

RAINIER BEACH PLAYFIELD

SOUTH LAKE  
HIGH SCHOOL

RAINIER BEACH  
COMMUNITY CENTER

# Corridor Planning and Upgrade Report Executive Summary

October 2020

**RAPIDRIDE** **R** Line

**King County  
METRO**

# 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, see Figure ES-1. 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.

**Figure ES-1. Demographics within the Study Area**

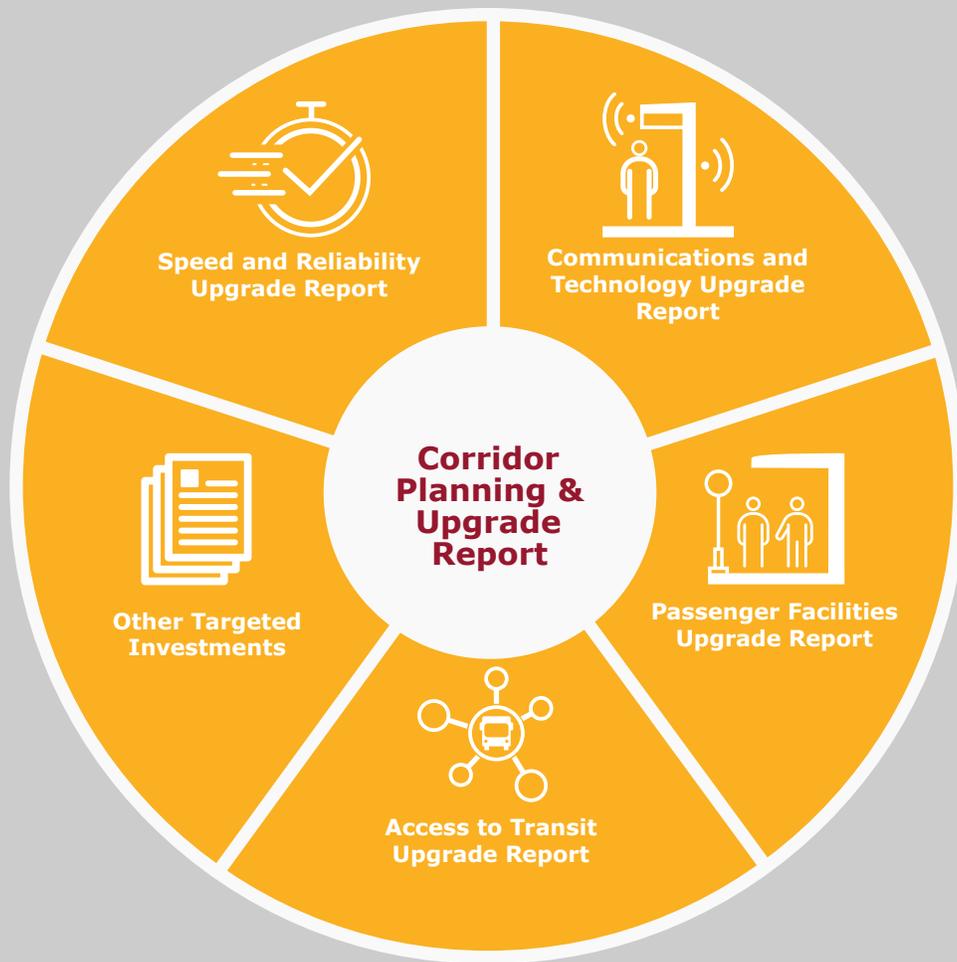
	Study Area	King County
 <b>Minority Population</b>	59.8%	29.6%
 <b>Low Income Population</b>	19.2%	12.6%
 <b>Limited English Speaking Households</b>	12.9%	5.7%
 <b>Households without a vehicle</b>	25.6%	6.2%
 <b>Persons with Disabilities</b>	13%	9.5%

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<sup>1</sup>. 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.

<sup>1</sup> 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-2. Corridor Planning Upgrade Report Building Blocks**



**Figure ES-3. R Line Study Corridor**



For the purpose of the pre-design analysis, the study corridor was divided into five segments, shown in Figure ES-3. Improvements included in the Unconstrained Alternative are described in the following sections.

**Legend**

- RapidRide R Line Study Corridor
- Link Light Rail Station
- Proposed RapidRide Stop

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

0 0.25 .5 MILES

# 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. Figure ES-5 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. Travel times for the Unconstrained Alternative compared to the No Build condition are shown in Figure ES-4.

