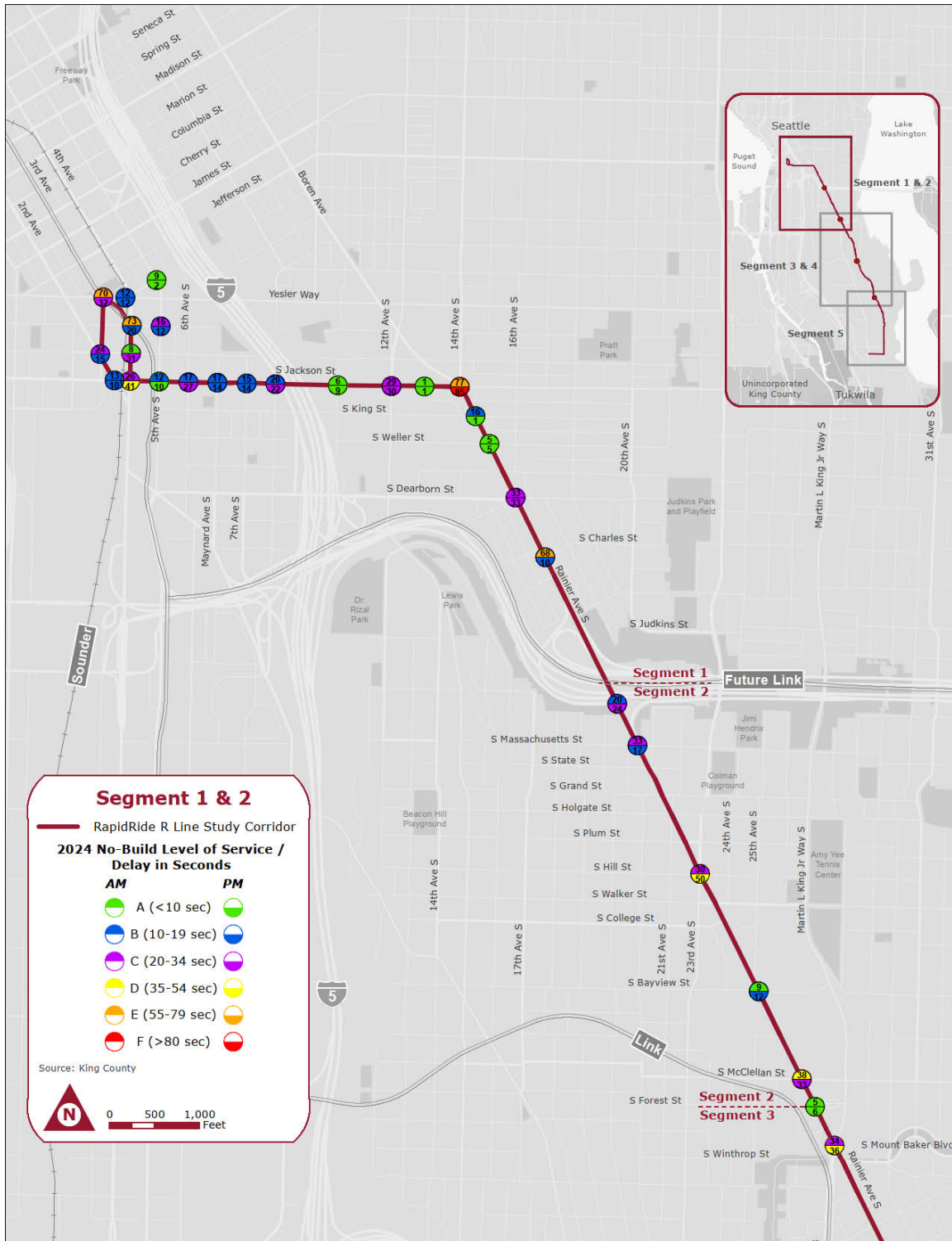


Figure 6-2. Year 2024 No-Build AM and PM Peak Period Operations (2 of 3)

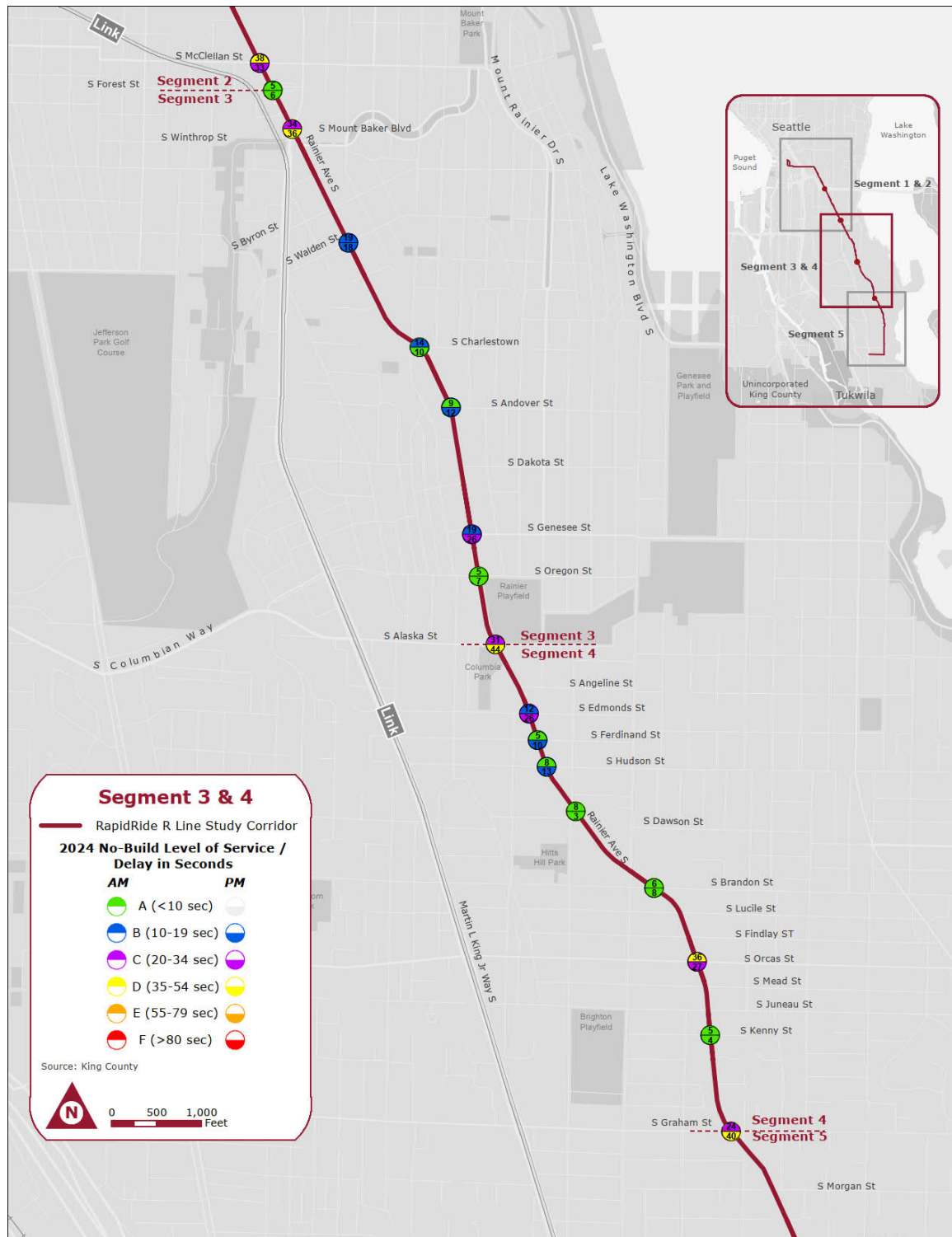


Figure 6-2. Year 2024 No-Build AM and PM Peak Period Operations (3 of 3)

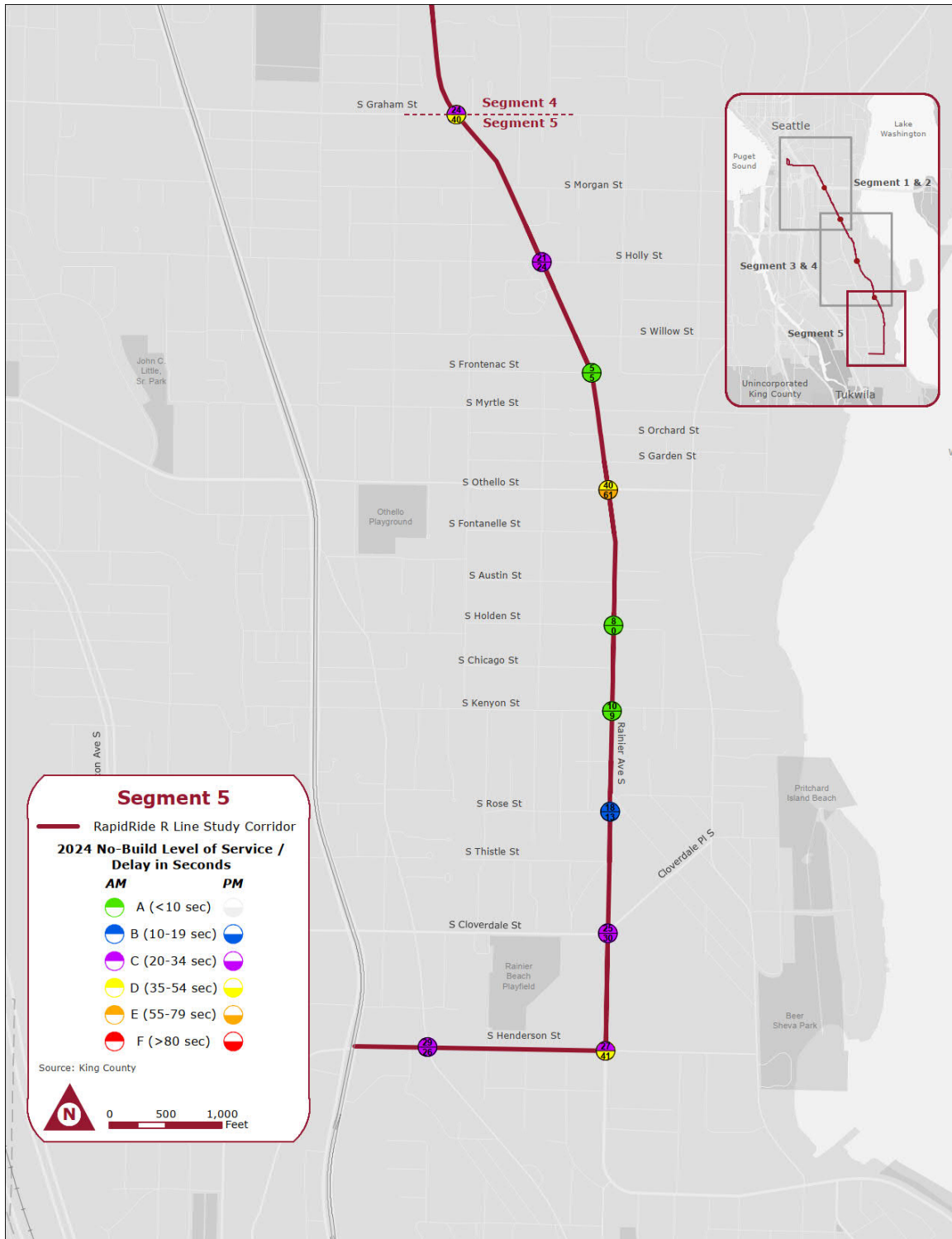


Figure 6-3. Year 2040 No-Build AM and PM Peak Period Operations (1 of 3)

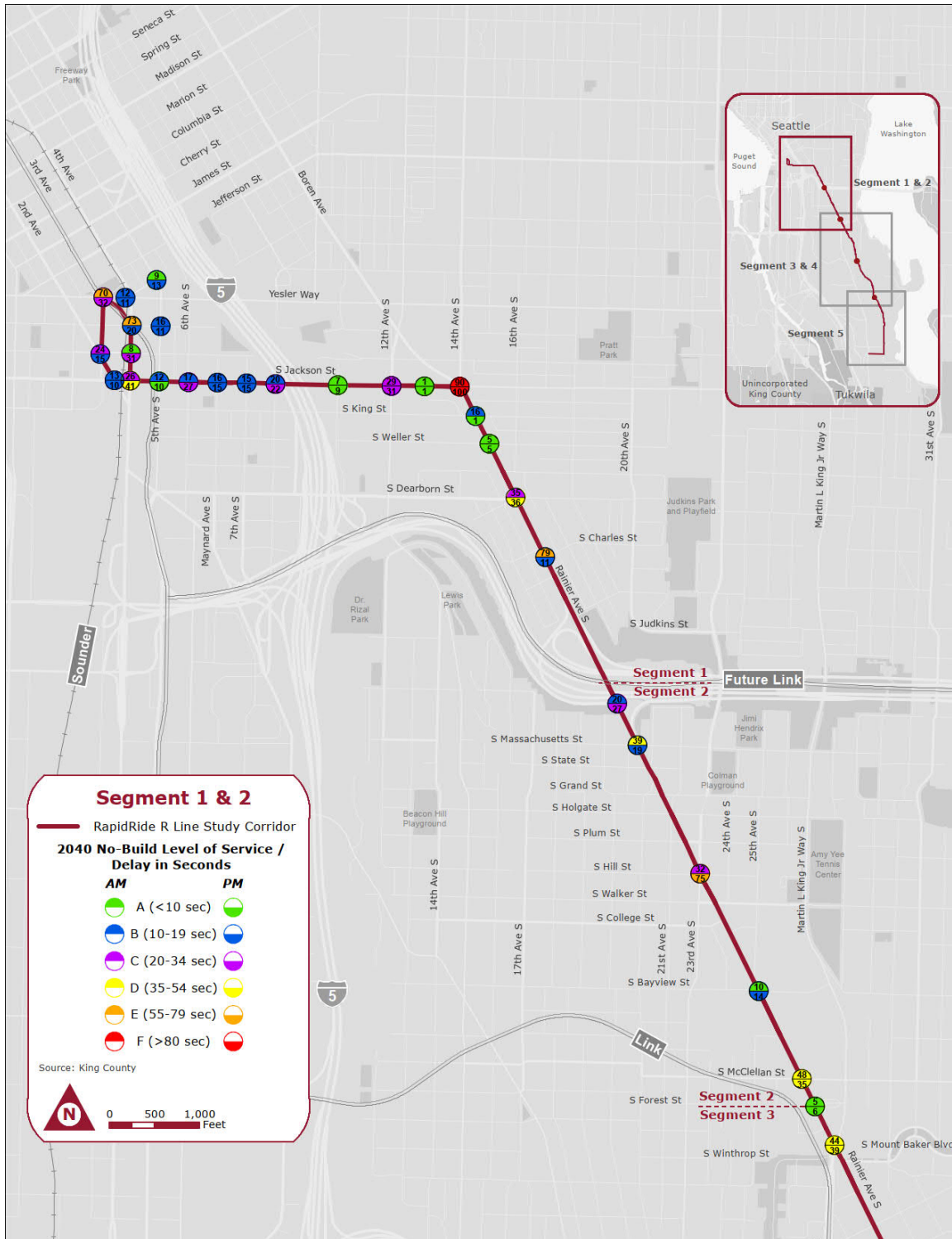


Figure 6-3. Year 2040 No-Build AM and PM Peak Period Operations (2 of 3)

