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Existing Conditions Report

Roosevelt to Downtown High Capacity Transit

First Draft 08/07/15
Revised Draft 11/04/15

Seattle Department of Transportation

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Section 1
Introduction

In April 2012, the Seattle City Council adopted the Transit Master Plan (TMP), which provides a long-range vision for the future of transit in Seattle. The TMP prioritized several high-capacity transit (HCT) corridors throughout the city, including the Roosevelt to Downtown Corridor. The Seattle Department of Transportation (SDOT) is conducting this study to further explore HCT options along the Roosevelt to Downtown Corridor. SDOT's definition of HCT includes both rail and rubber-tired transit modes that can operate in exclusive right-of-way or in mixed traffic, along with improved or enhanced roadway geometry, traffic signal timing, and vehicle and station amenities. Per the TMP definitions, the mode for HCT can be either Rapid Streetcar (RSC)or Bus Rapid Transit (BRT). The main goal of HCT is to provide faster, more convenient, and more reliable service for a larger number of passengers.

1.1 Overall Study Process

This study applies the principles of modal plan integration that supports Move Seattle, the city's strategic vision for transportation. The modal plan integration and policy framework involves the following steps:

- Step 1: Overlay the modal plans (for freight, walking, transit, and bicycling)
- Step 2: Identify the major purposes of the street
- Step 3: Develop alternatives
- Step 4: Evaluate alternatives
- Step 5; Design, construct, and maintain
- Step 6: Evaluate and report

The Right-of-Way allocation process considers the needs of the three ROW zones (pedestrian zone, travelway, and transition zone), establishes the priorities in each zone, integrates the priorities, and creates multi-function streets and corridors.

1.2 Document Purpose and Organization

This Existing Conditions Report provides a description of the current (2015) physical and operational conditions along the Roosevelt to Downtown HCT (RDHCT) Corridor. The study area is described in subsection 1.4. The document is organized as follows:

- Section 1 Introduction – Study overview and relevant studies
- Section 2 Land Use – Description of land use characteristics within the study area
- Section 3 Demographics – Description of demographics characteristics within the study area

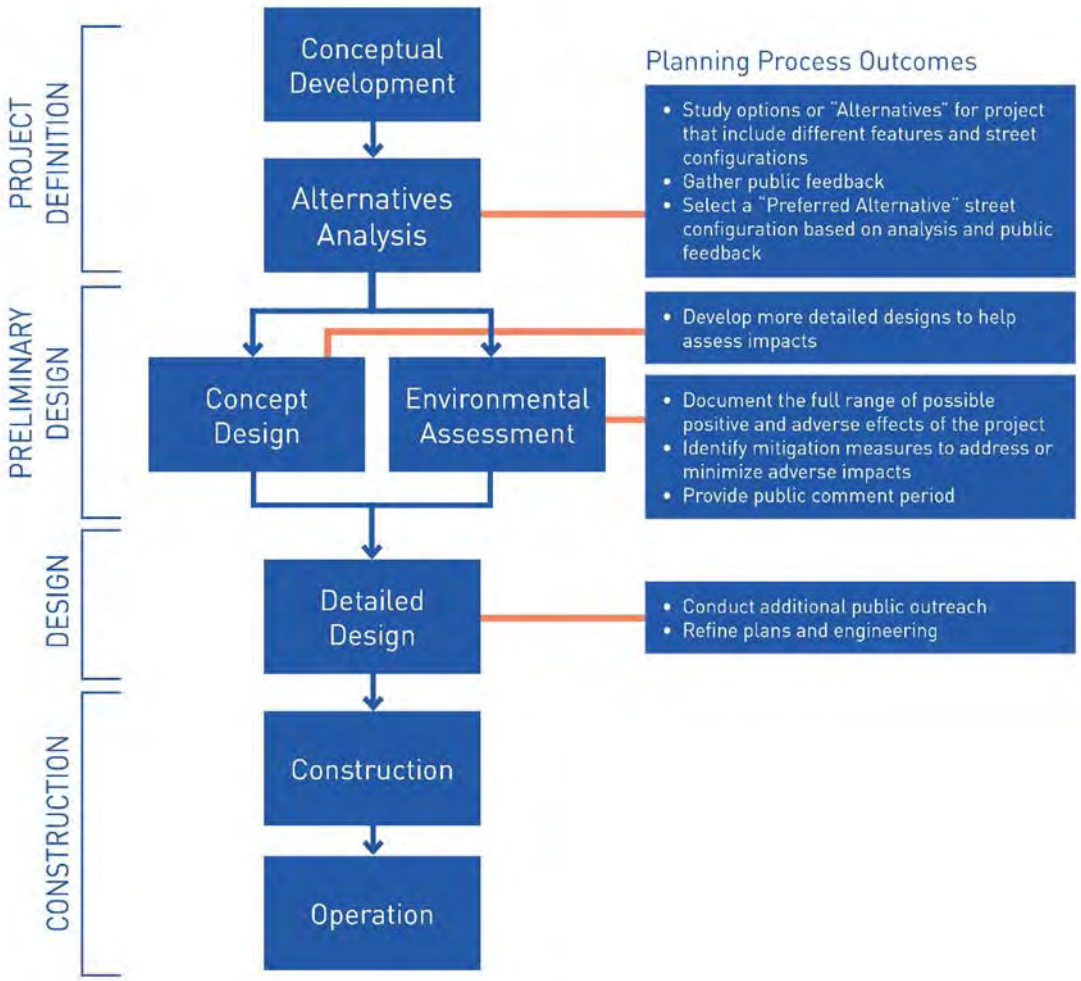
- Section 4 Traffic Conditions – Description of the corridor infrastructure, travel patterns, and traffic operations
- Section 5 Transit Conditions – Description of transit services and transit operations

1.3 Study Overview

This study represents the project definition phase and the purpose is to identify how best to provide HCT service to the Roosevelt to Downtown Corridor. This study uses a complete corridor approach to improve safety and access for all travelers and evaluates both BRT and rapid street car transit modes to determine how best to provide HCT service between Westlake Station and the Northgate Transit Center.

The overall project planning process is illustrated on **Figure 1-1**. It follows the Federal Transit Administration (FTA) process for all federally funded capital projects. The analysis of exiting conditions is conducted during the project definition phase, and supports the identification and evaluation of alternatives. It provides an inventory of existing conditions within the study area, clarifies the project purpose and need, and provides data for the development and evaluation of different HCT alternatives.

Figure 1-1. Project Planning Process



The process of developing and analyzing alternatives is currently underway, with the goal of identifying a recommended corridor concept in the first quarter of 2016. The conceptual design of the recommended corridor concept will follow and should be completed in mid 2016.

1.4 Study Area

The Roosevelt to Downtown High Capacity Transit Corridor is illustrated in **Figure 1-2**. The corridor is approximately 7 miles in length, and is defined as follows:

- begins at the Westlake Hub (southern terminus) at 5th Avenue/Westlake Avenue/Stewart Street then
- travels north through South Lake Union to the current northern end of the South Lake Union Streetcar at Fairview Avenue and Yale Avenue N then
- travels on Fairview Avenue N to Eastlake Avenue E then
- travels on Eastlake Avenue E to University Bridge then
- travels on 11th Avenue NE and 12th Avenue NE (Northbound) and Roosevelt Way NE (Southbound) to NE 75th Street then
- travels on Roosevelt Way to NE 80th Street then
- travels on NE 80th Street to 5th Avenue NE then
- travels on 5th Avenue NE to NE 100th/NE 103rd Street then
- travels on NE 100th/NE 103rd Street to Northgate Transit Center (northern terminus)

Two alternative alignments are considered for the southern segment of the corridor, between the Westlake Hub and the current South Lake Union streetcar terminus: the primary corridor follows Virginia Street/Stewart Street, then Fairview Avenue N; the South Alternative follows Westlake Avenue N/Terry Avenue N, then Valley Street.

The HCT transit service will very likely be provided along the path described above. This study includes some limited off-path considerations such as intersecting street traffic, intersecting transit operations, parking, and bicycle facilities, as well as station access routes. The boundary shown in **Figure 1-2** illustrates a one half mile area from the HCT path for consideration of the issues outlined above as well as the relevant demographic and land use information.

1.5 Relevant Plans and Studies

A number of plans and studies prepared by SDOT and other agencies were identified and reviewed for relevant information to this corridor study, including policy and requirements for transit, pedestrians, bicycles, and freight; existing and planned land uses through the corridor; and overall existing and desired urban context and design.

A list of reviewed plans and studies is presented in **Table 1-1**. Studies are sorted by agency, then by year. Key studies related to modal plans, land use plans, and light rail projects are summarized below. The remaining studies are summarized in Appendix A.

Figure 1-2. Study Area

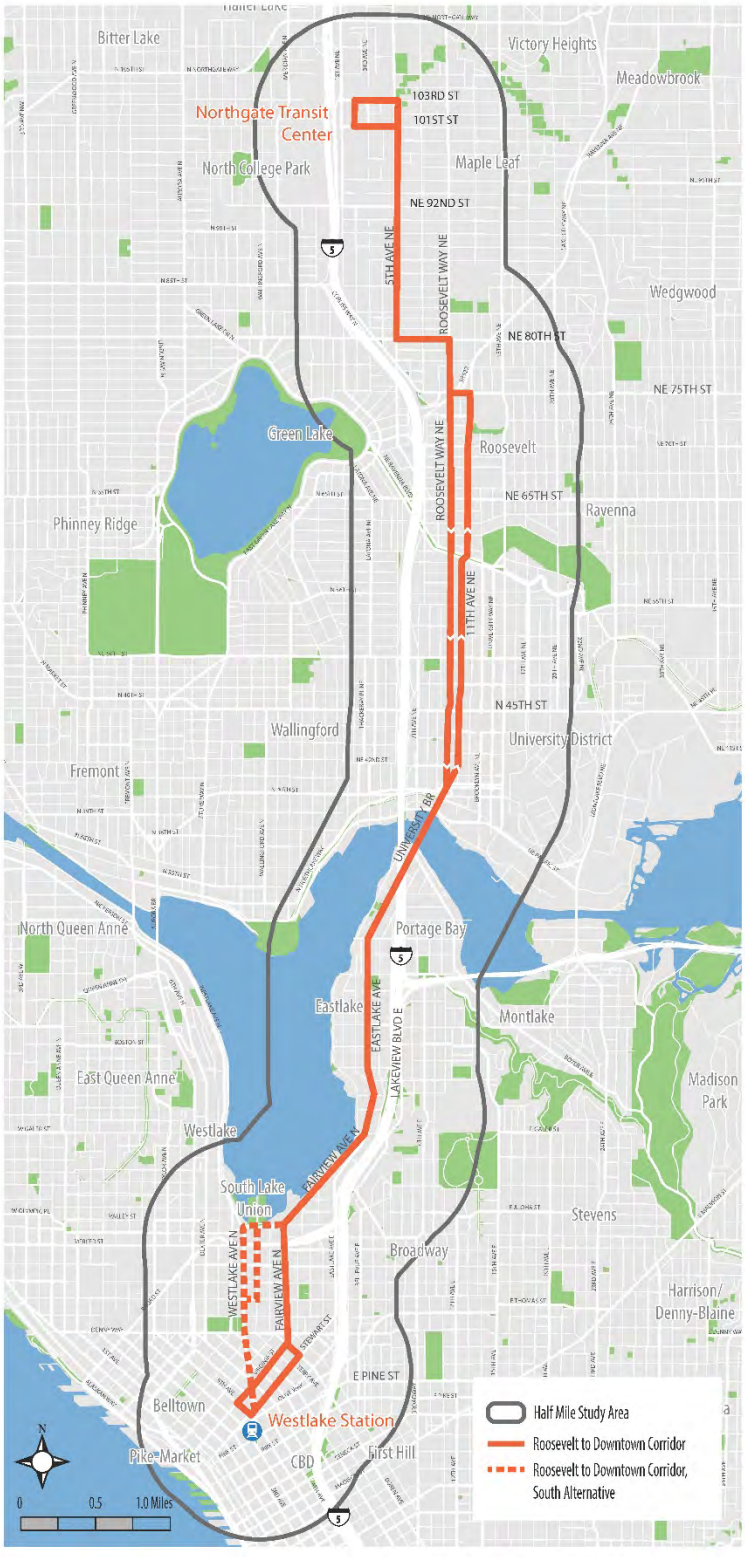


Table 1-1. List of Relevant Studies

Study	Agency	Date
Complete Streets Ordinance	Seattle City Council	2007
Neighborhood Plans and Status Reports (Commercial Core, Eastlake, Northgate, Roosevelt, South Lake Union, University)	Seattle Department of Neighborhoods	1993, 1999
Comprehensive Plan: Toward a Sustainable Seattle	Seattle Department of Planning and Development (DPD)	2005
South Lake Union Neighborhood (SLU) Height and Density Alternatives EIS	Seattle DPD	2012
Northgate Urban Design Framework	Seattle DPD	2013
University District EIS	Seattle DPD	2014
SDOT Art Plan	Seattle DOT	2005
Freight Mobility Strategic Action Plan	Seattle DOT	2005
Transportation Strategic Plan	Seattle DOT	2005
Bridging the Gap Levy for Transportation, Maintenance and Improvements	Seattle DOT	2006
Industrial Jobs Initiative Improved Freight Mobility Projects List	Seattle DOT	2008
Seattle ITS Strategic Plan (2010-2020)	Seattle DOT	2010
Transportation Infrastructure Inventory, Status and Condition Report	Seattle DOT	2010
Right-of-Way Improvements Manual	Seattle DOT	2012
Transit Master Plan: Final Summary Report and Appendices	Seattle DOT	2012
Urban Forest Management Plan	Seattle DOT	2013
Bicycle Master Plan	Seattle DOT	2014
Center City Street Car Plan: Center City Connector Transit Study and Seattle Streetcar Network	Seattle DOT	2014
Move Seattle	Seattle DOT	2015
Proposition 1 Service Changes	Seattle DOT & King County Metro	2015
Pedestrian Master Plan	Seattle DOT	2009
Race and Social Justice Initiative	Seattle Office of Civil Rights	2014
Climate Action Plan	Seattle Office of Sustainability and Environment	2012
King County Strategic Plan for Public Transportation	King County Metro	2013
Applicable Service Reduction Package	King County Metro	2014
King County Metro 2014 Service Guidelines Report	King County Metro	2014
Non-Motorized Connectivity Study	King County Metro	2014
Transportation 2040 (Regional Transportation Plan)	Puget Sound Regional Council	2014
Vision 2040 - Growing Transit Communities	Puget Sound Regional Council	2014
Vision 2040 - Regional Growth Centers	Puget Sound Regional Council	2014
Northgate Link Plan	Sound Transit	2014
Plans for the Roosevelt Station	Sound Transit	2014
System Access Issue Paper	Sound Transit	2014
University Link Plan	Sound Transit	2014

1.5.1 Transit Master Plan

The Seattle Transit Master Plan (TMP), adopted in April 2012, identifies proposed transit facilities, services, programs, and system features to accommodate Seattle's transit needs through 2030. The TMP goal is to establish a network of top quality, frequent transit services to meet the travel needs of most Seattle residents and workers.

The TMP includes several categories of Priority Bus Corridors as transit investment priorities over the next 20 years, with the top tier being HCT. Three HCT corridors were identified and evaluated for RSC or BRT service, including the Roosevelt to Downtown Corridor (see **Figure 1-3**). The evaluation included preliminary operating plans, potential restructuring of existing transit services, sample cross sections, planning level capital cost estimates, environmental impact screening, and potential travel time savings.

Figure 1-3. Corridors Evaluated for High Capacity Transit in the Transit Master Plan

Source: Seattle Transit Master Plan (page 3-7)

A key TMP implementation action is conducting an alternatives analysis (AA) process to analyze multiple transit service alignment options, for both BRT and RSC, and ultimately secure federal funding for the Roosevelt to Downtown Corridor.

1.5.2 Bicycle Mater Plan

The Bicycle Master Plan (BMP), updated in April 2014, provides an overall vision for the future of bicycling in Seattle, and includes a proposed citywide bicycle network to be designed and built over time. A series of maps show existing and recommended bicycle facilities throughout the city, including off-street trails, cycle tracks (protected bicycle lanes), neighborhood greenways, in-street/minor separation, and shared street.

The BMP Implementation Plan, last updated in March 2015, identifies projects that will be implemented between 2015 and 2019, including seven (7) specific projects within the study area that are detailed in Section 2.

1.5.3 Pedestrian Master Plan

The Seattle Pedestrian Master Plan (PMP), prepared in 2009, is a long-term action plan to make Seattle the most walkable city in the nation. The plan establishes policies, programs, design criteria, and projects to further enhance pedestrian safety, comfort, and access in all of Seattle's neighborhoods

The PMP is a tool to coordinate resources and provide information about pedestrian-related projects, pedestrian concerns, neighborhood resources, and important tools to get more people walking in Seattle that covers a wide range of topics related to walking in Seattle.

SDOT is currently conducting a technical update of the PMP, which is anticipated to be adopted in early 2016.

1.5.4 South Lake Union Neighborhood (SLU) Rezone

In 2013, the City Council approved South Lake Union Urban Center zone changes that allow for increased density and greater building heights through an incentive zoning program. This legislation is an important step for the South Lake Union neighborhood as it continues to develop as an Urban Center and a dynamic hub of economic development for Seattle and the region. The zoning changes:

- Advance the City's growth management strategy as set out in the Comprehensive Plan and South Lake Union Neighborhood Plan;
- Promote a neighborhood that will provide a more diverse mix of housing and employment;
- Support the continued growth of the city's economy;
- Encourage a safe and active pedestrian environment;
- Create new infrastructure financing tools that, together with affordable housing incentives and direct City investments, will provide the critical public infrastructure needed to support the area's dramatic growth; and,
- Ensure South Lake Union remains an attractive and livable neighborhood for all who live and work there.

The incentive zoning program will provide affordable housing and new infrastructure investment (investment in roads, sidewalks, and other neighborhood amenities). This will support growth of 12,000 households and 22,000 jobs over the next 20 years.

1.5.5 University District Urban Design Framework

The University District Urban Design Framework provides a clear, cohesive vision to guide development and public investments to create a lively, safe, and walkable neighborhood. The document will guide the City's work on a variety of efforts, including Neighborhood Plan updates, zoning changes, streetscape design work, and design guidelines.

The University District Urban Design Environmental Impact Statement (EIS) evaluates impacts of several possible Comprehensive Plan and Land Use Code amendments, including changes that would allow increased height and density in the core of the University District. The objectives of the proposal include:

- Better integration of land uses with the neighborhood's future light rail station;
- Development standards to accommodate a greater variety of building types; and,
- Support for equitable communities with a diversity of housing choices.

The city published the Final EIS in January 2015. Based on the EIS, the estimated growth resulting from this proposal would be 5,000 new households and 4,800 new jobs by 2035.

1.5.6 Northgate Urban Center Framework

The final Northgate Urban Design Framework (UDF) was published in December 2013 and supports the vision for a denser, more livable, transit oriented development in the Northgate area. The document includes advice and recommendations to help improve the design of buildings, public spaces, and pedestrian and bicycle amenities. The UDF also helps influence future building construction next to the light rail station that will open in 2021.

The UDF:

- Identifies key design concepts for Northgate's Urban Center to create a healthier, more livable, and denser mixed-use community with more houses and shopping opportunities;
- Illustrates recommended street improvements for pedestrians, bicyclists, drivers, and transit users; and,
- Provides design guidance for the area closest to the light rail station, where future development will occur

According to the FEIS published in December 2009, the estimated growth for Northgate Urban Center Rezone alternatives would vary between 1,000 and 4,000 new households, and between 900 and 10,000 new jobs by 2030.

1.5.7 Sound Transit University Link Extension

University Link will extend light rail service from downtown Seattle to Capitol Hill and the University of Washington. This section will add 3.15 miles to the region's light rail system, bringing the total to over 19 miles. The entire line will run in twin-bored tunnels from Westlake Station in the Downtown

Seattle Transit Tunnel to the University of Washington, with stations at Capitol Hill and on the University campus near Husky Stadium. The line's two stations will also serve the University of Washington, Seattle University and Seattle Central Community College, providing a strong ridership base for frequent all-day service.

Construction began in 2009 and service is scheduled to start in early 2016. The ridership projections indicate that University Link will add 71,000 riders to the system by 2030.

1.5.8 Sound Transit Northgate Link Extension

The Northgate Link Extension will add 4.3 miles of light rail to the north of University Link, and three new stations: U District, Roosevelt and Northgate. The Northgate Link Extension will connect the Northgate, Roosevelt, and University District neighborhoods to downtown Seattle. Construction has been ongoing since late 2012 starting with demolition at the Roosevelt Station site. Start of service is anticipated in 2021.

While construction of Northgate Link is underway, the designs of the future light rail stations are still being developed. The 90 percent design for Northgate station was presented publicly in March 2014. Sound Transit expects to reach the 90 percent design milestones for the Roosevelt and U District Stations in 2015.

U District Station will be located underground Brooklyn Avenue NE between NE 43rd and NE 45th streets in the University District. This station will serve the surrounding residential community, the "Ave" business district, other employment sites, the UW Tower (home to UW Administration) and the north end of the University of Washington campus. It is projected that approximately 12,000 daily riders will board at U District Station by 2030. Average ride time to Westlake or Northgate Stations will be about 8 and 5 minutes respectively.

Roosevelt Station will be located underground, just west of 12th Avenue NE, across from Roosevelt High School, with entrances at NE 65th and NE 67th streets. Roosevelt Station will serve the surrounding neighborhoods and the Roosevelt business district, including the Roosevelt Square development. It is projected that approximately 8,000 daily riders will board at Roosevelt Station by 2030. Average ride time to Westlake and Northgate Stations will be about 12 minutes, and 2 minutes respectively.

The elevated Northgate Station will be located east of First Avenue NE, spanning NE 103rd Street. Station entrances will be on the Northgate Mall property north of NE 103rd Street and south near the Northgate Transit Center. The station will provide access to Northgate Mall, bus transfers at the transit center and adjacent park-and-ride facilities, and serve the surrounding neighborhoods. It is projected that approximately 15,000 daily riders will board at Northgate Station by 2030. Average ride time from Northgate Station to Westlake Station will be about 14 minutes.

The Roosevelt to Downtown HCT Corridor will complement the Link light rail expansion which is already under construction. These two new services will increase travel options, decrease travel time, and increase reliability for passengers traveling between downtown and North Seattle. The Roosevelt to Downtown HCT Corridor will primarily serve local and through trips, with special emphasis on the mid-Roosevelt, Eastlake and South Lake Union neighborhoods. Link light rail will serve longer distance trips with special emphasis on Downtown, Capitol Hill, UW Stadium/Medical Center, and Northgate trips. Both will service the University District and Roosevelt Station areas, as well as

provide additional service at Northgate. Roosevelt HCT will provide a more direct connection to South Lake Union. Link will not connect to SLU, a fast growing population and employment center.

Section 2
Land Use

This section presents the current (2014) and planned land use within the Roosevelt to Downtown Corridor. Zoned land use types, major trip attractors, special overlay districts, and incentive zoning are highlighted below.

2.1 Land Use Summary

The Downtown to Roosevelt Corridor includes use types that are more high-density residential and more commercial use types compared to the City of Seattle overall. The City of Seattle has a relatively high proportion of low-density land use types such as manufacturing/industrial and single family residential.

The corridor also has a relatively large amount of major trip attractors such as colleges and universities, theaters, schools, hospitals, museums, and major retail destinations. Included in the Downtown to Roosevelt study area is the University of Washington, North Seattle College, Northgate Mall, Westlake Center Mall, Pike Place Market, Seattle Art Museum, Museum of History and Industry, as well as numerous other shopping, theater, and school trip attractors.

Additionally, the corridor includes three major overlay districts as well as incentive zoning overlays. Overlay districts are specially planned areas where studies are focusing on improving the neighborhoods with zoning changes, streetscape design work, and updated neighborhood plans. Incentive zoning areas are locations where developers provide additional benefits to the public in exchange for more dense development allowances. The majority of the city's incentive zoning is located within the corridor.

2.2 Zoning

The City's zoning ordinance plays a key role in guiding development type, density, and use. There are seven major zoning categories located within the corridor: single family residential, neighborhood/commercial mixed, multi-family residential, residential/commercial mixed, major institutions, downtown (land south of Denny Way, west of I-5, and north of Pioneer Square), and manufacturing/industrial. **Table 2-1** and **Figure 2-1** identify the zoning categories contained within a one half-mile buffer of the Roosevelt to Downtown Corridor.

Compared to the City of Seattle, the corridor has more neighborhood/commercial and mixed use land uses. It also has more major institution overlay and downtown land uses as a percent of total acreage. It has significantly less single family residential and manufacturing/industrial land uses.

Table 2-1. Existing Zoning by Category

Zoning Categories	Study Area		City of Seattle Percent of Total
	Acres	Percent of Total	
Single Family Residential (SF5000; SF7200; SF9600)	1,988	43%	65%
Multi-Family Residential (LR2I; LR3I; LR1; LR2; LR3)	782	17%	11%
Neighborhood/Commercial (NC1I; NC2I; NC3I; NC1; NC2; NC3)	720	16%	8%
Residential/Commercial Mixed (SMI; SM; SMR)	340	7%	1%
Major Institution Overlay (MIO)	285	6%	2%
Downtown			
Downtown Mixed Commercial (DMC)	162	3%	<1%
Downtown Mixed Residential/Residential (DMR)	87	2%	<1%
Downtown Office Core 1 (DOC1)	52	1%	<1%
Downtown Office Core 2 (DOC2)	65	1%	<1%
Downtown Retail Core (DRC)	33	<1%	<1%
Pike Market Mixed (PMM)	25	<1%	<1%
Downtown Harborfront 1 (DH1)	24	<1%	<1%
Downtown Harborfront 2 (DH2)	15	<1%	<1%
Manufacturing/Industrial (IDM; IDR; PMM; PSM)	76	2%	12%
Total	**4,654**	**100%**	**100%**

Source: City of Seattle Zoning (2014)

2.2.1 Single Family Residential

Forty-two percent of the study area is zoned Single Family Residential. Three zoning sub-categories specify different minimum lot sizes. As shown in yellow on **Figure 2-1**, Single Family Residential land uses are concentrated in the northern portion of the corridor plus a small portion on the east side of the study corridor south of the University Bridge.

2.2.2 Multi-Family Residential

Sixteen percent of the corridor is zoned Residential Multi-Family. This category includes three sub-categories: lowrise, midrise, and highrise. The majority (76 percent) of the Multi-Family Residential zoning is lowrise (LR1, LR2, and LR3). Only four percent of the corridor includes highrise (HR) Multi-Family Residential, located in the far southern portion of the corridor and minor zones scattered elsewhere in the corridor. As shown in light (lowrise) and dark (midrise and highrise) brown on **Figure 2-1**, Multi-Family Residential land uses are distributed throughout the length of the corridor.

There are several Multi-Family Residential incentive zoning areas within the Multi-Family Residential land uses, including Midrise Incentive (MRI) and Lowrise Incentive (LR2I and LR3I). However, total acreage of this zoning type is only 8.1 acres, or 1 percent of the total multi-family zoning areas. Incentive zoning are areas that require developers to provide additional benefits to the public such as

affordable housing, historic preservation, and open space in exchange for more dense development allowances (see **Figure 2-2** for locations zoned for incentive development).[1]

2.2.3 Neighborhood/Commercial

Sixteen percent of the study area is zoned Neighborhood/Commercial. Zoning sub-categories include neighborhood commercial (NC1, NC2, and NC3), neighborhood commercial incentive (NC1I, NC2I, NC3I), and Commercial (C1 and C2). Like residential incentive zoning, neighborhood commercial incentive zoning requires developers to provide public benefits in exchange for incentives such as allowances for higher density. As shown in dark yellow on **Figure 2-1**, Neighborhood/Commercial land use is distributed throughout the study area, with a high density in the northernmost section.

2.2.4 Residential/Commercial Mixed

Seven percent of the study area is zoned Residential/Commercial Mixed zoning. Zoning sub-categories include Seattle Mixed Residential (SMR), Seattle Mixed (SM), and Seattle Mixed Incentive (SMI). As shown in orange on **Figure 2-1**, Residential/Commercial Mixed land uses are largely in the South Lake Union neighborhood within the corridor.