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.

**Figure ES-4. Transit Travel Time Savings for the Unconstrained Alternative Compared to No Build**

	2024		2040	
	AM Peak	PM Peak	AM Peak	PM Peak
Southbound	2.5 min	8.5 min	2.4 min	7.3 min
Northbound	9.4 min	1.9 min	11.7 min	1.9 min

**Figure ES-5. R Line Unconstrained Alternative Speed and Reliability Improvements**



### Segment 1

- 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<sup>1</sup>
- 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<sup>2</sup>
- Apply TSP at S. Dearborn Street

### Segment 2

- 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<sup>3</sup>

### Segment 3

- 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 4

- 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

### Segment 5

- 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:**

1. Final routing from S. Jackson Street to 3rd Avenue and Yesler Way to be determined in a future project phase.
2. The HOV bypass lane would not be converted until it is no longer used by Sound Transit Express bus service.
3. This improvement responds to proposed access to transit improvements.

# Passenger Facilities

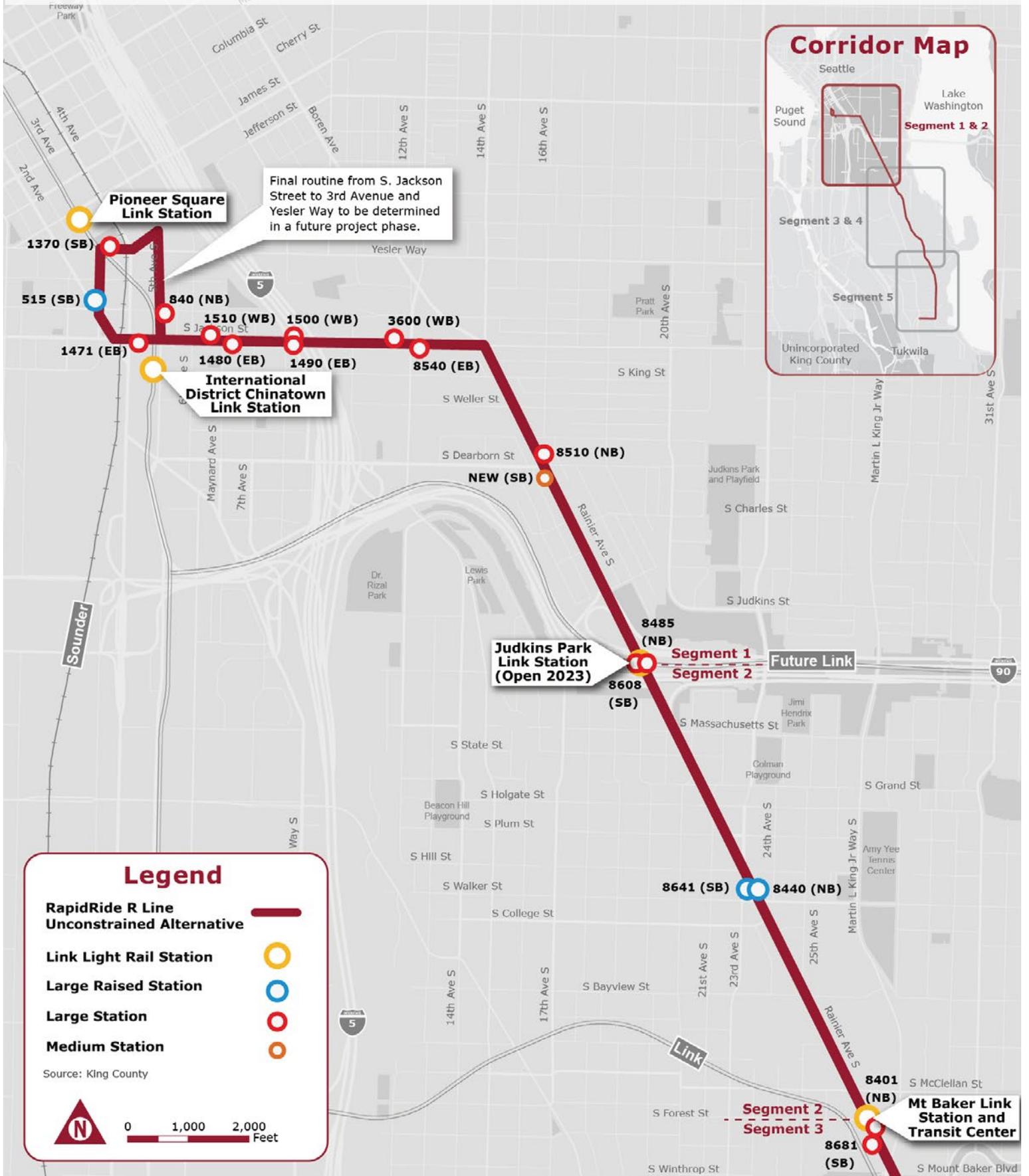
The stop rebalancing and station placement process was iterative and highly coordinated with the development of speed and reliability improvements. During the rebalancing process, the team acknowledged and considered the unique nature of the R Line study area and study corridor among Metro service areas 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-6 shows the location and type of stations included in the Unconstrained Alternative.