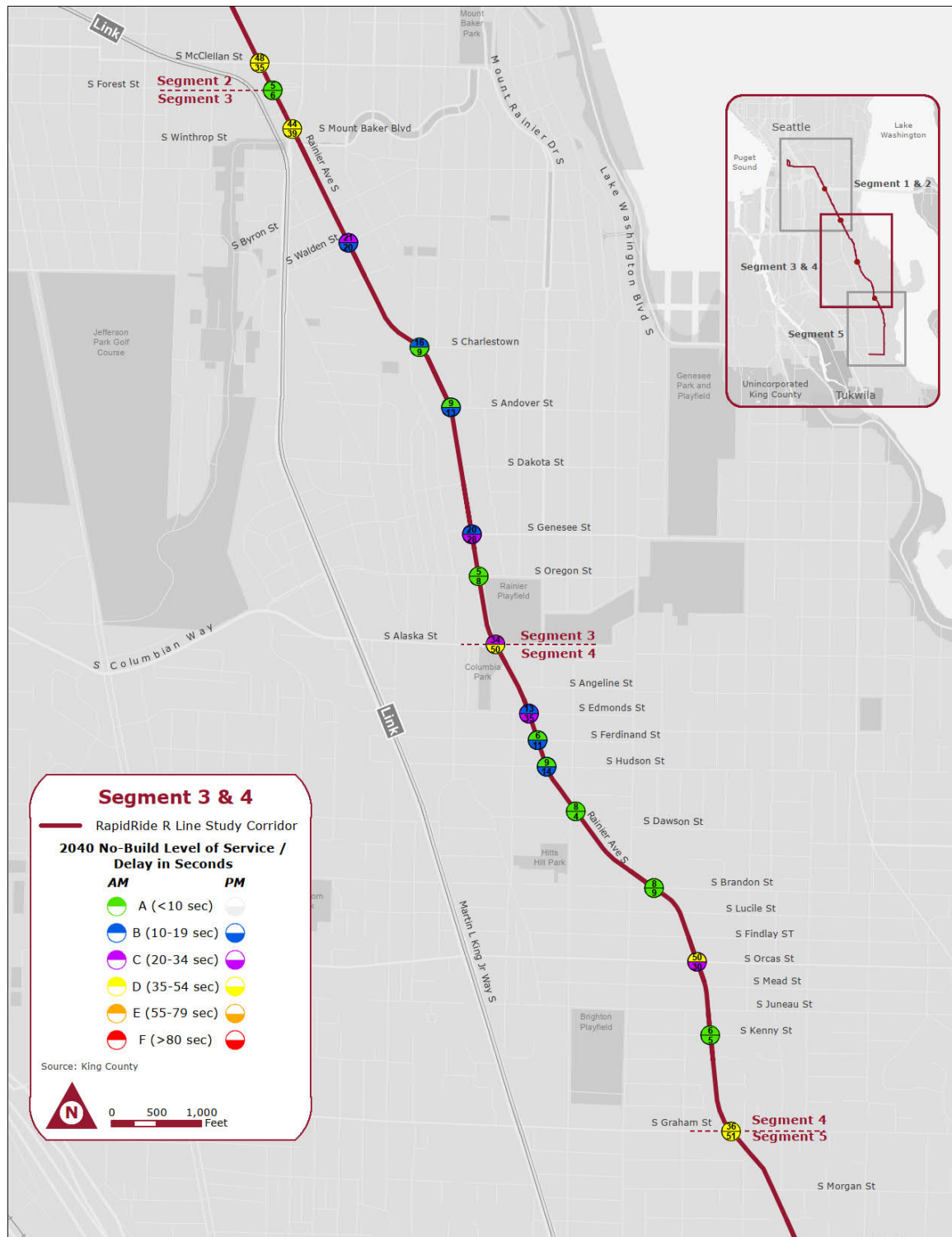
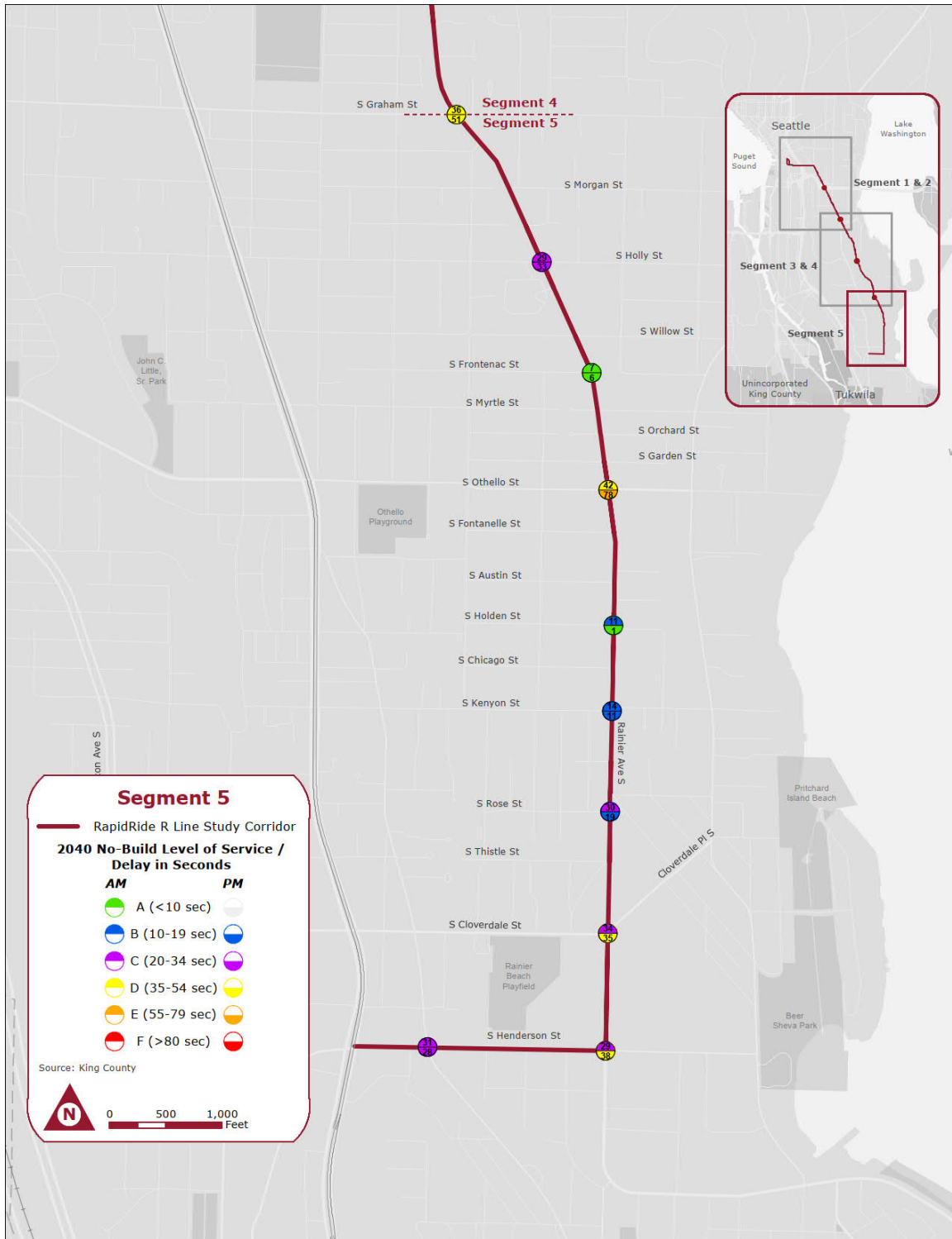


Figure 6-3. Year 2040 No-Build AM and PM Peak Period Operations (3 of 3)



6.1.3 Future No-Build Transit Operations

Future No-Build transit travel times for 2024 and 2040 were forecast using the VISSIM model. The southbound and northbound travel times in both the AM and PM peak hours for 2024 and 2040 are summarized in Tables 6-2 and 6-3. For the travel times reported, the representative AM Peak hour is 7 am to 8 am and the representative PM Peak hour is 4:30pm to 5:30 pm. Transit travel times are forecast to increase in the peak direction for each peak hour (northbound in the AM and southbound in the PM) from 2024 to 2040 but remain the same during the forecast years in the off-peak direction during the peak hours.

Table 6-2. Southbound No-Build Transit Travel Times by Segment

Segment	From	To	AM Peak Hour ^a		PM Peak Hour ^b	
			2024 Travel Time (Minutes)	2040 Travel Time (Minutes)	2024 Travel Time (Minutes)	2040 Travel Time (Minutes)
1	3rd Avenue and James Street	Rainier Avenue S. and S. King Street	10.7	10.9	12.3	12.5
2	Rainier Avenue S. and S. King Street	Rainier Avenue S. and S. Forest Street	8.1	8.1	15.1	18.1
3	Rainier Avenue S. and S. Forest Street	Rainier Avenue S. and S. Alaska Street	6.7	6.6	9.8	12.6
4	Rainier Avenue S. and S. Alaska Street	Rainier Avenue S. and S. Graham Street	4.8	4.9	9.5	10.8
5	Rainier Avenue S. and S. Graham Street	S. Henderson Street and Rainier Avenue S.	5.4	5.4	9.7	9.9
Total Travel Times			35.6	35.9	56.4	63.8

Notes:

^a Representative AM Peak hour is 7 am to 8 am.

^b Representative PM Peak hour is 4:30 pm to 5:30 pm.

Table 6-3. Northbound No-Build Transit Travel Times by Segment

Segment	From	To	AM Peak Hour ^a		PM Peak Hour ^b	
			2024 Travel Time (Minutes)	2040 Travel Time (Minutes)	2024 Travel Time (Minutes)	2040 Travel Time (Minutes)
5	Rainier Avenue S. and S. Henderson Street	Rainier Avenue S. and S. Graham Street	8.3	8.5	7.0	7.1
4	Rainier Avenue S. and S. Graham Street	Rainier Avenue S. and S. Alaska Street	6.0	6.1	5.6	5.5
3	Rainier Avenue S. and S. Alaska Street	Rainier Avenue S. and Mount Baker Transit Center	11.3	14.4	6.3	6.4
2	Rainier Avenue S. and Mount Baker Transit Center	S. Jackson Street and Boren Avenue S.	10.6	10.8	10.7	12.6
1	S. Jackson Street and Boren Avenue S.	Prefontaine Place S. and Yesler Way	8.5	8.9	8.6	8.4
Total Travel Times			44.7	48.7	38.3	40.0

Notes:

^a Representative AM Peak hour is 7 am to 8 am.

^b Representative PM Peak hour is 4:30 pm to 5:30 pm.

6.1.4 Northbound Routing from S. Jackson Street

Northbound Route 7 buses currently experience significant delay at the intersection of 4th Avenue S. and S. Jackson Street. The right turn lane from S. Jackson Street has high volumes of buses and general-purpose traffic. Storage capacity in this lane is limited by the presence of a bus stop serving westbound buses, including the Route 7. High pedestrian volumes crossing 4th Avenue S., particularly during the peak periods, limit opportunities to make a right turn from S. Jackson Street.

Development of the Unconstrained Alternative included analysis of five preliminary routing options. The analysis was performed primarily to address speed and reliability issues associated with this turning movement. It did not include consideration of impacts to non-revenue service that might follow similar routing or event reroutes.

The preliminary options were screened using qualitative metrics. Upon completion of the screening, three options remained for further evaluation:

- 4th Avenue S. (current routing)
- 2nd Avenue Extension S.
- 5th Avenue S.

The new routing options considered would require various right-of-way modifications in order to accommodate the potential bus routings including rechannelization, removal of on-street parking, widening into the Union Station Square Park, and changes to signal phasing. The 5th Avenue S. option would require rechannelization of 5th Avenue S. between Terrace Street and S. Washington street from two southbound lanes and one northbound lane to one southbound lane and two northbound lanes, which would require relocation of some or all layover spaces currently used by Route 62.

Transit travel times were calculated for each option. The travel times included a total of the segment delay and run time. Although it is the longest segment, the routing via 5th Avenue S. was forecast to have the least delay and less variation in traffic. Figures 6-4 and 6-5 summarize the delay and run time in the AM and PM peak periods for each alternative.

A detailed description of the analysis process and results can be found in the RapidRide R Line Speed and Reliability Upgrade Report (Appendix A).

Figure 6-4. Transit Travel Time AM Peak Hour

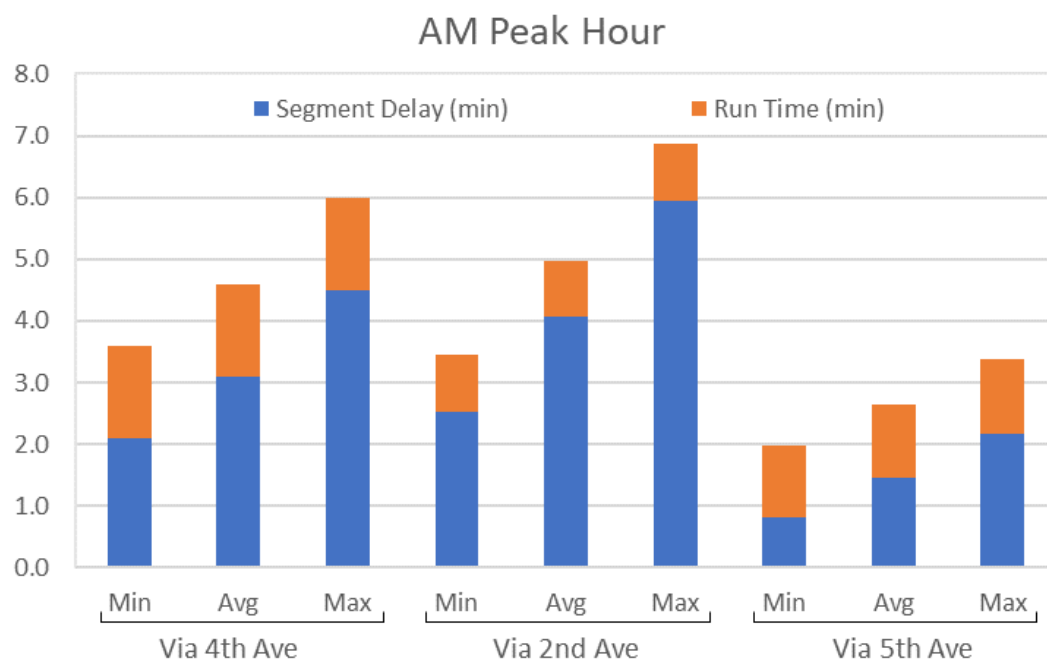
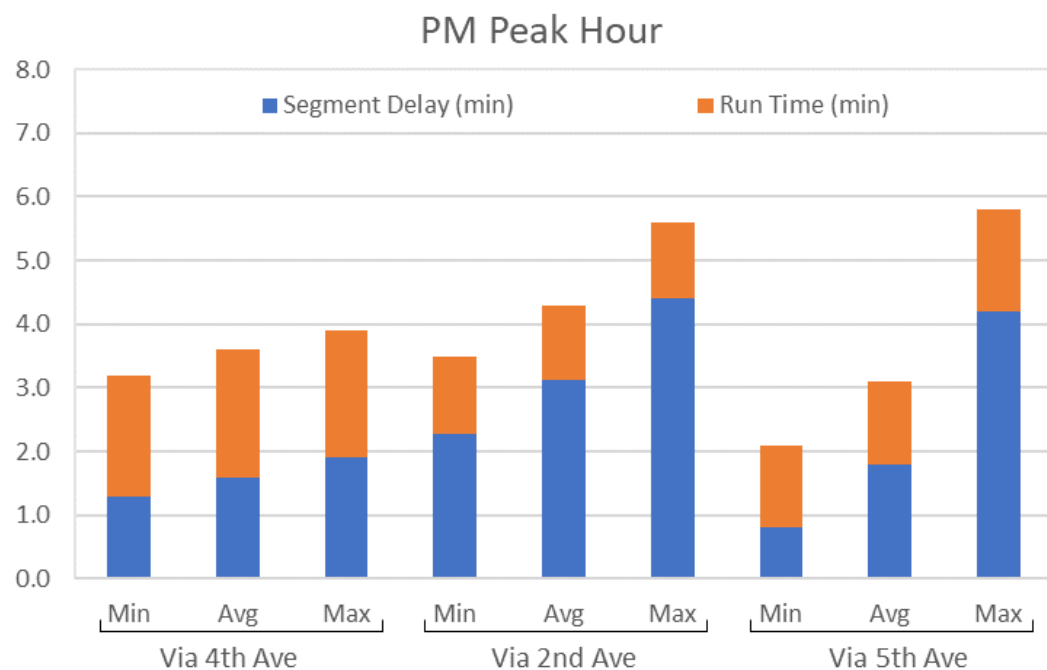


Figure 6-5. Transit Travel Time PM Peak Hour



6.2 Station Rebalancing

The passenger facilities task team used the criteria and methodology described in Section 2.4 to develop initial station rebalancing recommendations. During the rebalancing process, the team acknowledged and considered the unique nature of the R Line study area and study corridor among Metro service areas and routes because of its high ridership stops, large number of social services along the corridor, and high number of traditionally transit-dependent populations.

The stop rebalancing and station placement process was iterative and highly coordinated with the development of speed and reliability improvements. Metro was a partner in SDOT's RapidRide Rainier project and key findings from this effort associated with passenger facilities development and stop rebalancing included:

- A desire to reinstate an outbound stop at S. Dearborn Street
- Some acceptance of stop consolidation²⁵ by persons completing online surveys and concerns about stop consolidation expressed by those completing in-person surveys
- Stop consolidation on S. Jackson Street that merited additional consideration (SDOT 2019d)

The rebalancing effort began with an assessment of each stop along the R Line study corridor. Existing boarding and alighting activity, connections with other transit service, and planned SDOT improvements that could impact stops were identified. Locations that have or are forecast to have high transit transfer activity were categorized as "anchor stations," as they were anticipated to be served by R Line. Stops between anchor stations were subsequently evaluated.

As the rebalancing analysis proceeded, the project team incorporated feedback from residents, riders, business organizations, and community groups received during Community Engagement Phase 1. Additionally, the task team met with community service organizations, businesses, and Metro Operations staff to gain a deeper understanding of the impacts of potential stop rebalancing decisions.

Five internal charrettes were held to discuss stop rebalancing and address more complicated, multi-faceted stop rebalancing questions. These charrettes included project team representatives for speed and reliability, passenger facilities, access to transit, and trolley and traction. The charrettes focused on the following locations:

1. Rainier Avenue S. and Letitia Avenue S./33rd Avenue S.
2. S. Jackson Street and 12th Avenue S.
3. Columbia City
4. Rainier Avenue S. and S. Henderson Street
5. Rainier Beach Link Station

²⁵ Stop consolidation was terminology used as part of SDOT's outreach process.

Prior to beginning Community Engagement Phase 2, the project team developed the R Line Preliminary Unconstrained Alternative, which included recommended stop rebalancing. In the Preliminary Unconstrained Alternative, each existing stop was placed in one of three categories: 1) conversion to a RapidRide station; 2) retention as a local stop; or 3) closure. In some instances, stations or stops were identified for relocation. Additionally, a new station pair was proposed in Segment 5 at the intersection of Rainier Avenue S. and S. Henderson Street to accommodate the anticipated routing change from Route 7.

During Community Engagement Phase 2, Metro presented the Preliminary Unconstrained Alternative to the public. In Segment 1, recommendations were not presented for two existing stop pairs on S. Jackson Street: Maynard Avenue S. and 8th Avenue S. Community members were asked to select a preferred location for RapidRide stations at one of the two intersections, with the understanding the other stop would continue to be served by other routes. Similarly, community members were asked to express a preference for station locations in Segment 4. Two station pair options were presented, all on Rainier Avenue S. Option A included stations at S. Alaska Street and S. Hudson Street. Option B included stations at S. Edmunds Street and S. Dawson Street. The Preliminary Unconstrained Alternative did not include specific details associated with station and stop locations, such as whether they would be located near side or far side of an intersection. Additionally, station types were not presented. Table 6-4 summarizes the station rebalancing recommendations presented to the public.