2.2.5 Major Institution Overlay

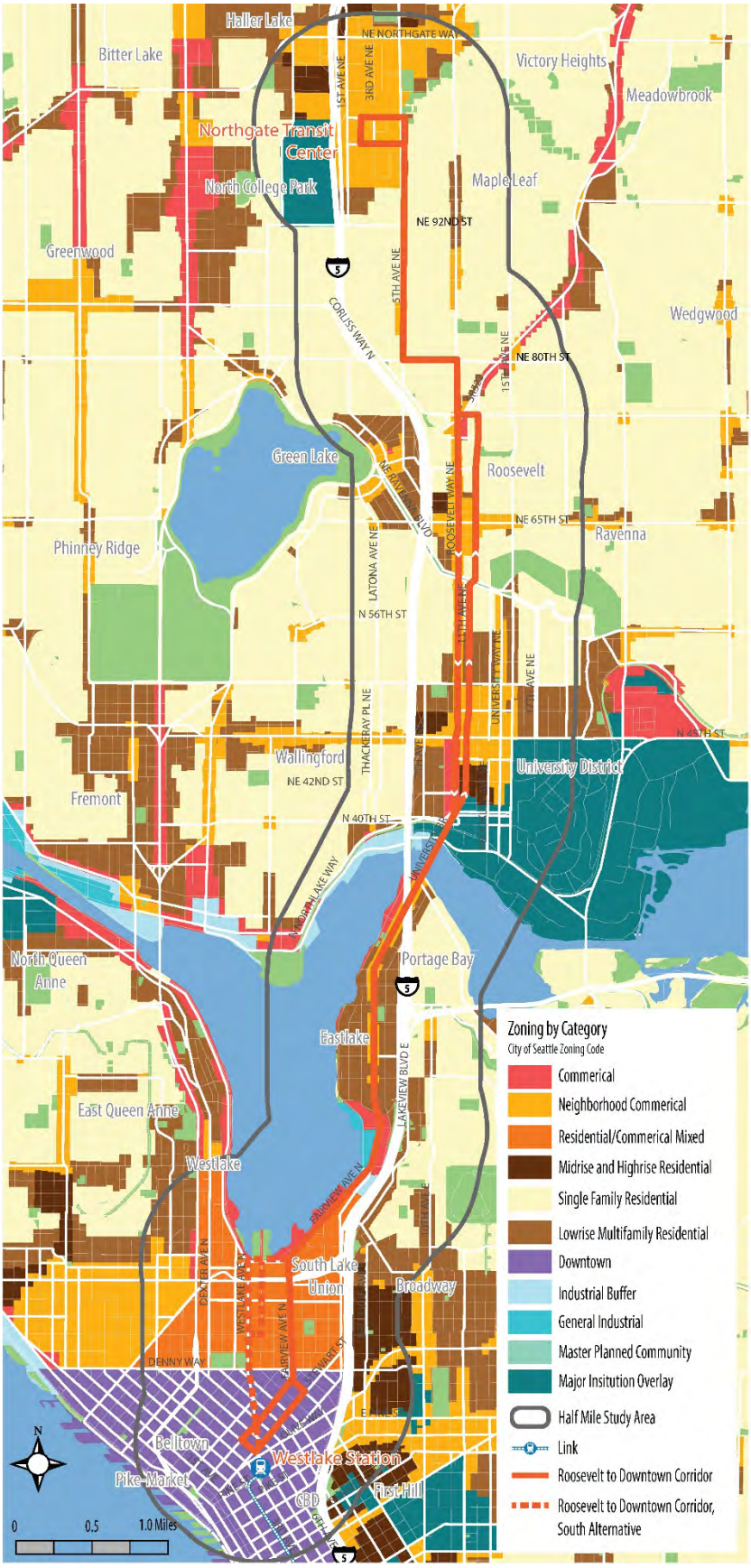
Six percent of the study area is zoned Major Institution Overlay. As shown in teal on **Figure 2-1**, Major Institution Overlay land uses include the University of Washington campus (middle portion of the corridor) and North Seattle Community College campus (northern most portion of the corridor).

2.2.6 Manufacturing/Industrial

Three percent of the study area is zoned Manufacturing/Industrial. Zoning sub-categories include Industrial Commercial (IC), Industrial Buffer (IB), and General Industrial (IG1). As shown in blue on the **Figure 2-1** zoning map, Manufacturing/Industrial land uses are located along the east and north shores of Lake Union.

[1] Seattle Department of Planning and Development, "Incentive Zoning Updated." Available at: http://www.seattle.gov/dpd/cityplanning/completeprojectslist/incentivezoning/whatwhy/

Figure 2-1. Zoning by Category



2.3 Overlay Districts

As shown on **Figure 2-2**, there are three special zoning overlay districts within the study area: the Northgate Urban Design Center, the University District Urban Design, and the South Lake Union Urban Center. Plans for these overlay districts will guide efforts for zoning changes, streetscape design work, and neighborhood plans.

2.3.1 Northgate Urban Design Framework

The Northgate Urban Design Framework overlay district is located on the far north side of the corridor, North of NE 92nd Street and bounded by I-5 and Roosevelt Way NE near the corridor. The vision for the neighborhood is published in the Northgate Urban Design Framework, which outlines recommendations for transportation and land use improvements to the area. This document identifies design concepts to provide more mixed-use, livable, community-oriented development. The recommendations focus on adding growth around transit stations as well as incorporating street improvements for other modes of transportation.[2]

2.3.2 University District Urban Design Framework

The University District Urban Design Framework overlay district is located within the University District neighborhood, just west of University of Washington, bordered by Portage Bay to the south, NE Ravenna Boulevard to the north and I-5 to the east. The University District Urban Design Environmental Impact Statement (EIS) was published in January 2015, outlining how land uses can be better integrated with future light rail; how development standards can accommodate more variety of building types; and how the area can support equitable communities and a diversity of housing choices.[3]

2.3.3 South Lake Union Urban Center

The South Lake Union (SLU) Urban Center overlay district borders South Lake Union and is located between Denny Way, Dexter Avenue North and Eastlake Avenue E. It was described in the Neighborhood Height and Density Alternatives Environmental Impact Statement (City of Seattle Department of Planning and Development, 2012). Efforts within this overlay district have led to the approval of the South Lake Union Urban Center zone changes (2013) that allow for increased density through an incentive zoning program requiring developers to provide affordable housing and participate in a regional transfer of development rights program. The proposed legislation for this overlay district was adopted by the Seattle City Council in May 2013.[4]

2.4 Trip Attractors

Theaters, schools, and hospital trip attractors within the Corridor are shown on **Figure 2-3**. There are 19 theaters in the far southern portion of the study corridor, as well as nine theaters in the University District. There are also four public schools and 17 private schools within a half mile of the study corridor. There are several medical centers in the study corridor and two major hospitals, Virginia

[2] The frame work for the Northgate Urban Center was published in December 2013. More information at Seattle Department of Planning and Development website: www.seattle.gov/dpd/cityplanning/completeprojectslist/northgate/

[3] The University District Urban Design Draft EIS was published January 2015. More information at Seattle Department of Planning and Development website: www.seattle.gov/dpd/cityplanning/completeprojectslist/universitydistrict/

[4] The South Lake Union Urban Center EIS in December 2013. More information at Seattle Department of Planning and Development website: www.seattle.gov/dpd/cityplanning/completeprojectslist/southlakeunion/

Mason Medical Center and the University of Washington Medical Center which touch the corridor border. Additional major attractors include the University of Washington, North Seattle College, and Seattle Center. Retail destinations include Northgate Mall, Roosevelt Square, University Way NE ("The Ave"), the Westlake Center and Pacific Place malls, downtown Retail Core, and Pike Place Market. The Museum of History and Industry (MOHAI), Seattle Art Museum and Burke Museum are in the study corridor. Finally Green Lake Park, Ravenna/Cowen Parks, and South Lake Union Park are major parks in the study corridor.

Figure 2-2. Overlay Districts

Figure 2-3. Major Trip Attractors

Section 3
Demographics

This section presents the socioeconomic characteristics (population and employment) for all Census tracts or blocks within one half mile of the Roosevelt to Downtown Corridor, including the South Alternative.[5] These characteristics are also compared to the City of Seattle as a whole.

3.1 Population Data

Seven demographic indicators were evaluated along the Roosevelt to Downtown Corridor. These indicators were chosen in order to evaluate the size of the market as well as population characteristics that indicate populations with higher transit mode share and transit dependencies. These indicators include:

- Population;
- Minority;
- Low-Income;
- Limited English Proficiency;
- Zero Vehicle Households;
- Youth (Ages 15 to 24); and,
- Senior (Ages 65 and older).

A summary of demographic data taken from the 2013 American Community Survey (5-year summary), is shown in **Table 3-1**.

Table 3-1. Demographic Indicators

Indicator	Study Area			City of Seattle		
	Total	Percent of Total Sampled[1]	Density (Persons per Acre)[2]	Total	Percent of Total Sampled[1]	Density (Persons per Acre)[3]
Population	83,920	100.0%	18.1	624,681	100.0%	6.8
Minority	24,490	29.2%	5.3	215,302	33.0%	2.4
Low-Income	15,122	19.0%	3.3	82,513	13.6%	0.9
Limited English Proficiency	4,853	6.0%	1.0	33,733	5.4%	0.4
No Vehicle Available	13,779	30.4%	3.0	31,556	8.5%	0.3
Youth (Ages 15-24) Density	18.051	21.5%	3.9	84,082	13.5%	0.9
Senior (Ages 65+) Density	8,114	9.7%	1.8	70,494	11.3%	0.8

Sources: 2013 American Community Survey (5-year estimates)
Notes: (1) U.S. Census American Community Survey sample numbers vary and may not include total population in defined area (2) 4,645 acres in the Roosevelt to Downtown Corridor; (3) 92,231 acres in City of Seattle.

[5] For Census tracts that are partially within one half mile boundary of the corridor, the data values are multiplied by the percentage of the Census tract that is within the half mile boundary.

3.1.1 Population Density

There is a population of 83,920 within one-half mile of the Roosevelt to Downtown corridor and an average density of 18.1 people per acre. As shown in **Table 3-1**, the population density is 2.7 times greater than the citywide average, which is 6.8 people per acre. The population density map, **Figure 3-1**, shows particularly high concentrations in the southern portion of the Roosevelt to Downtown Study Area as well as near the University District, where population density is more than 40 persons per acre.

The University of Washington enrollment is approximately 44,000 students, including about 29,000 undergraduate students. Approximately 24 percent of these students live on campus, consistent with the campuses' 2013 Census population of 6,808. While sometimes students are mistakenly counted under their parent's addresses, this analysis assumed that the majority of the student population at the University of Washington is accounted for. Note that the influence of the student population will strongly affect Census tracts in and around the University of Washington.

3.1.2 Minority Density

Minority population is defined as individuals who are American Indian and Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Other Pacific Islander, or two or more races. The minority population within one half mile of the Roosevelt corridor is 24,490, which is 29.2 percent of the total population. As shown in **Table 3-1**, the minority population of the City of Seattle is higher than the Roosevelt to Downtown Corridor, at 33.0 percent. The minority density map, **Figure 3-2**, shows pockets of high concentrations in the southern (near Downtown and South Lake Union), central (near the University District), and northern portion of the corridor (Northgate and surrounding area). Minority populations make up more than 60 percent of the total population in several Census tracts near the University District as well as the northern portion of the corridor.

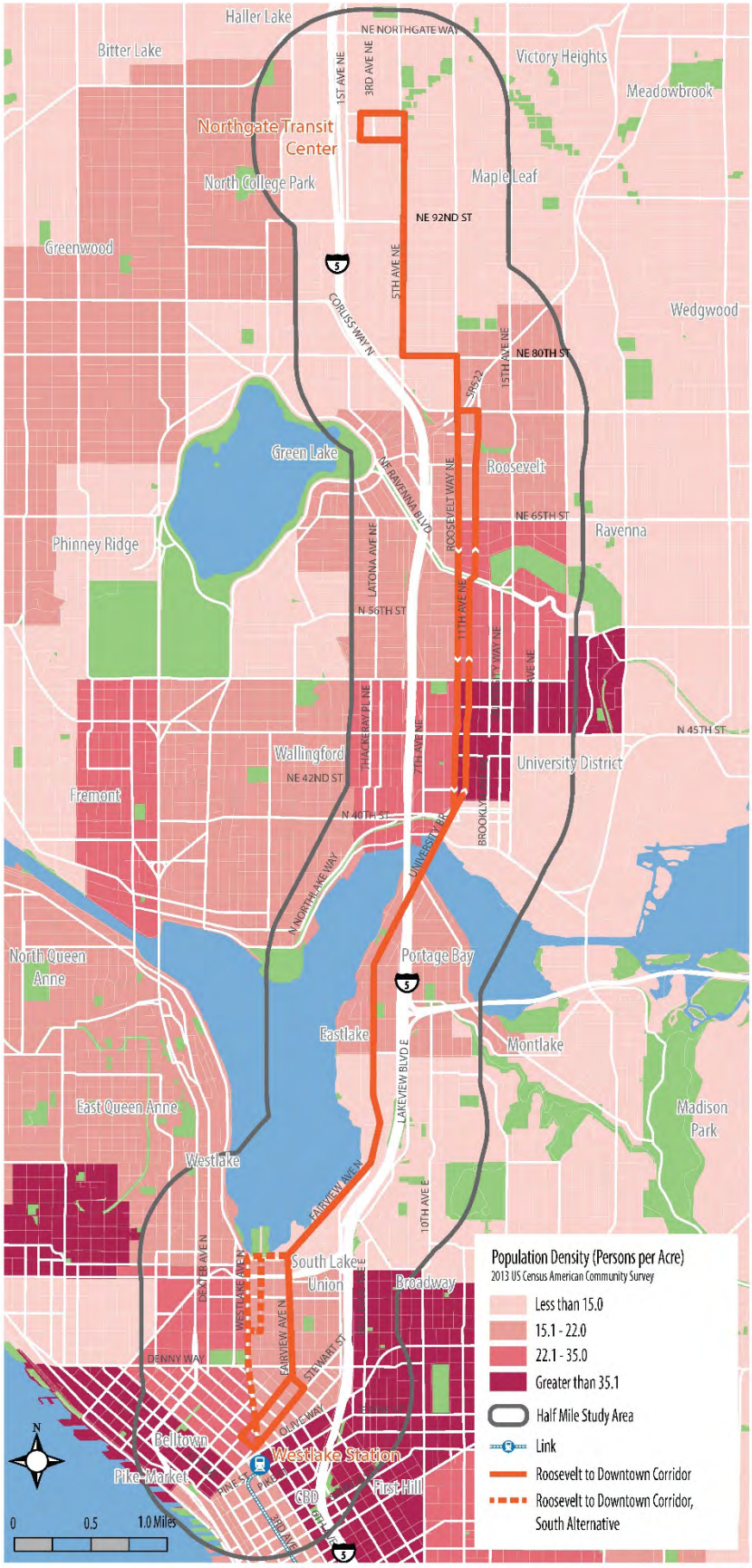
3.1.3 Low-Income Density

Low-income populations are defined as individuals in households with an annual income at or below the Department of Health and Human Services poverty guidelines. Poverty levels are updated annually based on the Consumer Price Index (CPI-U) and are dependent on household size, number of children, the age of the householder, and the family's income in the last 12 months.[6] There are 18,214 people below the poverty level within the Roosevelt to Downtown Corridor, or 20.1 percent of the population in this area; this percentage of people in households below the poverty level is higher than the citywide average of 13.6 percent.

This low-income density map, **Figure 3-3**, shows several areas with high concentrations of people in households below the poverty level (as a percentage of total population). As seen in the map, several of these U.S. Census tracts have more than 30 percent of the population below the poverty level. Census tracks surrounding the University of Washington campus have high percentage of households below the poverty level, likely influenced by high student populations in these regions. For example, every individual within University of Washington Census Tract 53.02 has at least some college education. Tract 53.01, located directly west of campus has a high level of individuals that are below the poverty level; however, 74 percent of the individuals below the poverty level have at least some college education, suggesting that this is highly influenced by the student population.

[6] In 2013, there were 48 poverty thresholds. For individuals in a one person household with no children, the poverty threshold is $11,888/year. For individuals in a four person household including two children, the poverty threshold is 23,624. Note that poverty levels are defined for the United States as a whole, and do not vary geographically.

Figure 3-1. Population Density



3.1.4 Limited English Proficiency (LEP) Density

Limited English Proficiency (LEP) population (also referred to as linguistic isolation) is defined by ability to speak English for the population five years and over. There are 4,853 persons with Limited English Proficiency within the Roosevelt to Downtown Corridor, which relates to a proportion of 6.0 percent of the corridor population. This density is higher compared with the citywide density, which is 5.4 percent of the City population. Nearly half (2,214) of the LEP households speak Chinese (1,436 households) or Spanish Creole (779 households). The LEP density map, **Figure 3-4**, shows high concentrations in the far southern portion of the corridor, the University District as well as the far northern portion of the corridor (Northgate area).

3.1.5 Zero Vehicle Households

Zero vehicle households include households that do not have access to a vehicle. There are 13,779 households with no vehicle available within the Roosevelt to Downtown Corridor, which relates to 30.4 percent of the population. As shown in **Table 3-1**, this density is significantly higher compared with the citywide average of 8.5 percent. **Figure 3-5** shows the number of zero vehicle households per acre. Census tracts with a high proportion of zero vehicle households are located in the far southern portion of the corridor, the University District, and the northern portion of the corridor. Note that the University District and surrounding area is likely affected by the large number of students, who typically have low car ownership rates, as well as its dense, transit-rich context.

3.1.6 Youth (Ages 15 to 24) Density

Youth density is defined for the purposes of this evaluation as individuals aged 15 to 24, in order to include the large student population within the University of Washington area. The Roosevelt to Downtown Corridor has a much higher density of youth population within these ages relative to the City of Seattle: 21.5 percent of the corridor population is within this age range (3.9 persons per acre), while only 13.5 percent of the City's population is within these ages. **Figure 3-6** shows the Census tracts where there are high concentrations of youth (ages 15 to 24) population per acre.

Youth populations in and around the University of Washington campus are highly affected by student populations. The percentage of young people ages 15 to 24 within the U.S. Census tract that includes the campus (Tract 53.02) is 97 percent.

3.1.7 Senior (Ages 65 and Older) Density

The senior population was determined as individuals aged 65 and older. Within the Roosevelt to Downtown Corridor, the percent of seniors is lower than the City as a whole (9.7 percent compared to 11.3 percent of the total population in each area). However, because of the higher population density, there are more seniors per acre in the corridor compared to the City as a whole (1.8 persons per acre compared to 0.8 persons per acre). **Figure 3-7** shows the Census tracts where there are high concentrations of seniors (ages 65 and older).