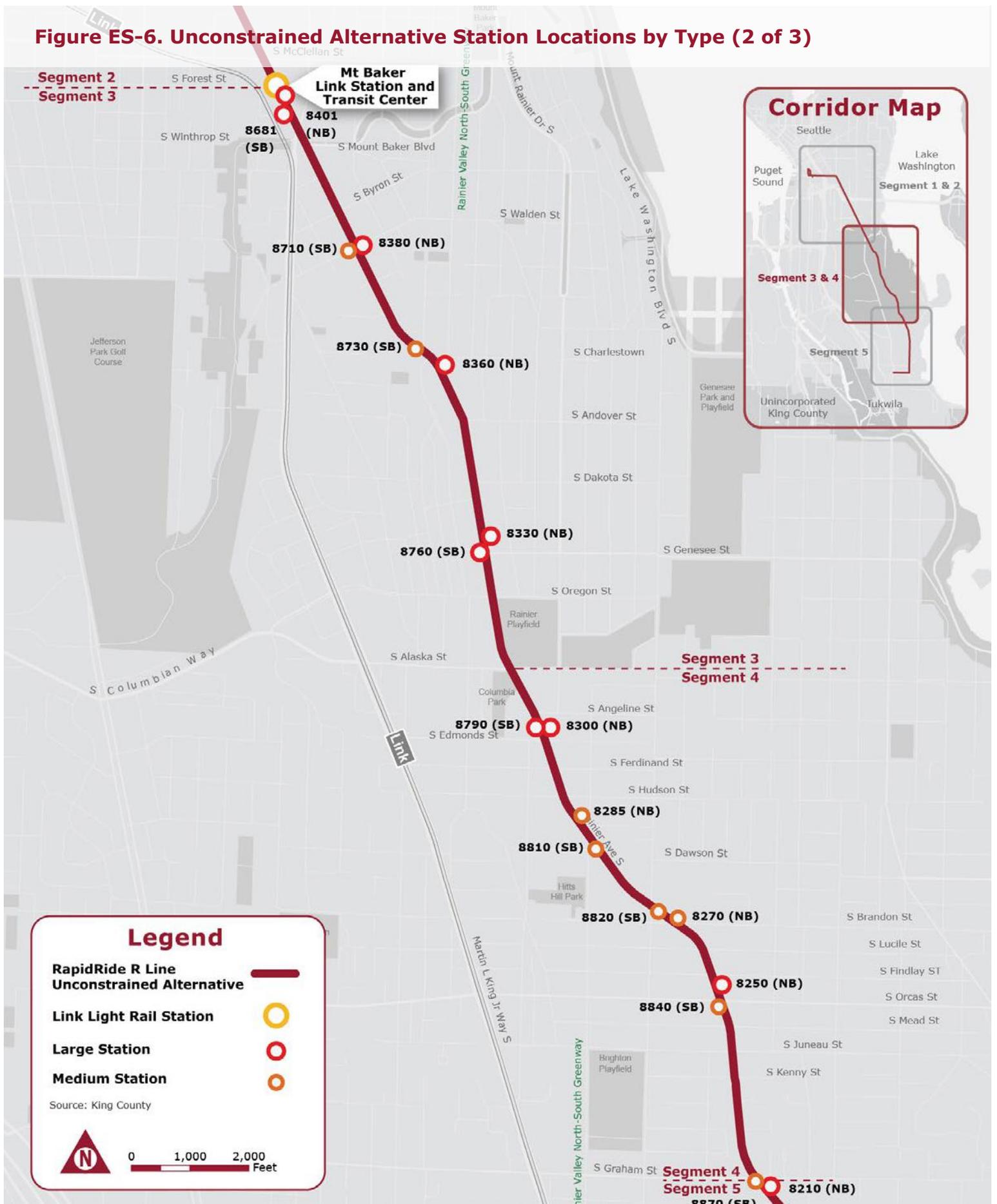
## Proposed westbound station at S. Jackson Street and Maynard Avenue S.