Table 6-4. Preliminary Unconstrained Alternative Stop Rebalancing Recommendations

Stop Number	Direction	Primary Street	Cross Street	Recommendation
Segment 1: 3rd Avenue and Yesler Way to I-90				
515	SB	3rd Avenue S.	S. Main Street	Future R Line Station
1530/1471	WB/EB	S. Jackson Street	5th Avenue S.	Future R Line Station
1510/1480	WB/EB	S. Jackson Street	Maynard Avenue S.	No recommendation – requested feedback from the community regarding placement at Maynard Avenue S. or 8th Avenue S.
1500/1490	WB/EB	S. Jackson Street	8th Avenue S.	
3600/8540	WB/EB	S. Jackson Street	12th Avenue S.	Future R Line Station
8530	WB	S. Jackson Street	Boren Avenue S.	Stop served by other routes
8550	SB	Rainier Avenue S.	S. King Street	Stop served by other routes
8510/New	NB/SB	Rainier Avenue S.	S. Dearborn Street	Future R Line Station
8494/8590	NB/SB	Rainier Avenue S.	S. Norman Street/ S. Charles Street	Stop served by other routes
8485/8608	NB/SB	Rainier Avenue S.	I-90 Ramp	Future R Line Station

Stop Number	Direction	Primary Street	Cross Street	Recommendation
Segment 2: I-90 to S. Forest Street				
8460/8620	NB/SB	Rainier Avenue S.	S. Grand Street/S. State Street	Stop served by other routes
8450	NB	Rainier Avenue S.	S. Plum Street	Removed/relocated stop
8440/8641	NB/SB	Rainier Avenue S.	S. Walker Street	Future R Line Station
8429/8660	NB/SB	Rainier Avenue S.	S. Bayview Street	Stop served by other routes
Segment 3: S. Forest Street to S. Alaska Street				
8401/8681	NB/SB	Rainier Avenue S.	S. Forest Street/S. Stevens Street	Future R Line Station
8400/8690	NB/SB	Rainier Avenue S.	S. Mount Baker Blvd/MLK Jr Way S.	Removed/relocated stop
8380/8710	NB/SB	Rainier Avenue S.	S. Walden Street	Future R Line Station
8360	NB	Rainier Avenue S.	33rd Avenue S.	Relocated to Rainier Avenue S./Letitia Avenue S.
8730	NB/SB	Rainier Avenue S.	Letitia Avenue S.	Future R Line Station
8350/8740	NB/SB	Rainier Avenue S.	S. Andover Street	Removed/relocated stop
8330/8760	NB/SB	Rainier Avenue S.	S. Genesee Street	Future R Line Station

Stop Number	Direction	Primary Street	Cross Street	Recommendation
Segment 4: S. Alaska Street to S. Graham Street				
8310/8780	NB/SB	Rainier Avenue S.	S. Alaska Street	No recommendation – requested feedback from the community regarding stop pair options: S. Alaska Street and S. Hudson Street (new) or S. Edmunds Street and S. Dawson Street
8300/8790	NB/SB	Rainier Avenue S.	S. Edmunds Street	No recommendation – requested feedback from the community regarding stop pair options: S. Alaska Street and S. Hudson Street (new) or S. Edmunds Street and S. Dawson Street
8285/8810	NB/SB	Rainier Avenue S.	39th Avenue S./S. Dawson Street	No recommendation – requested feedback from the community regarding stop pair options: S. Alaska Street and S. Hudson Street (new) or S. Edmunds Street and S. Dawson Street
8270/8820	NB/SB	Rainier Avenue S.	S. Brandon Street	Future R Line Station
8250/8840	NB/SB	Rainier Avenue S.	S. Orcas Street	Future R Line Station
8231/8850	NB/SB	Rainier Avenue S.	S. Kenny Street	Removed/relocated stop

Stop Number	Direction	Primary Street	Cross Street	Recommendation
Segment 5: S. Graham Street to S. Henderson Street				
8210/8870	NB/SB	Rainier Avenue S.	S. Graham Street	Future R Line Station
8190/8890	NB/SB	Rainier Avenue S.	S. Holly Street	Future R Line Station
8175/8905	NB/SB	Rainier Avenue S.	S. Frontenac Street/ S. Myrtle Street	Removed/relocated stop
8160/8920	NB/SB	Rainier Avenue S.	S. Othello Street	Future R Line Station
8140/8940	NB/SB	Rainier Avenue S.	S. Holden Street	Future R Line Station
8110/8970	NB/SB	Rainier Avenue S.	S. Rose Street	Future R Line Station
8100/8990	NB/SB	Rainier Avenue S.	Cloverdale Pl S./ S. Cloverdale Street	Removed/relocated stop
New/New	NB/SB	S. Henderson Street	Rainier Avenue S.	Future R Line Station
30140/31134	WB/EB	S. Henderson Street	Rainier Avenue S./48th Avenue S.	Stop served by other routes
30160/31132	WB/EB	S. Henderson Street	MLK Jr Way S./Renton Avenue S.	Stop served by other routes
55583	NB	MLK Jr Way S.	S. Henderson Street	Future R Line Station

Community feedback associated with station rebalancing presented in the Preliminary Unconstrained Alternative was varied. Persons who engaged through the online and in-person open houses generally supported recommended bus stop changes to keep buses arriving reliably on-time across all segments—most understood the trade-offs needed to increase reliability, such as station rebalancing. However, across all modes of engagement, many community members expressed concerns about impacts of wider stop spacing to riders with mobility challenges, community members seeking essential services, transit-dependent riders, riders with limited English proficiency, and people who are older.

In the two segments where the team asked community members for station location preferences, the following feedback was provided.

- Segment 1
 - In-Person: Most attendees preferred the station location at 8th Avenue S. Their reasons for this preference included better station spacing. Some attendees preferred the station location at Maynard Avenue S. Their reasons for this preference included safety and proximity to Chinatown-International District.
 - Online: The two options nearly tied for preferred station location. The top reason people said they preferred Maynard Avenue S. was access to the International District. For 8th Avenue S., the primary reason for their preference was station spacing.
- Segment 4
 - In-Person: The majority of attendees preferred station Option B at S. Edmunds Street and S. Dawson Street. Reasons for this preference included access to community resources, access to Link light rail and bus transfers, more accessible location, and safety. Some attendees preferred station Option A at S. Alaska Street and S. Hudson Street. Reasons for this preference included avoiding congestion, access to Link light rail and bus transfers, access to community resources, access to essential resources, and more accessible location. Some attendees preferred that Metro include both stops from both options in final design. These attendees shared concerns about consolidation and limited access to community resources and essential services that would come from this change.
 - Online: The majority of respondents preferred Option B (57 percent) more than Option A (33 percent). The primary reason was because of better transit connections. Respondents who preferred Option A explained it was primarily because of access to community resources.

6.3 Communications and Technology

The evaluation and selection of TSP locations was completed by the R Line Speed and Reliability Task and the evaluation and selection of station locations, sizes and associated amenities was completed by the R Line Passenger Facilities Task. The Communication and Technology Task then evaluated what equipment and technology was needed to provide functioning TSP at signalized intersections and real-time arrival data and off-board fare transactions at station locations based on the locations identified by the other tasks.

6.4 Access to Transit

Access to transit projects were identified through systematic assessment of the existing walking and bicycling facilities within the R Line study corridor walk- and bikesheds. Access deficiencies and network gaps near proposed R Line stations that warranted improvement concepts included:

- Missing sidewalks within the quarter-mile walkshed of proposed R Line stations
- Sidewalk segments in poor condition and where ADA accessibility was a concern within proposed R Line station walksheds. Special focus was given to mitigating the impact of Route 7 stop consolidation required for future R Line stations. Access to transit improvements were identified along routes where riders will likely have a longer walk to future R Line stations compared to the current Route 7 stops.
- Intersections lacking crosswalks or controlled crossings near proposed R Line stations
- Locations with a history of collisions involving people walking and bicycling within the R Line study corridor station walk- and bikesheds
- Street segments connecting directly to proposed R Line stations where the Seattle Bike Master Plan identified a bike facility for implementation

Phase 1 community engagement also informed identification of initial improvements concepts.

Forty-four initial access to transit improvements concepts were identified in R Line study corridor walk- and bikesheds with the project identification methodology described in Section 2.6. Following project identification, the Access to Transit team evaluated the projects using King County Metro's Access to Transit Project Ranking Tool to evaluate the potential benefits of each project. The Project Ranking Tool prioritizes project locations with the greatest equity, ridership, or safety benefits using Tier 1 and Tier 2 ranking criteria that are a mix of quantitative and qualitative variables. Access to transit project locations were evaluated based on the Route 7 stop/future R Line station they would serve or the demographic characteristics of the five-minute walk- or bikeshed within which they improve transit access. The Access to Transit Project Ranking Tool includes prioritization scenarios allowing for adjustable weighting of ranking criteria based on project objectives. The Access to Transit team ranked the 44 initial access to transit project locations with the following scenarios to elevate projects that improve safety, serve areas of greatest need, and benefit the most transit riders.

- **The equity-focused prioritization scenario** elevates project locations with the potential to serve areas of greatest need by highly weighting demographic ranking criteria including percent of low-income people, communities of color, zero-car households, and households with a person living with a disability.
- **The ridership-focused prioritization scenario** elevates project locations that benefit the most transit riders by highly weighting ranking criteria including nexus to transit, potential benefit to transit users, population and jobs within the walkshed, and ridership.
- **The safety-focused prioritization scenario** elevates project locations that improve safety the most by elevating projects at locations with a history of collisions with highly weighted collision history ranking criteria.

Tables 6-5 through 6-7 depict the top 10 ranking project locations from the equity-, safety-, and ridership-focused scenarios. Some initial project concepts were consolidated into a single access to transit project due to proximity to a common future R Line station. It is worth noting that some project locations ranked high across multiple scenarios, indicating that those projects achieve multiple objectives. The outcomes of the project ranking informed project selection for the Preliminary Unconstrained Alternative, which was presented to the community for comment.

Table 6-5. Top Ten Equity-Focused Access to Transit Projects

Equity Ranking	Access to Transit Project
1	Improve sidewalk along east side of 5th Avenue S. between S. Jackson Street and S. King Street
2	New sidewalk along north and south sides of S. Adams Street from Letitia Avenue S. to Rainier Avenue S.
3	Neighborhood greenway along S. Rose Street from Rainier Avenue S. to Rainier Valley North-South Greenway at 46th Avenue S.
4	New sidewalk along west and east sides of 48th Avenue S. between S. Director Street and S. Henderson Street
5	Pedestrian signal and median crossing island at S. Walker Street/Rainier Avenue S.
6	Shorten pedestrian recall time to improve signal responsiveness for people crossing Rainier Avenue S. to the future R Line station at S. Graham Street
7	Improve pedestrian lighting at S. Holly Street/Rainier Avenue S.

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| 8 | Protected bike lanes along S. Graham Street from 48th Avenue S. to Rainier Valley North-South Greenway at 39th Avenue S. |
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| 9 | Accessibility improvements for people with visual impairments at S. Hill Street/23rd Avenue S./Rainier Avenue S. intersection. Improved sidewalk connection to the Lighthouse for the Blind. |
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| 10 | New sidewalk along west and east sides of 46th Avenue S. between S. Director Street and S. Henderson Street |
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Table 6-6. Top Ten Safety-Focused Access to Transit Projects

Safety Ranking	Access to Transit Project
1	Improve sidewalk along west side of Rainier Avenue S. between S. Alaska and S. Edmunds Street
2	Improve sidewalk along east side of 5th Avenue S. between S. Jackson Street and S. King Street
3	Accessibility improvements for people with visual impairments at S. Hill Street/23rd Avenue S./Rainier Avenue S. intersection. Improved sidewalk connection to the Lighthouse for the Blind
4	Protected bike lane along S. Orcas Street from Wilson Avenue S. to Rainier Valley North-South Greenway at 39th Avenue S.
5	Sidewalk improvements along west side of Rainier Avenue S. connecting to the future R Line station at S. Dearborn Street
6	Protected bike lanes along S. Graham Street from 48th Avenue S. to Rainier Valley North-South Greenway at 39th Avenue S.
7	New sidewalk along south side of S. Charles Street between Poplar Pl S. and Rainier Avenue S.
8	Shorten pedestrian recall time to improve signal responsiveness for people crossing Rainier Avenue S. to the future R Line station at S. Graham Street
9	Neighborhood greenway along S. Rose Street from Rainier Avenue S. to Rainier Valley North-South Greenway at 46th Avenue S.
10	Protected bike lanes along S. Othello Street from Seward Park Avenue S. to Othello Link station at MLK Jr Way

Table 6-7. Top Ten Ridership-Focused Access to Transit Projects

Ridership Ranking	Access to Transit Project
1	Sidewalk improvements along west side of Rainier Avenue S. connecting to the future R Line station at S. Dearborn Street
2	New sidewalk along north and south sides of S. Adams Street from Letitia Avenue S. to Rainier Avenue S.
3	New sidewalk along north and south sides of S. Walker Street from 20th Avenue S. to 23rd Avenue S. New sidewalk along south side of S. Walker Street from MLK Jr Way S. to 24th Avenue S.
4	New sidewalk along south side of S. Charles Street between Poplar Pl S. and Rainier Avenue S.
5	Accessibility improvements for people with visual impairments at S. Hill Street/23rd Avenue S./Rainier Avenue S. intersection. Improved sidewalk connection to the Lighthouse for the Blind.
6	Improve sidewalk along west side of Rainier Avenue S. between S. Alaska and S. Edmunds Street
7	Improve sidewalk along east side of 5th Avenue S. between S. Jackson Street and S. King Street
8	New sidewalk along west side of 50th Avenue S. between S. Director Street and S. Henderson Street
9	Protected bike lanes along S. Othello Street from Seward Park Avenue S. to Othello Link station at MLK Jr Way S.
10	Improve pedestrian lighting at S. Holly Street/Rainier Avenue S.

6.5 Layover Assessment

6.5.1 Northern Terminus

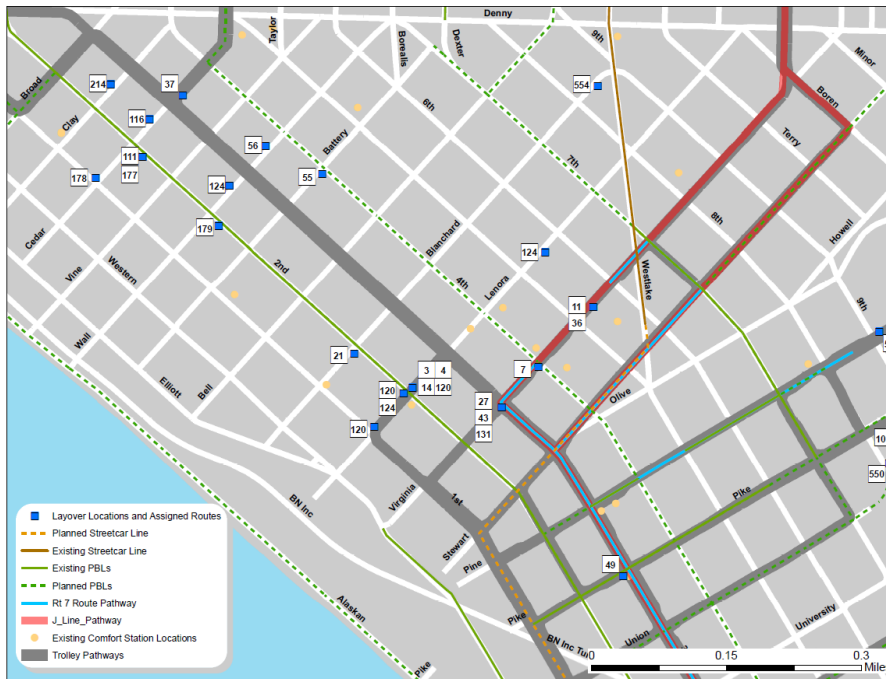
Currently, the Route 7 occupies three layover spaces on Virginia Street between 3rd Avenue and 7th Avenue. It is assumed R Line will need to accommodate a minimum of four 60-foot trolley coaches at the northern terminus, requiring identification of additional layover spaces at the northern terminus of the study corridor.

Options for the northern terminus layover location were evaluated during the Pre-Design phase. The process began with identification of preferred layover characteristics including:

- Is located off-street
- Has open space adjacent to each layover for drivers to use during breaks
- Allows for full independency of each layover space
- Locates all layover spaces in close proximity for easy scheduling
- Provides easy access to comfort stations
- Allows for actively managed layovers

Existing and planned transportation facilities were also reviewed to aid in the strategic positioning of the layover spaces and avoid conflict with facilities such protected bike lanes and streetcar lines. Figure 6-6 provides a map of the existing and planned facilities in the vicinity of the current layover.

Figure 6-6. Existing and Planned Facilities



The following three layover options within or near the existing Route 7 pathway were developed. Each of the options included varying route alignments, layover space allocations, and OCS modifications:

- Option 1 identified two alternatives for layover spaces along Virginia Street (Options 1A and 1B)
- Option 2 included five alternatives that positioned the layover spaces along Lenora Street, Virginia Street, and/or 3rd Avenue (Options 2-A through 2-E)
- Option 3 identified layover spaces along 2nd Avenue (Option 3-A)

For all options, it was assumed that a comfort station that meets agency standards, guidelines, and state law will be identified²⁶, trolley infrastructure will be built out to support operations, and frontage at new retail development will be coordinated with the City of Seattle.

Three goals were set as an evaluation criterion for the layover options to ensure the integrity of transit operation is maintained, impacts to surrounding community are minimized, and bicycle and pedestrian comfort and safety are prioritized. These goals served as the guidelines for determining options most suitable for implementation.

²⁶ While comfort station access was discussed, specific locations were not identified during this process.

- Goal 1: Maintain the integrity of transit operations
- Goal 2: Minimize impacts to surrounding community
- Goal 3: Prioritize bicycle and pedestrian comfort and safety

In the first step in the evaluation of northern terminus layover options, representatives from multiple Metro divisions including Service Planning, Passenger Facilities, Capital Planning, Operations, and the RapidRide Program reviewed the options, employing the evaluation criteria to narrow down the list of potential layover locations and configurations. SDOT was also consulted to review the options and provide feedback.

After review by Metro and SDOT, two options (Options 1-A and 2-D) were identified to receive further consideration. Additionally, a variant of Option 1-A (Option 1-Ab) that would not require the relocation of the Route 36 layover spaces and increases existing layover capacity to three total layover spaces east of 3rd Avenue on Virginia Street was identified for further consideration. Figures 6-7 and 6-8 display Options 1-A, 1-Ab, and 2-D.

AutoTURN analysis was performed for Option 1-Ab using templates for both 40 and 60-foot coaches with a bike rack deployed and the appropriate mirror clearance for proposed 3rd Avenue channelization provided by SDOT. The front of the 3rd bus was set to begin 150 foot from the 4th Avenue/Virginia Street stop bar to allow room for the first two buses (60-foot bus + 5 feet from stop bar + 10 foot maneuver distance, approximately). Figure 6-9 shows the 60 foot AutoTURN run. A coach test and further evaluation of the related turning movement and its feasibility will be required. There will also be need for new OCS wire so that the third bus can enter and exit the layover spaces without affecting buses in the travel lane.