Figure 3-2. Minority Population Density

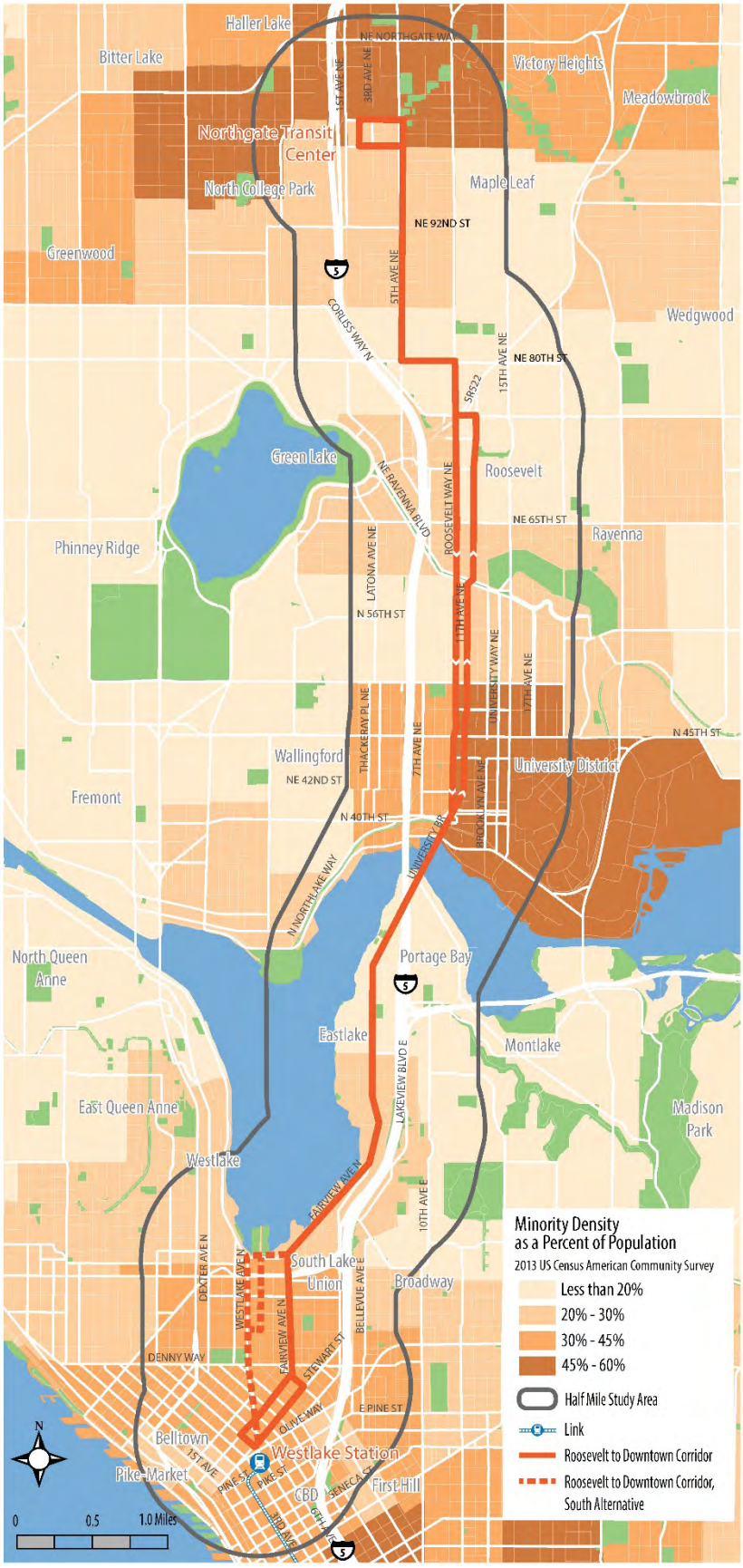


Figure 3-3. Low-Income Population Density

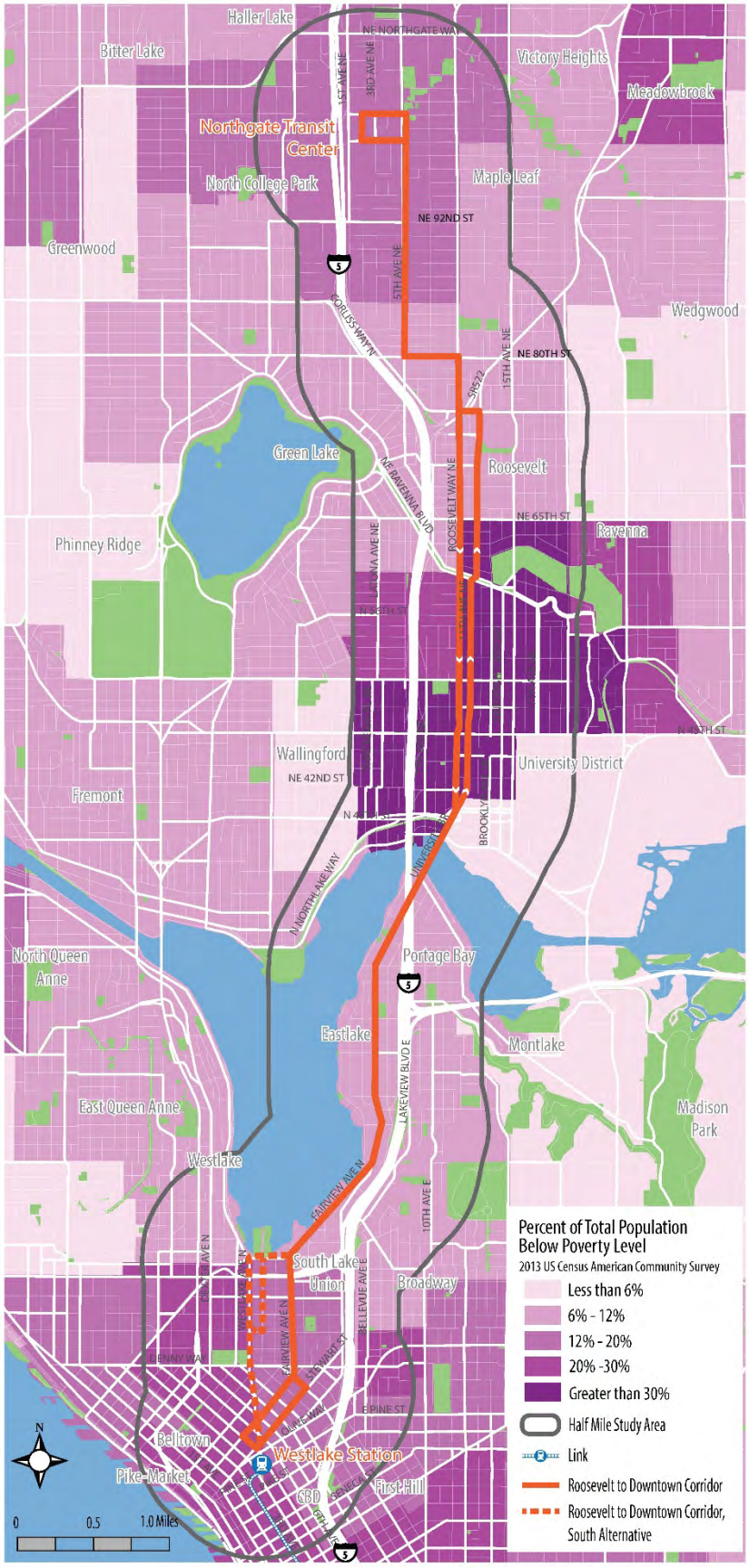


Figure 3-4. Limited English Proficiency (LEP) Population Density

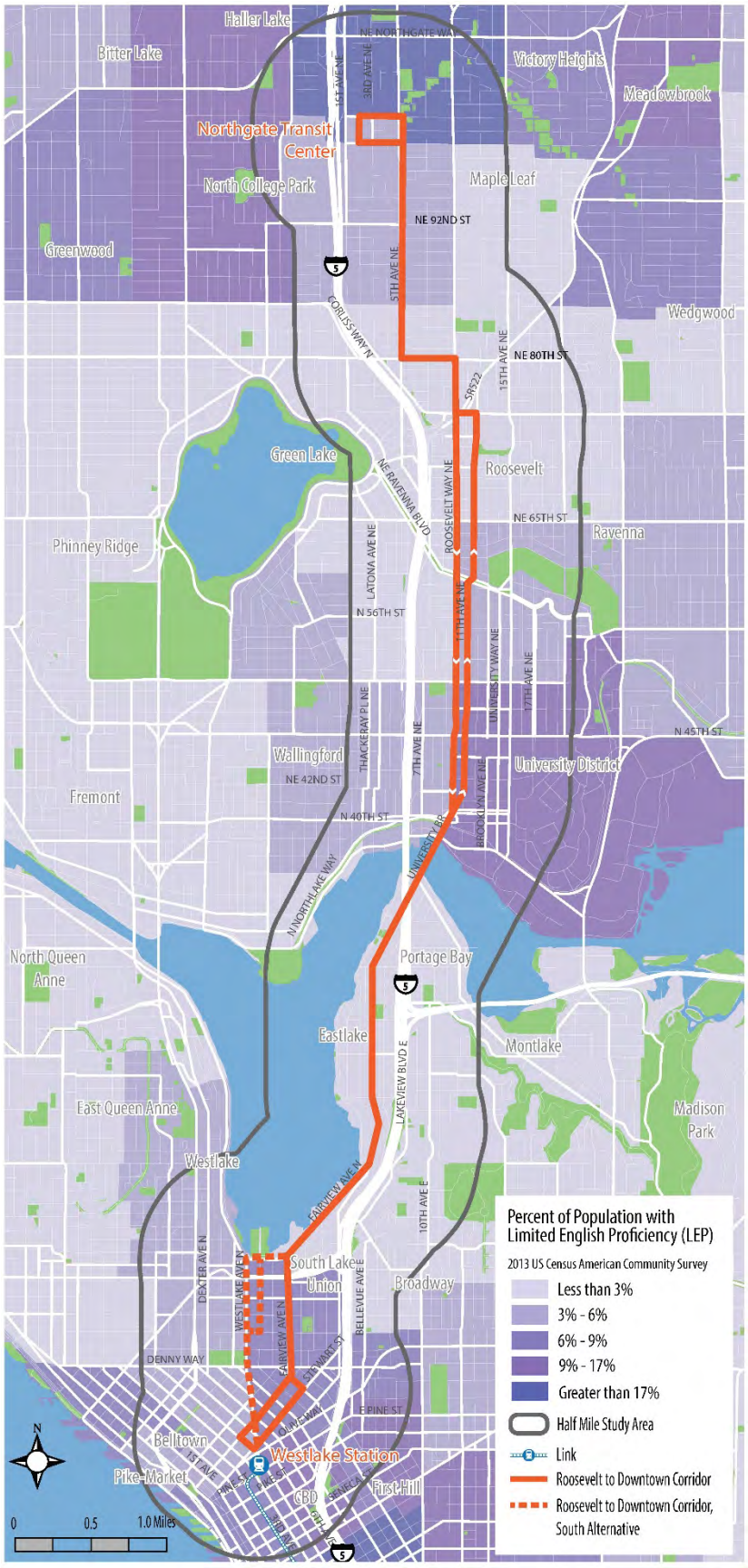


Figure 3-5. Zero Vehicle Availability Density

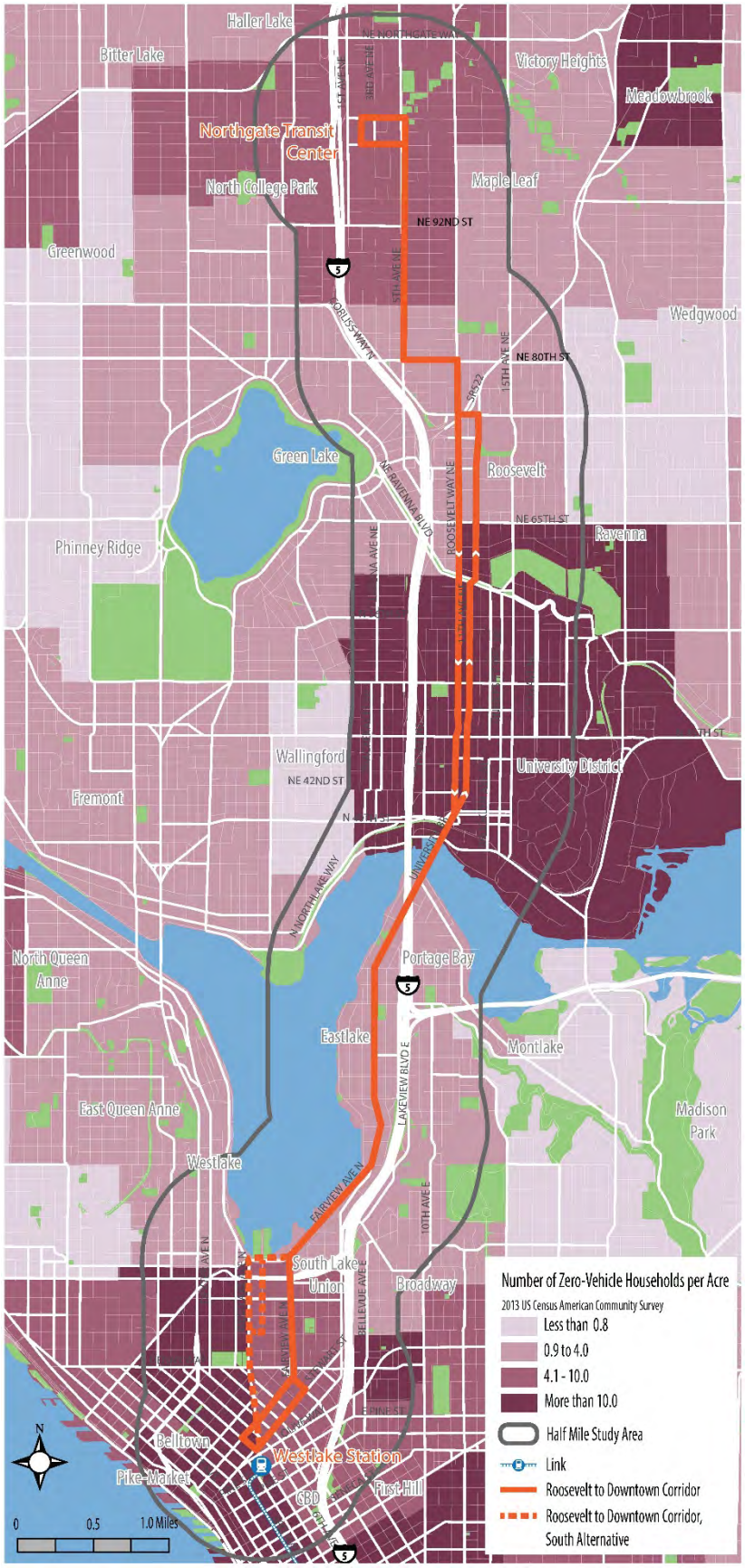


Figure 3-6. Youth (Ages 15 to 24) Population Density

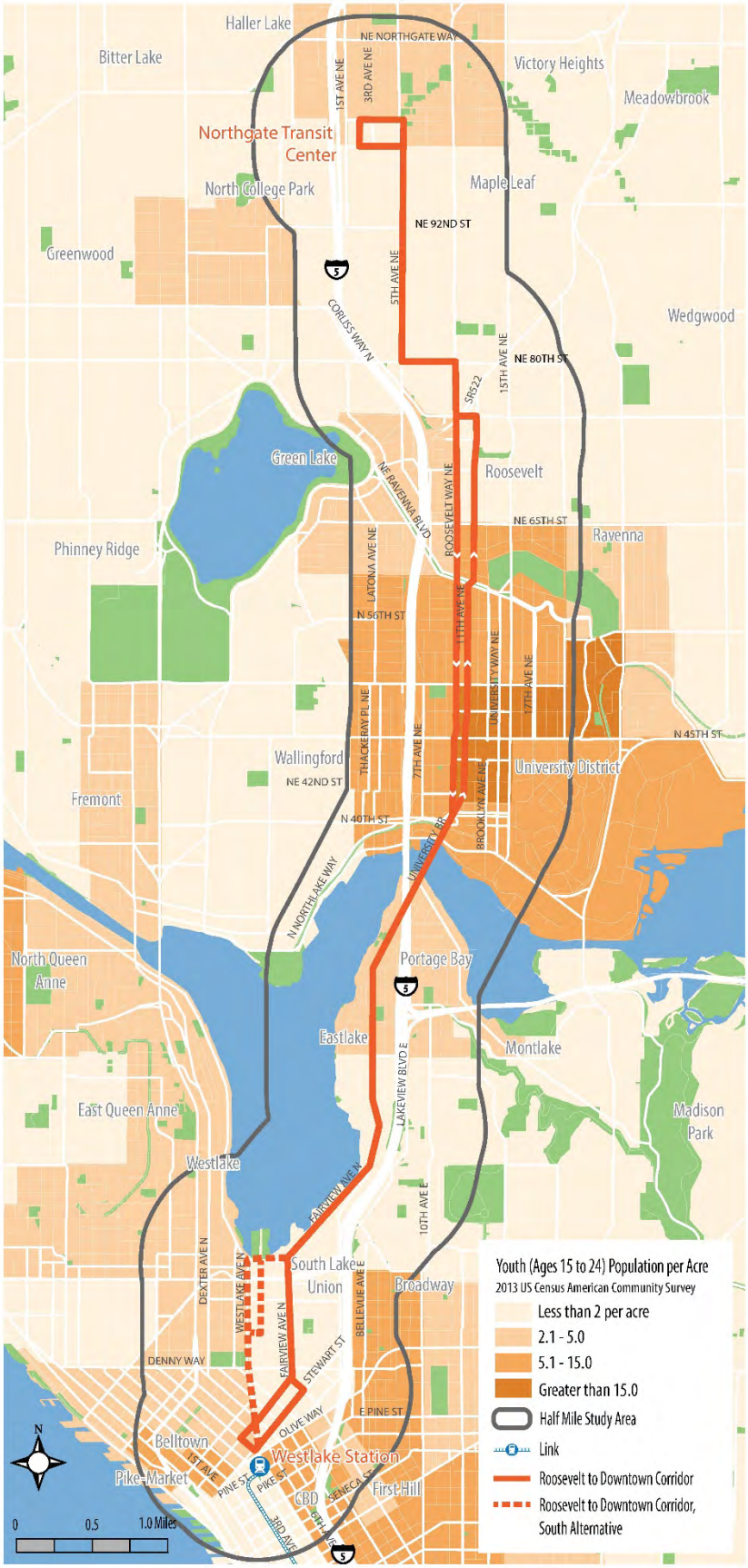


Figure 3-7. Senior (Ages 65 and Older) Population Density

3.2 Employment Data

This section outlines the employment characteristics—including major employers in the county and jobs and employed resident information for the City of Seattle and the Roosevelt to Downtown Corridor. The corridor analysis includes all Census tracts within one half mile of the Roosevelt to Downtown Corridor. This analysis uses 2013 U.S. Census data from the Longitudinal Employer-Household Dynamic's (LEHD) Origin-Destination Employment Statistics (LODES) dataset, which is the most recent available data.[7]

3.2.1 King County Major Employers

The top 17 major employers in the King County Area are listed in **Table 3-2**. Among the top five employers, the University of Washington and Amazon are headquartered in the corridor.

Table 3-2. Top Employers within King County

Employer Name	Full-time Employees in Washington	Share
The Boeing Co.	85,000	27.9%
Microsoft	41,664	13.7%
University of Washington	29,800	9.8%
Providence Health and Services	20,240	6.6%
Amazon	24,000	7.9%
King County Government	12,993	4.3%
United States Postal Service	11,914	3.9%
Starbucks	10,837	3.6%
City of Seattle	10,479	3.4%
Nordstrom Inc.	9,281	3.0%
Costco Wholesale Corp	8,912	2.9%
Swedish	8,586	2.8%
Group Health Cooperative	7,833	2.6%
Alaska Air Group	6,667	2.2%
Seattle Public Schools	5,696	1.9%
Virginia Mason Medical Center	5,611	1.8%
United Parcel Service	5,554	1.8%
Total	**305,067**	**100.0%**

Source: Puget South Business Journal Book of Lists 2014

Note: Amazon does not disclose their regional employment numbers. Estimate based on latest news reports.

[7] U.S. Census, Longitudinal Employer-Household Dynamic (LEHD), On the Map (2013 employment data).

3.2.2 Employment in the Roosevelt to Downtown Corridor

There are 169,710 primary jobs within the Roosevelt to Downtown Corridor (U.S. Census LEHD, 2011), which is 36 percent of the total jobs in the City of Seattle. If an individual has multiple jobs, the primary job is considered the job where that individual earns the most money. The top industries in the corridor include professional, scientific and technical services (27,499 workers, or 16.4 percent of primary jobs) and educational services (23,333 workers or 13.9 percent of primary jobs). As shown in **Table 3-3**, the top five industries make up 55.1 percent of all employment within one half mile of the Roosevelt Corridor. **Figure 3-8** shows a map of job density. The highest concentration of jobs exists in the far southern portion of the corridor (within and near Downtown) and the central portion of the corridor near the University District.

Table 3-3. Jobs by Industry for Workers Employed in the Roosevelt to Downtown Study Area and City of Seattle

Industry Description	Corridor		City of Seattle	
	Count	Percent of all Workers	Count	Percent of all Workers
Professional, Scientific, and Technical Services	29,118	17.20%	57,693	12.29%
Educational Services	23,917	14.10%	40,189	8.56%
Finance and Insurance	15,847	9.30%	37,604	8.01%
Accommodation and Food Services	13,882	8.20%	20,878	4.45%
Health Care and Social Assistance	13,319	7.80%	44,911	9.56%
Retail Trade	13,000	7.70%	67,363	14.35%
Administration/Support, Waste Management & Remediation	9,726	5.70%	19,653	4.19%
Other Services (excluding Public Administration)	8,566	5.00%	20,082	4.28%
Information	7,250	4.30%	20,008	4.26%
Wholesale Trade	6,363	3.70%	20,218	4.31%
Public Administration	5,909	3.50%	10,604	2.26%
Real Estate and Rental and Leasing	5,756	3.40%	13,280	2.83%
Management of Companies and Enterprises	3,996	2.40%	20,835	4.44%
Construction	3,976	2.30%	20,101	4.28%
Arts, Entertainment, and Recreation	3,156	1.90%	8,276	1.76%
Manufacturing	2,973	1.80%	16,221	3.45%
Transportation and Warehousing	2,706	1.60%	27,460	5.85%
Agriculture, Forestry, Fishing and Hunting	163	0.10%	950	0.20%
Utilities	57	0.00%	167	0.04%
Mining, Quarrying, and Oil and Gas Extraction	30	0.00%	3,073	0.65%
Total	**169,710**	**100.00%**	**469,566**	**100.00%**

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics 2013.

Note: Primary jobs only

Figure 3-8. Employment Density (Jobs per Acre)

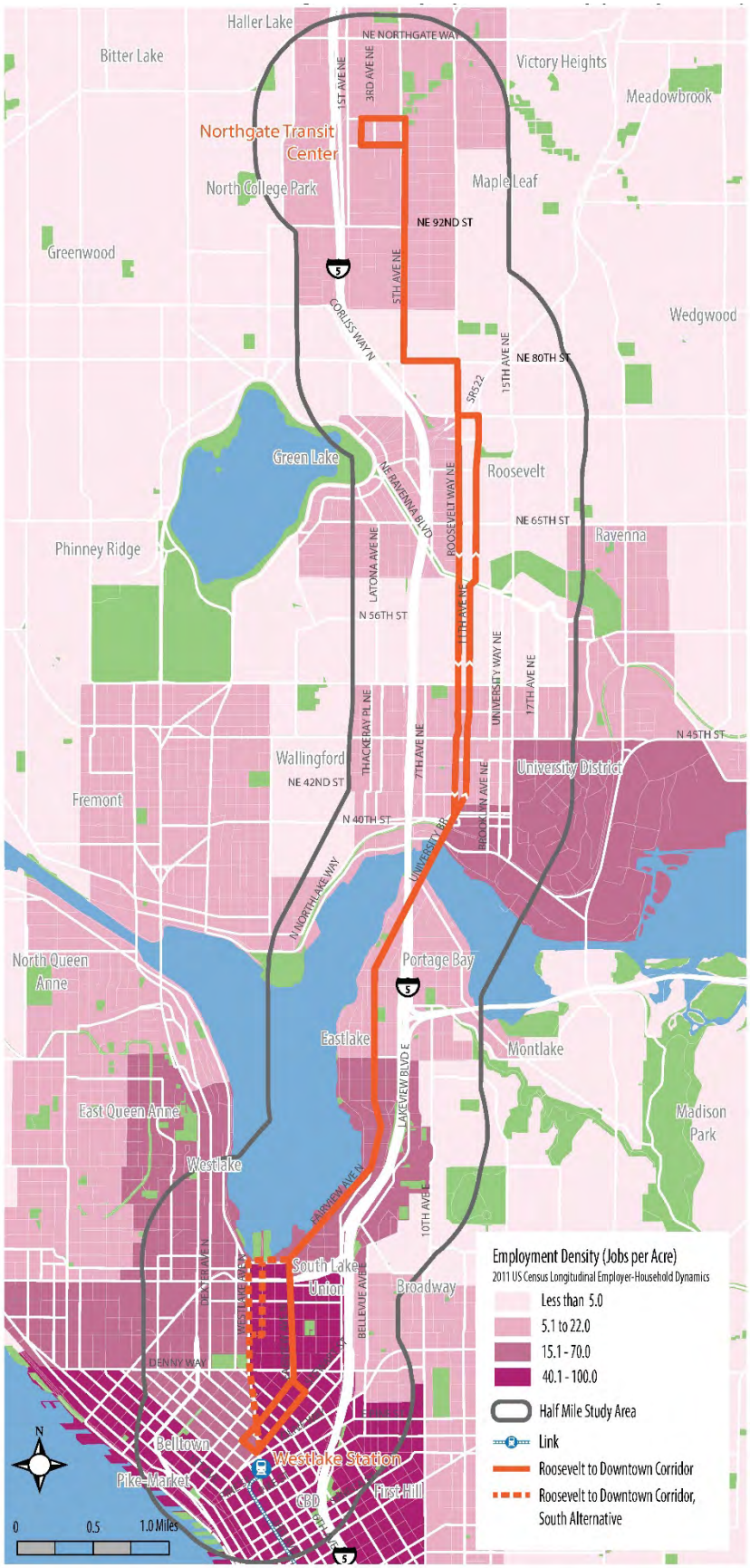


Table 3-4 and **Table 3-5** provide worker ages and earnings for workers employed within one half mile of the corridor. Approximately 60 percent of the workers living in the corridor are age 30 to 54; 39 percent of workers living in the corridor make less than $3,333 per month. This is similar to the ages and monthly earnings of workers in the City of Seattle overall.

Table 3-4. Worker Ages for Workers Employed in the Corridor

Age	Corridor		City of Seattle	
	Count	Percent of all Workers	Count	Percent of all Workers
29 or younger	32,662	19.25%	89,896	19.14%
30 to 54	101,623	59.88%	279,559	59.54%
55 or older	35,425	20.87%	100,111	21.32%
Total	**169,710**	**100.00%**	**469,566**	**100.00%**

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics, 2013.

Note: Primary jobs only.

Table 3-5. Job Earnings for Workers Employed in the Corridor

Monthly Job Earnings	Corridor		City of Seattle	
	Count	Percent of all Workers	Count	Percent of all Workers
$1,250 per month or less	19,713	11.62%	57,002	12.14%
$1,251 to $3,333 per month	42,138	24.83%	126,572	26.96%
More than $3,333 per month	107,859	63.55%	285,992	60.91%
Total	**169,710**	**100.00%**	**469,566**	**100.00%**

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics, 2013.

Note: Primary jobs only.

3.2.3 Employed Residents Who Live in the Roosevelt to Downtown Corridor

There are many more jobs than employed residents in the corridor, which means many people are travelling to the corridor for their jobs. There are 169,710 primary jobs in the corridor and only 46,074 employed residents within the corridor. The top industries for employed residents living in the corridor include professional, scientific, and technical services (5,533 workers, or 12.6 percent of the employed residents) and health care and social assistance (5,200 workers or 11.8 percent of the employed residents). **Table 3-6** shows the top industries for employed residents who live within the corridor. Compared to the City of Seattle overall, 5.1 percent more of the corridor's total residents work in Professional, Scientific, and Technical Services. **Figure 3-9** shows where employed residents live within the corridor.

Table 3-6. Jobs by Industry for Employed Residents Who Live in the Roosevelt to Downtown Corridor

Industry Description	Corridor		City of Seattle	
	Count	Percent of all Workers	Count	Percent of all Workers
Professional, Scientific, and Technical Services	5,801	12.59%	33,421	11.55%
Retail Trade	5,489	11.91%	28,344	9.79%
Health Care and Social Assistance	5,274	11.45%	37,692	13.02%
Information	4,412	9.58%	20,950	7.24%
Educational Services	4,271	9.27%	28,802	9.95%
Accommodation and Food Services	4,078	8.85%	23,877	8.25%
Manufacturing	2,312	5.02%	18,009	6.22%
Administration & Support, Waste Management and Remediation	2,246	4.87%	14,462	5.00%
Finance and Insurance	2,175	4.72%	12,950	4.47%
Other Services (excluding Public Administration)	1,784	3.87%	12,382	4.28%
Wholesale Trade	1,742	3.78%	11,613	4.01%
Public Administration	1,136	2.47%	9,237	3.19%
Management of Companies and Enterprises	1,125	2.44%	7,001	2.42%
Transportation and Warehousing	1,119	2.43%	9,344	3.23%
Real Estate and Rental and Leasing	1,080	2.34%	6,450	2.23%
Construction	982	2.13%	7,349	2.54%
Arts, Entertainment, and Recreation	809	1.76%	5,387	1.86%
Utilities	128	0.28%	1,214	0.42%
Agriculture, Forestry, Fishing and Hunting	105	0.23%	883	0.31%
Mining, Quarrying, and Oil and Gas Extraction	6	0.01%	42	0.01%
Total	**46,074**	**100.00%**	**289,409**	**100.00%**

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics, 2013.

Note: Primary jobs only

Table 3-7 and **Table 3-8** provide earning peak south by age category for those workers residing within the Roosevelt to Downtown Corridor. A higher percentage of workers 29 or younger reside in the corridor compared to the citywide percentage, 23 percent. Compared to the City of Seattle overall, the corridor has more employed residents who are 29 or younger, and fewer employed residents who are 55 or older. Approximately one third of the total employed residents in the corridor make less than $3,333 per month.

Table 3-7. Worker Ages for Workers Living in the Roosevelt to Downtown Corridor

Age	Corridor		City of Seattle	
	Count	Percent of all Workers	Count	Percent of all Workers
29 or younger	12,850	27.89%	62,675	21.66%
30 to 54	26,445	57.40%	173,272	59.87%
55 or older	6,779	14.71%	53,462	18.47%
Total	**46,074**	**100.00%**	**289,409**	**100.00%**

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics, 2013.

Note: Primary jobs only

Table 3-8. Job Earnings for Workers Living in the Roosevelt to Downtown Corridor

Monthly Job Earnings	Corridor		City of Seattle	
	Count	Percent of all Workers	Count	Percent of all Workers
$1,250 per month or less	5,456	11.84%	36,541	12.63%
$1,251 to $3,333 per month	11,820	25.65%	79,080	27.32%
More than $3,333 per month	28,798	62.50%	173,788	60.05%
Total	**43,998**	**100.00%**	**289,409**	**100.00%**

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics, 2013.

Note: Primary jobs only

As shown on **Table 3-9**, 27 percent (12,384 residents) of the employed residents also work within the boundaries of the Roosevelt to Downtown Corridor. Relative to the total population of workers who are employed in the corridor, there are more young and low-earning workers who both live and work in the corridor: of these workers who both live and work in the corridor, 28 percent are age 29 or younger; 38 percent earn less than $3,333 per month.

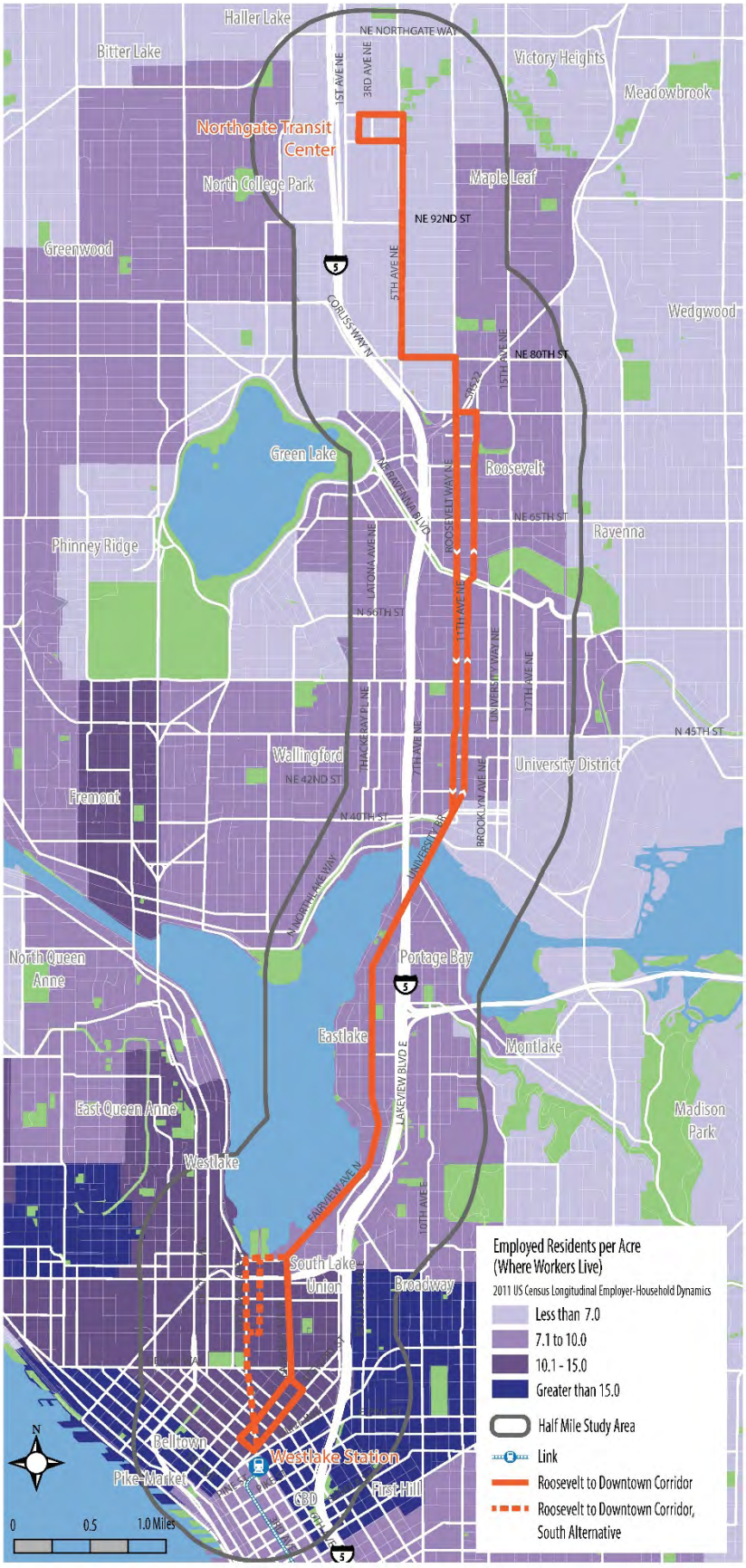
Table 3-9. Areas Where Employed Residents Work

Monthly Job Earnings	Count	Percent of Total
Live and work in study area	12,384	26.9%
Live in the study area, but work outside	33,690	73.1%
Total (workers who live in study area)	**46,074**	**100.0%**

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics, 2013.

Note: Primary jobs only

Figure 3-9. Employed Residents per Acre (Where Workers Live)



3.3 Mode Share

Mode share data indicates how workers (aged 16 and older) living in the corridor travel to work. This data was analyzed for the corridor and the City as a whole. Compared to the citywide average, the corridor has a lower drive-alone mode share and higher walking and transit mode shares (U.S. Census, American Community Survey, 2013). While walking mode share in the corridor is more than double compared to the city as a whole, carpool mode share is lower and bicycle mode share is approximately the same. The significantly higher walking mode share suggests that the area has a high potential for further reducing driving mode shares with increased carpool, bicycle, and public transit use. **Table 3-10** shows mode share in the corridor as well as the City of Seattle.

Table 3-10. Mode Share in the Downtown to Roosevelt Corridor and the City of Seattle

Indicator	Study Area		City of Seattle	
	Amount	Percent of Total Workers	Amount	Percent of Total Workers
Drive Alone	23,473	39%	183,163	52%
Carpool	3,946	7%	31,320	9%
Public Transportation	14,100	23%	68,318	19%
Bicycle	2,527	4%	12,562	4%
Walked	11,917	20%	32,117	9%
Taxi, motorcycle, work from home, other	4,212	7%	27,974	8%
Total	**60,174**	**100%**	**355,454**	**100%**

Sources: 2013 American Community Survey (5-year estimates)

As shown on **Figure 3-10**, the drive mode share (drive-alone and carpool) is lowest in the southern and middle portions of the corridor. However, drive mode share is significantly higher in the area just below the Ship Canal and in northern portion of the corridor (north of NE 65th Street).

Figure 3-11 shows that transit use for journey-to-work trips above 30% for five Census Tracts within the corridor. However, several Census tracts in the southern areas of the corridor (Belltown neighborhoods and just north of Westlake Station) have transit mode shares below 25 percent. Many of these low transit mode shares near downtown correlate with high walking mode shares and high population density (greater than 21 persons per acre). This is likely due to their walking proximity to downtown employment opportunities.

Figure 3-10. Drive Mode Share (Drive Alone and Carpool Mode Share)

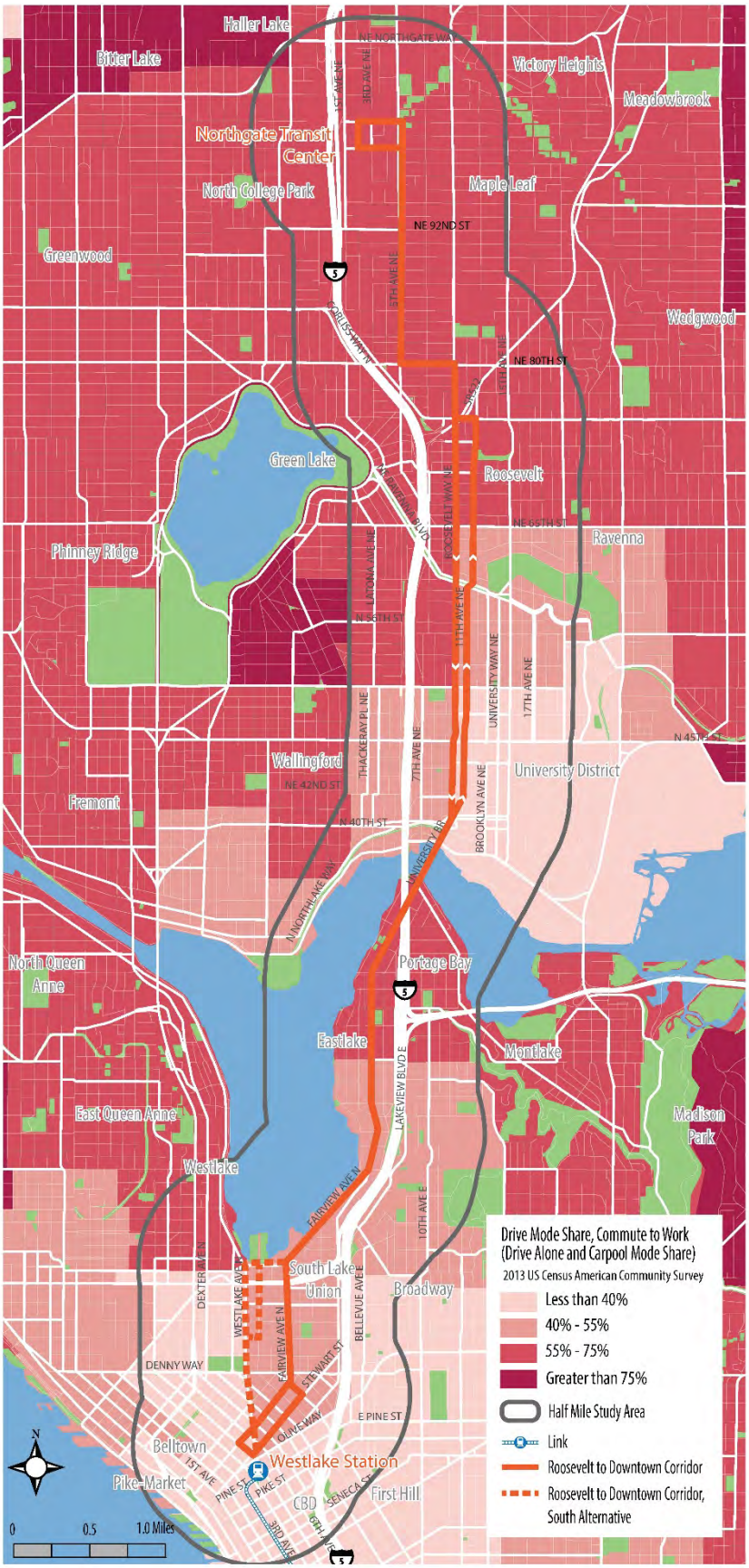
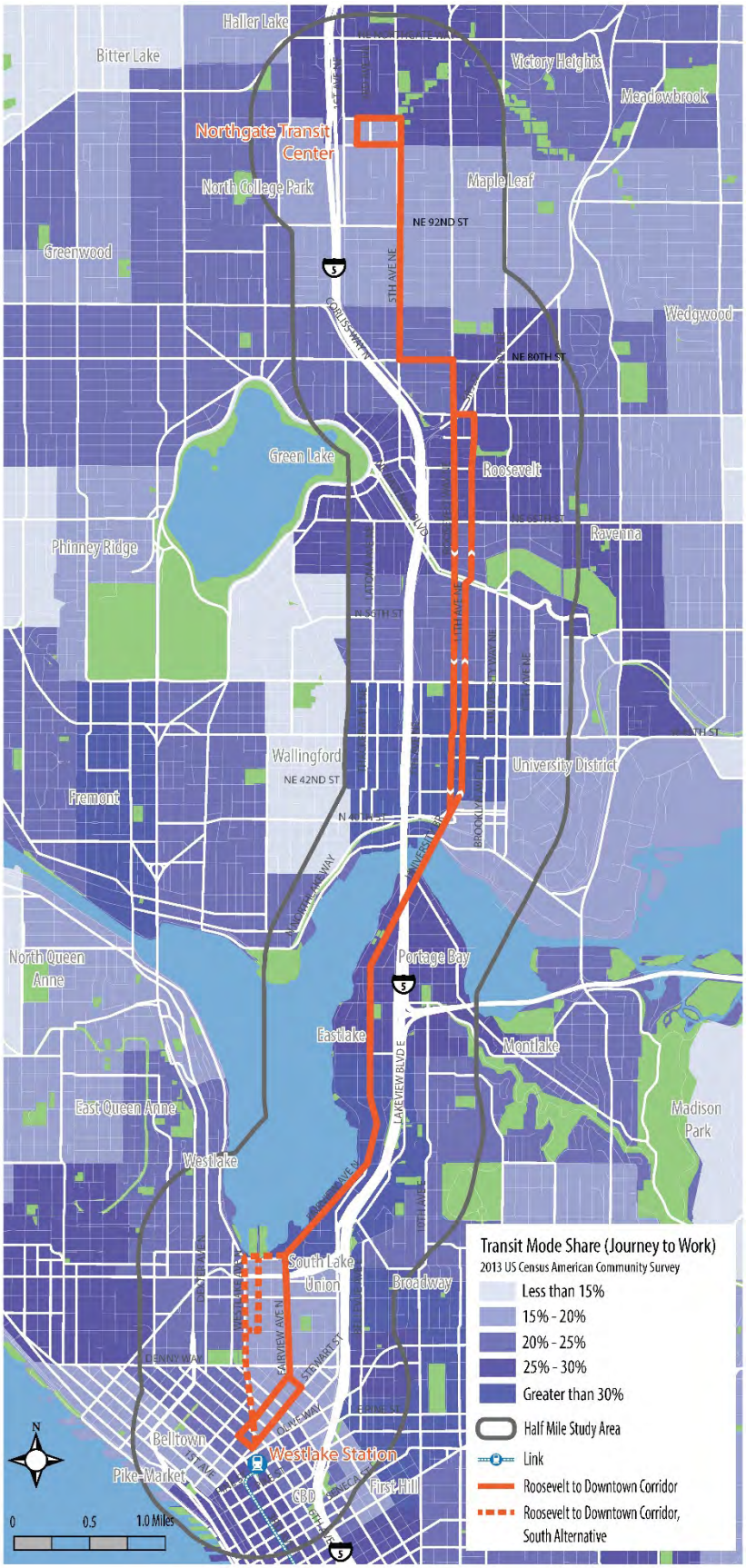


Figure 3-11. Transit Journey to Work



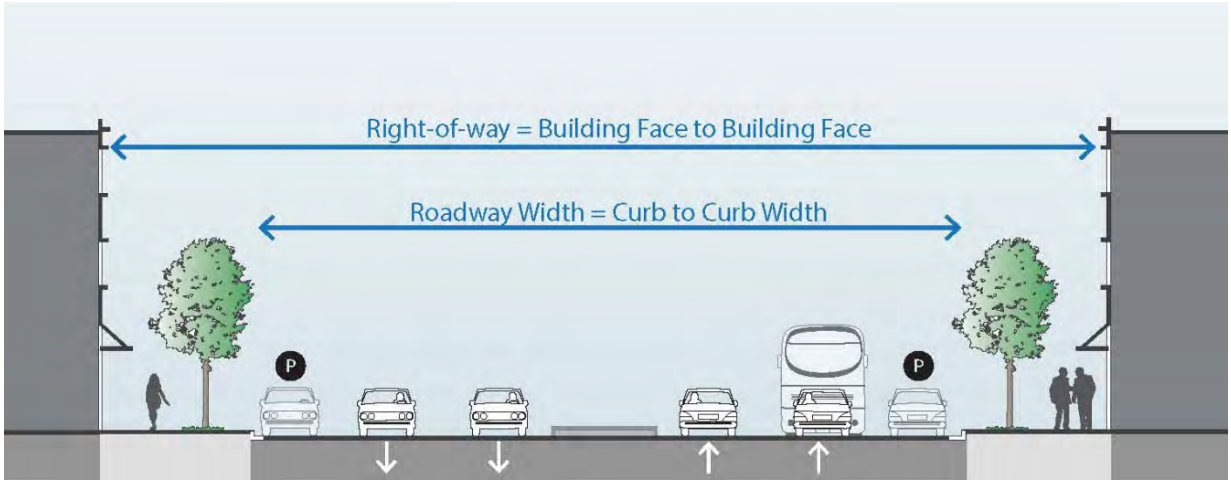
Section 4
Traffic Conditions

This section describes the physical infrastructure and traffic operations of the Roosevelt to Downtown Corridor, which serves as the operational environment for transit services.