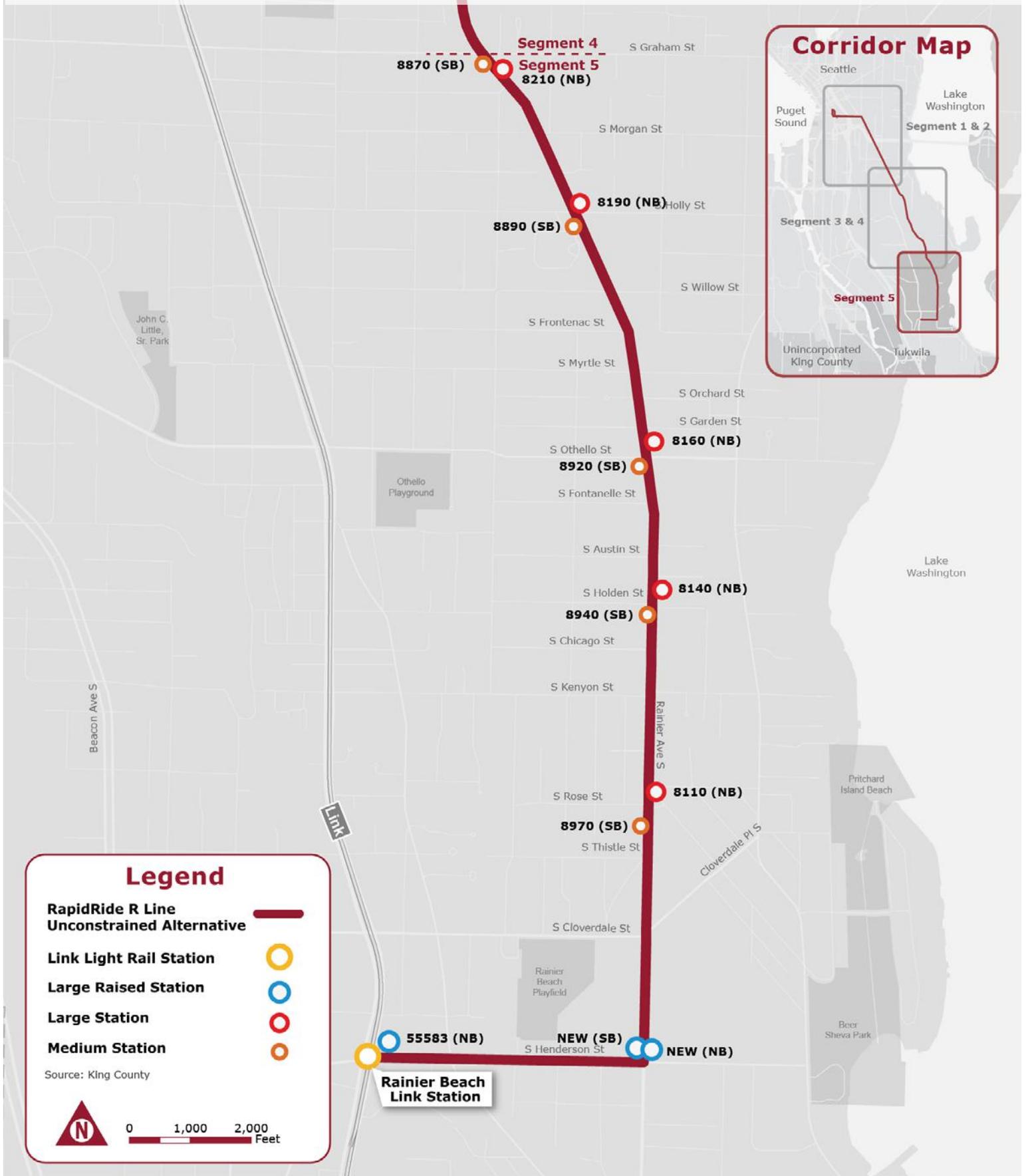
**Figure ES-6. Unconstrained Alternative Station Locations by Type (1 of 3)**