No final option was selected as part of the Pre-Design evaluation. Options 1-A, 1-Ab, and 2-D will need to be further evaluated during future phases of R Line project development.

A detailed description of the northern terminus analysis process can be found in Appendix K.

Figure 6-7. Northern Terminus Layover Option 1-A/1-Ab



Figure 6-8. Northern Terminus Layover Option 2-D

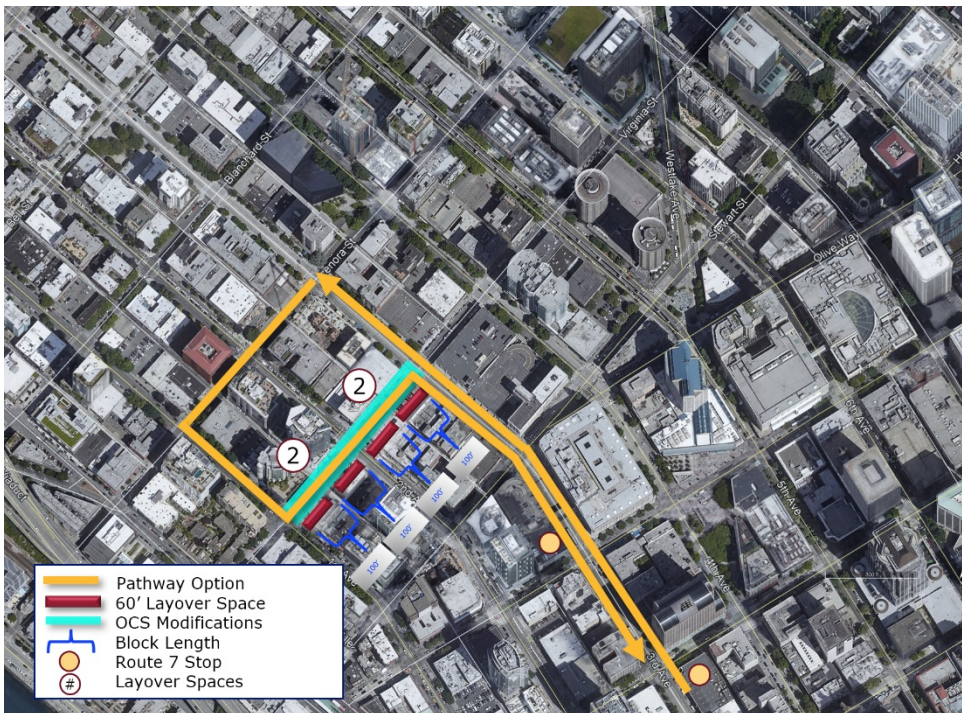


Figure 6-9. AutoTURN for 60 foot coach for Northern Terminus Layover Option 1-Ab



6.5.2 Southern Terminus

As noted in Section 2.1, the southern terminus of the R Line study corridor is located adjacent to the Rainier Beach Link station at MLK Jr Way S. and S. Henderson Street. During the Pre-Design analysis process, the project team evaluated four layover location options at the southern terminus. Three options included layover spaces on both S. Trenton Street and S. Henderson Street while the fourth option located all layover spaces on S. Henderson Street. The options were evaluated for performance across five goals:

1. Provide optimal passenger transfer experience between bus and rail
2. Provide forward compatibility with city bike plans
3. Maintain the integrity of transit operations
4. Minimize impacts to surrounding community
5. Minimize Capital Cost

After consultation with trolley operations, service quality, and the comfort station coordinator, the project team identified two feasible layout options for the southern terminus, both of which performed approximately equally across the five goals:

- Option 1: Three layover spaces on S. Henderson Street and one on S. Trenton Street
- Option 2: All layover spaces on S. Henderson Street

The layout of the two options are shown in Figures 6-10 and 6-11.

For either option, passengers would disembark at the layover spaces on S. Henderson Street. Under Option 1, if all layover spaces on S. Henderson Street were full, passengers would disembark at the new station on MLK Jr Way S. and the driver would proceed to the S. Trenton Street location. Use of the S. Trenton Street location would require drivers to perform a double loop around the block bounded by S. Henderson Street, MLK Jr Way S., S. Trenton Street, and Renton Avenue S. in order to drop off passengers at the station on MLK Jr Way S., travel to the layover space, and then pick up passengers at the station on MLK Jr Way S. as they begin their inbound trip.

Figure 6-10. Southern Terminus Layover Option 1



Figure 6-11. Southern Terminus Layover Option 2



A preferred option was not identified during the Pre-Design analysis. Final determination of the layover configuration will be determined in future project phases. Development of the southern terminus will include the following improvements:

- Layover spaces for four buses
- Driver comfort station
- A new RapidRide station on MLK Jr Way S.
- OCS extensions on MLK Jr Way S., S. Trenton Street, and Renton Avenue S., and S. Henderson Street, including passing wire at the S. Trenton Street layover space included in Option 1
- OCS passing wire on S. Henderson Street to support operations at the layover spaces
- Pedestrian crossing improvements at the Chief Sealth Trail
- Removal of the existing bus stop on S. Henderson Street on the far side of Renton Avenue S. for Option 2
- Removal of on-street parking on S. Trenton Street (subject to selection of Option 1) and on S. Henderson Street for both options

- Minor widening on S. Henderson Street to accommodate the added layover space east of the two existing layover spaces

Planning for and eventual development of improvements at the southern terminus will require coordination among multiple agencies. SDOT regulates the public right-of-way and improvements therein may necessitate permits and/or other approvals. Seattle City Light (SCL) owns a wide swath of land between S. Henderson Street and S. Trenton Street on which large scale transmission lines and support towers are located. These lines cross S. Henderson Street and S. Trenton Street. The Chief Sealth Trail, which is maintained by Seattle Parks and Recreation, is located on SCL's property as well as undeveloped right-of-way. Sound Transit owns the parcel at the northeast corner of the intersection of MLK Jr Way S. and S. Henderson Street, on which the existing Metro bus shelter is located. Sound Transit also has existing OCS infrastructure in the MLK Jr S. right-of-way. The Northwest Kidney Center recently opened a new facility at the southwest corner of S. Trenton Street and Renton Avenue S. Rechannelization of S. Trenton Street will need to consider impacts to on-street parking along their frontage.

Table 6-8 details the individual tasks associated with the improvements and identifies internal and external parties that should participate in the relevant discussions. It also notes the anticipated process for each task and the appropriate time to begin the engagement process with internal and external partners. Final determination of the southern terminus will be determined during future phases of R Line project development.

Table 6-8. Rainier Beach Link Station Southern Terminus Agency Coordination Activities

	Task	Internal Coordination	Partner Agencies/ Property Owners	Anticipated Process	When to Initiate Involvement	Notes
1	Placement of comfort station on SCL property	Bus Operations – Systems Impact (Comfort Station Coordinator) Transit Real Estate & Environmental	SCL Seattle Parks and Recreation SPU	<ul style="list-style-type: none"> Initial contact with SCL and Seattle Parks and Recreation to examine feasibility of comfort station placement Prepare preliminary/final design Apply for permits 	Upon approval of Preferred Alternative	<ul style="list-style-type: none"> Recognize it can be challenging to engage SCL in design processes prior to 30 percent design Potential for coordination with community groups regarding comfort station design May require temporary construction easement Task not needed if comfort station is placed on Sound Transit property

Task	Internal Coordination	Partner Agencies/ Property Owners	Anticipated Process	When to Initiate Involvement	Notes
2 Placement of comfort station on Sound Transit property	Bus Operations – Systems Impact (Comfort Station Coordinator) Transit Real Estate & Environmental	Sound Transit SPU	<ul style="list-style-type: none"> Initial contact with Sound Transit to examine feasibility of comfort station placement Prepare preliminary/final design Apply for permits, including water and sanitary sewer from SPU 	Upon approval of Preferred Alternative	<ul style="list-style-type: none"> Will need to coordinate with Sound Transit to determine if they want to apply for permits or want to authorize Metro to act as their agent Potential for coordination with community groups regarding comfort station design May require temporary construction easement Task not needed if comfort station is placed on Sound Transit property

Task	Internal Coordination	Partner Agencies/ Property Owners	Anticipated Process	When to Initiate Involvement	Notes
3 Installation of OCS in the layover loop	Design and Construction – Structural Engineering/Facilities Architecture (OCS Design) Bus Operations – System Impact (Trolley Impacts Coordinator) Transit Real Estate & Environmental	SDOT SCL Sound Transit	<ul style="list-style-type: none"> Initial contact with SCL and Sound Transit to identify concerns associated with OCS proximity to existing facilities Coordination with SDOT to identify acceptable locations for new OCS poles Prepare preliminary/final design Apply for permits (Street Improvement Permit [SIP]) 	Preliminary Design	<ul style="list-style-type: none"> Recognize it can be challenging to engage SCL in design processes prior to 30 percent design Should be coordinated with Tasks 4 through 8 May require temporary construction easement

Task	Internal Coordination	Partner Agencies/ Property Owners	Anticipated Process	When to Initiate Involvement	Notes
4 Installation of pedestrian improvements at Chief Sealth Trail of S. Henderson Street	Design and Construction – Civil Engineering Transit Real Estate & Environmental	SDOT SCL Seattle Parks and Recreation	<ul style="list-style-type: none"> Initial contact with Sound Transit to examine feasibility of comfort station placement Prepare preliminary/final design Apply for permits (SIP) 	Preliminary Design	<ul style="list-style-type: none"> Recognize it can be challenging to engage SCL in design processes prior to 30 percent design May require temporary construction easement
5 Rechannelization of S. Trenton Street and S. Henderson Street to accommodate layover spaces	Design and Construction – Civil Engineering	SDOT Northwest Kidney Center	<ul style="list-style-type: none"> Prepare preliminary/final design Apply for permits (SIP) 	Preliminary Design	<ul style="list-style-type: none"> Coordination needed with Bus Operations to determine final location of layover spaces

	Task	Internal Coordination	Partner Agencies/ Property Owners	Anticipated Process	When to Initiate Involvement	Notes
6	Station improvements on MLK Jr Way S.	Design and Construction – Civil Engineering Transit Route Facilities	SDOT Sound Transit	<ul style="list-style-type: none"> Prepare preliminary/final design Apply for permits (SIP) 	Preliminary Design	
7	Changes to existing bus stop on S. Henderson Street	Design and Construction – Civil Engineering Transit Route Facilities	SDOT	<ul style="list-style-type: none"> Prepare preliminary/final design Apply for permits (SIP) 	Preliminary Design	



7 Project Definition – Unconstrained Alternative

The culmination of the analysis described in Chapter 6 was development of the R Line Unconstrained Alternative (Unconstrained Alternative). The Unconstrained Alternative represents the complete suite of improvements that would serve to provide the greatest benefit for transit operations, ridership increases, and passenger safety and comfort. The estimated cost for design and construction of all improvements in the Unconstrained Alternative are likely to exceed Metro’s future budget for R Line. To address this potential condition, an Investment Strategy and Reconciliation Report (Appendix I) was developed. This report summarizes and compares the projects included in the R Line Unconstrained Alternative and the R Line LFA. The LFA represents the highest priority projects for R Line that ensure it incorporates the capital investments needed to provide the minimum level of service for a RapidRide line. The report describes the process and methodology employed for development of the LFA as well as the process to “build up” from the LFA to the Unconstrained Alternative via a prioritized list of projects.

The Unconstrained Alternative was developed as an iterative process among tasks, with the Speed and Reliability and Passenger Facilities tasks serving as the primary factors for identification of improvements. Development of recommended speed and reliability and passenger improvements was a concurrent and coordinated effort in which projects were identified and confirmed for consistency to ensure there were no conflicts. Access to transit improvements followed the location of stations, including the station rebalancing process. Similarly, communications and technology investment recommendations were related to the identified locations for TSP as part of the speed and reliability improvements and stations with real-time arrival data and off-board fare transactions. Figure 7-1 shows the location of all speed and reliability, passenger facilities, and access to transit improvements included in the Unconstrained Alternative.

Figure 7-1. R Line Unconstrained Alternative Improvements (1 of 3)

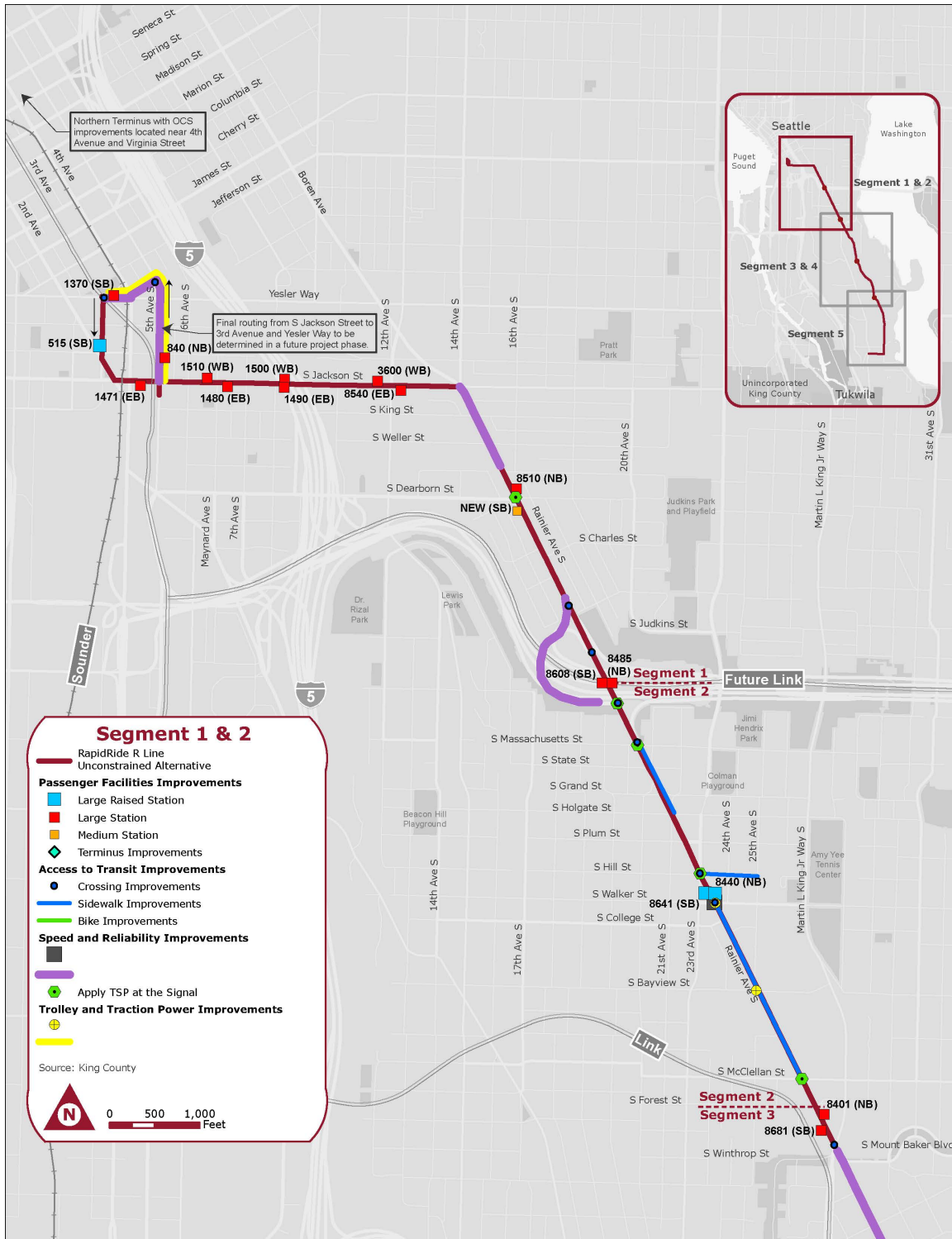


Figure 7-1. R Line Unconstrained Alternative Improvements (2 of 3)