4.1 Street Characteristics

Public right-of-way is a section of land that is reserved for public use, particularly for moving people and goods. The right-of-way includes both public property as well as private property easements. Within the Roosevelt to Downtown Corridor, the public right-of-way is generally defined as the width between property lines, as shown on **Figure 4-1**. Within the right-of-way are areas for different users of the facility beginning with the sidewalk. The area between the curbs, as shown on **Figure 4-1**, is for moving vehicles including cars, trucks and buses. Areas for parking and loading zones are also included between the curbs.

Figure 4-1. Right-of-Way and Roadway Width Extents



The right-of-way width along the Roosevelt to Downtown Corridor varies between a minimum of 54 feet and a maximum of 88 feet, as shown in **Table 4-1** and on **Figure 4-2.** The curb-to-curb width varies between a minimum of 32 feet and a maximum of 60 feet, as shown in **Table 4-1** and on **Figure 4-2**.

Table 4-1. Corridor Right-of-Way and Curb-to-Curb Widths

Street	Start Point	End Point	Curb-to-Curb Width (ft)	Right of Way Width (ft)	Travel Lanes	
					NB	SB
Stewart St	5th Av	Boren Av	48	78	0 (EB)	2 (WB)
Fairview Av N	Denny Way	Valley St	56	80	1	1
Westlake Av N	Denny Way	Harrison St	58	88	2	2
Westlake Av N	Harrison St	Mercer St	56	86	2	2
Terry Av N	Denny Way	Valley St	50	74	2	0
Valley St	Westlake Av N	Fairview Av N	49	74	1 (EB)	1 (WB)
Fairview Av N	Valley St	Yale Av N	52	70	2	2
Fairview Av N	Silver Cloud Inn	Eastlake Av E	40	56	2	1
Eastlake Av E	Fairview Av E	E Allison St	50	70	1	1
University Bridge	Furhman Av E	NE 40th St	60	72	2	2
11th/12th Av NE	NE 42nd St	NE 65th St	40	60	2	0
Roosevelt Way NE	NE 65th St	NE 42nd St	40	56-60	0	2
80th St	5th Av NE	Roosevelt Way NE	32	54	1 (WB)	1 (EB)
5th Av NE	NE 80th St	NE 92nd St	40	56	1	1
100th St	3rd Av NE	5th Av NE	42	60	1 (WB)	1 (EB)
103rd St	3rd Av NE	5th Av NE	34	60	1 (WB)	1 (EB)

Notes: NB = Northbound, SB = Southbound except as noted
Rows 3 through 6 are for South Alternative
Source: CDM Smith

Figure 4-2. Right-of-Way and Curb-to-Curb Widths

4.2 Vehicle Facilities

4.2.1 Roadway Jurisdiction and Classification

The entire Roosevelt to Downtown Corridor is under the jurisdiction of the City of Seattle. The majority of the roadways within the corridor are classified as Primary Arterials, with a few sections of Minor Arterials (Virginia Street, NE 80th Street and 5th Avenue NE).

4.2.2 Typical Roadway Cross Sections

As shown in **Table 4-1**, roadway cross sections along the corridor vary between one and two traffic lanes in each direction. Typical cross sections along the corridor are shown on **Figure 4-3** and briefly described below.

Downtown and South Lake Union

Typical cross sections encountered just north of Denny Way include:

- On Westlake Avenue: two northbound traffic lanes, two southbound lanes (including mixed-traffic running streetcar lane on the right side), and street parking on both sides.
- On Terry Avenue: one way northbound street with two lanes including mixed-traffic running streetcar lane on the left side, parallel parking on the left side, and back-in angled parking on the right side.
- On Fairview Avenue: one traffic lane in each direction, a central two-way left-turn lane, and parking lanes on both sides. The parking lanes are open to traffic during peak hours.

Eastlake

On the Fairview Bridge, the cross section includes two northbound traffic lanes, one southbound traffic lane, and one southbound bicycle lane.[8] South of the University Bridge, the typical cross section encountered along Eastlake Avenue E is a two-way street with one traffic lane in each direction, a central two-way left-turn lane, and street parking on both sides.

Roosevelt and University

Along the Roosevelt Way/11th Avenue couplet, the cross section includes a one-way street with two traffic lanes, street parking on both sides, and a bike lane on the right side of the traffic lanes.[9]

Northgate and Maple Leaf

On 5th Avenue north of 80th Street, the typical cross section includes one southbound traffic lane with bicycle sharrow, one northbound traffic lane, one northbound bicycle lane, and street parking on both sides.

Lane widths are generally standard (at least 10 feet wide) although some lanes are temporarily narrowed near construction sites.

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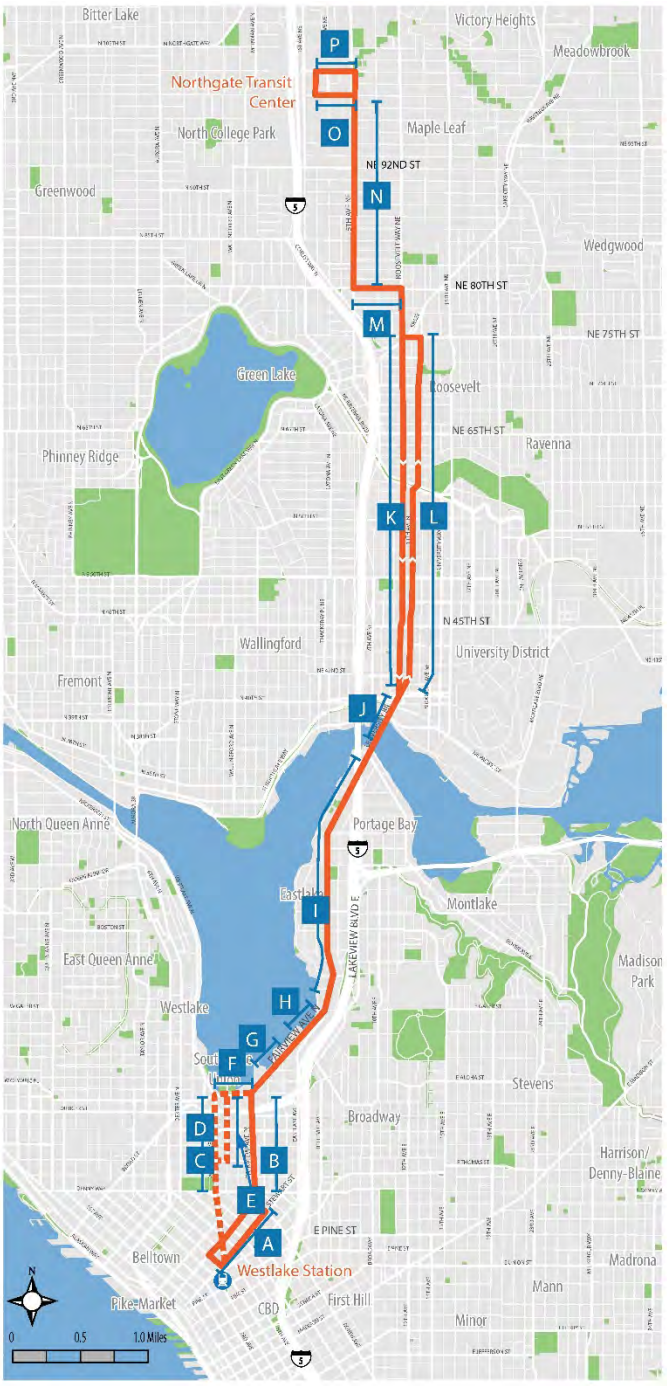
[8] SDOT is currently working on the design of a Fairview Avenue N bridge replacement. The proposed roadway configuration will better accommodate all users along Fairview Avenue N, with wider travel lanes and wider sidewalks to protect pedestrians.

[9] In 2016, the Protected Bike Lane on Roosevelt Way will extend from the University Bridge to NE 65th Street.

Figure 4-3. Typical Roadway Cross Sections



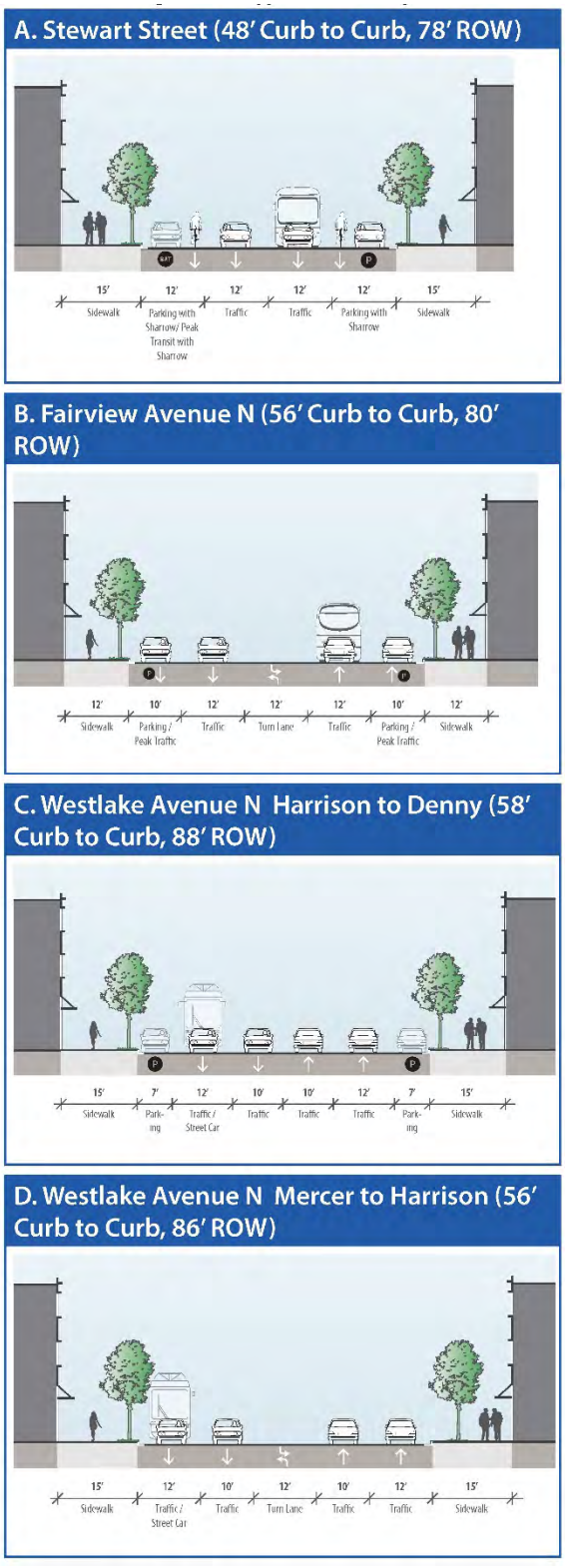
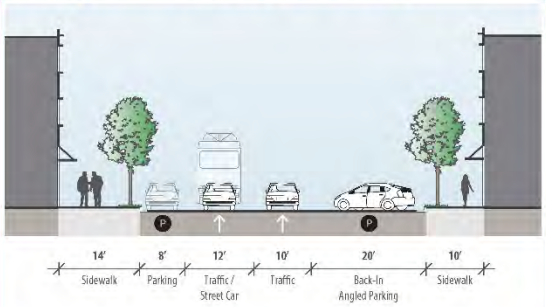
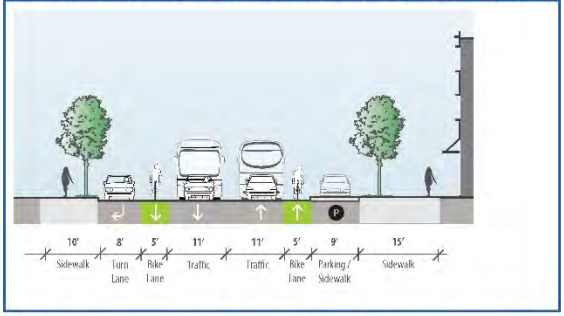


Figure 4-3. Typical Roadway Cross Sections (Continued)

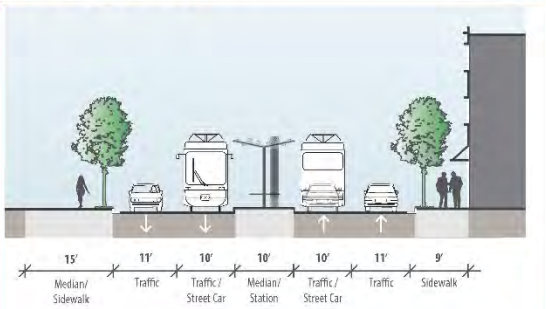
E. Terry Avenue N (50' CtC, 74' ROW)



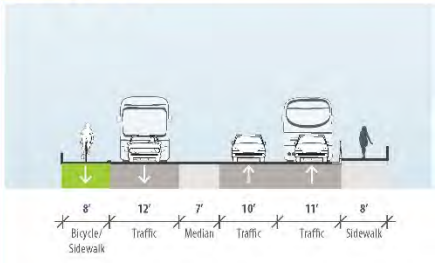
F. Valley Street N (49' Curb to Curb, 74' ROW)



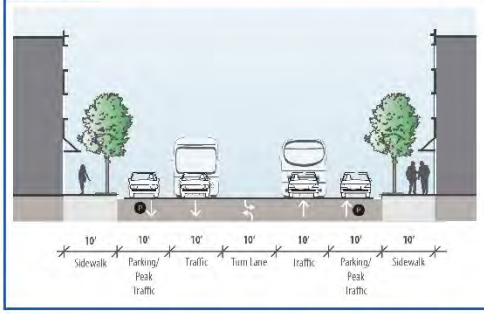
G. Fairview Avenue N at Aloha (52' Curb to Curb, 70'+ ROW)



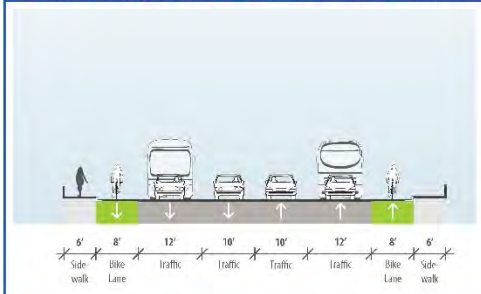
H. Fairview Avenue N Bridge (40' Curb to Curb, 56'-65' ROW)



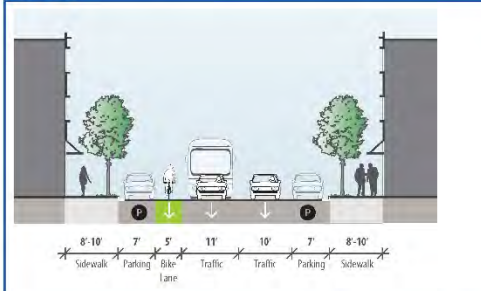
I. Eastlake Avenue N (50' Curb to Curb, 70' ROW)



J. University Bridge (60' Curb to Curb, 72' ROW)



K. Roosevelt Way NE (40' Curb to Curb, 56'-60' ROW)



L. 11th and 12th Avenue NE (40' Curb to Curb, 60' ROW)

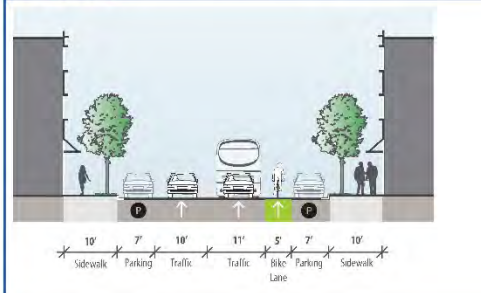
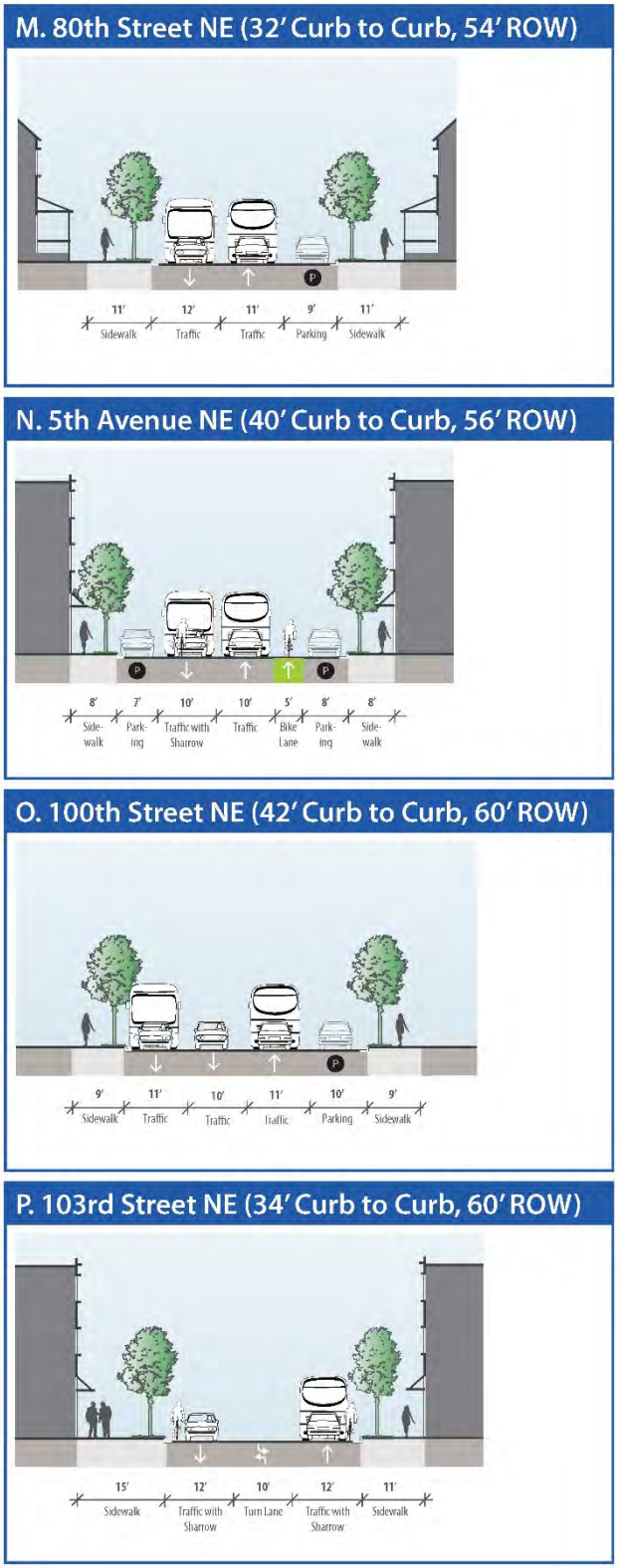


Figure 4-3. Typical Roadway Cross Sections (Continued)



4.2.3 On-Street Parking

On-street parking lanes are provided along most segments of the corridor. As shown on **Figure 4-4**, parking supply is a mix of pay parking spaces, time-limited parking spaces, restricted parking zones (RPZ), 30-minute load zones (general and commercial), 3-minute passenger load zones and unrestricted parking. **Table 4-2** provides a summary of parking supply along the corridor. Appendix B provides more detailed information about existing parking conditions.

Table 4-2. Corridor Parking Supply (Spaces)

Street Segment	Paid[1]	Time-limited[2]	RPZ[3]	Unrestric-ted	Total Parking Spaces	30-min load zone[4]	3-min passenger load zone	Total Load Zones
Westlake to S. Lake Union	336	0	0	34	**370**	19	15	34
Fairview to Eastlake	106	57	15	245	**423**	12	6	18
U District to Roosevelt	200	109	87	253	**649**	24	12	36
Roosevelt to Northgate	22	72	0	494	**588**	14	9	23
Total Corridor	**664**	**238**	**102**	**1,026**	**2,030**	**69**	**42**	**111**

Sources: SDOT; Parking Inventory by Category data base and Pay Parking Curb Space inventory. Supplemented with the Seattle Parking Map, Google Earth/Street View, and field reviews. Last update 5/26/15
1. Paid parking spaces include some motorcycle parking. Load/unload within paid parking zones are not included in pay parking quantities.
2. Time limited spaces include 1-Hour and 2-Hour time-limited parking.
3. Restricted Parking Zone
4. A few 15-minute load zones exist within the study corridor that are included in the 3-minute load/unload quantities.
Source: TCS draft memo 5/26/15

Downtown and South Lake Union

Observed parking characteristics from Westlake to South Lake Union are typical of the downtown environment with primarily paid parking. There are no time-limited parking spaces. There are 34 remaining unrestricted spaces on Terry Avenue N between the Mercer Street north roadway and Valley Street. Peak period/peak direction parking restrictions occur on various block faces on Westlake Avenue between 9th Avenue to Denny Way and various block faces on Virginia Street and Stewart Street. Peak period/peak direction parking restrictions also occur on Fairview Avenue N from Denny Way to Republican Street. Peak period/peak direction parking restrictions occur from 7 to 9 AM for southbound movements and from 4 to 6 PM for northbound movements.

Eastlake

Fairview Avenue N parking spaces are located on the north roadway and on the northwest side of Fairview Avenue N beyond the sidewalk and landscape strip. There is a mix of paid parking, time-limited and unrestricted parking spaces. Along Eastlake Avenue E, in the Eastlake neighborhood, there are no paid parking spaces. Approximately one quarter of the spaces are time-limited or RPZ and the remaining spaces are unrestricted. The RPZ is between E Newton Street and E Boston Street on the west side. Numerous driveways exist along Eastlake Avenue NE and some are very wide at older buildings. Peak period/peak direction parking restrictions occur from E Blaine Street to Harvard Avenue E.

Figure 4-4. On-street Parking Supply

Roosevelt and University

There is paid parking on Roosevelt Way NE, from the University Bridge to NE 45th Street consisting of approximately 26 paid spaces, five 30-minute load/unload, and four 3-minute load/unload spaces. There are relatively few parking spaces within this segment due to the new bicycle lane on the west side of Roosevelt Way NE. From NE 45th Street to NE 65th Street, there is a mix of paid, time-limited, and unrestricted parking. On 11th Avenue NE there is a mix of paid, time-limited, and unrestricted parking from NE Campus Parkway to NE 65th Street. There are RPZs on 11th Avenue NE between NE 50th Street and NE Ravenna Boulevard.

Northgate and Maple Leaf

The study corridor streets from Roosevelt Way NE to Northgate primarily consist of unrestricted parking. The only paid parking is on Roosevelt Way NE between NE 65th Street and NE 67th Street.

4.2.4 Truck Facilities and Truck Volumes

The City of Seattle has identified a network of streets known as "major truck streets" that accommodate trucks in order to preserve and improve commercial transportation mobility. Along the Roosevelt to Downtown Corridor, the only segments designated as major truck streets are: Valley Street between Fairview Avenue N and Westlake Avenue N; Westlake Avenue N between Valley Street and Mercer Street; and Fairview Avenue N between Valley Street and Mercer Street. [10] The most recent version of SDOT's Freight Master Plan shows Roosevelt Way designated as a minor truck street.

WSDOT's Freight and Goods Transportation System (FGTS) maps are provided to display tonnage volume classifications for roadways, freight railroads and waterways statewide. Along the RDHCT Corridor, the sections classified include:[11]

- T1 (over 10,000 thousand of annual tons): Valley Street between Westlake Avenue N and Fairview Avenue N
- T2 (4,000 to 10,000): Westlake Avenue N between Valley Street and Denny Way
- T3 (300 to 4,000): 11th/12th Avenue between 40th Street and Lake City Way; and 5th Avenue between 80th Street and 103rd Street.

Table 4-3 shows daily truck volumes per direction and corresponding truck percentages of overall traffic for various locations along the corridor. For the studied locations, truck volumes are typically fairly low, varying between 150 and 750 trucks per day. These truck volumes correspond to truck percentages of 4 to 9 percent. The highest truck volume and percentage along the corridor was observed on Roosevelt Way south of Ravenna Boulevard.

[10] Source: http://www.seattle.gov/transportation/streetclassmaps/truckweb.pdf; accessed 07-17-15

[11] Source: http://www.wsdot.wa.gov/Freight/FGTS/UrbanAreaMaps.htm; accessed 07-17-15

Table 4-3. Truck Volumes and Percentages

Location	Direction	Daily Truck Volumes[2]	Truck %
Fairview Av N, Thomas St to Harrison St	NB	334	5.3%
Fairview Av N, Thomas St to Harrison St	SB	364	8.1%
Fairview Av N, south of Fairview Av E	NB	299	5.5%
Fairview Av N, south of Fairview Av E	SB	274	5.5%
Eastlake Av E, Hamlin St to Allison St	NB	279	5.0%
Eastlake Av E, Hamlin St to Allison St	SB	334	5.2%
Eastlake Av E, 40th St ramps to diverge	NB	436	6.2%
Eastlake Av E, 40th ramps to diverge	SB	347	4.3%
11th Ave NE, 47th St to 50th St	NB	242	4.8%
Roosevelt Way NE, 57th St to 58th St	SB	743	8.6%
Roosevelt Way NE, 69th St to 70th St	SB	532	5.3%
5th Av NE, 90th St to 91th St	NB	150	3.7%
5th Av NE, 90th St to 91st St	SB	226	4.0%

Notes:
1. Average Daily Traffic
2. Two axle 6-tire vehicles counted as trucks
Source: CDM Smith counts, January-February 2015

4.3 Pedestrian Facilities

This subsection describes pedestrian connectivity and the quality of the pedestrian facilities along the corridor. A more detailed analysis of the pedestrian environment is provided in Appendix C.

4.3.1 Pedestrian Connectivity

Pedestrian connectivity along the corridor is illustrated by the walkshed shown on **Figure 4-5**. The connectivity analysis uses the public pedestrian network, with sidewalks, paths, and crosswalks to determine pedestrian connectivity within a one-half mile buffer (or about a 10-minute walk) of the corridor.

Throughout the corridor, network connectivity is typically very good due to the grid network of streets. Areas of high network connectivity are located in the South Lake Union and University District areas. These neighborhoods have grid street networks of small blocks providing multiple paths of access for pedestrians to the proposed HCT alignment. While I-5 is a physical barrier throughout the corridor, access under the interstate is provided on most streets in these neighborhoods.