**Figure ES-6. Unconstrained Alternative Station Locations by Type (2 of 3)**



**Figure ES-6. Unconstrained Alternative Station Locations by Type (3 of 3)**

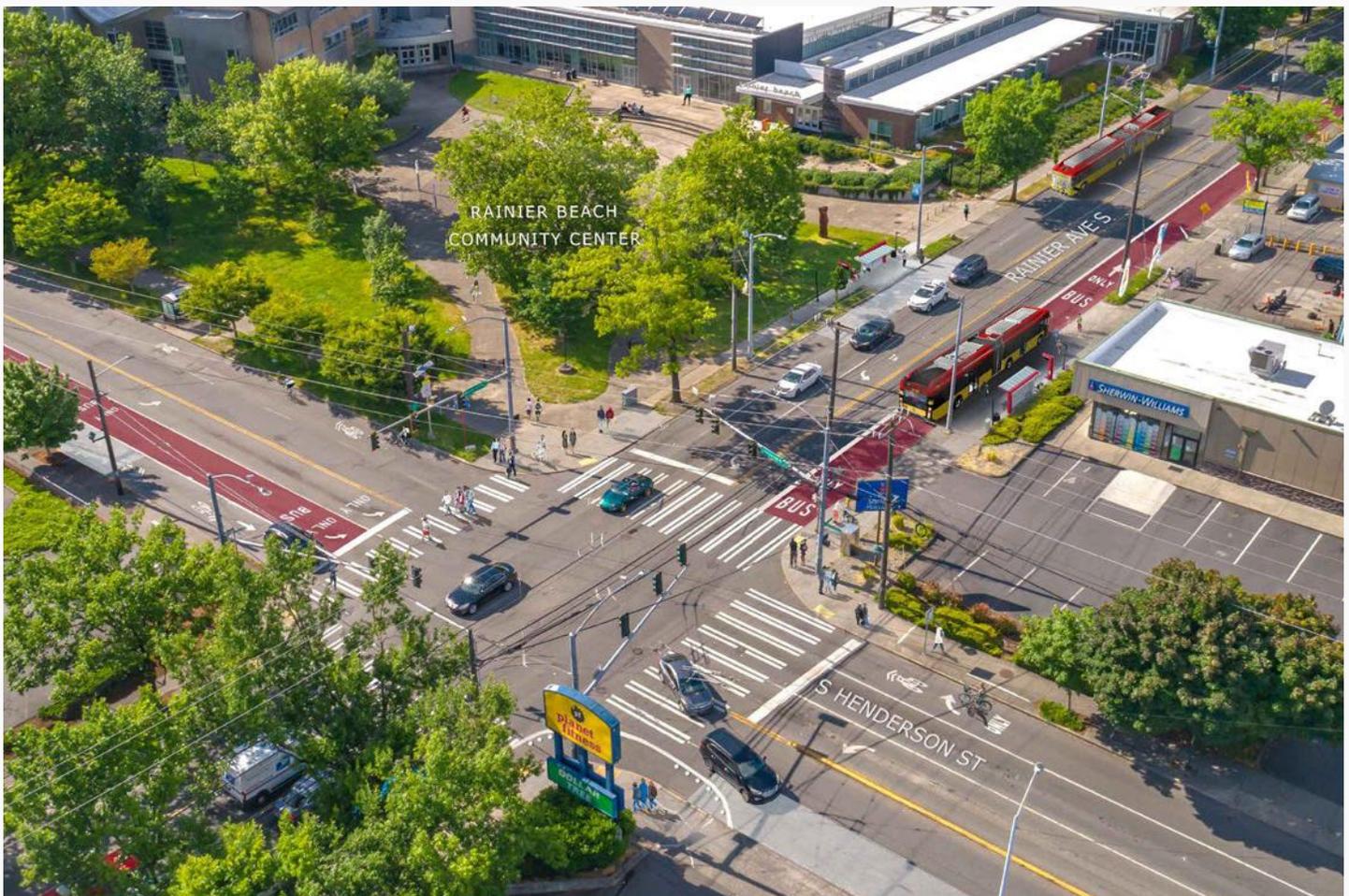


# Communications and Technology

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.