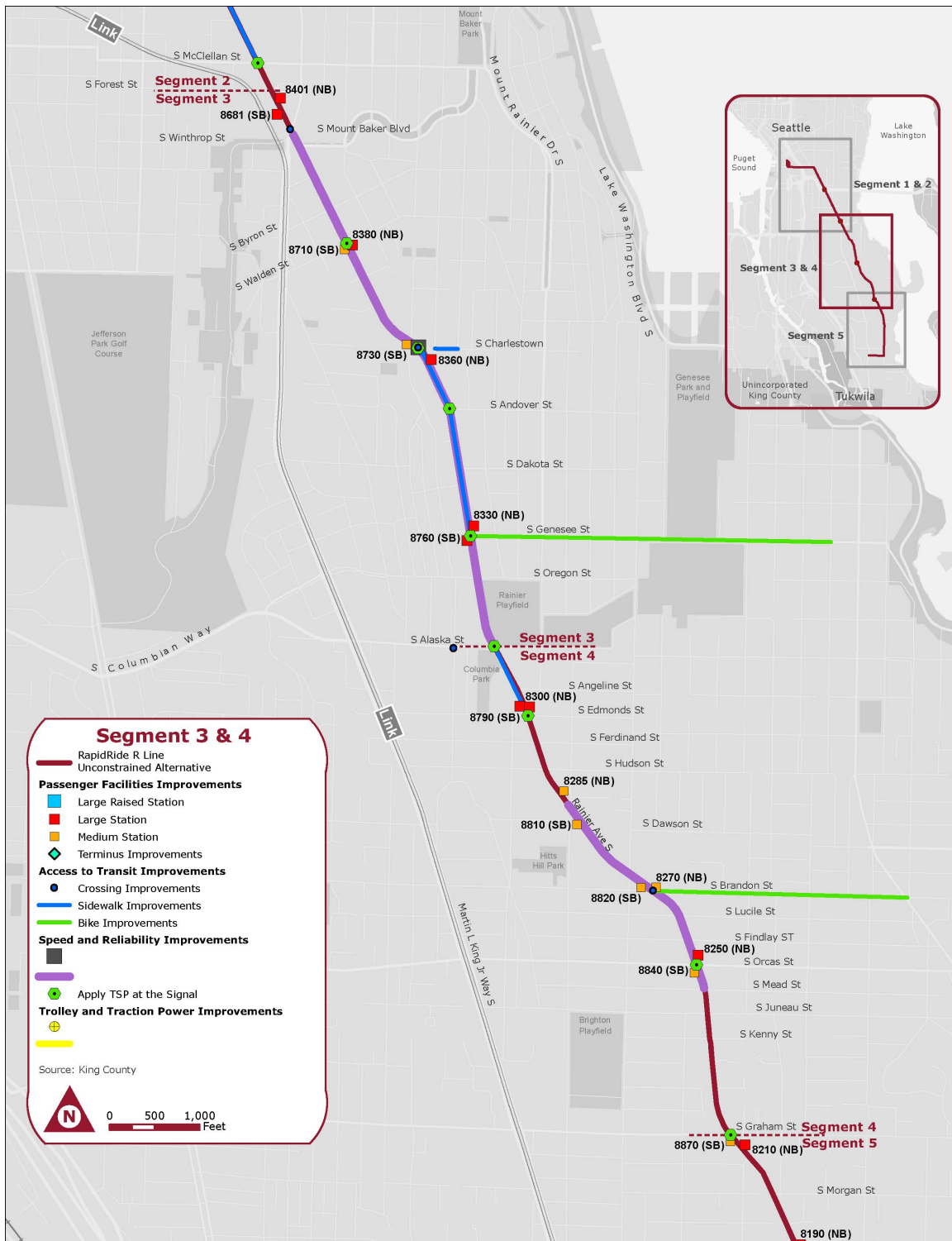
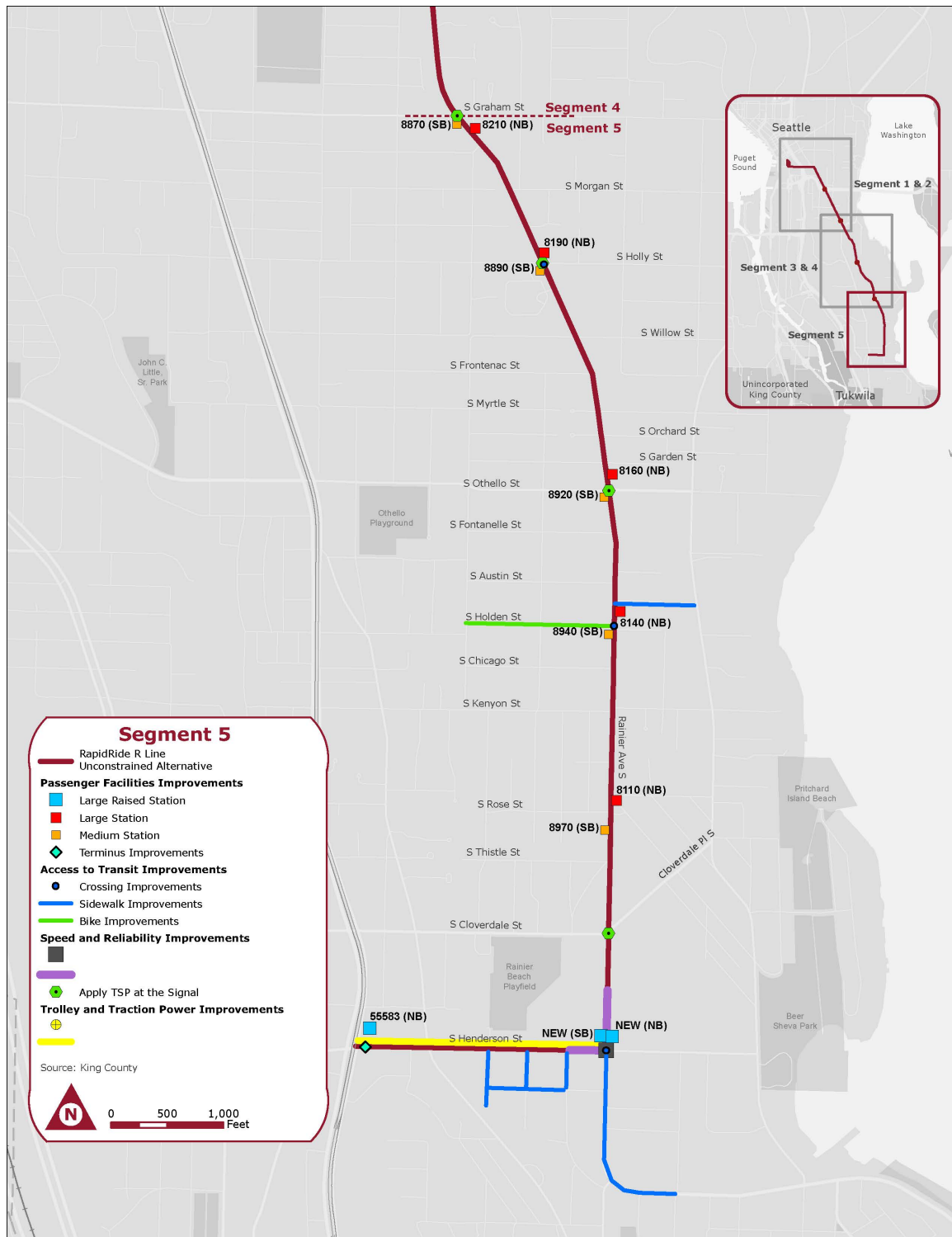


Figure 7-1. R Line Unconstrained Alternative Improvements (3 of 3)



In addition to the speed and reliability, passenger facilities, communications and technology, and access to transit improvements, the Unconstrained Alternative also includes the following:

- Targeted investments to improve the pavement conditions
- OCS investments to provide trolley bus power in areas where it is not currently provided and passing wire
- Improvements to support layover needs at the northern and southern termini.

7.1 Speed and Reliability Improvements

The Unconstrained Alternative includes speed and reliability improvements in all segments of the study corridor. Given the constrained built environment on S. Jackson Street, including the presence of the Seattle Streetcar, no speed and reliability improvements were proposed on S. Jackson Street. The Unconstrained Alternative comprises BAT lanes, TSP, and queue jumps, all of which were selected based on their potential to reduce transit travel time without significant impacts to general purpose traffic, improve transit reliability, and improve safety. TSP was identified at all signals or transit approaches forecast to operate at LOS C or worse (with the exception of those forecast to operate at LOS F) in 2040. Table 7-1 summarizes the improvements by segment and their locations and extents are shown on Figure 7-1.

The improvements included in the Unconstrained Alternative focus on improving transit speed and reliability, rather than overall intersection operations. The improvements included in the Unconstrained Alternative are not anticipated to impact general purpose traffic. Most intersections are anticipated to operate similarly under the No-Build and Build conditions for both 2024 and 2040, with three exceptions:

- Operations at the intersection at S. Dearborn Street and Rainier Avenue S. are forecast to decline in the PM peak period from LOS C and D in 2024 and 2040, respectively, to LOS F, with delay increasing to more than 100 seconds. This delay is attributed to installation of the crosswalk at the south leg of the intersection. This will impact both general purpose and transit in both directions.
- The intersections from S. Walden Street to S. Andover Street are forecast to operate worse under the Build conditions due to development of the northbound BAT lane. Northbound general purpose, southbound general purpose, and southbound transit will be impacted.
- Rechannelization of the south leg of the intersection at S. Henderson Street and Rainier Avenue S. will result in a decrease in the AM peak period to LOS E and F in 2024 and 2040, respectively. Northbound general purpose, southbound general purpose, and southbound transit will be impacted.

Table 7-1. R Line Unconstrained Alternative Speed and Reliability Improvements

Segment	From	To	Proposed Improvement
1	3rd Avenue/ Yesler Way	I-90	<ul style="list-style-type: none"> Develop a NB path from 5th Avenue S. and S. Jackson Street to 3rd Avenue and Yesler Way via 5th Avenue S., Terrace Street, and Yesler Way^a Construct a NB center-running BAT lane from S. Lane Street to S. Jackson Street Convert the HOV bypass lane on SB Rainier Avenue S./I-90 EB ramp to a general-purpose lane^b Apply TSP at S. Dearborn Street
2	Rainier Avenue S./ S. King Street	Rainier Avenue S./ S. Forest Street	<ul style="list-style-type: none"> Apply TSP at I-90 EB off-ramp, S. Massachusetts Street, 23rd Avenue S., S. McClellan Street Installation of a pedestrian half-signal at S. Walker Street^b
3	Rainier Avenue S./ S. Forest Street	Rainier Avenue S./ S. Alaska Street	<ul style="list-style-type: none"> Convert the curbside general-purpose lane to a NB BAT lane from S. Genesee Street to MLK Jr Way S. Remove on-street parking and add a NB BAT lane from S. Alaska Street to S. Genesee Street Apply TSP at S. Walden Street, Letitia Avenue S., S. Andover Street, S. Genesee Street, S. Alaska Street Modification of signal phasing at S. Charlestown Street/Letitia Avenue S.
4	Rainier Avenue S./ S. Alaska Street	Rainier Avenue S./ S. Graham Street	<ul style="list-style-type: none"> Convert on-street parking to a NB BAT lane from S. Mead Street to 39th Avenue S. Apply TSP at S. Edmunds Street, S. Orcas Street, S. Graham Street

Segment	From	To	Proposed Improvement
5	Rainier Avenue S./ S. Graham Street	Rainier Avenue S./ S. Henderson Street	<ul style="list-style-type: none"> At the intersection of Rainier Avenue S. and S. Henderson Street, change the NB approach from a shared left turn/through, and shared through/right turn to a left, through, and right turn lane. Allow through buses to pass through the intersection from the right turn lane. Convert the curbside general-purpose lane to a NB BAT lane connecting to the existing NB BAT lane Rechannelize the EB approach on S. Henderson Street to include an EB left turn lane for general purpose traffic, an EB bus-only left turn lane, and an EB shared through/right turn lane Apply TSP at S. Holly Street, S. Othello Street, S. Cloverdale Street

Notes:

^a Final routing from S. Jackson Street to 3rd Avenue and Yesler Way to be determined in a future project phase.

^b The HOV bypass lane would not be converted until it is no longer used by Sound Transit Express bus service.

^c This improvement responds to proposed access to transit improvements.

The improvements in the Unconstrained Alternative result in transit travel time savings over the No-Build conditions in all segments, in both directions, and during both peak periods in both 2024 and 2040. The most significant transit travel time savings along the length of the corridor, 9.4 minutes in 2024 and 11.7 minutes in 2040, are forecast for northbound travel during the AM peak period. This is primarily attributed to installation of the northbound BAT lanes from S. Alaska Street to MLK Jr Way S. With the activation of TSP, southbound transit travel times are forecast to decrease in the PM peak hour compared to No-Build conditions, saving 8.5 and 7.3 minutes along the length of the corridor in 2024 and 2040, respectively. Tables 7-2 through 7-5 summarize travel time savings for northbound and southbound travel times in both the AM and PM peak hours for Years 2024 and 2040.

Table 7-2. Southbound Transit Travel Times with Unconstrained Alternative by Segment – AM Peak Hour

Southbound			AM Peak Hour ^a			
Segment	From	To	2024 Travel Time (Minutes)		2040 Travel Time (Minutes)	
			No-Build	Unconstrained Alternative	No-Build	Unconstrained Alternative
1	3rd Avenue and James Street	Rainier Avenue S. and S. King Street	10.7	10.6	10.9	10.7
2	Rainier Avenue S. and S. King Street	Rainier Avenue S. and S. Forest Street	8.1	7.3	8.1	7.5
3	Rainier Avenue S. and S. Forest Street	Rainier Avenue S. and S. Alaska Street	6.7	6.1	6.6	6.2
4	Rainier Avenue S. and S. Alaska Street	Rainier Avenue S. and S. Graham Street	4.8	4.1	4.9	4.2
5	Rainier Avenue S. and S. Graham Street	S. Henderson Street and Rainier Avenue S.	5.4	5.0	5.4	5.0
Total Travel Times			35.6	33.1	35.9	33.5

Notes:

^a Representative AM Peak hour is 7 am to 8 am.

Table 7-3. Northbound Transit Travel Times with Unconstrained Alternative by Segment – AM Peak Hour

Northbound			AM Peak Hour ^a			
Segment	From	To	2024 Travel Time (Minutes)		2040 Travel Time (Minutes)	
			No-Build	Unconstrained Alternative	No-Build	Unconstrained Alternative
5	Rainier Avenue S. and S. Henderson Street	Rainier Avenue S. and S. Graham Street	8.3	7.1	8.5	7.0
4	Rainier Avenue S. and S. Graham Street	Rainier Avenue S. and S. Alaska Street	6.0	5.2	6.1	6.5
3	Rainier Avenue S. and S. Alaska Street	Rainier Avenue S. and Mount Baker Transit Center	11.3	5.8	14.4	6.0
2	Rainier Avenue S. and Mount Baker Transit Center	S. Jackson Street and Boren Avenue S.	10.6	9.1	10.8	9.9
1	S. Jackson Street and Boren Avenue S.	Prefontaine Pl S. and Yesler Way	8.5	8.2	8.9	7.6
Total Travel Times			44.7	35.3	48.7	37.0

Notes:

^a Representative AM Peak hour is 7 am to 8 am.

Table 7-4. Southbound Transit Travel Times with Unconstrained Alternative by Segment – PM Peak Hour

Southbound			PM Peak Hour ^a			
Segment	From	To	2024 Travel Time (Minutes)		2040 Travel Time (Minutes)	
			No-Build	Unconstrained Alternative	No-Build	Unconstrained Alternative
1	3rd Avenue and James Street	Rainier Avenue S. and S. King Street	12.3	10.6	12.5	11.3
2	Rainier Avenue S. and S. King Street	Rainier Avenue S. and S. Forest Street	15.1	13.1	18.1	17.0
3	Rainier Avenue S. and S. Forest Street	Rainier Avenue S. and S. Alaska Street	9.8	8.3	12.6	11.6
4	Rainier Avenue S. and S. Alaska Street	Rainier Avenue S. and S. Graham Street	9.5	7.9	10.8	8.4
5	Rainier Avenue S. and S. Graham Street	S. Henderson Street and Rainier Avenue S.	9.7	8.0	9.9	8.1
Total Travel Times			56.4	47.9	63.8	56.6

Notes:

^a Representative PM Peak hour is 4:30 pm to 5:30 pm.

Table 7-5. Northbound Transit Travel Times with Unconstrained Alternative by Segment – PM Peak Hour

Northbound			PM Peak Hour ^a			
Segment	From	To	2024 Travel Time (Minutes)		2040 Travel Time (Minutes)	
			No-Build	Unconstrained Alternative	No-Build	Unconstrained Alternative
5	Rainier Avenue S. and S. Henderson Street	Rainier Avenue S. and S. Graham Street	7.0	7.2	7.1	7.1
4	Rainier Avenue S. and S. Graham Street	Rainier Avenue S. and S. Alaska Street	5.6	5.2	5.5	5.4
3	Rainier Avenue S. and S. Alaska Street	Rainier Avenue S. and Mount Baker Transit Center	6.3	6.2	6.4	6.2
2	Rainier Avenue S. and Mount Baker Transit Center	S. Jackson Street and Boren Avenue S.	10.7	9.8	12.6	11.8
1	S. Jackson Street and Boren Avenue S.	Prefontaine Pl S. and Yesler Way	8.6	8.1	8.4	7.5
Total Travel Times			38.3	36.4	40.0	38.1

Notes:

^a Representative PM Peak hour is 4:30 pm to 5:30 pm.

7.1.1 Unresolved Issues Associated with Alignment Revisions

The Unconstrained Alternative includes revised northbound routing from S. Jackson Street along 5th Avenue S. As noted in Section 6.1.4, the analysis of this routing was performed to identify potential speed and reliability solutions to address delay at the intersection of 4th Avenue S. and S. Jackson Street. It was an internal analysis and neither the results nor the potential alignment and station location changes were presented for community input as part of the Preliminary Unconstrained Alternative. During a future phase of the R Line project, likely between 10 percent and 30 percent design, the following issues will require additional consideration prior to incorporating the revised routing to 3rd Avenue and Yesler Way.

- Evaluation of alignment options should be comprehensive and incorporate all aspects of transit route planning including, but not limited to, service planning, speed and reliability analysis, and passenger facility locations.
- All bus routes that follow similar existing routing at 4th Avenue S. and S. Jackson Street would use the revised routing. The revised routing analysis assumed implementation of the METRO CONNECTS service vision, which included elimination of many Metro, Community Transit, and Sound Transit peak-only routes serving north end communities that currently use the pathway from 5th Avenue and Terrace Street to 3rd Avenue and Yesler Way, both in service and deadheading. Should any of these routes be maintained at a level that could impact the capacity of the intersection, this analysis should be revisited.
- This alternative would include development of a RapidRide station at the existing northbound stop at 5th Avenue S. and S. Jackson Street (Northbound Stop #840). This station would replace the existing bus stop at S. Jackson Street and 5th Avenue S. (Westbound Stop #1530). Stop #840 is approximately 140 feet farther from the International District/Chinatown Link Station than Stop #1530 and requires an additional street crossing to access the Link station. With the implementation of the Ballard to West Seattle Link service, this Link station is poised to serve as a busy transfer point. Consideration of the passenger transfer experience in this vicinity should be an important consideration prior to implementation of revised routing. Additional community input should be solicited to better understand the rider experience and needs associated with potential station relocation to 5th Avenue S. and S. Jackson Street. The Route 62 currently uses layover spaces on 5th Avenue S. between S. Main Street and S. Jackson Street. Rechannellization of 5th Avenue S. should strive to maintain some or all of the existing layover spaces. Loss of the southbound right turn lane at 5th Avenue S. & S. Jackson Street would require Route 62 to use Seattle Boulevard to return northbound on 4th Avenue S., which will add running time and operating cost for this route.
- Should the R Line alignment include the right turn from S. Jackson Street to 4th Avenue S., additional improvements should be evaluated to reduce speed and reliability impacts at this location.