There are areas of low network connectivity along the corridor due to I-5 and other physical barriers. The Eastlake neighborhood is bordered by Lake Union to the west and I-5 to the east. These barriers limit the distance of east-west connectivity. In the Eastlake neighborhood there is a single pedestrian path across I-5. Pedestrian access in the Eastlake neighborhood is more confined compared with other neighborhoods along the corridor, as a result of these manmade and natural barriers.

The Northgate neighborhood also exhibits low pedestrian network connectivity with fewer and larger blocks and I-5 acting as a barrier to the west. There are currently no pedestrian access points across I-5 within close proximity of the Northgate Transit Center. SDOT is working with regional partners to

build a new pedestrian and bicycle bridge over I-5 at 100th Avenue to improve connections within the Northgate community.

4.3.2 Pedestrian Quality Analysis

Most segments along the corridor have sidewalks (or walkways) on both sides of the street. Planting strips between the sidewalk and curb are found in many sections such as the Roosevelt Way NE and the 11th/12th Avenue couplet, Eastlake Avenue E, Valley Street, and Fairview Avenue N between Mercer Street and Yale Avenue. Along the residential northern portions of corridor, grass strips are often found between the sidewalk and the curb.

Pedestrian Realm

The pedestrian realm is defined as the sum of the sidewalk width and sidewalk buffer. The City of Seattle Right-of-Way Improvements Manual defines the standard pedestrian realm to be 11 feet. Overall, the corridor provides adequate separation for pedestrians from traveling vehicles. The Downtown, Eastlake, Roosevelt, and Northgate neighborhoods provide sidewalk buffers and sidewalk widths greater than six feet which contributes to the reduction of vehicle proximity to the pedestrian environment. On-street parking is an additional buffer as parked vehicles separate traffic from pedestrians.

Sidewalk Condition

The condition of sidewalks is important in determining whether walking is safe, comfortable, and appealing. Sidewalk condition along the corridor is illustrated on **Figure 4-5**. Sidewalk condition includes three categories: good, fair, and poor. Sidewalks identified as good condition exhibit little to no cracking, fair sidewalks show instances of cracking, while poor sidewalks exhibit both cracking and raised unevenness. Several segments along the corridor were found to have fair or poor sidewalk conditions. These segments were more evident in the northern section of the corridor in the University District and Roosevelt neighborhoods.

Intersections

The quality and consistency of intersection features for pedestrians varies along the corridor. The downtown area provides continuous pedestrian quality as most intersections contain adequate pedestrian enhancements; including crosswalk markings, pedestrian ramps, pedestrian signals, and ADA accessible curb ramps. Other neighborhoods also provide the same level of intersection features primarily at major signalized intersections. This is evident in the University District and Roosevelt neighborhoods as smaller street intersections along the corridor do not provide pedestrian signal crossings.

Driveways

Curb cuts for driveways can increase pedestrian conflicts with vehicles and reduce pedestrian quality. While these occur throughout the corridor, they are more common in the Eastlake and Northgate neighborhoods. Shopping center driveways are more evident in the Eastlake and University neighborhoods, while the Northgate neighborhood exhibits a higher number of driveways due to the area being predominately residential.

Bridges

The Fairview and University bridges are choke points with limited width that reduce the ability to provide buffering between pedestrians and vehicles. The University Bridge has a limited width and the sidewalk width of six feet or less and relatively low curb buffer presents a challenge for the pedestrian environment. On the Fairview Bridge there is a low safety barrier between the sidewalk and travel lane, but there is limited room to provide buffers.

Figure 4-5. Walkshed and Sidewalk Conditions

4.4 Bicycle Facilities

Existing bicycle facilities on and near the Roosevelt to Downtown Corridor are shown on **Figure 4.6** and are summarized below. Additional information on the bicycle environment is provided in Appendix D.

4.4.1 Existing Conditions

The existing bicycle network is described below, separating the north-to-south and the south-to-north directions. Deficiencies in the system in terms of connectivity and safety are also discussed.

North to South Travel

Roosevelt Way NE is a main commuter route into downtown from the north end, and is currently one of the more dangerous streets for biking based on the number of collisions. A temporary protected bike lane (PBL) was installed in early 2015 between NE 45th Street and the University Bridge. The PBL will be permanently installed and extended from NE 45th Street to NE 65th Street as part of a paving project with construction beginning in late 2015 and wrapping up in 2016.The connection at the University Bridge, even with the new improvement, is not ideal with vehicles and bicycles sharing the lane and merging in an uncomfortably short span of roadway. There is a bicycle lane across the University Bridge that leads to Eastlake Avenue on the south side of the Ship Canal. This bike lane continues for a short distance to the Harvard Avenue intersection. From this point and to the south, Eastlake Avenue does not have a signed bike lane until the junction with Fairview Avenue. The intersection of Eastlake and Fairview has a bike lane that runs through the intersection, but it ends abruptly and bicyclists must then choose between sharing the roadway with cars or traversing an 8-foot multi-use pathway with pedestrians. Once bicyclists arrive at Valley Street, there is a dedicated bike lane running east-west. Because of the curb-side streetcar located along Westlake, there are no dedicated bike lanes. The nearest north-south bicycle facility is located one block west on 9th Avenue N.

South to North Travel

North of downtown Seattle, there are no dedicated bike lanes along Virginia Street, Fairview Avenue, or Eastlake Avenue. Near the corridor study area, bike facilities between downtown and South Lake Union include bike lanes along 9th Avenue and sharrow lanes/bike lanes along Stewart Street/Virginia Street, and Howell Street/Eastlake Avenue. Similar to the southbound direction, a bike lane exists on Eastlake Avenue from Harvard Street to the University Bridge and across the University Bridge. The bike lane through the interchange just north of University Bridge is complicated by traffic exiting to the right at multiple ramps and portions are marked as sharrows rather than a true bike lane. North from the University Bridge area bicyclists travel on 11th Avenue NE in a striped bike lane. This bike lane extends north on 11th Avenue NE and 12th Avenue NE to NE 65th Street.

Existing Deficiencies

North of the University Bridge, existing northbound and southbound bike lanes are provided along the corridor. South of the University Bridge, bicyclists ride with traffic on Eastlake, Fairview, Stewart, Virginia, and Westlake. The transition on the north side of the University Bridge to the bike lanes raises safety concerns.

Analysis of bicycle/vehicle collision data between 2010 and 2014 showed that there were eleven collisions involving bicyclists at the intersection with Eastlake Avenue and Fuhrman Avenue and the midblock segment to Harvard Avenue. Other locations with high bicycle injuries are along the 11th

Avenue and Roosevelt Avenue couplet north of the University Bridge. The newly constructed protected bicycle lane on Roosevelt Way south of NE 45th Street improves bicycle safety in this area by providing a separated path for bicycle users away from vehicular traffic.

4.4.2 Proposed Improvements

The City of Seattle's Bicycle Master Plan (BMP) details the planning, designing, and building of bicycle facilities that make traveling by bicycle safer and more convenient for all ages and abilities. The focus of the plan is to implement new facilities that improve the current bicycle network, and encourage increased ridership through improved access and safety.

Short Term Improvements

The Bicycle Master Plan Implementation program, last updated in March 2015, includes several near-term bicycle improvement projects in or near the corridor (also illustrated on **Figure 4-6**):

2015 – Protected bike lanes on:

- Roosevelt Way NE from NE 45th Street to NE 65th Street (as part of the Roosevelt Paving and Safety Project)
- University Bridge between Furhman Avenue E and NE Campus Parkway (also part of the Roosevelt Paving and Safety Project)
- NE Ravenna Boulevard/Cowen Place NE/15th Avenue NE
- NE Campus Parkway between Eastlake Avenue and University Way NE

2016 – New bike lane on Banner Way (NE 75th Street) between Roosevelt Way NE and 5th Avenue NE

2017 – Protected bike lane on NE 40th Street between Brooklyn Avenue NE and 7th Avenue NE

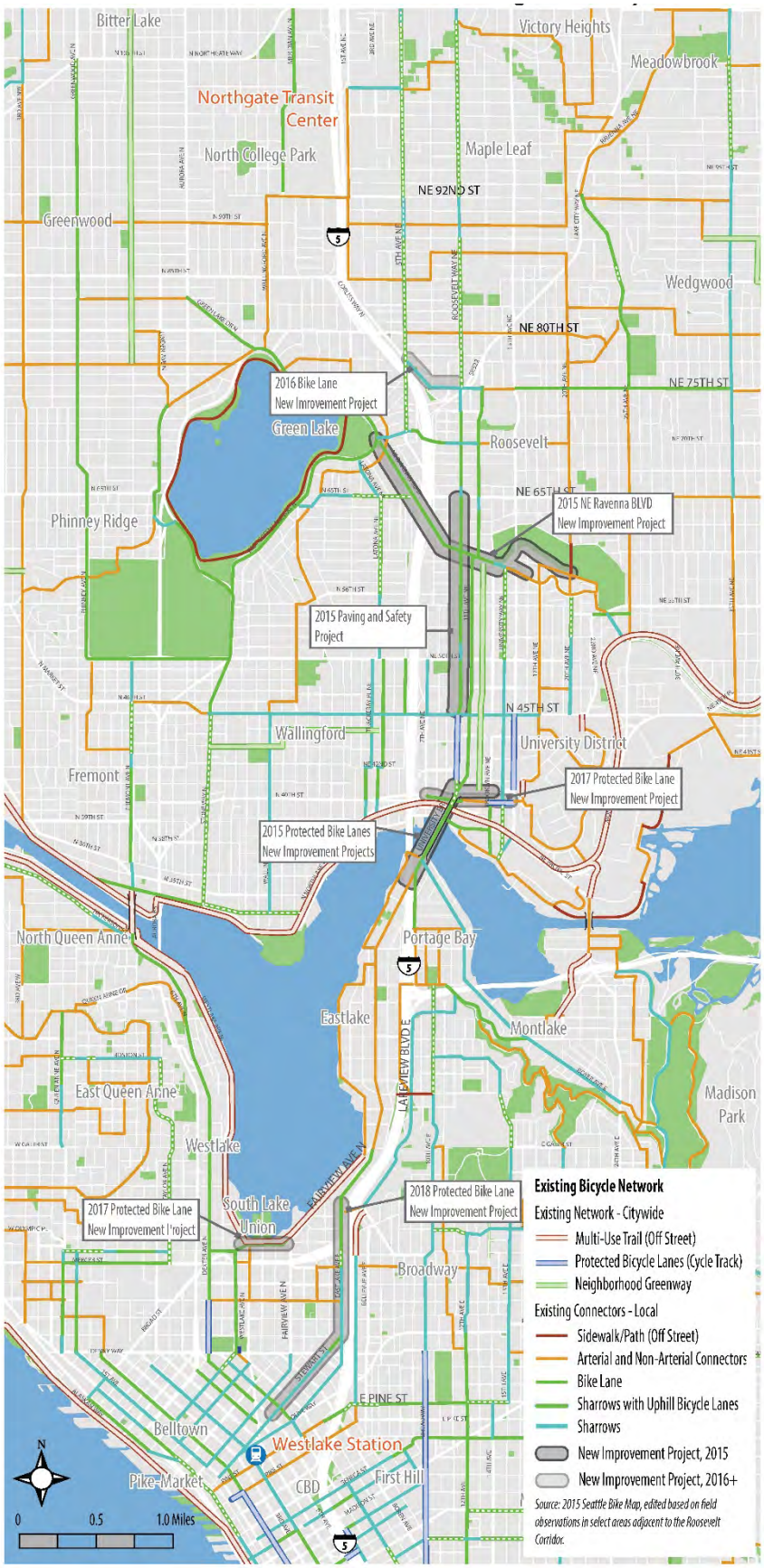
2017 – Broadway to Eastlake Greenway (3.5 mile long north-south greenway linking First Hill and Eastlake).

Long Term Goal

The Bicycle Master Plan envisions a connected bicycle network. It contains recommended facilities along the entire corridor, including the Roosevelt Way and the 11th/12th Avenue couplet. On the north section, the recommended route follows Roosevelt Way to Northgate. In the southern part of the corridor, the recommended routes in and out of downtown are: Eastlake Avenue, Stewart Street, Fairview Avenue, 9th Avenue, and 7th Avenue. These are recommended facilities and further analysis is needed to determine where and what type of facility is appropriate.

In addition to improving safety conditions, these new bicycle facilities will create better connections with Seattle's citywide bicycle network and multi-modal system. Critical connections to the citywide bike network include connections with Westlake Avenue (north-south travel on the west side of Lake Union), the future SR 520 trail, the Burke Gilman Trail, and Ravenna Boulevard/Ravenna Park. There are planned bicycle connections to the future Link light rail stations scheduled to open in 2021. Roosevelt Station will be directly connected to the Roosevelt protected bike lane (PBL). At U District Station, a protected bike lane on NE 45th Street will provide connections with the Roosevelt/11th Avenue PBL and the 15th Avenue PBL.

Figure 4-6. Bicycle Facilities



4.5 Traffic Signals

There are 86 intersections controlled by traffic signals along the corridor. These include four pedestrian crossing only intersections, one streetcar access intersection (on Fairview Avenue north of Ward Street), and the University Bridge draw span signal (which does not operate during the peak periods due to the restriction on bridge openings). **Figure 4-7** shows the location of the signalized intersections along the corridor.

4.6 Interstate and State Route Access

The Roosevelt to Downtown Corridor runs parallel to I-5, with access to and from I-5 provided primarily through the following interchanges:

- Stewart Street/Denny Way (southbound only);
- Mercer Street;
- Boylston Avenue E (southbound); Harvard Ave E (northbound)
- NE 45th Street;
- NE 50th Street;
- NE Ravenna Boulevard;
- Lake City Way (SR 522);
- NE 80th Street/NE 85th Street; and,
- NE Northgate Way

In 2014, the section of I-5 between downtown and Northgate had an annual average daily traffic (AADT) varying between 152,000 and 217,000 vehicles.[12] The highest AADT along this section (217,000 vehicles) was observed just north of the Mercer Street interchange.

Ramp volumes are particularly high at the Mercer Street interchange. The 2014 AADTs reported by WSDOT at this interchange are 13,000 vehicles entering I-5 northbound; 17,000 vehicles entering I-5 southbound; 12,000 vehicles exiting southbound I-5; and 17,000 vehicles exiting northbound I-5. [13]

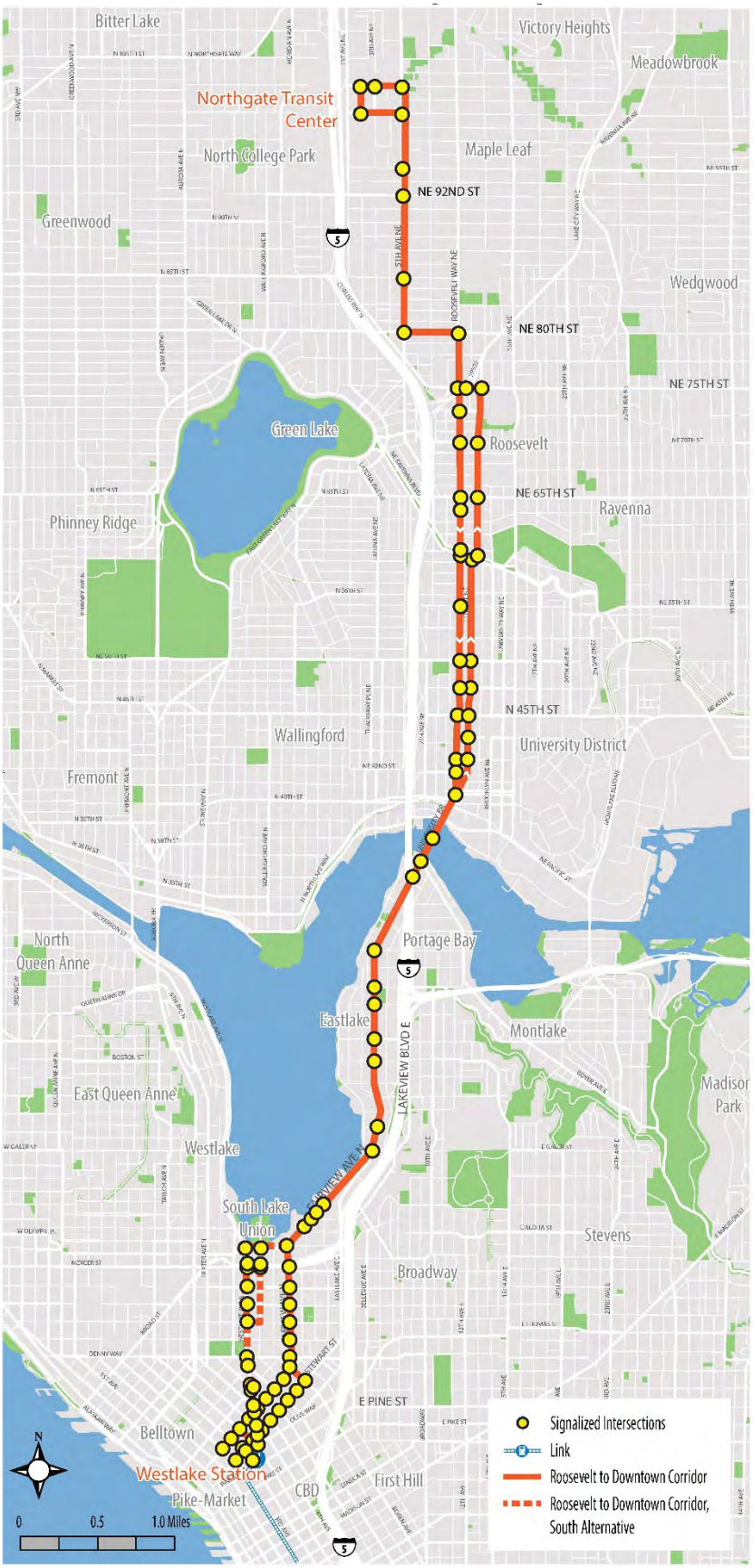
I-5 interchanges near the Roosevelt to Downtown Corridor also provide access to and from SR 520, a major regional east-west corridor across Lake Washington.

North of the Roosevelt neighborhood, the corridor is intersected by SR 522, which is an arterial (Lake City Way) at its origin near I-5. SR 522 connects Seattle to its northeastern suburbs. At the Roosevelt Way tunnel the 2013 AADT on SR 522 was 27,000 vehicles.

[12] Source: WSDOT. http://www.wsdot.wa.gov/mapsdata/travel/annualtrafficreport.htm.

[13] Source: WSDOT. http://www.wsdot.wa.gov/NR/rdonlyres/1BA5BED4-FEA2-47FC-B597-D0A623307FE5/0/AverageDailyVolumesforWeb.pdf

Figure 4-7. Signalized Intersections



4.7 Vertical Structures

The only vertical structure along the corridor is the I-5 Viaduct over Eastlake Avenue near the Ship Canal. The section of Eastlake Avenue under I-5 maintains travel lanes but does not include parking lanes and has limited sidewalk width.

The Seattle Right-of-Way Improvements Manual requires a minimal vertical clearance of 20 feet over roadway surfaces. There are currently no vertical clearance restrictions for transit vehicles along the corridor.

4.8 Traffic Operations

This subsection presents an overview of existing traffic operations along the corridor by discussing average daily traffic volumes, peak hour traffic, intersection level of service, and typical travel speeds for passenger cars.

4.8.1 Average Daily Traffic

Average daily traffic (ADT) represents the total traffic volume along a segment, in both directions, over the course of a typical weekday. Data sources for this study included SDOT's tube count data from 2011 to 2014, as well as recent 2015 volume and classification counts collected for this project. Historic traffic data show annual growth rates from 0.25 to 1 percent within the RDHCT Corridor which were applied to estimate existing (2015) average daily volumes.

As shown on **Figure 4-8**, the 2015 ADT volumes along the corridor vary between 6,000 and 27,800 vehicles. The highest volumes are observed on the University Bridge and in the downtown area (Stewart Street).

Figure 4-8. Average Daily Traffic (2015)

4.8.2 Peak Hour Traffic and Intersection Level of Service

Traffic operations at 63 signalized intersections along the corridor are documented in this report.[14] These intersections were evaluated during the weekday AM and PM peak hours. A summary of the traffic analysis is presented here, and more details are available in Appendix E.

Traffic analysis was performed based on the Highway Capacity Manual (HCM) 2010 methodology. HCM 2010 methodology is based on the control delay or the average delay per vehicle at signalized intersections. Intersection operation is described as level of service (LOS), A through F based on thresholds for average vehicle delay. LOS A indicates free flow or short delays and LOS F indicates congested or over capacity conditions with extremely long delays.

Turning movement data at the study intersections were obtained from the following sources:

- Roosevelt to Downtown HCT Study – Turning movement counts were collected for this project in January, February, and June of 2015.
- Seattle Department of Transportation (SDOT)
    - Traffic counts collected by SDOT between 2009 and 2013
    - Traffic volumes available in the Synchro models provided by SDOT. The exact date of these volumes is not available, but they are generally older than 2008.
- Fairview Bridge Replacement Study report – Traffic counts collected in 2014 for a study were used in a portion of the study area.

Existing traffic operations at the study intersections were evaluated for 2015 conditions. Intersection turning movement volumes were estimated for 2015 volumes using the following growth factors from historic data:

- Downtown Seattle – At locations where traffic counts were available from 2013, an annual growth factor of 0.25 percent was applied. Intersections with counts older than 2013 were omitted from this analysis.
- South Lake Union – All new traffic counts were collected in this neighborhood to accurately reflect the high growth that has recently occurred in the South Lake Union area.
- Eastlake, University, and Northgate neighborhoods – An annual growth rate of 0.50 percent was applied to intersection counts from 2010 to 2014.

Level of service at the study intersections were analyzed for existing AM and PM peak hours and the findings are summarized in **Table 4-4**. The LOS values are also shown in **Figure 4-9** (AM peak) and **Figure 4-10** (PM peak).

Eight intersections along the corridor operate at LOS E or F during at least one of the peak periods. These include six intersections during the weekday AM peak hour and six intersections during the PM peak hour:

[14] Seventeen additional intersections located in the downtown portion of the study area will be evaluated separately and the level of service results will be reported in an addendum to this report.

- Westlake Avenue/Mercer Street (LOS E – AM Peak Hour);
- Westlake Avenue/Valley Street (LOS E – AM Peak Hour, LOS F – PM Peak Hour);
- Fairview Avenue/Mercer Street (LOS F – AM Peak Hour, LOS E – PM Peak Hour);
- Fairview Avenue/Valley Street (LOS F – AM Peak Hour, LOS E – PM Peak Hour);
- Eastlake Avenue/Fuhrman Avenue (LOS E – PM Peak Hour);
- Roosevelt Way/45th Street (LOS E – AM Peak Hour);
- Roosevelt Way/65th Street (LOS E – AM Peak Hour, LOS E – PM Peak Hour); and,
- 12th Avenue/65th Street (LOS E – PM Peak Hour).

Figure 4-9. Existing Intersection Level of Service – AM Peak

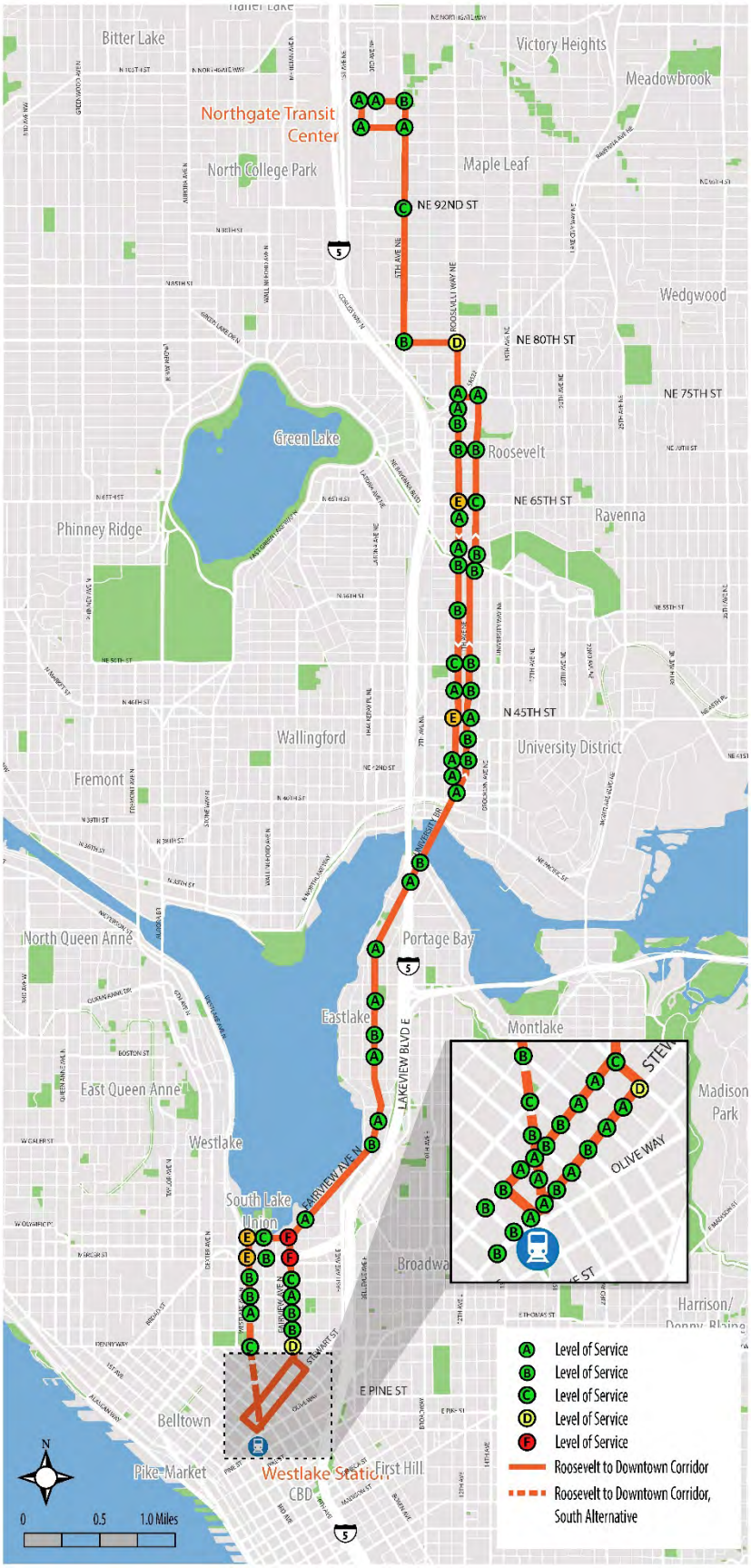


Figure 4-10. Existing Intersection Level of Service – PM Peak

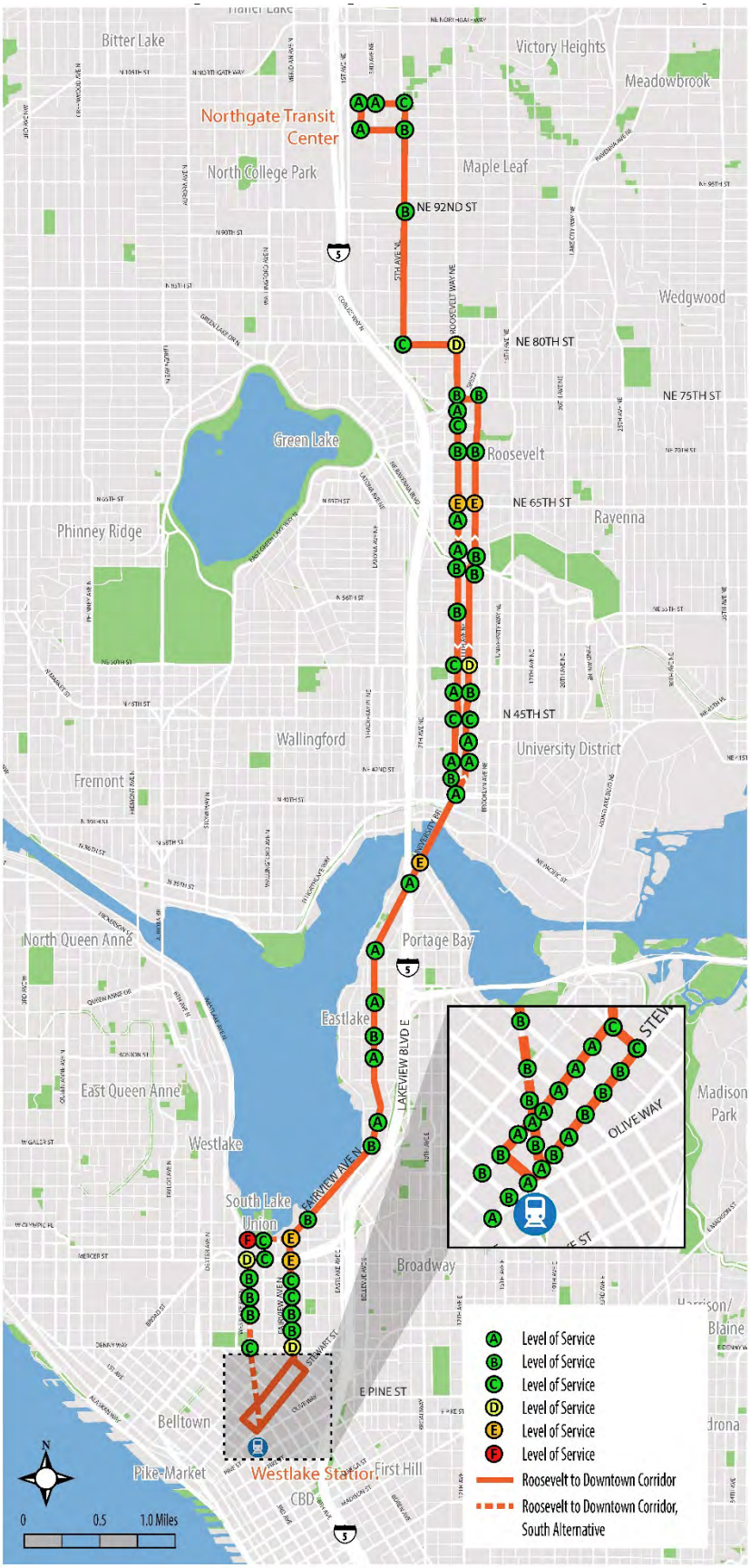


Table 4-4. 2015 Intersection Level of Service

#	Study Intersection	AM Peak Hour		PM Peak Hour	
		Delay (seconds per vehicle)	LOS	Delay (seconds per vehicle)	LOS
1	Stewart St/3rd Av[1]	7.6	A	9.4	A
2	Stewart St/4th Av/Olive Way[1]	11.4	B	15.9	B
6	Stewart St/7th Av[1]	9.4	A	7.9	A
10	Stewart St/Boren Av[1]	37.3	D	25.8	C
11	Virginia St/3rd Av[1]	13.1	B	12.7	B
13	Virginia St/5th Av[1]	16.7	B	12.3	B
20	Virginia St/Boren Av/Fairview Av[1]	22.9	C	30.0	C
24	Westlake Av/8th Av/Lenora St[1]	27.5	C	19.5	B
26	Westlake Av/Denny Way	27.4	C	26.3	C
27	Westlake Av/Thomas St	9.1	A	13.3	B
28	Westlake Av/Harrison St	12.1	B	11.4	B
29	Westlake Av/Republican St[1]	13.2	B	14.7	B
30	Westlake Av/Mercer St	56.2[2]	E	51.4	D
31	Westlake Av/Valley St[1]	79.1	E	138.6	F
32	Terry Av/Mercer St[1]	11.3	B	34.1	C
33	Terry Av/Valley St[1]	25.0	C	29.1	C
34	Fairview Av/Denny Way	43.0	D	41.2	D
35	Fairview Av/John St[1]	13.0	B	12.4	B
36	Fairview Av/Thomas St	16.9	B	13.2	B
37	Fairview Av/Harrison St	7.9	A	33.1	C
38	Fairview Av/Republican St	21.9	C	25.2	C
39	Fairview Av/Mercer St[1]	123.9	F	69.3	E
40	Fairview Av/Valley St[1]	85.8	F	57.2	E
41	Fairview Av/Aloha St[1]	4.2	A	10.3	B
45	Fairview Av/Eastlake Av/Galer St[1]	11.6	B	13.0	B
46	Eastlake Av/Garfield St[1]	2.5	A	3.9	A
47	Eastlake Av/Boston St[1]	0.3	A	1.1	A
48	Eastlake Av/Lynn St[1]	14.4	B	11.2	B
49	Eastlake Av/Louisa St[1]	0.3	A	2.3	A
50	Eastlake Av/Roanoke St[1]	13.4	B	18.9	B
51	Eastlake Av/Hamlin St[1]	4.3	A	6.0	A
52	Eastlake Av/Harvard Av[1]	8.0	A	9.3	A
53	Eastlake Av/Fuhrman Av[1]	11.1	B	71.6	E
55	Roosevelt Way/Eastlake Av/Campus Pkwy[1]	0.8	A	2.0	A
56	Roosevelt Way/42nd St (South)[1]	6.1	A	16.9	B