## Proposed station and BAT Lane Improvements at S. Henderson Street and Rainier Avenue S.



# Access to Transit

The Unconstrained Alternative includes 14 access to transit improvements, as summarized in Figure ES-7. Access to transit improvements included in the Unconstrained

Alternative were determined using the King County Metro Access to Transit Improvement Methodology and community feedback.

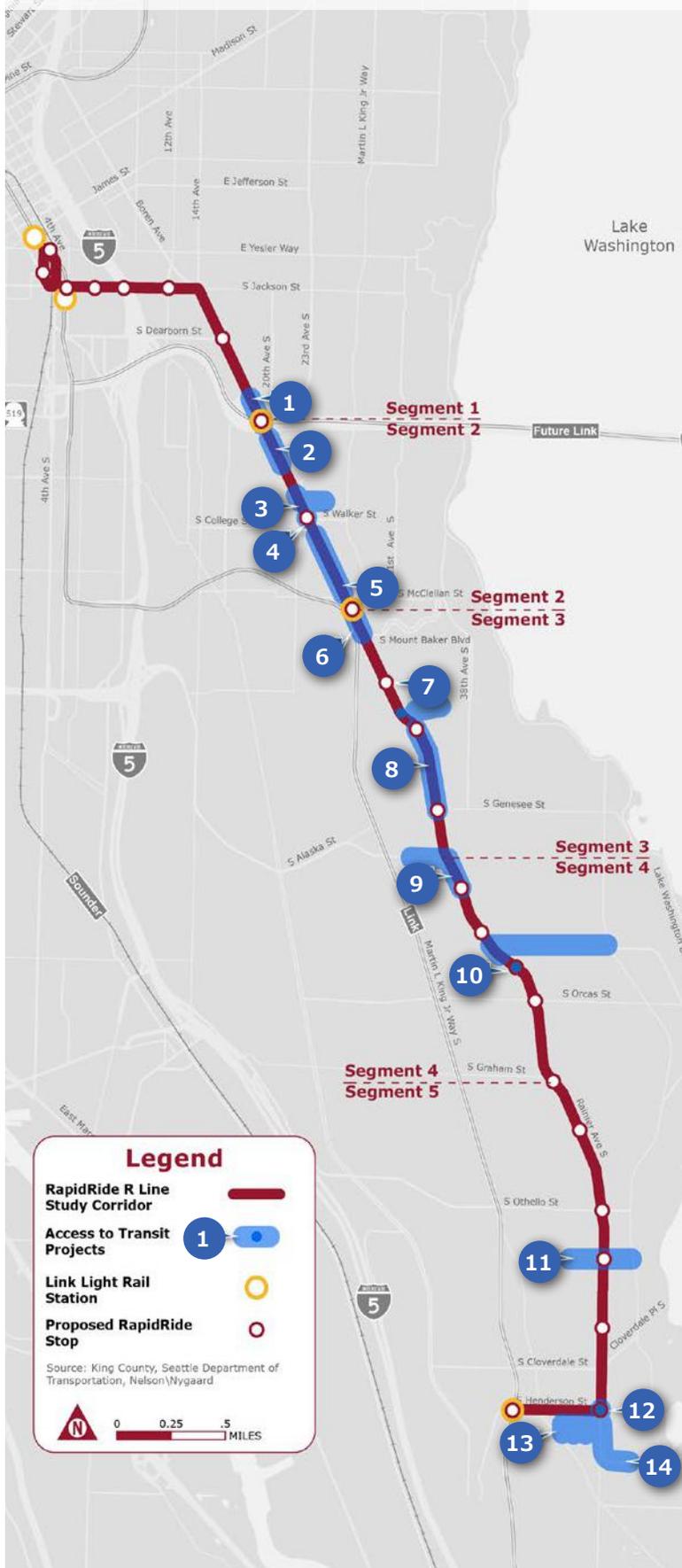
In addition to the projects summarized in Figure ES-7, the following access to transit improvements are integrated into passenger facilities improvements.

- 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.

**Figure ES-7. Access to Transit Projects Included in the Unconstrained Alternative Improvements**



### Segment 1

- 1 Pedestrian crossing improvements at I-90 on- and off-ramps

### Segment 2

- 2 Sidewalk spot improvements along the east side of Rainier Avenue S. from the I-90 eastbound on-ramp to S. Holgate Street
- 3 Sidewalk spot improvements along the east side of Rainier Avenue S. from the I-90 eastbound on-ramp to S. Holgate Street
- 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

- 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

- 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.

### Segment 5

- 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 52<sup>nd</sup> Avenue S.