7.2 Passenger Facility Improvements

Upon completion of Community Engagement Phase 2, the project team developed a recommended Unconstrained Alternative for stop rebalancing. It included all recommended stop changes identified in Preliminary Unconstrained Alternative as well as the following:

- Station pairs at both locations on S. Jackson Street in Segment 1 (8th Avenue S. and S. Maynard Street) and the station pair at S. Edmunds Street and S. Dawson Street in Segment 4.
- Closure of the outbound stop at S. Alaska Street and retention of the inbound stop for service by other routes, as it serves as a key transfer point to existing and proposed bus service.
- Development of a new station at 5th Avenue S. and S. Jackson Street and at 3rd Avenue and Yesler to respond to the revised inbound routing from 5th Avenue S. and S. Jackson Street to 3rd Avenue and Yesler Way via 5th Avenue S. and Terrace Street.²⁷

Figure 7-1 shows the location and type of stations included in the Unconstrained Alternative. In some locations, the station type is inconsistent with the RapidRide Standards. The rationale for this discrepancy is documented in the RapidRide R Line Passenger Facilities Upgrade Report (Appendix B). Figures 7-2 and 7-3 show all forecast daily boardings for 2024 and 2040 for all routes serving the station. The average inbound and outbound spacing for stations included in the Unconstrained Alternative are 1,698 feet (0.32 miles) and 1,685 feet (0.32 miles), respectively. Only 14 outbound and 14 inbound stops would have spacing greater than one-quarter mile.

Ridership forecasts developed during the Pre-Design phase found no measurable differences in R Line ridership between use of the existing Route 7 terminus location and a terminus at the Rainier Beach Link Station. Should the terminus be located at the existing location, R Line would see approximately 200 to 250 fewer daily riders than if the terminus were located at the Rainier Beach Link Station. However, some portion of those “lost riders” would transfer to Routes 106 and 107 to access the Link station. Approximately 150 to 200 of these riders would have boarded at stops south of S. Orcas Street and approximately 70 riders would board northbound trips at the Rainier Beach Link Station.

²⁷ Final routing from S. Jackson Street to 3rd Avenue and Yesler Way to be determined in a future project phase. Station would only be developed if routing is located on 5th Avenue S.

Figure 7-2. 2024 Forecast Daily Boardings (1 of 3)

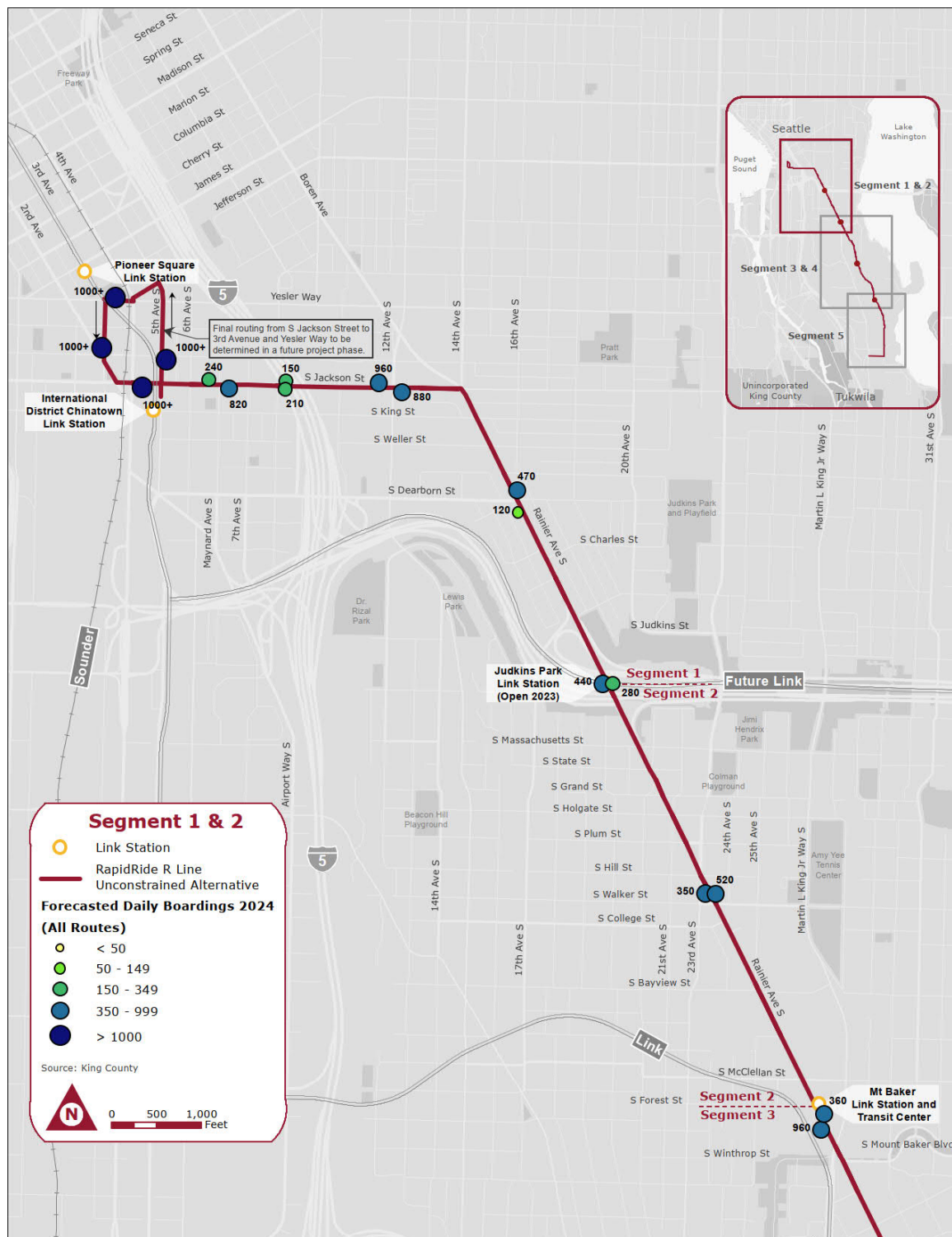


Figure 7-2. 2024 Forecast Daily Boardings (2 of 3)

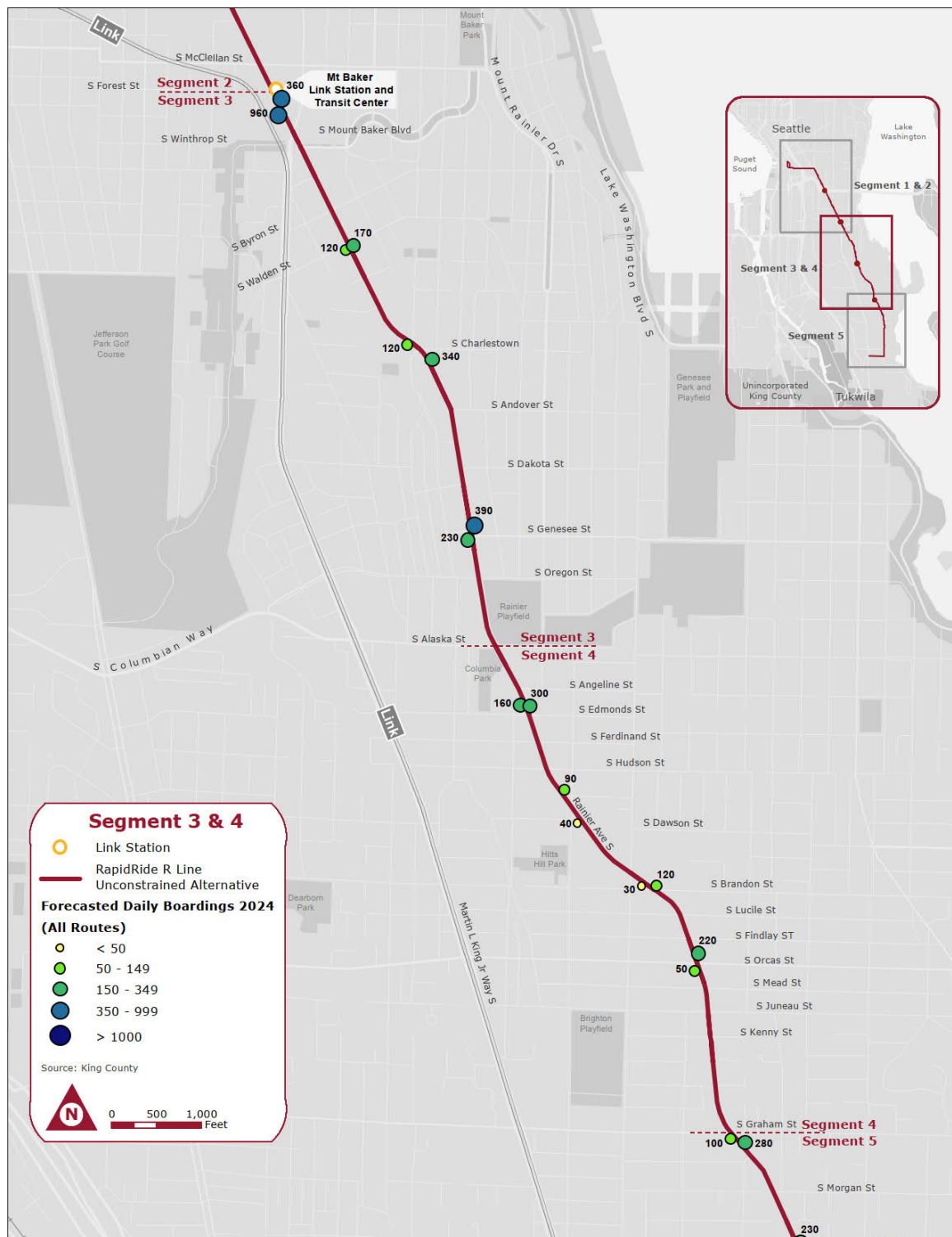


Figure 7-2. 2024 Forecast Daily Boardings (3 of 3)

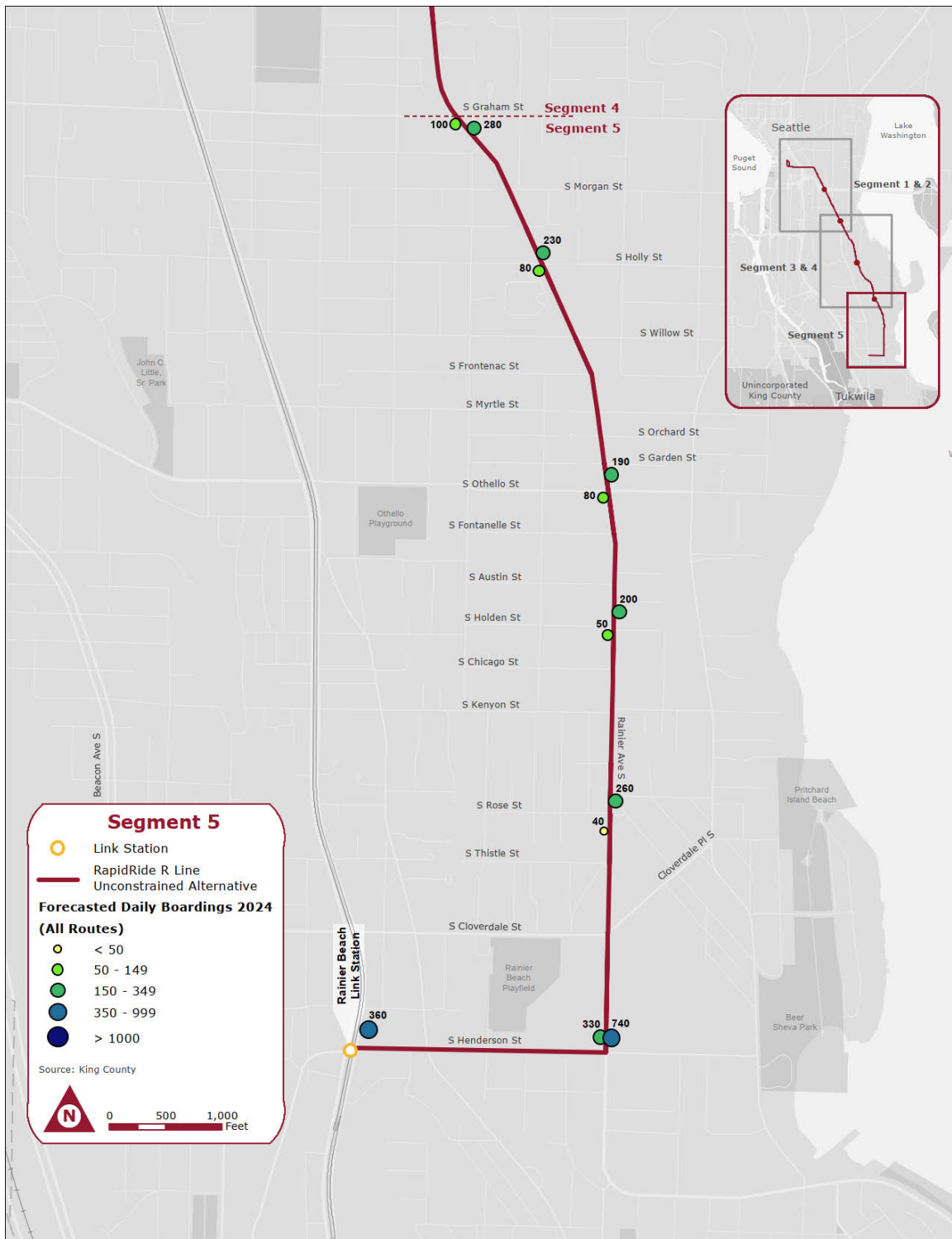


Figure 7-3. 2040 Forecast Daily Boardings (1 of 3)

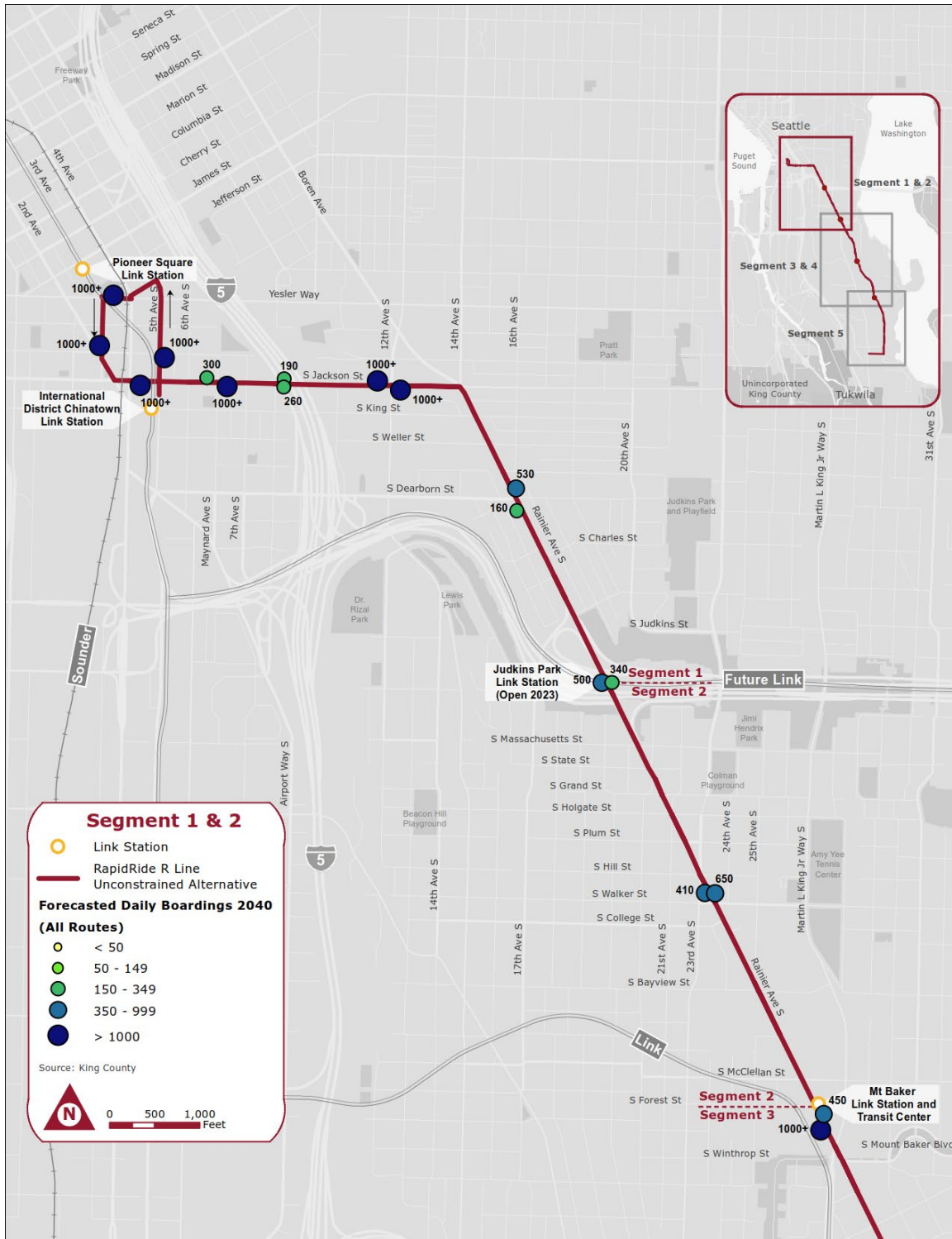


Figure 7-3. 2040 Forecast Daily Boardings (2 of 3)