Table 4-4. 2015 Intersection Level of Service

#	Study Intersection	AM Peak Hour		PM Peak Hour	
		Delay (seconds per vehicle)	LOS	Delay (seconds per vehicle)	LOS
57	Roosevelt Way/42nd St (North)	1.3	A	1.3	A
58	11th Av/42nd St[1]	10.8	B	9.0	A
59	11th Av/43rd St[1]	10.6	B	9.7	A
60	Roosevelt Way/45th St[1]	**67.8**	**E**	23.7	C
61	11th Av/45th St[1]	8.1	A	34.5	C
62	Roosevelt Way/47th St[1]	6.7	A	9.4	A
63	11th Av/47th St[1]	17.5	B	11.1	B
64	Roosevelt Way/50th St	33.6	C	22.1	C
65	11th Av/50th St	15.9	B	52.4	D
66	Roosevelt Way/55th St[3]	13.9 (EB)[4]	B	12.8 (EB)	B
67	11th Av/Ravenna Blvd[1]	16.5	B	18.9	B
68	Roosevelt Way/Ravenna Blvd[1]	8.7	B	9.7	A
69	Roosevelt Way/64th St[1]	6.5	A	9.0	A
70	Roosevelt Way/65th St	**79.5**	**E**	**59.4**	**E**
71	12th Av/65th St	30.8	C	**57.1**	**E**
72	Roosevelt Way/70th St[1]	12.9	B	14.4	B
73	12th Av/70th St[1]	10.3	B	15.6	B
74	Roosevelt Way/73rd St	10.1	B	20.0	C
75	Roosevelt Way/75th St/Lake City Way[1]	9.9	A	10.8	B
76	12th Av/75th St[1]	7.9	A	18.8	B
77	Roosevelt Way/80th St[1]	36.4	D	53.8	D
78	5th Av/80th St	18.3	B	25.8	C
80	5th Av/92nd St	20.1	C	10.0	B
82	5th Av/100th St[1]	7.8	A	11.1	B
83	2nd Av/100th St[1]	4.9	A	3.1	A
84	2nd Av/103rd St[1]	2.7	A	3.4	A
85	3rd Av/103rd St[1]	3.9	A	9.8	A
86	5th Av/103rd St[1]	11.3	B	21.0	C

Notes:
1. Intersections analyzed with HCM 2000 methodology.
2. Bold and red fonts indicate intersection that operates at LOS E or F.
3. For unsignalized intersections, delay and LOS are presented for the worst approach, annotated in parentheses ( ).
4. EB = Eastbound

4.8.3 Travel Speeds

In Seattle the speed limit on arterial streets is 30 miles per hour with some reduced speed limits in school zones and construction zones.[15] The speed limit along with roadway design governs the free-flow speed, which is the expected travel speed along the corridor without delays due traffic congestion, construction zones, parking maneuvers, or traffic signals.

Travel time runs were conducted in January 2015 during the AM and PM peak periods. The results are shown graphically on **Figures 4-11** and **4-12**, respectively for the AM peak and PM peak periods, More details are provided in Appendix F.

As **Figure 4-11** shows, traffic is moving fairly well throughout the corridor during the AM peak period, although the majority of the corridor has average travel speeds lower than 30 miles per hour (mph), the most common speed limit posted along the corridor, except in the downtown area. This is primarily due to the high density of traffic signals along the corridor. The areas of slower speeds (less than 20 mph) tend to be in areas with numerous of traffic signals and in the construction area between South Lake Union and downtown.

As **Figure 4-12** shows, traffic tends to be slower in the PM peak compared to AM peak conditions, in both directions. Slower speeds are observed between downtown and South Lake Union, south of the University Bridge, and between the University Bridge and NE 65th Street.

[15] Seattle Municipal Code 11.52.080.

Figure 4-11. Observed Typical Travel Speed – AM Peak

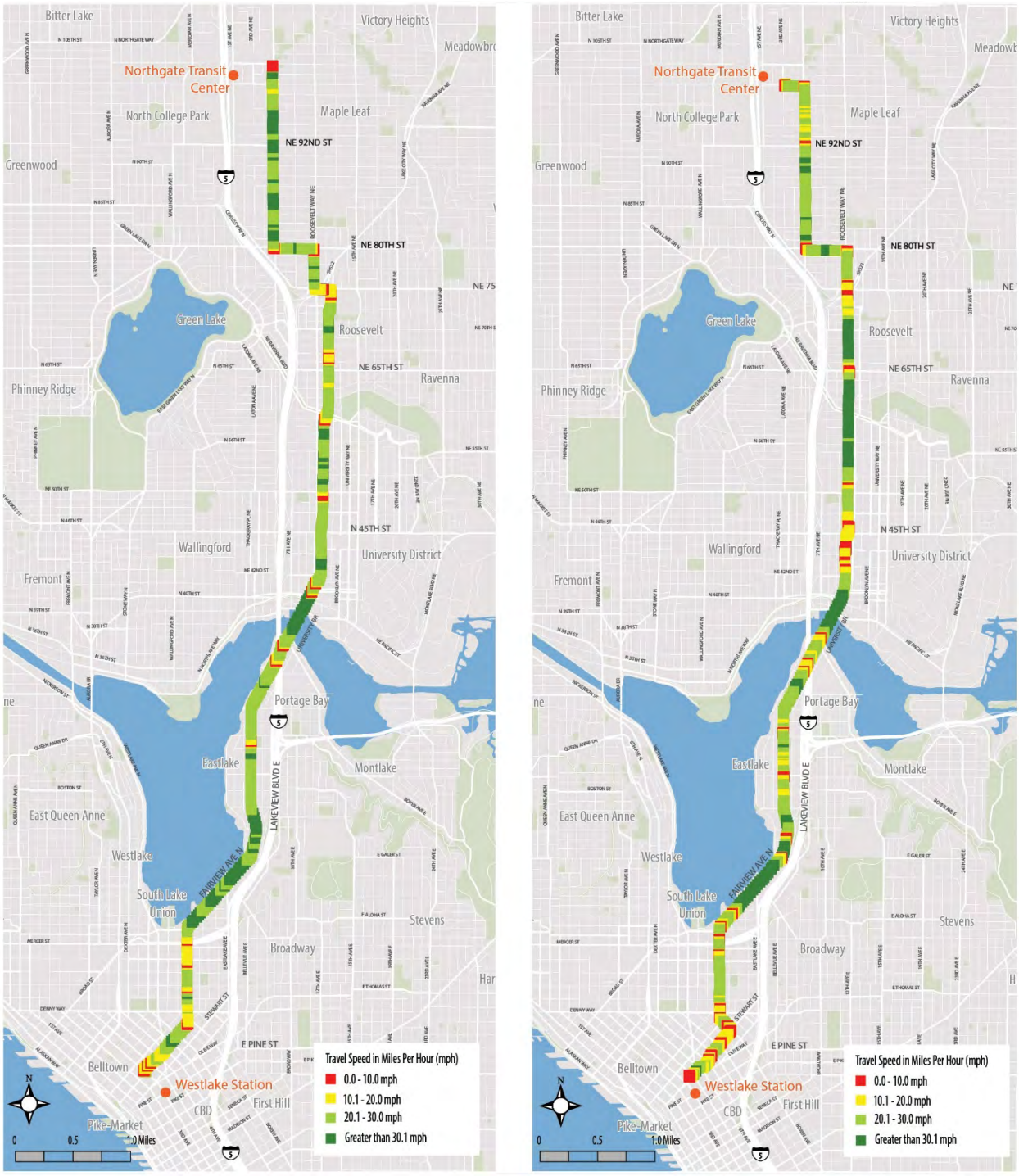
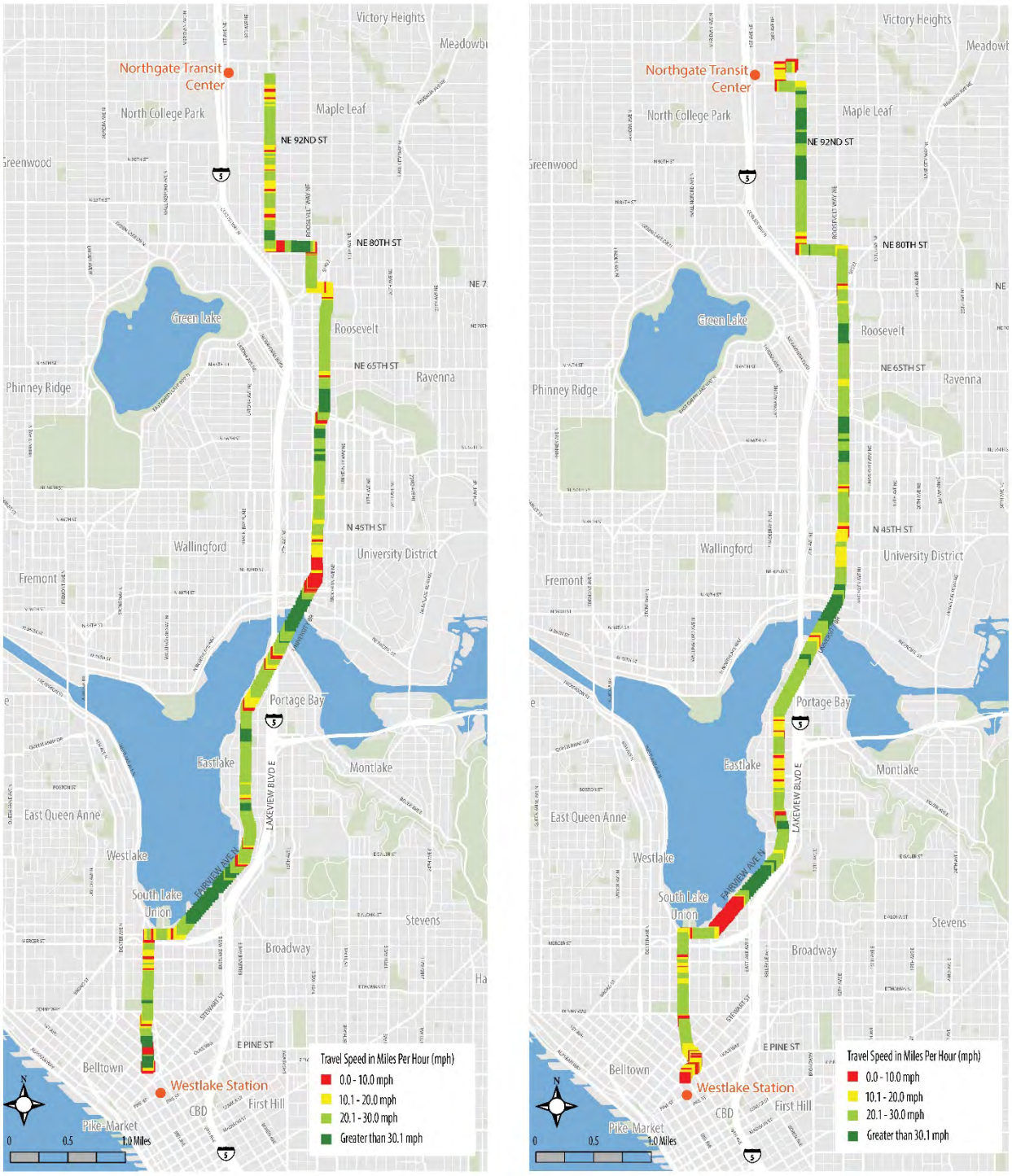


Figure 4-12. Observed Typical Travel Speed – PM Peak



4.9 Crash Analysis

A review of crash locations and high crash areas, including those involving pedestrian and bicycles, was conducted along the Roosevelt to Downtown Corridor. SDOT provided collision data for 2010 to 2014. This subsection summarizes the findings. Appendix G provides more detailed information about the crash analysis.

Table 4-5 below shows the overall collisions, as well as subtotals of property-damage-only (PDO) and injury collisions by corridor segments. In the past five years, there were a reported 657 collisions along the corridor. About one third of the reported collisions (568) involved at least one injury. Among the injury collisions, nearly one-third (an estimated 184 collisions) involved a pedestrian or bicyclist.

The highest number of collisions over the past five years occurred in the Downtown/South Lake Union segment, followed by the Roosevelt/University segment.

Table 4-5. Number of Collisions by Corridor Segment, Years 2010-2014

Study Corridor Segment	Total Collisions	Injury Collisions	PDO Collisions
Downtown/South Lake Union	621	204	417
Eastlake	229	97	132
Roosevelt/University	491	154	337
Northgate/Maple Leaf	316	113	203
Total Corridor	**1,657**	**568**	**1,089**

Source: SDOT and CDM Smith
Note: PDO = Property Damage Only

Eight locations experienced more than twenty collisions during the 5-year period. These locations are listed on **Table 4-6**. They are all located in the Downtown/South Lake Union (SLU) and Roosevelt/University segments of the corridor. All of these high crash areas are located at intersections, except for one mid-block location (the section of Roosevelt Way just north of 45th Street).

Table 4-6. Locations with more than 20 Collisions, 2010-2014

Location	Segment	Type	Total Collisions	Injury Collisions	% of Injury[1]
5th Av and Virginia St	Downtown/SLU	Intersection	52	18	35%
Fairview Av N and Mercer St	Downtown/SLU	Intersection	37	4	11%
11th Av NE and NE 45th St	Roosevelt/University	Intersection	30	16	53%
Roosevelt Way NE between NE 45th St and NE 47th St	Roosevelt/University	Midblock	25	2	8%
Mercer St and Westlake Av N	Downtown/SLU	Intersection	24	13	54%
Denny Way and Fairview Av N	Downtown/SLU	Intersection	23	8	35%
Roosevelt Way NE and NE 45th St	Roosevelt/University	Intersection	22	14	64%
Roosevelt Way NE and NE 50th St	Roosevelt/University	Intersection	22	6	27%

Source: SDOT and CDM Smith

Intersections with three or more pedestrian injury collisions during the 5-year period include:

- Roosevelt Way NE and NE 45th Street (5 pedestrian injury collisions);
- Denny Way and Fairview Avenue (4 pedestrian injury collisions) ;
- 12th Avenue NE and NE 75th Street (4 pedestrian injury collisions);
- Roosevelt Way NE and NE 65th Street (4 pedestrian injury collisions);
- 3rd Avenue NE and NE 103rd Street (3 pedestrian injury collisions); and,
- Roosevelt Way NE and NE 42nd Street N (3 pedestrian injury collisions).

Areas with high pedestrian volumes and high vehicle volumes, and/or complex intersections, result in more conflicts between pedestrians and vehicles.

Intersections with four or more bicycle injury collisions during the 5-year period include:

- Eastlake Avenue E and Fuhrman Avenue E (7 bicycle injury collisions);
- 11th Avenue NE and NE 45th Street (4 bicycle injury collisions);
- Section of Eastlake Avenue E between Harvard Avenue E and Fuhrman Avenue E (4 bicycle injury collisions);
- Roosevelt Way NE and NE 66th Street (4 bicycle injury collisions); and,
- Eastlake Avenue E and E Edgar Street (4 bicycle injury collisions).

Figures 4-13 and **4-14** show the locations where pedestrian and bicycle collisions occurred during the 5-year period. The Fuhrman Avenue intersection at Eastlake Avenue E and the midblock segment south of that intersection (to Harvard Avenue E) have a combined eleven collisions involving bicyclists. This location is an area with a high amount of vehicular and bicycle traffic using the University Bridge to the north and Eastlake Avenue. A substantial number of the bicycle collisions can be attributed to the travel patterns and higher conflicting movements.

Figure 4-13. Pedestrian Collision Summary

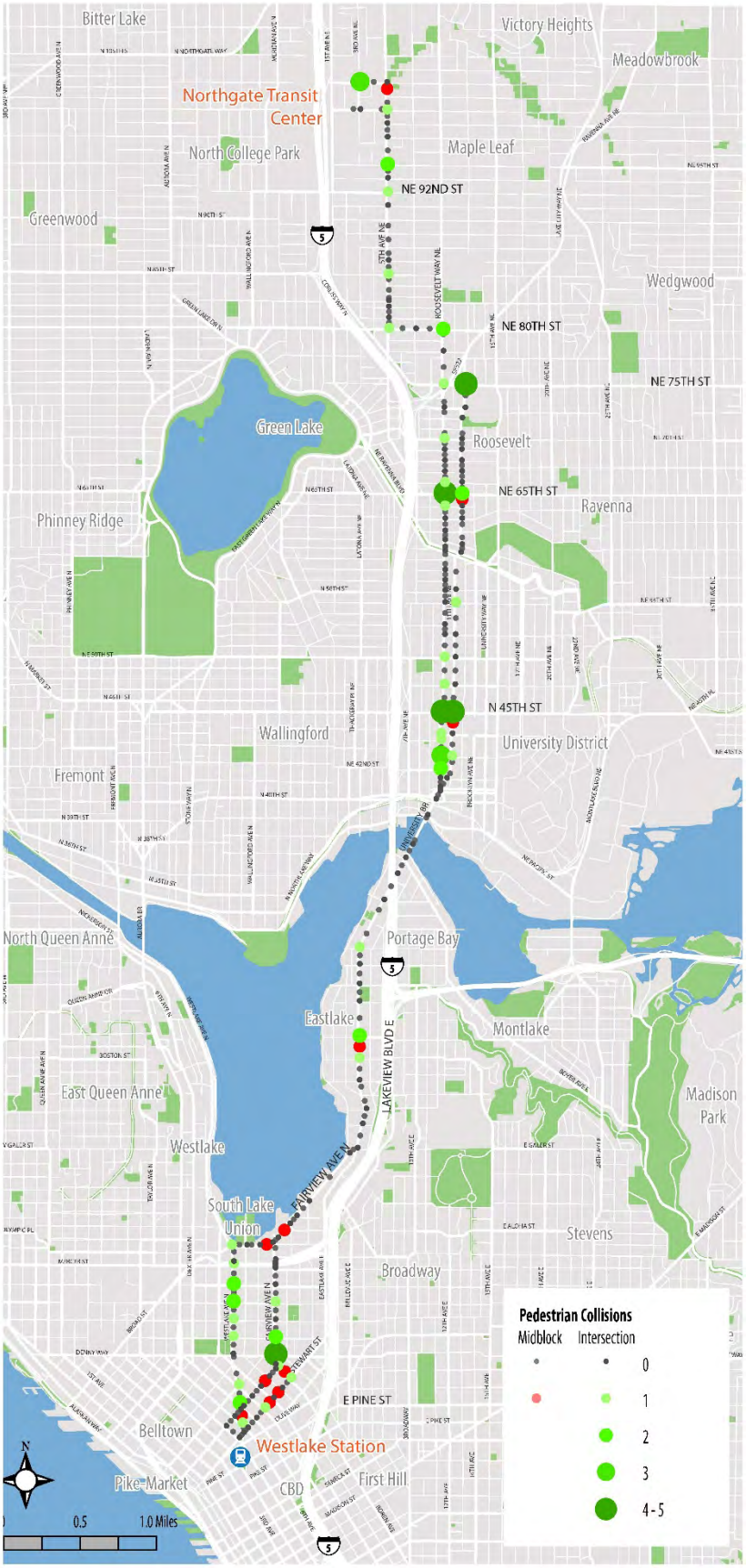
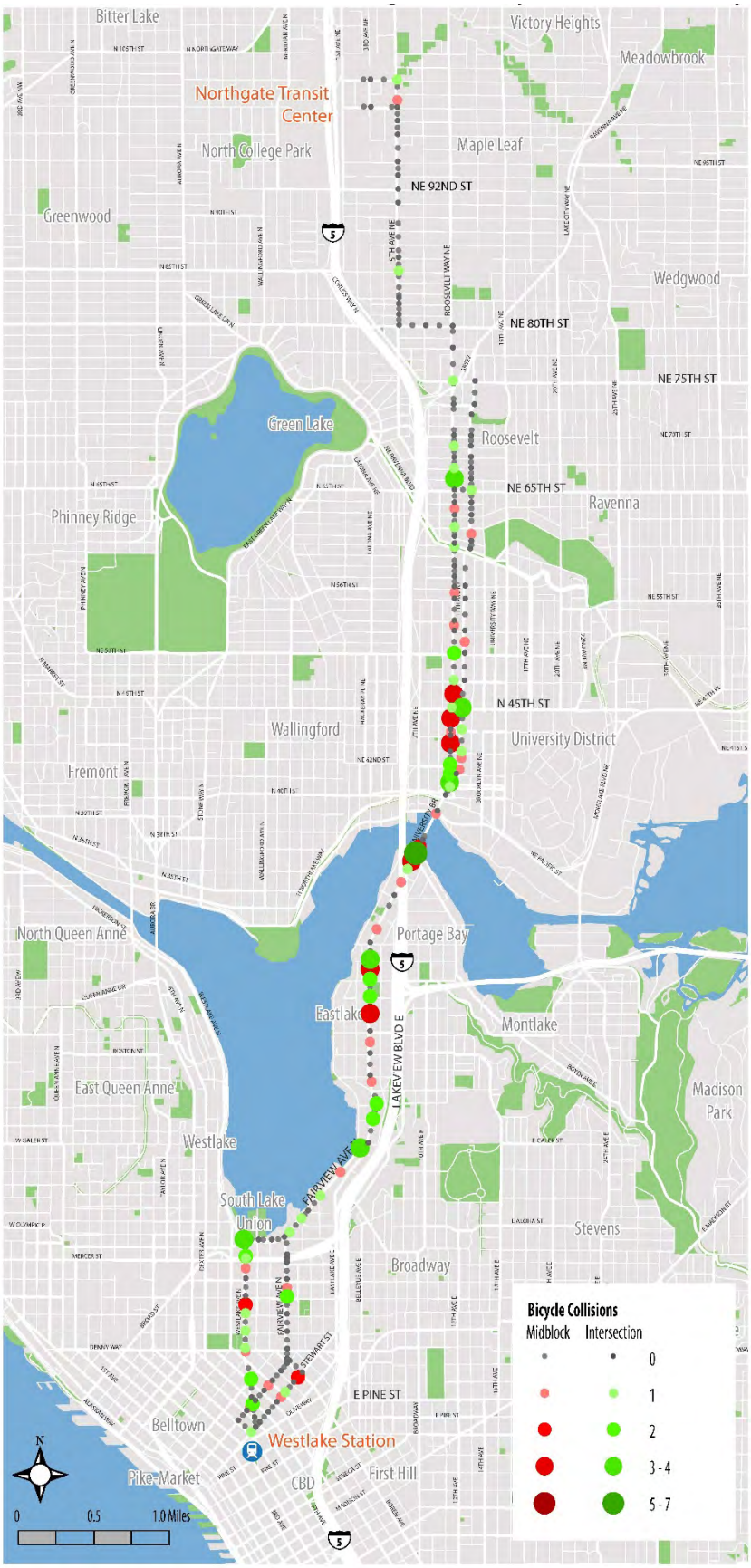


Figure 4-14. Bicycle Collision Summary



4.9.1 High-Collision Locations

SDOT maintains an annual list of locations that have high frequency of collisions. The high-collision locations are classified by SDOT into the following five categories:

- Signalized Intersection – A signalized intersection with 10 or more collisions reported in the previous year.
- Unsignalized Intersection – An unsignalized intersection with five or more collisions reported in the previous year.
- Mid-block Street Segment – A street segment with 10 or more collisions reported in the previous year.
- Pedestrian High-Collision Location – A location with five or more pedestrian collisions reported over the previous three years.
- Bike High-Collision Location – A location with five or more bike collisions reported over the previous three years.

A list of the most-recent (between years 2012 and 2015) high-collision locations that are within the boundaries of the RDHCT project is provided in **Table 4-7**. Overall, there are 20 high-collision locations within the study corridor and 6 locations in the vicinity of the corridor.