## 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.<sup>1</sup>

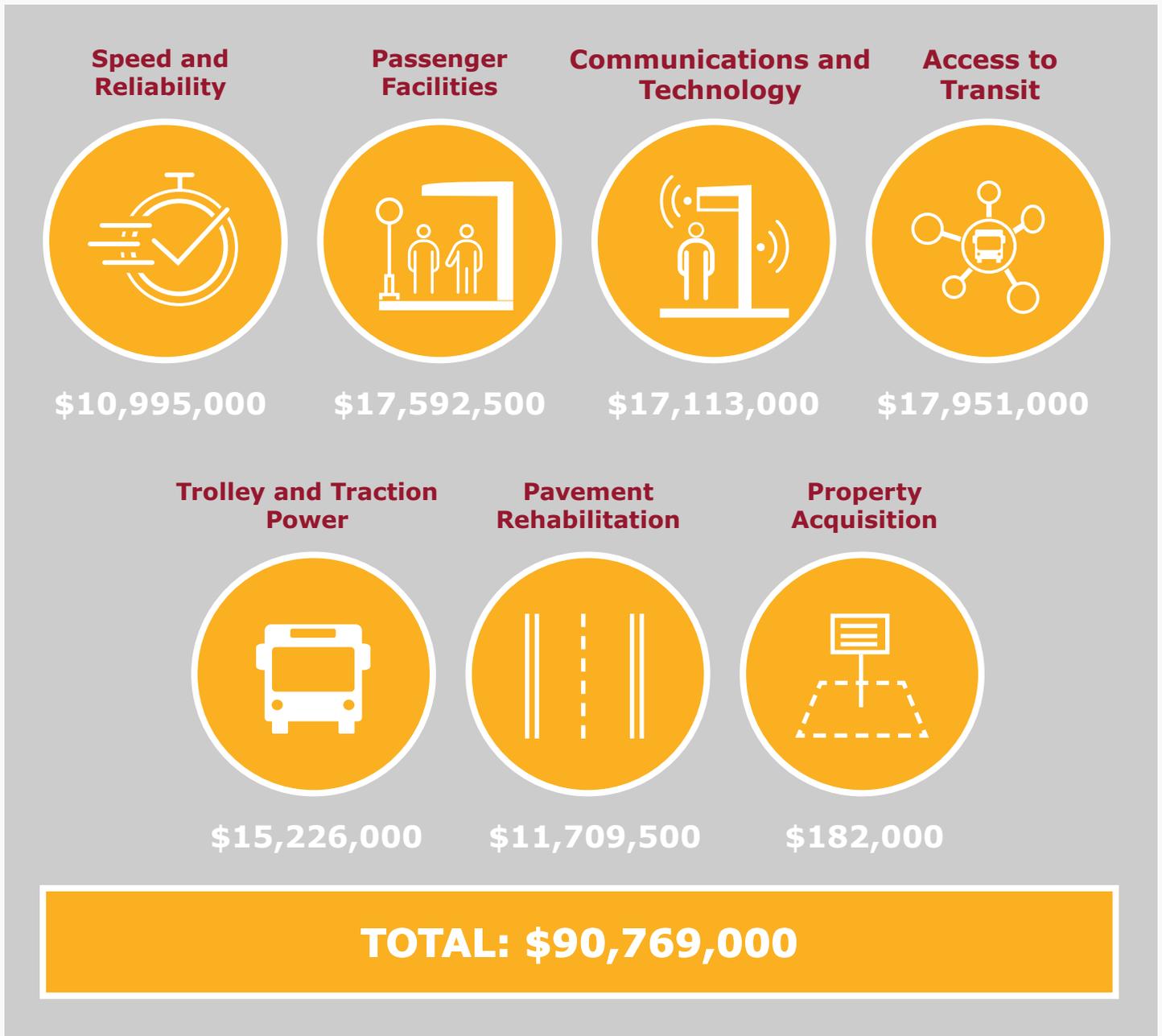
*<sup>1</sup> Final routing from S. Jackson Street to 3rd Avenue and Yesler Way to be determined in a future project phase.*

# 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. Figure ES-8 summarizes estimated costs for the project by task.

**Figure ES-8. R Line Unconstrained Alternative Cost Estimate**



# Future Project Consideration

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.

## Proposed station and pedestrian crossing at Rainier Avenue S. and S. Walker Street