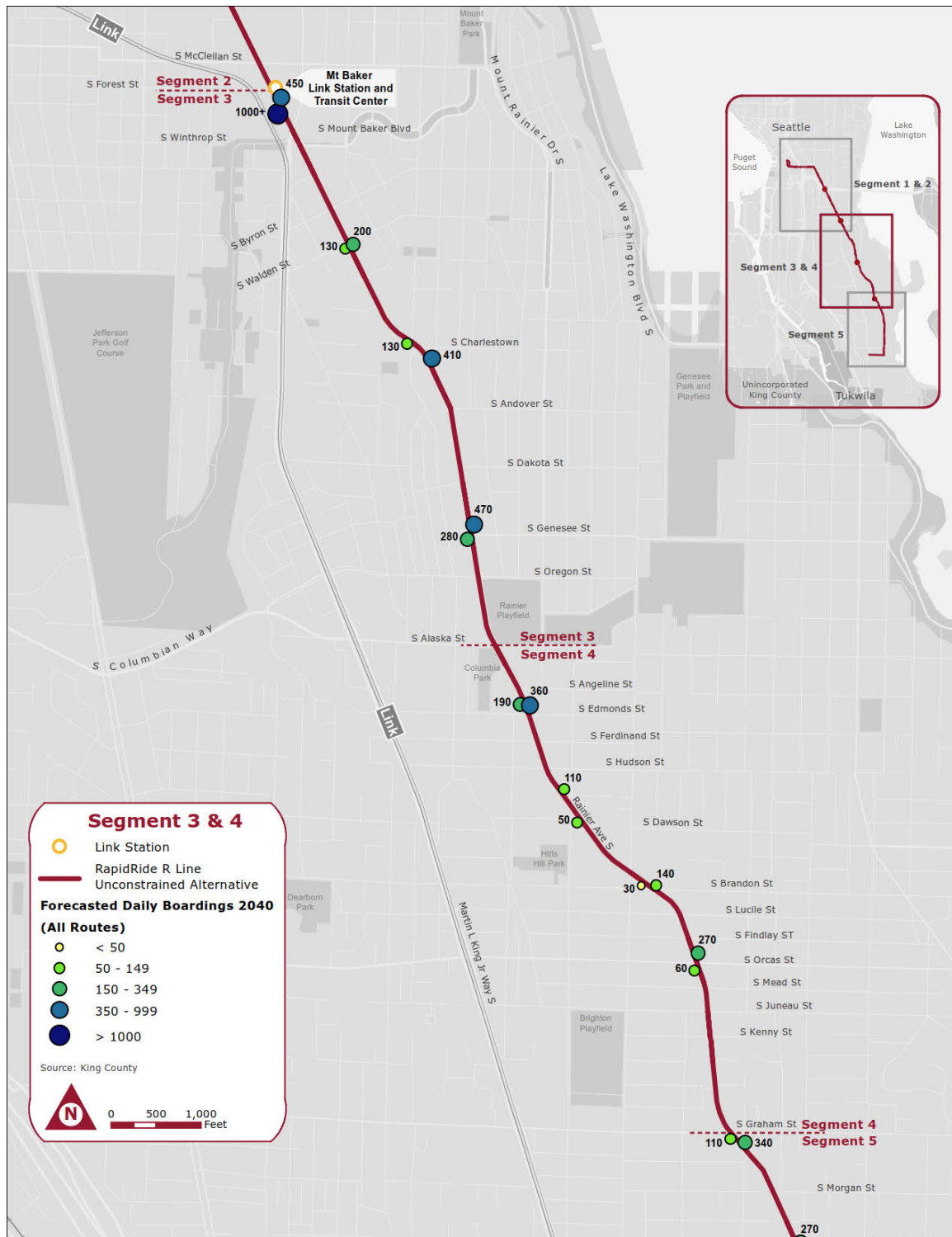
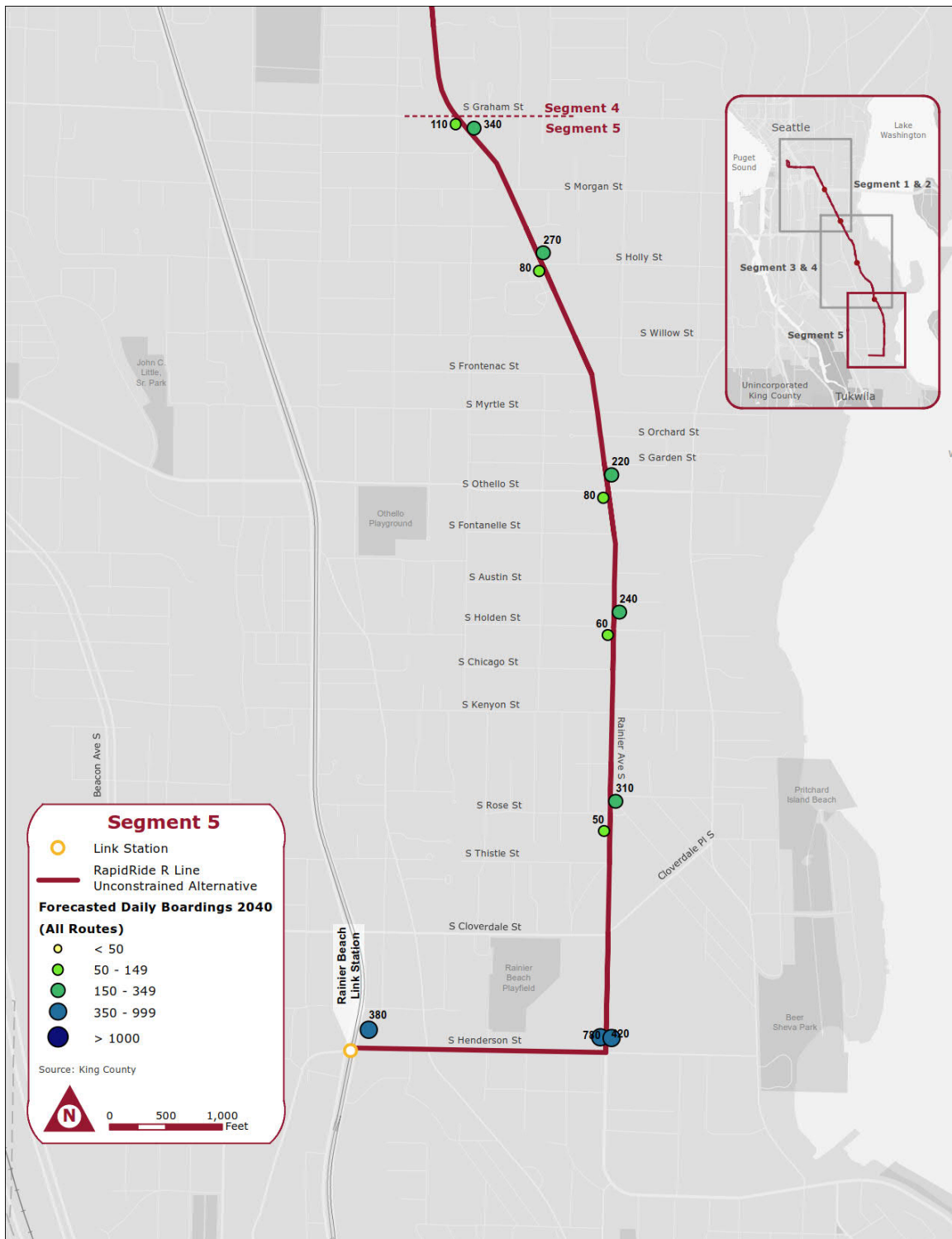


Figure 7-3. 2040 Forecast Daily Boardings (3 of 3)



7.3 Communications and Technology Improvements

7.3.1 Proposed Signal and TSP Locations

The R Line Speed and Reliability Task conducted an operational analysis of the R Line corridor and identified a list of recommended TSP locations based on the criteria established in the King County Metro TSP Policies and Strategies. As summarized in Table 7-1, 16 of the 48 signalized intersections along the study corridor were recommended for TSP as a part of the R Line Unconstrained Alternative.

Of the 6 intersections that were previously equipped with existing TSP for the Route 7, only 3 would meet the operational requirements per Metro's TSP Policies and Strategies document and are assumed for the R Line corridor. A total of 13 new TSP intersections are included in the Unconstrained Alternative.

7.3.2 Proposed Station Locations

As shown in Figure 7-2, a total of 45 stations have been identified along the study corridor as a part of the Unconstrained Alternative. Of the 45 proposed station locations, 6 stations are proposed as large raised stations, 26 as large stations, and 13 as medium stations. All large raised, large, and medium sized stations include technology pylons with real time information signs (RTIS), which will require communication connections between Metro's central system and the station to provide next bus arrive information to the signs. Large raised and large stations will also include stand-alone fare transaction processors for off-board fare collection, which also require communication connections to the station.

7.4 Access to Transit Improvements

Based on project ranking that elevated project locations most beneficial in serving areas of greatest need, improving safety, and benefitting the most transit riders as well as community priorities expressed through Phase 2 community engagement, the initial list of 44 access to transit projects was prioritized to the subset of 14 projects detailed in Table 7-6. Detailed descriptions of each project and their ranking among the equity-, safety-, and ridership-focused scenarios can be found in the RapidRide R Line Access to Transit Upgrade Report (Appendix D).

Table 7-6. Access to Transit Projects Included in the Unconstrained Alternative

Access to Transit Project	
Segment 1 – 3rd Avenue and Yesler Way to I-90	
1	Pedestrian crossing improvements at I-90 on- and off-ramps
Segment 2 – I-90 to S. Forest Street	
2	Sidewalk spot improvements along the east side of Rainier Avenue S. from the I-90 eastbound on-ramp to S. Holgate Street
3	ADA crossing improvements at S. Hill Street/23rd Avenue S./Rainier Avenue S. connecting to the Lighthouse for the Blind
4	Pedestrian crossing improvements at S. Walker Street/Rainier Avenue S.
5	Sidewalk spot improvements along both sides of Rainier Avenue S. between S. Walker Street and S. McClellan Street
Segment 3 – S. Forest Street to S. Alaska Street	
6	Sidewalk and crossing improvements at the Mount Baker Link Station and Transit Center
7	Improve pedestrian crossings of Rainier Avenue S. at Letitia Avenue S. and S. Charlestown Street; Construct new sidewalk along north side of S. Charlestown Street from 34th to 35th Avenue S.
8	Sidewalk spot improvements along both sides of Rainier Avenue S. between S. Charlestown Street and S. Genesee Street
Segment 4 – S. Alaska Street to S. Graham Street	
9	Pedestrian improvements between the Washington State Department of Services for the Blind and the future S. Edmunds Street R Line Station
10	Improve pedestrian crossings of S. Brandon Street; Install a neighborhood greenway connection along S. Brandon Street between Rainier Avenue S. and the protected bike lanes along Wilson Avenue S.

Access to Transit Project

Segment 5 - S. Graham Street to S. Henderson Street

- | | |
|----|--|
| 11 | Upgrade ADA curb ramps and stripe crosswalks across all legs of the S. Holden Street intersection; Improve the S. Wildwood Lane pedestrian path; Install a neighborhood greenway connection along S. Holden Street between the future R Line station at Rainier Avenue S. and the Rainier Valley North-South Greenway along 46th Avenue S. |
| 12 | Pedestrian crossing improvements at S. Henderson Street/Rainier Avenue S. |
| 13 | New sidewalks along 46th Avenue S., 48th Avenue S., 50th Avenue S., and S. Director Street |
| 14 | Sidewalk spot improvements along the east side of Rainier Avenue S. from S. Henderson Street to 52nd Avenue S. |

In addition to the projects summarized in Table 7-6, the following access to transit improvements are integrated into passenger facilities improvements.

- Construct sidewalk improvements along west side of Rainier Avenue S. near the future R Line station at S. Dearborn Street (New zone)
- Shorten pedestrian recall time to improve signal responsiveness at pedestrian crossings near the future Columbia City R Line stations at S. Edmunds Street and S. 39th Street (Zones 8285, 8810, 8300, and 8790)
- Shorten pedestrian recall time to improve signal responsiveness at pedestrian crossings near the future S. Graham Street R Line stations (Zones 8210 and 8870)
- Improve pedestrian lighting at S. Holly Street and Rainier Avenue S. (Zones 8190 and 8890)

Additionally, an improved pedestrian crossing at the Chief Sealth Trail near the southern terminus at the Rainier Beach Link station is included in the Unconstrained Alternative.

7.5 Northern and Southern Termini

As noted in Section 6.5, the multiple options for the northern and southern termini were evaluated during the Pre-Design phase, however, the Unconstrained Alternative does not specify the layout for either. The Unconstrained Alternative includes the northern terminus near the existing Route 7 layover near 4th Avenue and Virginia Street. The southern terminus of the Unconstrained Alternative is located at the Rainier Beach Link station at MLK Jr Way S. and S. Henderson Street. For both termini, the layout option with the estimated higher cost was incorporated into the Unconstrained Alternative cost estimate (See Chapter 9). The OCS infrastructure investments needed to support each termini were also included in the Unconstrained Alternative cost estimate.

7.6 Traction and Trolley Investments

Development of the Unconstrained Alternative would require the following expansions of the existing traction and trolley infrastructure:

- Extension of the OCS system along S. Henderson Street from Rainier Avenue S. to MLK Jr Way S. Additionally, OCS infrastructure would be needed along the layover loop on MLK Jr Way S., S. Trenton Street, and Renton Avenue S., and at layover locations (passing wire). As part of the Pre-Design analysis, a voltage drop evaluation was conducted to determine if an additional traction power substation would be needed to support this extension. The evaluation concluded an additional traction power substation would not be needed. The calculations supporting this evaluation can be found in Appendix L.
- Installation of passing wire at the northbound and southbound stations at S. Bayview Street and S. Walker Street to allow R Line buses to travel around other trolley buses stopped at these zones.
- Extension of the OCS system along 5th Avenue S., Terrace Street, and Yesler Way to support the revised northbound routing from S. Jackson Street.²⁸
- Possible extension of the OCS system to accommodate layover needs at the northern terminus.

²⁸ Final routing from S. Jackson Street to 3rd Avenue and Yesler Way to be determined in a future project phase.



8 Consistency with RapidRide Standards

The King County Metro RapidRide Expansion Program Standards and Implementation Guidance (Standards) define the features and characteristics for development of RapidRide lines. They define the standards by which future lines will be planned, designed, implemented and operated. They are organized into 10 categories addressing distinct elements of service, passenger experience, and management practice.

The Unconstrained Alternative includes speed and reliability, passenger facilities, and access to transit improvements that address several elements in the Standards. Table 8-1 compares the Unconstrained Alternative to the respective standards. Many of the standards direct station design at a greater level of detail than has been prepared for this phase of the project. This is noted accordingly in the comparisons.

Table 8-1. Comparison of Unconstrained Alternative to RapidRide Expansion Program Standards and Implementation Guidance

Category	Standard	Project Element	Comparison to Standards
1.0 Station Spacing and Location in the ROW	1.1 Station Spacing	Passenger Facilities	This element establishes the standard for RapidRide station spacing. Three inbound and 3 outbound stops (13 percent and 14 percent, respectively) included in the Unconstrained Alternative are consistent with the minimum standard for station spacing (1/4 mile to 1/3 mile) and 11 inbound and 10 outbound stops (48 percent and 45 percent) are consistent with the desired standard for station spacing (1/3 mile to 1/2 mile). All remaining stops are spaced closer than 1/4 mile.

Category	Standard	Project Element	Comparison to Standards
	1.2 Station Location at Intersections	Passenger Facilities	<p>The Unconstrained Alternative includes 45 stations: 23 inbound and 22 outbound. Of these stations, all but 15 are located at the far side of intersections, consistent with the desired and minimum standards for this element. Exceptions include locations at the following:</p> <ul style="list-style-type: none"> ▪ 3rd Avenue S. and S. Main Street ▪ 3rd Avenue and Yesler Way ▪ S. Jackson Street and 5th Avenue S. (both stations are near side respective to cross streets)^a ▪ S. Jackson Street and 8th Avenue S. (westbound) ▪ Rainier Avenue S. and S. Walker Street (southbound) ▪ Mount Baker Link Station (both stations are near side respective cross streets) ▪ Rainier Avenue S. and S. Walden Street (northbound) ▪ Rainier Avenue S. and S. Charlestown Street/ Letitia Avenue S. (both stations) ▪ Rainier Avenue S. and S. Edmunds Street (southbound) ▪ Rainier Avenue S. and S. Brandon Street (southbound) ▪ Rainier Avenue S. and S. Graham Street (northbound) ▪ Rainier Avenue S. and S. Henderson Street (southbound) <p>These were primarily set to provide better and safer access to transit from local amenities such as social services, housing, and shopping.</p>
	1.3 Bus Zone location in the ROW	Passenger Facilities	All bus zones included in the Unconstrained Alternative are located in-lane on the right/curb side of the street, consistent with the desired standard for this element.

Category	Standard	Project Element	Comparison to Standards
	1.4 In-Lane Stopping	Passenger Facilities	All bus zones included in the Unconstrained Alternative are located in-lane, consistent with the desired standard for this element.
2.0 Service Levels	2.1 Span of Service	RapidRide Program	Analysis during the Pre-Design phase assumed span of service 7 days a week, 24 hours per day, consistent with the desired standard.
	2.2 Frequency	RapidRide Program	<p>Analysis during the Pre-Design phase assumed the following service headways, consistent with the desired standard. The assumptions for evening and night/late night are more frequent than the desired standard.</p> <ul style="list-style-type: none"> ▪ Peak – 7.5 minutes ▪ Off-peak – 10 minutes ▪ Evening – 10 minutes (until 10 pm) ▪ Night/late night – 15 minutes (10 pm to 6 am)
4.0 Transit Supportive Strategies: Speed and Reliability	4.1 Bus Lanes and HOV Lanes	Speed & Reliability	This element establishes the standard for dedicated runningway environments for RapidRide service. The R Line study corridor is 7.1 miles in each direction. The Unconstrained Alternative includes approximately 2 miles of northbound BAT lanes and no southbound BAT lanes. When combined with existing and planned BAT lanes by the City of Seattle, the total will be approximately 2.3 miles of northbound BAT lanes and 2.3 miles of southbound BAT lanes along the R Line study corridor. This equates to approximately 20 percent of the miles in the study corridor as BAT lanes in each direction, which is less than the desired or minimum standard of 50 and 40 percent, respectively.