Table 4-7. High-Collision Locations, Years 2012-2015

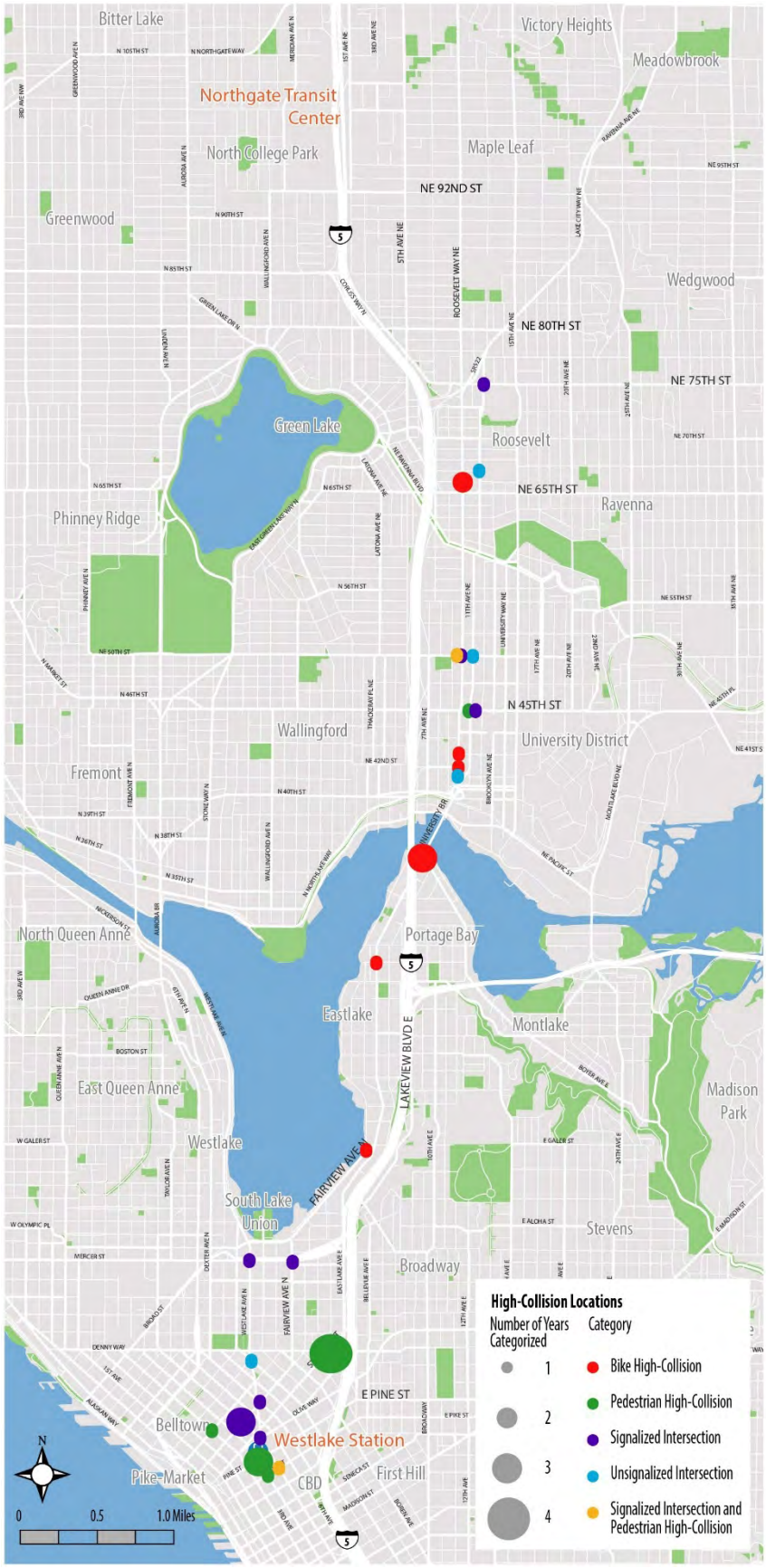
#	High-Collision Location	Category	Year of Categorization
Locations Within the Corridor			
1	3rd Avenue and 103rd Street	Pedestrian High-Collision Location	2015
2	4th Avenue and Pine Street	Pedestrian High-Collision Location	2012, 2013, 2014
3	5th Avenue and Olive Way	Signalized Intersection	2015
4	5th Avenue and Virginia Street	Signalized Intersection	2012, 2013, 2014
5	7th Avenue and Virginia Street	Signalized Intersection	2012
6	9th Avenue and Westlake Avenue	Unsignalized Intersection	2013
7	11th Avenue and 45th Street	Pedestrian High-Collision Location	2015
		Signalized Intersection	2014
8	12th Avenue and 67th Street	Unsignalized Intersection	2013
9	12th Avenue and 75th Street	Signalized Intersection	2014
10	Eastlake Avenue and Edgar Street	Bike High-Collision Location	2014
11	Eastlake Avenue and Fuhrman Avenue	Bike High-Collision Location	2012, 2014, 2015
12	Fairview Avenue East and Fairview Avenue North	Bike High-Collision Location	2015
13	Fairview Avenue and Mercer Street	Signalized Intersection	2012
14	Roosevelt Avenue and 41st Street	Unsignalized Intersection	2012
15	Roosevelt Avenue and 42nd Street	Bike High-Collision Location	2015
16	Roosevelt Avenue and 45th Street	Signalized Intersection and Pedestrian High-Collision Location	2015

Table 4-7. High-Collision Locations, Years 2012-2015

#	High-Collision Location	Category	Year of Categorization
17	Roosevelt Avenue and 50th Street	Signalized Intersection	2014
18	Roosevelt Avenue and 66th Street	Bike High-Collision Location	2012, 2013
19	Roosevelt Avenue, between 42nd Street and 43rd Street	Bike High-Collision Location	2014
20	Westlake Avenue and Mercer Street	Signalized Intersection	2012
Locations in the Vicinity of the Corridor			
21	3rd Avenue and Lenora Street	Pedestrian High-Collision Location	2012
22	4th Avenue and Pike Street	Pedestrian High-Collision Location	2015
23	5th Avenue and Pike Street	Signalized Intersection and Pedestrian High-Collision Location	2015
24	5th Avenue and 106th Street	Pedestrian High-Collision Location	2014
25	12th Avenue and 50th Street	Unsignalized Intersection	2015
26	Denny Way and Stewart Street	Pedestrian High-Collision Location	2012, 2013, 2014, 2015

Source: SDOT

Figure 4-15. High-Collision Locations by Category



Section 5
Transit Conditions

Multiple transit bus and rail services operate throughout the Seattle region, primarily operated by King County Metro Transit and Sound Transit. A description of transit services follows, including a broad description of service in the Seattle region as well as a more detailed description of service directly along the Roosevelt to Downtown High Capacity Transit (RDHCT) Corridor.

5.1 Rail Service

Three transit operators provides several types of rail service in the Seattle region. All of the rail systems provide service to stations in the vicinity of the RDHCT Corridor.

Sound Transit provides rail service via the Link Light Rail and Sounder Train. Sounder is the only regional rail service provided in the region. Its trains travel between Lakewood and Seattle (making stops in South Tacoma, Tacoma, Puyallup, Sumner, Auburn, Kent and Tukwila) and between Everett and Seattle (making stops in Mukilteo and Edmonds). Sounder regularly runs weekday mornings and afternoons only. Sounder also serves select major weekend events such as Mariners and Seahawks games.

The Link is an urban light rail service. One line, the Central Link, is currently operating in the project area. The system is presently undergoing expansion via the University Link Extension, extending Central Link northward from downtown Seattle to the University of Washington, including along the corridor with new connections between Northgate, Roosevelt, and University District. Additional expansion will extend Link light rail north via Northgate to Lynnwood, south to Redondo Heights Park & Ride in Federal Way, and east via Mercer Island and Bellevue to Microsoft's main campus in Redmond.

Seattle Monorail Services runs the Seattle Center Monorail, which operates along Fifth Avenue between Seattle Center in Lower Queen Anne and Westlake Center in Downtown.

SDOT provides rail service via the Seattle Streetcar South Lake Union Line. The line provides service from the South Lake Union neighborhood to Seattle's downtown core. It includes seven stops along the 1.3 mile line. The line connects to Seattle's other public transit systems, including Link Light Rail, the Monorail, and several bus points. (The line is operated by King County Metro under contract to SDOT).

SDOT is expanding the streetcar network to include additional lines:

- First Hill Streetcar: will provide connections with Link Light Rail at the Capitol Hill Station and International District Station, as well as Sounder Commuter Rail and Amtrak intercity rail at King Street Station. This line will likely be operational in 2016. SDOT is planning to extend this line a half-mile further on Broadway to serve the commercial core of Broadway
- Center City Connector: segment to link the South Lake Union and First Hill Streetcar lines, creating a system that will connect over a dozen Seattle neighborhoods in Seattle's Center City, and allow connections between the RDHCT Corridor and all the areas served by the Streetcar.

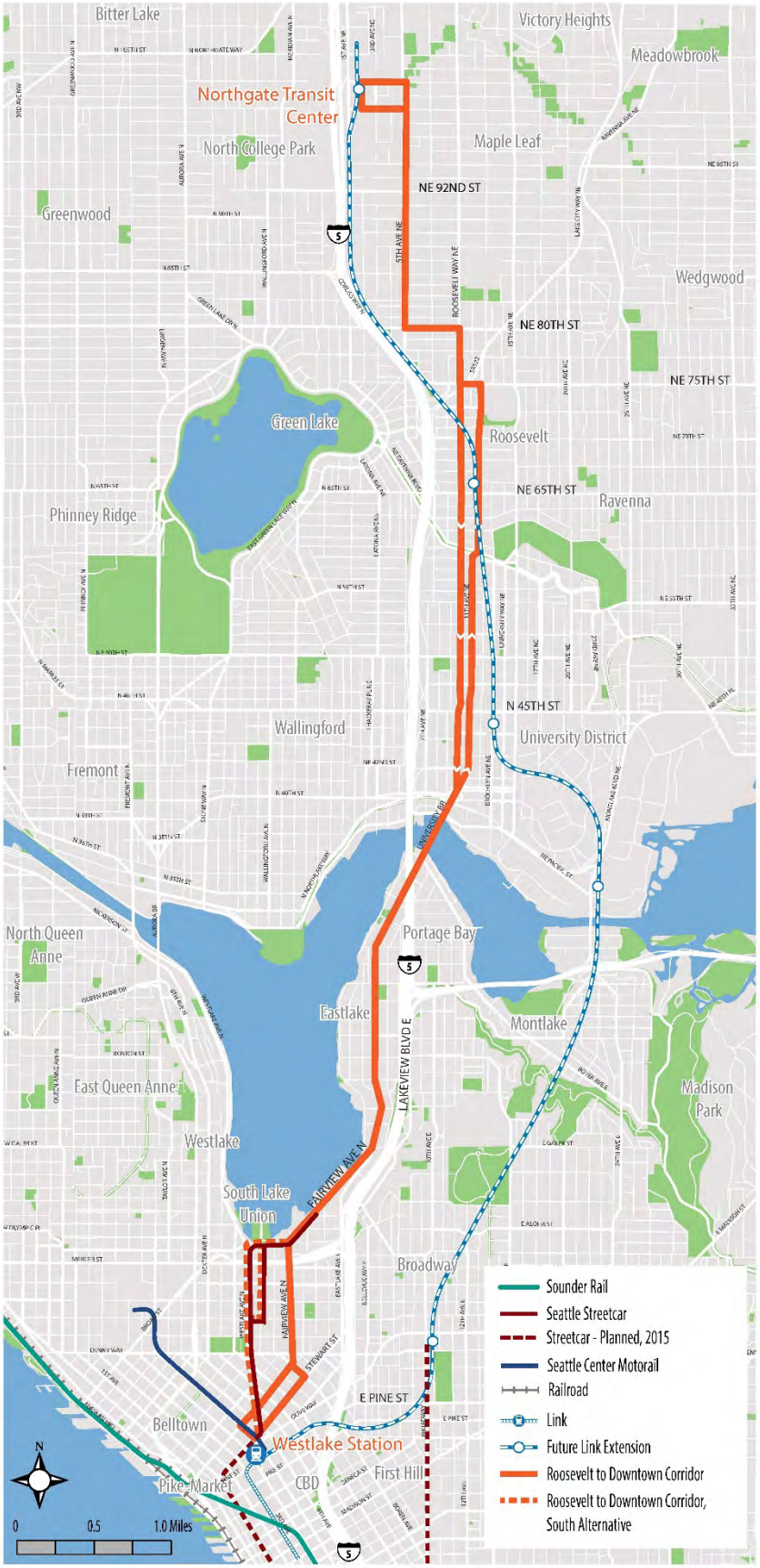
Additional details regarding each system is shown in **Table 5-1**; the routes are shown on **Figure 5-1**.

Table 5-1. RDHCT Corridor Rail Service

Service	Rail Line	Connecting Station(s)	Termini	Max Daily Span	Frequency	Status
Link Light Rail	Central Link	Westlake	Westlake to SeaTac Airport	5 AM – 1 AM	7.5 to 15 minutes	Operational
Link Light Rail	University Link	Westlake	Westlake to University of Washington	5 AM - 1 AM	6 to 15 minutes	Planned 2016 Open
Link Light Rail	Northgate Link	Roosevelt, Northgate	University of Washington to Northgate	5 AM - 1 AM	4 to 15 minutes	Planned 2021 Open
Link Light Rail	Lynwood Link	Northgate	Northgate to Lynnwood	TBD	TBD	Planned 2023 Open
Link Light Rail	East Link	Westlake	Westlake to Redmond	TBD	TBD	Planned 2023 Open
Seattle Center Monorail	Monorail	Westlake	Westlake to Seattle Center	7:30 AM – 11 PM	10 minutes	Operational
Streetcar	South Lake Union	Westlake and various others depending on Roosevelt HCT Routing	Westlake to Fairview Ave	6PM – 11 PM	10 to 15 minutes	Operational
Streetcar	Center City Connector	Westlake	Westlake to Occidental Mall	TBD	TBD	Under Development

Source: Sound Transit System Map, 2015; Seattle Street Car Map, 2015

Figure 5-1. Rail Service



5.2 Bus Service

The majority of Seattle bus service within the city is provided by Sound Transit and King County Metro.

5.2.1 King Country Metro

Most King County Metro bus routes run early morning through late evening, every 10 to 30 minutes. Buses stop approximately every block (1/8 mile) or every other block (1/4 mile) at posted signs, which give basic route and service information. Most routes provide weekend and late night service, still generally running at least every 30 minutes. All buses are accessible for passengers needing a wheelchair lift or ramp, and all buses have bike racks. King County Metro's current fleet of 1,614 buses each seat between 30 and 58 patrons, with an additional 30-50% of patrons that could be comfortably accommodated standing. Crush capacities are much higher with a maximum of approximately 95 patrons on a 60-foot articulated bus.

King County Metro bus service is provided throughout RDHCT Corridor. Currently, as shown in **Table 5-2** and on **Figure 5-2**, there are three King County Metro bus routes that operate along the major portions of the RDHCT Corridor (66, 67, and 70). Four express routes provide other major north-south service on significant portions of parallel roadways (71X, 72X, 73X, and 74X). After 10 PM, the 71, 72, and 73 express routes become local and replace the Route 70 service on the corridor. Four additional local routes, plus two express sub-routes, provide parallel service along limited sections of the corridor (5/5X, 26/26X, RapidRide C (in March 2016), and E lines) although these are all in the downtown and South Lake Union areas. Nine routes run perpendicular to the corridor (8, 31, 32, 44, 48, 49, 64, 68, and 76) with 13 routes providing direct connections at the University District Transfer Point (25, 30, 65, 75, 271, 372) and Northgate Transit Center (16, 41, 68, 75, 242, 303, 345, 347). However, Metro service will be restructured with service on the new Link rail lines is operational.

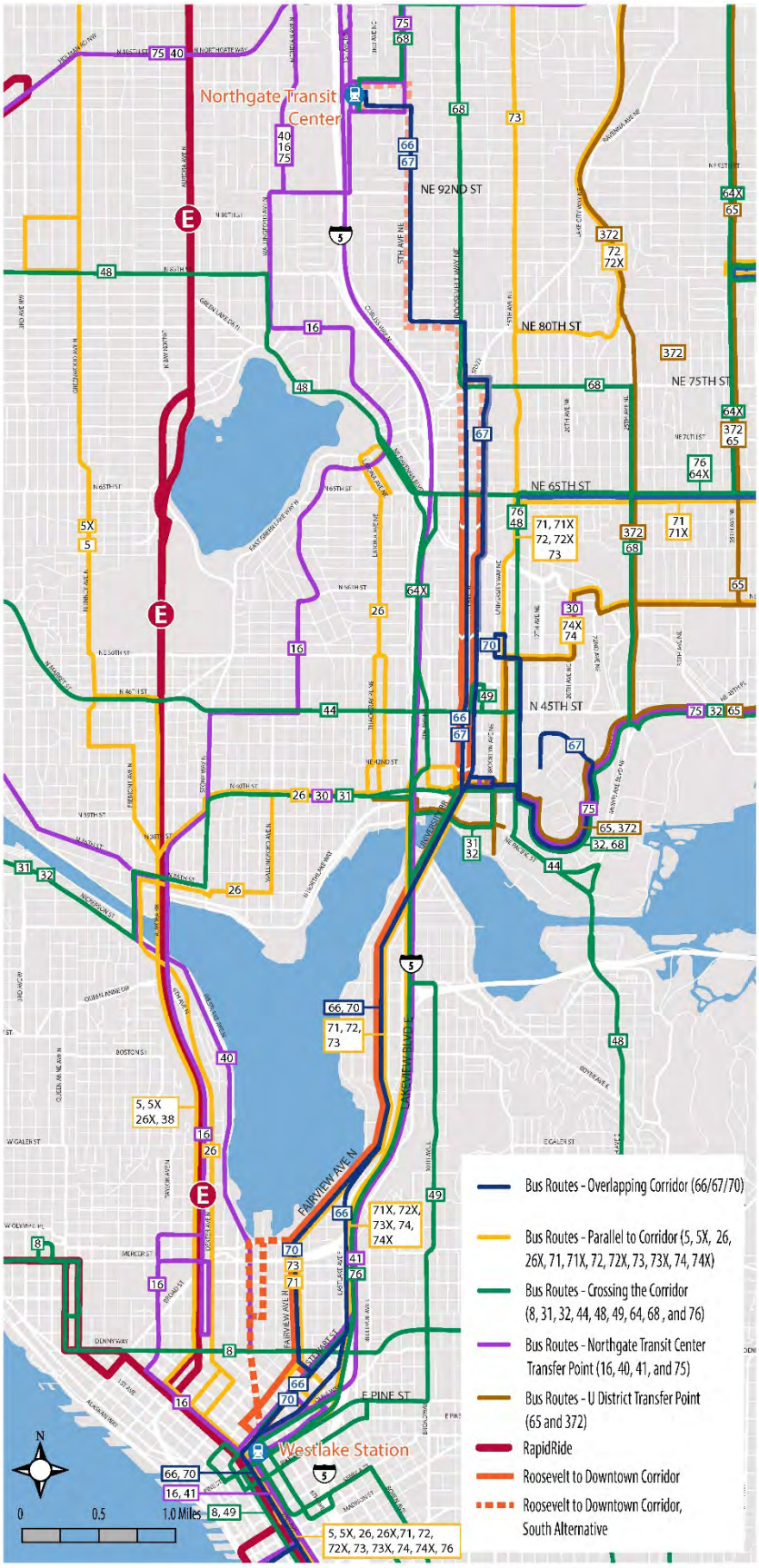
Though there are many north-south transit options and connecting service throughout the RDHCT Corridor, routes 66, 67, and 70 are the routes providing equivalent local bus service. These three routes are used in the subsequent performance analysis.

Table 5-2. RDHCT Corridor King County Metro Bus Service

Route Number	Route	Relationship to RDHCT
66/67	Northgate TC to Roosevelt to University District or Downtown Seattle	Directly on Corridor
70	University District to Eastlake to Downtown Seattle	Directly on Corridor
71	Wedgwood to University District to Downtown Seattle	Replaces Route 70 after 10 PM
71X	Wedgwood to University District to Downtown Seattle via I-5	Express direct compete for some trips
72	Lake City to to University District Downtown Seattle	Replaces Route 70 after 10 PM
72X	Lake City to University District to Downtown Seattle via I-5	Express direct compete for some trips
73	Jackson Park to Cowen Park to to University District Downtown Seattle	Replaces Route 70 after 10 PM
73X	Jackson Park to Cowen Park to University District to Downtown Seattle via I-5	Express direct compete for some trips
74X	Sand Point to to University District Downtown Seattle	Express direct compete for some trips
5	Shoreline Community College to Greenwood to Downtown Seattle	Parallel but unlikely competing
5X	Greenwood to Downtown Seattle	Parallel but unlikely competing
26	East Green Lake to Downtown Seattle via Dexter Ave N	Parallel but unlikely competing
26X	East Green Lake to Downtown Seattle via Aurora Ave N	Parallel but unlikely competing
Rapid Ride C	Westwood Village to Fauntleroy Ferry to Alaska Junction to Downtown Seattle to South Lake Union	Connects to corridor and provides some service in the SLU area (starting March 2016)
Rapid Ride E	Aurora Village to Downtown Seattle	Connects to corridor and provides some service near the SLU area
8	Seattle Center to Capitol Hill to Rainier Beach	Perpendicular to Corridor
31	University District to Fremont to Central Magnolia	Perpendicular to Corridor
32	University District to Fremont to Interbay to Seattle Center West	Perpendicular to Corridor
44	Ballard to Montlake	Perpendicular to Corridor
48	Mt Baker to University District to Loyal Heights	Perpendicular to Corridor
49	University District to Broadway to Downtown Seattle	Perpendicular to Corridor
64	Lake City to Downtown Seattle to First Hill	Perpendicular to Corridor
68	Northgate TC to Ravenna to University District	Perpendicular to Corridor/ Northgate Transit Center
76	Wedgwood to Downtown Seattle via I-5	Perpendicular to Corridor
25	Laurelhurst, University District, Montlake, Downtown Seattle	University District Transfer Point
30	Sand Point to University District	University District Transfer Point
65	Lake City to University District	University District Transfer Point
271	Issaquah to Eastgate to Bellevue to University District	University District Transfer Point
372	Woodinville P&R to University District	University District Transfer Point
16	Northgate TC to Downtown Seattle (local)	Northgate Transit Center
41	Lake City to Northgate TC to Downtown Seattle (express)	Northgate Transit Center
75	Northgate TC to Lake City to Sand Point to University District	Northgate Transit Center
242	Ridgecrest to Overlake P&R	Northgate Transit Center
303	Shoreline P&R to First Hill	Northgate Transit Center
345	Shoreline Community College to Northgate TC	Northgate Transit Center
347	Mountlake Terrace TC to Northgate TC	Northgate Transit Center

Source: King County Metro Bus Map, 2015

Figure 5-2. RDHCT Corridor King County Metro Bus Service



As part of a November 2014 initiative, Seattle voters approved Proposition 1, which provides funds for the City's investment in expanded Metro bus service. The service expansion is based on existing King County Metro Service Guidelines, the Seattle Transit Master Plan recommendations, and route performance data. It seeks to improve service by reducing bus overcrowding, increasing bus reliability, and increasing bus frequency. Consideration for service investments was undertaken on all bus routes that have at least 80 percent of their stops within the City of Seattle. Roughly 85 percent of the routes in Seattle will see an investment. In particular, the expanded service seeks to address issues with off-peak service, with just over 71 percent of investments going to off-peak service, improving frequency and reliability for a diverse set of riders who use the service throughout the day, evening, and night. The majority of the new service is set to begin in June and September 2015, with some in March 2016.

5.2.2 Sound Transit

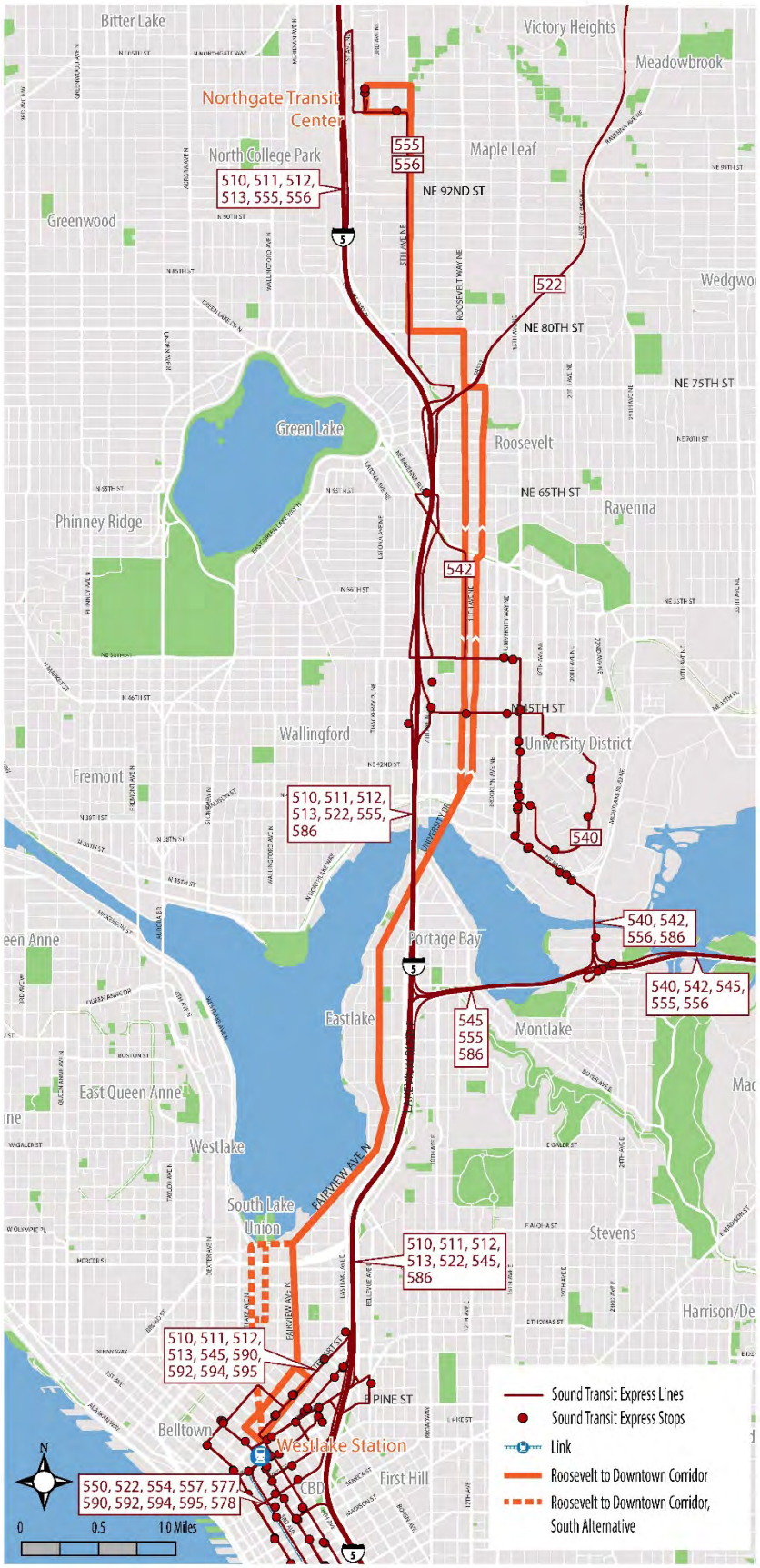
Sound Transit provides express bus service to urban centers in King, Snohomish, and Pierce Counties, mainly between major cities and job centers. For popular routes, Sound Transit bus service is offered seven days a week between 5 AM and 1 AM. Headways may be as frequent as every few minutes during peak periods and usually never longer than 30 minutes. Most routes connect with King County Metro and other Sound Transit routes. Thirteen routes, as listed in **Table 5-3** and shown on **Figure 5-3**, provide express service between various urban areas around the region and Downtown Seattle, with stops adjacent to the RDHCT Corridor. While these express routes parallel or have stops along the corridor, the routes primarily serve a different market than the service proposed to run on the RDHCT Corridor. Sound Transit service is generally not used for local travel.

Table 5-3. Sound Transit Bus Service

Route Number	Route
512	Everett to Lynnwood to Seattle
540	Kirkland to Evergeen Point to Montlake to U. District
542	Redmond to Overlake to U. District to Green Lake
555/556	Issaquah to Eastgate to Bellevue to University District (556) to Northgate
586	Tacoma to U. District

Source: Sound Transit System Schedule, 2015.

Figure 5-3. Sound Transit Express Bus Service

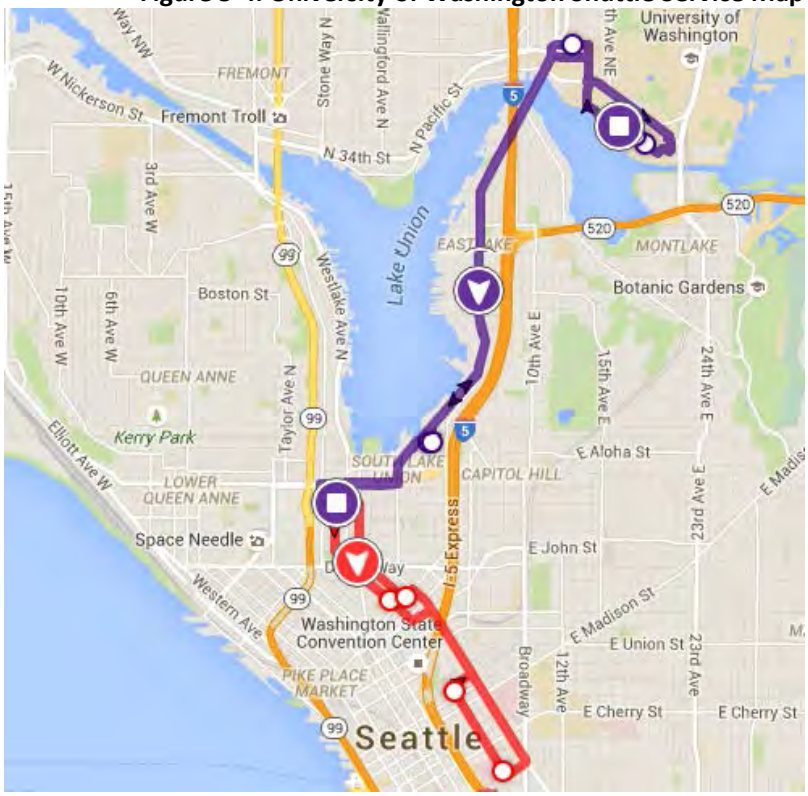


5.2.3 Private Shuttles

Some private shuttles also provide limited service in the Seattle area, some of which provides similar service to public transit routes. Private shuttles include:

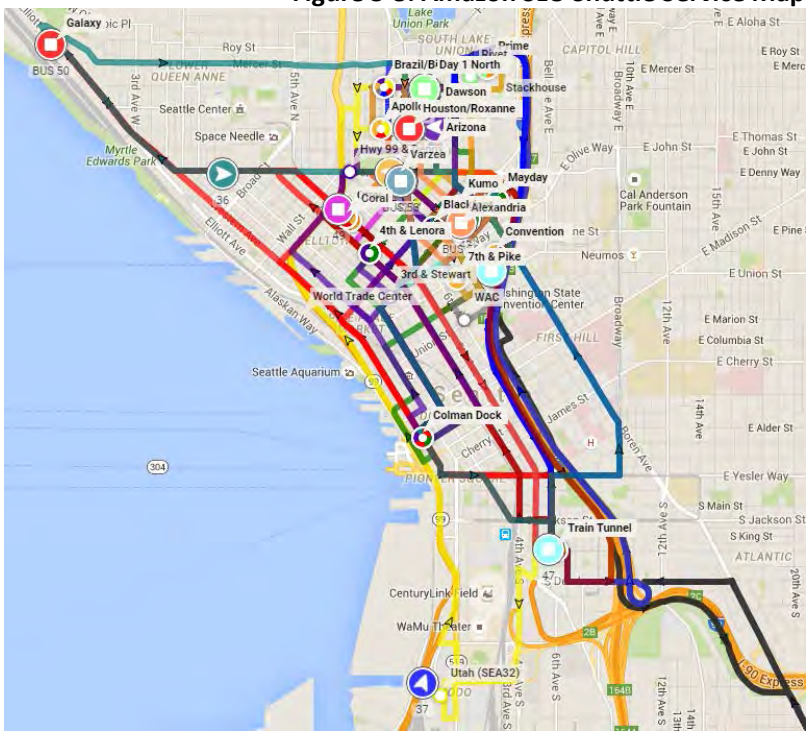
- University of Washington provides service from its medical center to South Lake Union (SLU) and from SLU to Harborview. Service is available to faculty, staff, students, as well as medical center patients and their families, as shown in **Figure 5-4.**

Figure 5-4. University of Washington Shuttle Service Map



- Amazon provides shuttle service for its employees around the downtown area, connecting employees to its campus in SLU.

Figure 5-5. Amazon SLU Shuttle Service Map



- Microsoft's Connector service transports Microsoft employees from various areas in Puget Sound to and throughout its campus in Redmond. The service includes daily fixed routes as well as on-demand service.