Category	Standard	Project Element	Comparison to Standards
	4.2 Transit Signal Priority	Speed & Reliability	This element establishes the standards for application of TSP along a RapidRide line. In 2024 and 2040, 22 intersections will operate at LOS C, D, or E. The Unconstrained Alternative includes application of TSP at 16 of these intersections. This is mostly consistent with the desired standard, which states TSP should be applied to all signalized intersections with LOS C, D, or E. Due to the complex signal operations in the CBD and on S. Jackson Street areas, including the Seattle Streetcar, six intersections were not recommended for TSP.
	4.3 Traffic Control Tools and Roadway Modifications	Speed & Reliability	In addition to BAT lanes, a variety of additional tools are available to achieve speed and reliability targets. The Unconstrained Alternative includes application of TSP at 16 intersections along the study corridor which are designed to address transit delay in areas where BAT lanes are not an option. They are included at all/some intersections with LOS D, E, and F (F for minimum). The project also includes converting the HOV bypass lane on the southbound Rainier Avenue S./I-90 EB ramp to a general-purpose lane, thereby reducing traffic backups on Rainier Avenue S. in which buses are often trapped.
5.0 Fare Payment	5.1 Fare Payment: ORCA and Mobile Payment	RapidRide Program	All large and large raised stations include ORCA card readers. This provides for ORCA card readers at all stations forecast to have 150 or more daily boardings, consistent with the desired standard.
	6.1 Lighting	Passenger Facilities	The conceptual designs include lighting at all Unconstrained Alternative stations, consistent with the desired standard for this element.

Category	Standard	Project Element	Comparison to Standards
6.0 Safety, Comfort, and Security	6.2 Stop and Station Security	Passenger Facilities	Clear sightlines are shown in the conceptual designs for all stations, consistent with the desired standard for this element. Sightlines may be adjusted as station design progresses through future project phases.
	6.3 Universal Access and Design	Passenger Facilities	At all stations, the conceptual designs allow for horizontal clearance of 6 feet for pedestrian through space, the minimum standard for this element. Available right-of-way was limited in many locations and additional right-of-way acquisition was not assumed to accommodate additional horizontal clearance. All conceptual designs are consistent with Americans with Disabilities Act Accessibility Guidelines and meet and exceed Part 1190–Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way of the Public Right-of-Way Accessibility Guidelines (United States Access Board 2011).
	6.4 Weather Protection	Passenger Facilities	All medium, large, and large raised stations include shelters, consistent with the minimum standard for this element. The conceptual designs for stations were not developed to address prevailing weather. This can be advanced as part of future design work.

Category	Standard	Project Element	Comparison to Standards
7.0 Service Integration	7.1 Zone Length and Bus Bays at Stations Served by Multiple Routes	Passenger Facilities	<p>Thirty-seven stations are proposed to serve more than one existing bus route, including 4 stations served by one additional frequent route and 9 stations served by two additional frequent routes²⁹. Of the stations served by additional frequent service, 9 (69 percent) have sufficient curb space for 2 articulated buses (130 feet). These include 6 stations served by one additional frequent route and 3 stations served by two additional frequent routes. The station lengths do not allow for independent operation (entry) at the head of the zone if a bus is located in the rear space as stated in the desired standard. The conceptual designs do not include designation of RapidRide spaces within the zone.</p> <p>R Line will overlap with other trolley service along S. Jackson Street and a short portion of Rainier Avenue S. once the Route 48 is electrified. R Line is assumed to serve all stops on S. Jackson Street, thus passing wire was not assumed. It was also determined that passing wire would be very difficult and expensive to install, given the complexity of the built OCS/Seattle Streetcar. Additional passing wire is assumed to be needed at S. Bayview Street (stop served by the Route 48) and S. Walker Street (station served by R Line and Route 48).</p>

²⁹ This assessment assumes all existing routes that currently travel westbound on S. Jackson Street would replicate the alignment along 5th Avenue S., Terrace Street, and Yesler Way, as shown in the Unconstrained Alternative.

Category	Standard	Project Element	Comparison to Standards
	7.4 Transportation Network Companies (TNC) and For-Hire Vehicle Integration	Access to Transit	<p>R Line access to transit projects in the Unconstrained Alternative do not include designated zones for passenger pick-up/drop-off near future R Line stations. However, SDOT's shared mobility hub program identifies future RapidRide stations near other frequent transit connections as potential mobility hubs that warrant designated TNC or passenger loading zones. Future R Line stations that are candidates for SDOT implementation of mobility hubs with TNC or for-hire vehicle integration include:</p> <ul style="list-style-type: none"> ▪ Chinatown-International District Station: S. Jackson Street/5th Avenue S. ▪ Little Saigon R Line Station: S. Jackson Street/12th Avenue S. ▪ Future Judkins Park Link Station: Rainier Avenue South/I-90 ▪ Mount Baker Link Station and Transit Center: Rainier Avenue South/MLK Jr Way S. ▪ Columbia City R Line Station: Rainier Avenue S./S. Edmunds Street ▪ Rainier Beach Link Station: Rainier Avenue S./S. Henderson Street
8.0 Passenger Facilities and Customer Information	8.1 Station Types, Configuration and Elements	Passenger Facilities	<p>Station types were determined predominantly based on forecast ridership in 2024 but also accounted for space limitations due to business entry proximity. Stations on Rainier Avenue S. at S. Dearborn Street (northbound), I-90 Judkins Park Link Station (southbound), S. Genesee Street (northbound), S. Edmunds Street (northbound), and S. Henderson Street (northbound) vary from the ridership-based station typology due to adjacent businesses and matching station platform heights with the matching paired station. The conceptual designs for all stations incorporate elements from the RapidRide Kit of Parts.</p>

Category	Standard	Project Element	Comparison to Standards
	8.2 Platform Design	Passenger Facilities	Large raised stations, which are designed to accommodate near-level boarding at stations with 350 or more daily passenger boardings, are included at six locations in the Unconstrained Alternative. Of these stations, all but one are forecast to have 350 or more daily passenger boardings. This one location (southbound at S. Henderson Street and Rainier Avenue S.) is forecast to have 330 daily boardings and is located at a transfer point for multiple routes. An additional 11 stations are forecast to have more than 350 daily passenger boardings. However, these were identified as large stations primarily due to physical constraints, such as the presence of existing or planned buildings or other built features. At three locations (both directions – Judkins Park Link Station and northbound S. Dearborn Street) recent or planned capital investments by other parties better accommodated future large stations.
	8.3 Passenger Load Zone	Passenger Facilities	All passenger loading zones include at least 48 feet to allow three-door boarding, as described in the minimum standard. Only 13 stations, which share service with one or more additional existing routes, include sufficient space to accommodate two buses and the associated loading zones. R Line service is scheduled to operate with 7.5-minute headways. It is not likely to share stops with other RapidRide lines, which would be applicable for addressing the desired standard for this element.
	8.4 Bus Door Delineation	Passenger Facilities	The conceptual designs for all stations include placement of the bus stop sign at the head of the zone and sufficient space is included to accommodate tactile pads at the front door location, consistent with the desired standard for this element. The conceptual designs for large raised stations include sufficient space to accommodate tactile pads across the length of the platform.

Category	Standard	Project Element	Comparison to Standards
	8.5 Bike Parking at Stations	Passenger Facilities	The conceptual designs include adequate space to accommodate six bicycle racks at all stations with fewer than 500 forecast daily boardings, consistent with the minimum standard for this element. Secure bike storage is already provided or planned at three of the 10 stations for which 500 or more daily boardings are forecast, consistent with the desired standard for this element.
	8.6 Bike Share and Dockless Mobility Integration	Passenger Facilities	Space for dockless mobility devices is not specifically identified in the conceptual designs for stations. These should be identified in partnership with SDOT during future efforts to respond to the city's plans for permitting dockless mobility devices.
	8.7 Real-Time Information Signs	Passenger Facilities	RTIS is included at all RapidRide stations, consistent with the desired standard.
10.0 Community Integration and Access	10.1 Public Realm, Public Art, and Urban Design	Passenger Facilities	Public art features have not been identified at stations at this phase of design. The conceptual design for many stations includes sufficient space to incorporate free-standing art features. Integrated art may also be accommodated. Future design phases will identify stations for which public art should be integrated. The project cost estimate includes an assumption of 1 percent of the project budget for art features.
	10.2 Landscaping, Street Trees, and Green Stormwater Infrastructure	Passenger Facilities	Specific landscaping elements have not been identified as part of conceptual design for the stations. Although the designs were prepared to maintain existing street trees to the greatest extent possible, some tree removal will be needed, and the designs identify locations where it is anticipated. Because no increases to impervious surfaces are anticipated as part of the station development, no changes to the existing stormwater infrastructure was anticipated.

Category	Standard	Project Element	Comparison to Standards
	10.3 Mobility Hubs and Park and Rides	Access to Transit	The Unconstrained Alternative does not include dedicated space for vehicle access whether parking or passenger loading zones at future R Line stations. SDOT's shared mobility hub program identifies potential mobility hub locations at the intersection of major transit corridors, including Sound Transit Link light rail. The potential mobility hub candidate locations listed above are locations where future R Line stations will coincide with other frequent transit connections.
	10.4 Proximity and Accessibility to Ped and Bike Networks	Access to Transit	R Line access to transit projects were identified for the Unconstrained Alternative to ensure every future R Line station was served by complete sidewalk connections, safe street crossings, and all ages and abilities bike facilities. The one-mile bikeshed and one-quarter-mile walkshed, or the areas within a 5-minute walk or bike ride of stations, were assessed for walking and bicycling network gaps to identify projects. Many of the walking and bicycling network improvements identified are within SDOT's responsibility for implementation and maintenance. R Line access to transit projects included in the Unconstrained Alternative are those that ranked highest to serve the most riders, improve safety, and serve areas of greatest need as well as demonstrated a high level of community support during engagement activities.
	10.5 Transit Oriented Development	Passenger Facilities	Assessment of station locations in proximity to TOD will be undertaken in future phases of the R Line project.

Notes:

^a Final routing from S. Jackson Street to 3rd Avenue and Yesler Way to be determined in a future project phase. Northbound station would only be developed if routing is located on 5th Avenue S.



9 Conceptual Design and Cost Estimates

9.1 Conceptual Design

Conceptual plans have been developed at a 10 percent design level for all speed and reliability, passenger facility, and access to transit improvements included in the Unconstrained Alternative. Appendix M includes the complete plan set for all improvements as well as a basis of design technical memorandum.

9.2 Capital Cost Estimates

Cost estimates were developed based on the 10 percent conceptual plans. Cost estimates include construction and contingency costs. The total cost for all improvements included in the Unconstrained Alternative is \$90.8 million in 2020 dollars. Table 9-1 summarizes estimated costs for the project by task. Appendix N includes a detailed cost estimate for all improvements as well as a memorandum describing the cost estimating methodology.

Table 9-1. R Line Unconstrained Alternative Cost Estimate

Project Element	Estimated Cost (2020 dollars)
Speed and Reliability	\$10,995,000
Passenger Facilities	\$17,592,500
Communications and Technology	\$17,113,000
Access to Transit	\$17,951,000
Trolley and Traction Power	\$15,226,000
Pavement Rehabilitation	\$11,709,500
Property Acquisition	\$182,000
Total	\$90,769,000

9.2.1 Investment Strategy

The Investment Strategy and Reconciliation Report (Appendix I) summarizes and compares the projects included in the R Line Unconstrained Alternative and the R Line LFA. The LFA represents the highest priority projects for R Line that ensure it incorporates the capital investments needed to provide the minimum level of service for a RapidRide line. The report describes the process and methodology employed for development of the LFA as well as the process to “build up” from the LFA to the Unconstrained Alternative via a prioritized list of projects. Finally, the Investment Strategy and Reconciliation Report identifies interim projects which could be developed in advance of R Line should funding become available. These projects include improvements that would benefit existing service in the corridor and would be retained as part of the eventual R Line development



10 Conclusions and Next Steps

After the completion of Pre-Design, the Unconstrained Alternative will be confirmed and advanced to final design and bidding services, with continued coordination with SDOT. The following phase of project development includes services during construction. This project will culminate with the successful opening of R Line.

10.1 Interagency Coordination

Continued project development for R Line will require coordination with other agencies. Some of the required coordination efforts are noted below, however, this is not meant to be an exhaustive list. Similar to Metro, many of these agencies are contending with financial impacts associated with the COVID-19 pandemic and the timing and extent of the improvements assumed as part of this analysis have the potential to change, possibly impacting how and when Metro implements R Line improvements.

- SDOT – Metro will continue to coordinate with SDOT to understand which planned improvements included in the Baseline scenario will advance to construction and their associated timing. Similarly, projects included in the Baseline scenario that are not advanced by SDOT will need to be identified, as they could impact Metro’s R Line project development process. Improvements not included in the Baseline scenario that are defined and implemented by SDOT in the interim will need to be considered in the project development process. All R Line improvements within the right-of-way implemented by Metro will require appropriate permits from SDOT via their SIP process.
- City of Seattle – Metro will need to obtain Certificates of Approval from the Department of Neighborhoods for R Line improvements in the Pioneer Square Preservation District, the ISRD, and the Columbia City Landmark District.
- Washington State Department of Transportation (WSDOT) – R Line improvements near I-90 will require coordination with WSDOT. Some projects, such as crossing improvements at the I-90 on-ramps, would likely be led by Metro but would require approval from WSDOT. Conversion of the HOV bypass lane on the southbound Rainier Avenue S./I-90 eastbound ramp to a general-purpose lane would be undertaken by WSDOT at Metro’s request.

- Sound Transit – Improvements included in the R Line Unconstrained Alternative are located near the International District/Chinatown, Mount Baker, and Rainier Beach Link Stations, as well as the Judkins Park Link station currently under construction. The development of RapidRide stations must be planned and designed to provide safe and efficient connections with Link stations. Sound Transit should be involved in the design associated with expansion of the trolley bus OCS infrastructure at the Rainier Beach Link Station to ensure there are no conflicts with the Link OCS infrastructure.
- SCL and Seattle Parks and Recreation – Both SCL and Seattle Parks and Recreation own facilities near the southern terminus at the Rainier Beach Link Station. Development of a RapidRide station and layover spaces would require coordination with these agencies to ensure there are no conflicts with the existing transmission lines and support towers, allow for possible siting of a comfort station, and improve the nonmotorized crossing of the Chief Sealth Trail.

10.2 Risk Register

Project risks were identified during the Pre-Design phase. Mitigation for each risk was discussed with the project team and documented in a risk register. In many instances, risks were addressed and mitigated during the Pre-Design phase. Outstanding risks that may impact future phases are summarized in Appendix O.

10.3 Issues for Future Consideration

During the Pre-Design evaluation, a number of issues surfaced that were outside the scope of evaluation during this phase. These issues, summarized in Table 10-1, were documented throughout the phase to ensure continued attention in future project phases.

Table 10-1. R Line Issues for Future Consideration

Project Element	Issue	Relevance to R Line	Future Steps
All	Integration of public art	Metro is in the process of developing a public art plan for the entire RapidRide program. Depending upon the timing of its completion, public art will be installed/integrated into R Line in accordance with the plan.	Public art issues and/or recommendations specific to R Line should be discussed as part of the plan development. The plan will be implemented accordingly upon its completion.
Service Planning	Provision of local service in addition to RapidRide	The Service Planning group expressed interest in the provision of local, underlying service along the corridor.	A decision is needed prior to advancing design that will result in stop closures (2020). Final discussions to occur in conjunction with service restructure planning, approximately 18 months before R Line opening.
Funding	Pursuit of Small Starts grant	Metro may choose to pursue Small Starts funding for R Line.	Decision anticipated in the first quarter of 2021.
Speed and Reliability, Passenger Facilities, Service Planning	West Seattle-Ballard Link Extension Construction Impacts to 5th Avenue Pathway	Sound Transit plans to begin construction on the West Seattle-Ballard Link Extension in 2025. The Unconstrained Alternative includes routing that uses 5th Avenue north of S. Jackson Street.	The final routing for R Line will be determined in future project phases. Once identified, Metro will need to discuss construction impacts with Sound Transit.
Passenger Facilities, Service Planning	Active Headway Management	Staff at the Transit Control Center and the RapidRide program staff are very interested in active headway management.	Discussion with RapidRide and Service Planning teams.

Project Element	Issue	Relevance to R Line	Future Steps
Passenger Facilities, Communications and Technology	Coordination with Sound Transit on construction timing at the Judkins Park Link Station	This impacts two stations on this project (Zones 8608 and 8485).	Continue to coordinate with Sound Transit on the timing and construction details at these station locations.
Passenger Facilities, Communications and Technology, Access to Transit	Ethiopian Village at Rose (Southbound station; Zone 8970)	There is interest in redeveloping this site. The developer is considering integration of station elements into the site plans. This could include moving the station south and incorporating the shelter into the building frontage.	Continue to coordinate with the Developer. A decision is needed before final design begins.
Passenger Facilities	Assessment of TOD Potential	An assessment of TOD potential related to station locations is needed for the overall project, prior to completion of 30% design. This need was identified at a very late stage in the current project phase, after significant station location analysis by the project team was complete.	During Preliminary Design (prior to completion of 30 percent design).
Speed and Reliability, Passenger Facilities	Pavement Condition	Pavement condition along the corridor is poor in many locations, primarily the outside lane. The City of Seattle may require pavement restoration as part of R Line improvements.	Costs associated with pavement restoration were included with the Unconstrained Alternative cost estimate. Negotiations with the City of Seattle will be required to determine the extent of required pavement restoration.

11

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Appendix A – RapidRide R Line Speed and Reliability Upgrade Report

Appendix B – RapidRide R Line Passenger Facilities Upgrade Report

Appendix C – RapidRide R Line Communications and Technology Upgrade Report

Appendix D – RapidRide R Line Access to Transit Upgrade Report

Appendix E – RapidRide R Line Community Engagement Summary Phase 1

Appendix F – RapidRide R Line Community Engagement Summary Phase 2

Appendix G – RapidRide R Line Service Planning Report

Appendix H – RapidRide R Line Environmental Memoranda

Appendix I – RapidRide R Line Investment Strategy and Reconciliation Report

Appendix J – RapidRide R Line Pre-Design Phase Decision Matrix

Appendix K – RapidRide R Line Northern Terminus Analysis Memorandum

Appendix L – RapidRide R Line Voltage Drop Calculations

Appendix M – RapidRide R Line Conceptual Design Plan Set

Appendix N – RapidRide R Line Conceptual Design Cost Estimates

Appendix O – RapidRide R Line Risk Register