- Seattle Children's Hospital provides a free van service to and from the hospital main campus for patients and families traveling through Seattle's Sea-Tac Airport, Amtrak train station, Ferry terminals, and Greyhound bus station. The shuttle requires 24 hours' notice.

5.3 Corridor Bus Service Characteristics

5.3.1 Bus Stops

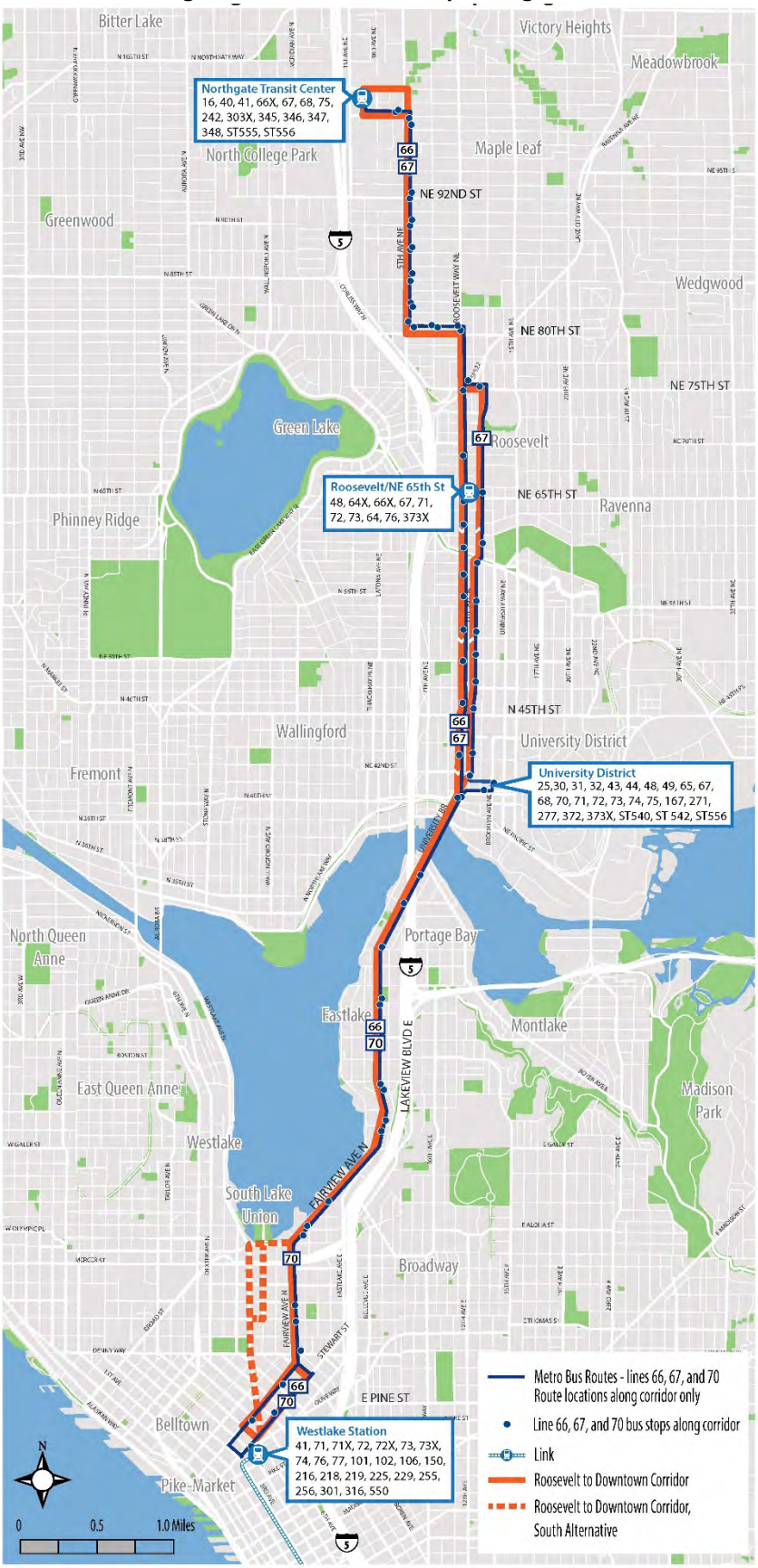
There are currently 130 King County Metro and Sound Transit bus stops along RDHCT Corridor, with approximately one stop every other block. The amenities and location (near- vs. far-side) vary at each stop, based on boarding and alighting activity and roadway geometrics, respectively. Bus stop locations are shown in **Figure 5-6**. Additional information regarding bus stops can be found in Appendix H.

- Passenger Amenities: Less than half of the existing stops have shelters (38%) and fixed benches (44%).

- Platform Area: About half of the existing stops (51%) did not have a clear rear landing pad. More than half of the existing stops (65%) have a sidewalk cross slope that exceed the 1:48 maximum slope allowed by ADA (2010 edition) and ANSI A117.1 (2009 edition).
- Lighting: Stop lighting is inconsistent along the corridor. Only 4% of the stops had interior shelter lighting, and 5% had pedestrian-scaled lighting.
- Passenger Information: Passenger information provided at the stops is inconsistent along the corridor. Four types of passenger information signs that exist along the corridor including: schedule, route map, system map, and general bus information. Schedule and general bus information were the most prevalent pieces provided, with both items present at 40% of the stops. Only two stops along the corridor had all four types of passenger information signs.

The corridor also features several major transit centers, where local bus service connects with other transportation modes. Northgate Transit Center is located at the northern terminus of the RDHCT Corridor and features 296 parking spaces plus bicycle lockers. Westlake Station does not have any on-site parking available but has connections to many other transit services. Additional Sound Transit Link stations are currently under development along the RDHCT Corridor, including Capitol Hill, University of Washington, U District, and Roosevelt.

Figure 5-6. Current Bus Stops along the RDHCT Corridor



5.3.2 Primary Corridor Service

Currently, King County Metro bus routes 66, 67, and 70 provide primary north-south service along the RDHCT Corridor. Route 66 is an express version of the 67 and terminates in Downtown Seattle, whereas Route 67 ends in the University District. During weekday peak periods, the frequency of each bus route along the corridors is 10-30 minutes; when all the routes run concurrently, a bus will arrive at a given stop as frequently as every 5-10 minutes. The operational service characteristics of each primary north-south bus route along the corridor are detailed in **Table 5-4.** The significant amount of service on the corridor is indicative of the strong demand for transit service.

With the introduction of new Link Light Rail service, two alternative network concepts for Metro bus restructuring are under consideration. Alternative 1 would provide for only weekday peak service on 66, expand the span of service and increase frequencies on the 67. Alternative 2 would delete the 66 and 67. Both alternatives would increase expand the span of service and increase frequencies on the 70.

Table 5-4. Primary Corridor Service Operational Characteristics

Route	Northern/Southern Terminus	Hours	Peak Headway	Off Peak Headway
66 67	North: Northgate South: S Washington St & 4th Ave S (Except 67 which terminates on the UW Campus)	Weekday: 5 AM – 12 AM Saturday: 5 AM – 12 AM Sunday: 7 AM – 12 AM Weekday: 6 AM – 9 PM	10-15 min 30 min 30 min 10-15 min	~30 min 30 min 30 min ~30 min
70	North: University District at NE 50th St & Brooklyn Ave NE South: Downtown Seattle at 3rd Ave & Union St	Weekday: 7 AM – 7 PM Saturday: 9 AM – 6 PM	10-15 min 15 min	10-15 min 15 min

5.4 Ridership

5.4.1 Daily Ridership

In Spring 2014, the King County Metro average weekday bus ridership on routes 66, 67, and 70 was 8,271, as shown in **Table 5-5.** While bus ridership on these routes occurs throughout the day, over 60% of the ridership occurs during the AM (5 to 9) and PM (3 to 7) peak periods.

Table 5-5. Average Weekday King County Metro Bus Ridership – Routes 66, 67, and 70

Route	AM (5-9)	Midday (9AM-3PM)	PM (3-7)	Evening (7-10)	Late Night (10PM-5AM)	Total Ridership	Percent of Corridor
66 (Express)	***604***	***528***	***863***	***219***	***60***	***2,274***	***27.5%***
Inbound	379	268	283	78	26	1,034	12.5%
Outbound	225	260	580	141	34	1,240	15.0%
67 (Local)	***192***	***406***	***551***	***188***	***7***	***1,344***	***16.2%***
Inbound	185	203	110	72	0	570	6.9%
Outbound	7	203	441	116	7	774	9.4%
70 (Local)	***1,026***	***1,648***	***1,879***	***100***	***0***	***4,653***	***56.3%***
Inbound	506	881	959	77	0	2,423	29.3%
Outbound	520	767	920	23	0	2,230	27.0%
Total	**1,822**	**2,582**	**3,293**	**507**	**67**	**8,271**	***27.5%***

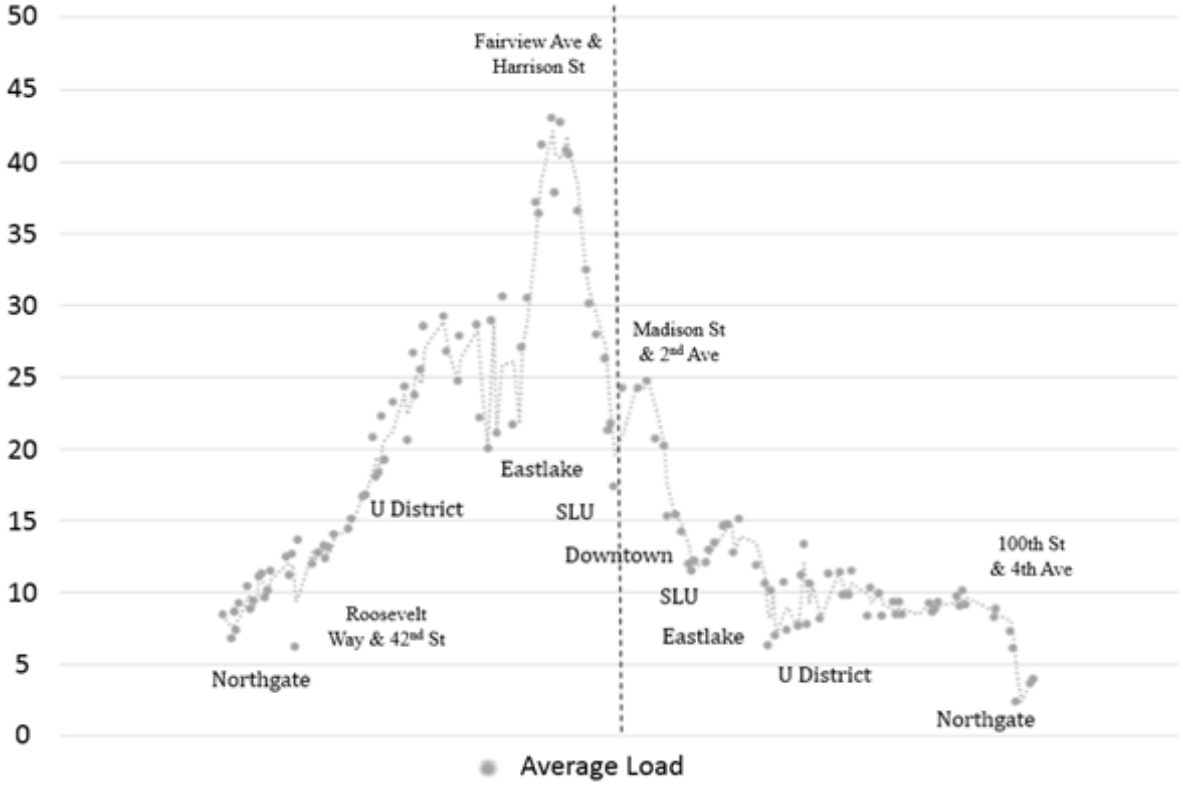
Note: Summary here includes all ridership on these routes. Parts of route 67 operate outside of the RDHCT Corridor.

Source: King County Metro Ridership Data 2014

Figure 5-7 shows the average number of passengers on each bus at each stop for all trips during the AM peak period along the corridor on all route 66, 67, and 70 buses. This provides an indication of the demand along the corridor. Each point along the horizontal access represents a stop along the corridor as buses travel southbound from Northgate to Downtown, then return northbound from Downtown to Northgate. The dotted line in the center represents the southern end of the line. The location of several prominent neighborhoods along the corridor, including Northgate, University District, Eastlake, South Lake Union (SLU), and Downtown are noted with text in the figure. The figure shows that buses gain passengers heading southbound, then many passengers exit the bus in the vicinity of Eastlake and SLU. When buses head north, passengers steadily exit the bus from Downtown to Northgate.

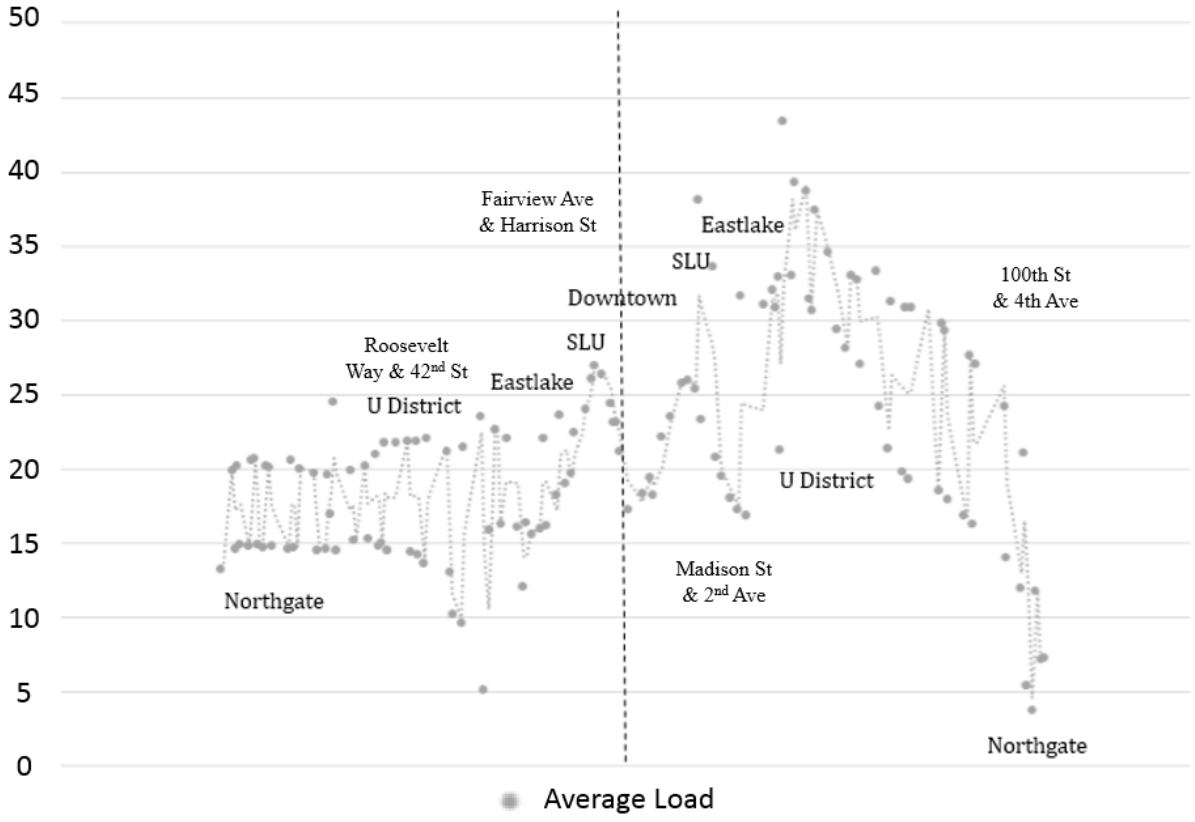
Figure 5-8 provides the same information for the PM peak period. During the PM peak, southbound travel is lighter but more volatile. Northbound travel is heavier with many passengers boarding in Eastlake and SLU and alighting at Northgate. In both time periods, the figures use average passenger load. Therefore, the figures show some turnover between sequential stops along the corridor. **Figure 5-9** denotes total weekday ridership by time of day, from early morning to late night.

Figure 5-7. Average AM Weekday Passengers per Bus by Stop – Northgate to Downtown (Left of Center) & Downtown to Northgate (Right of Center)



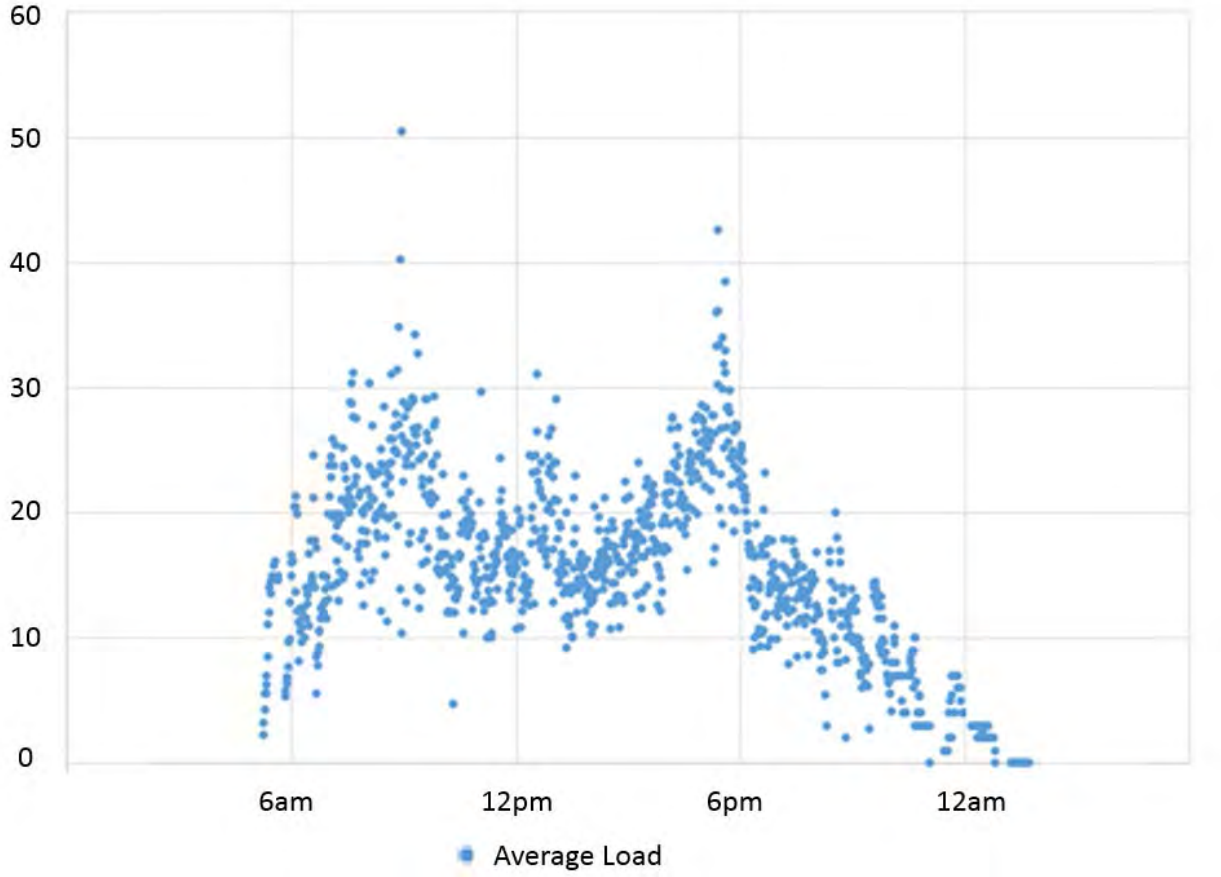
Source: King County Metro Ridership Data 2014

Figure 5-8. Average PM Weekday Passengers per Bus by Stop – Northgate to Downtown (Left of Center) & Downtown to Northgate (Right of Center)



Source: King County Metro Ridership Data 2014

Figure 5-9. Average Weekday (Spring 2014) Passenger Load by Time of Day



Source: King County Metro Ridership Data 2014

5.4.2 Boardings & Alightings

In Spring 2014, 28 of the 107 bus stops along routes 66, 67, and 70 had 100 or more average daily boardings. **Table 5-6** lists the cross streets of bus stops by the number of boardings. Only stops with a hundred or more boardings are included.

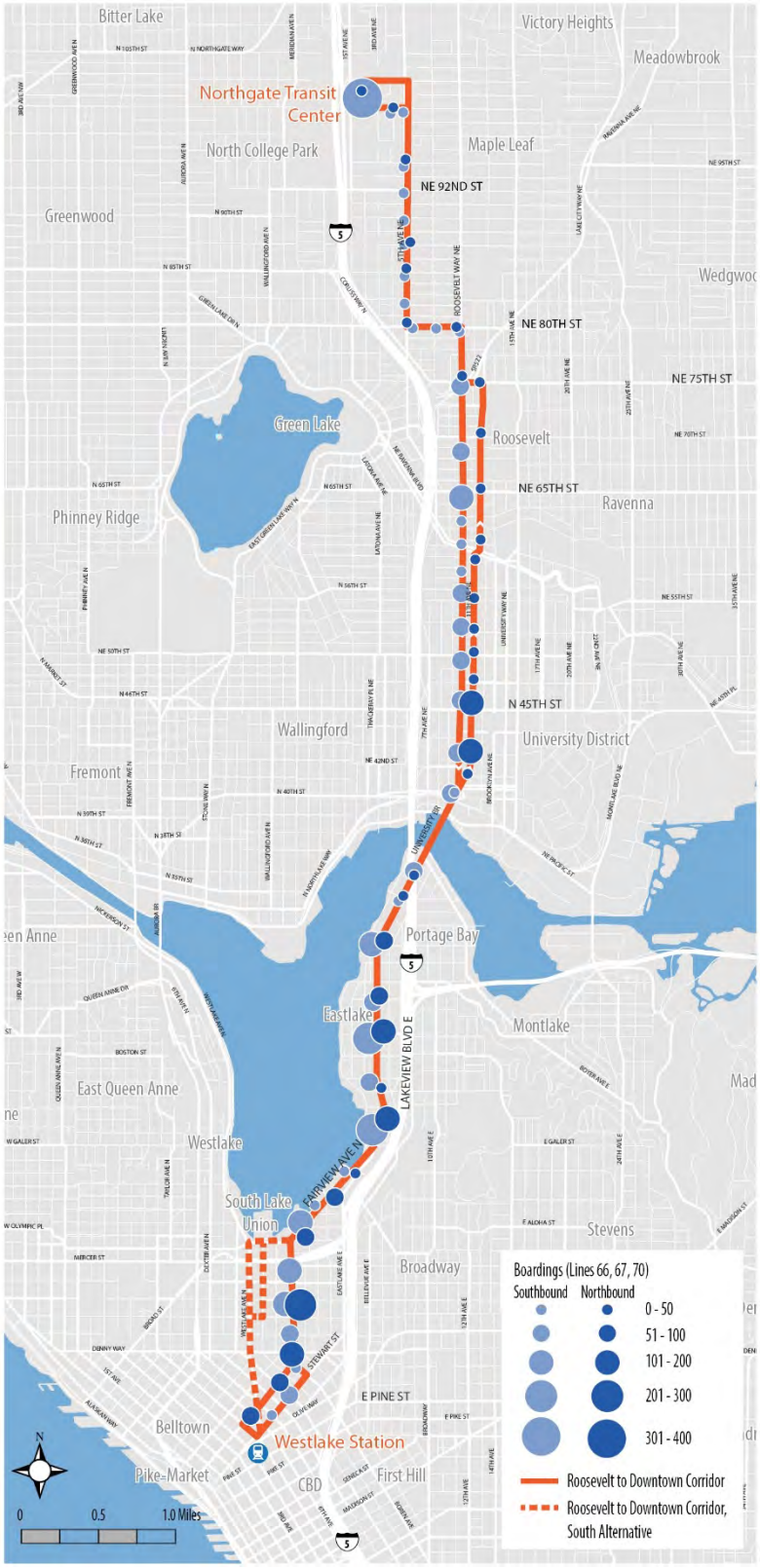
Table 5-6. Average Daily (Spring 2014) Routes 66, 67, and 70 Top Boardings by Bus Stop

Stop Location	Inbound	Outbound	Total
3rd Ave & Pike St	0	651	651
Eastlake Ave E & E Lynn St	242	142	384
Northgate TC AcRd & NE 100th St	368	1	369
Fairview Ave N & Harrison St	129	204	333
Eastlake Ave E & E Garfield St	203	106	309
NE Campus Pkwy & 12th Ave NE	300	0	300
15th Ave NE & NE Campus Pkwy	215	0	215
3rd Ave & Seneca St	0	184	184
3rd Ave & Columbia St	0	184	184
11th Ave NE & NE 45th St	0	176	176
Eastlake Ave E & E Hamlin St	107	54	161
Stevens Way & Benton Ln	0	146	146
Fairview Ave & Denny Way	0	142	142
Brooklyn Ave NE & NE 50th St	135	0	135
15th Ave NE & NE 50th St	134	0	134
Eastlake Ave E & E Louisa St	78	52	130
Fairview Ave N & Yale Ave N	40	83	123
Olive Way & 6th Ave	0	121	121
Eastlake Ave E & Harvard Ave E	74	44	118
S Main St & 3rd Ave S	0	111	111
Fairview Ave N & Mercer St	111	0	111
Prefontaine Pl S & Yesler Way	0	111	111
1st Ave & Marion St	2	108	110
11th Ave NE & NE 42nd St	0	110	110
Roosevelt Way NE & NE 65th St	107	0	107
Fairview Ave N & Aloha St	107	0	107
Stevens Way & Garfield Ln	0	104	104
Eastlake Ave E & Aloha St	35	69	104

Source: King County Metro Ridership Data 2014

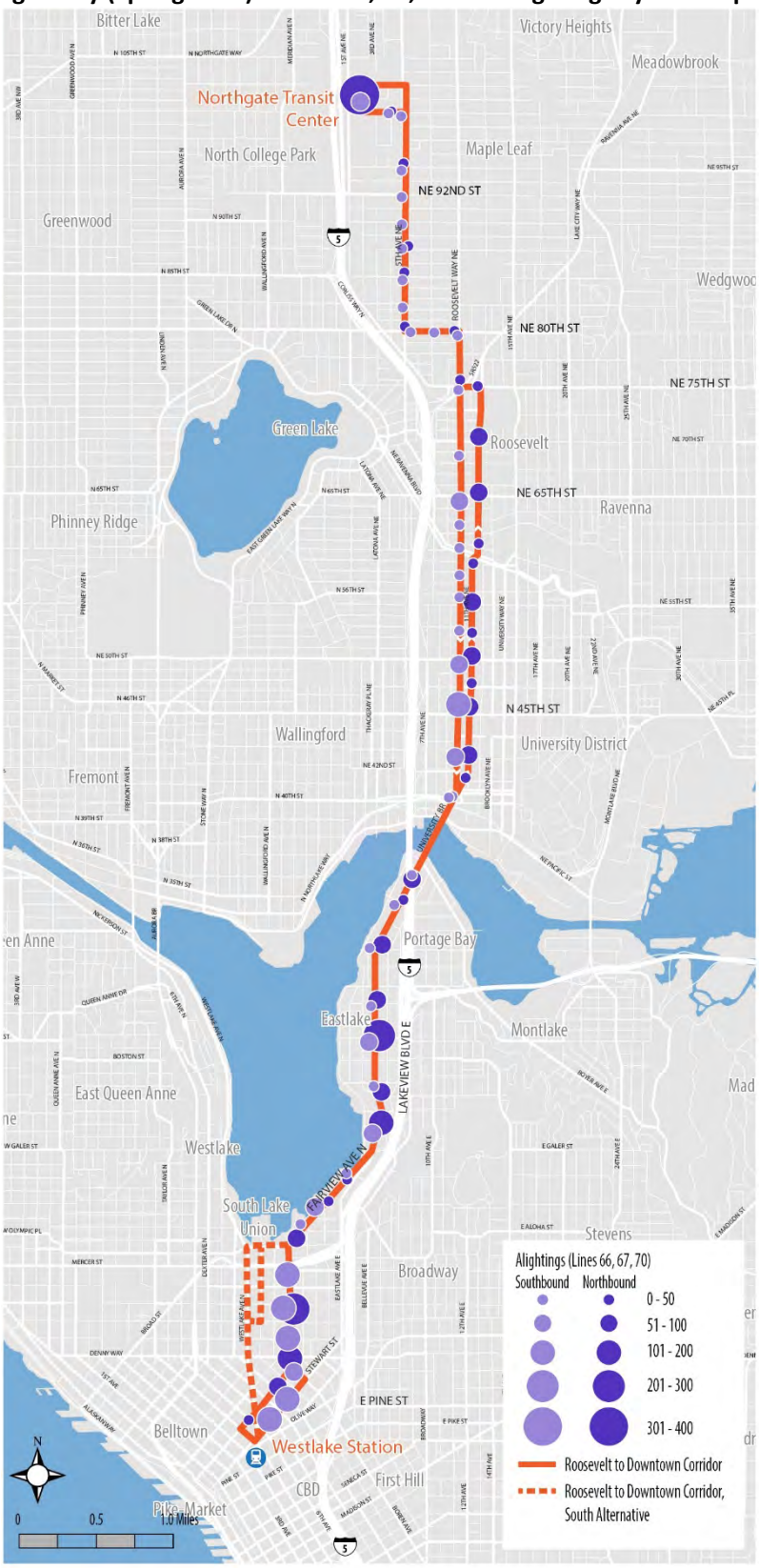
Figure 5-10 and **Figure 5-11** show maps of boardings and alightings along the corridor, respectively. The highest boarding and alighting stations are located in the Eastlake and SLU neighborhoods as well as at the Northgate Transit Center. Many of these trips are likely associated with transfers to other modes and connections to downtown employment and commercial activities.

Figure 5-10. Average Daily (Spring 2014) Routes 66, 67, and 70 Boardings by Bus Stop



Source: King County Metro Ridership Data 2014

Figure 5-11. Average Daily (Spring 2014) Routes 66, 67, and 70 Alightings by Bus Stop



Source: King County Metro Ridership Data 2014

5.5 Bus Travel Speed

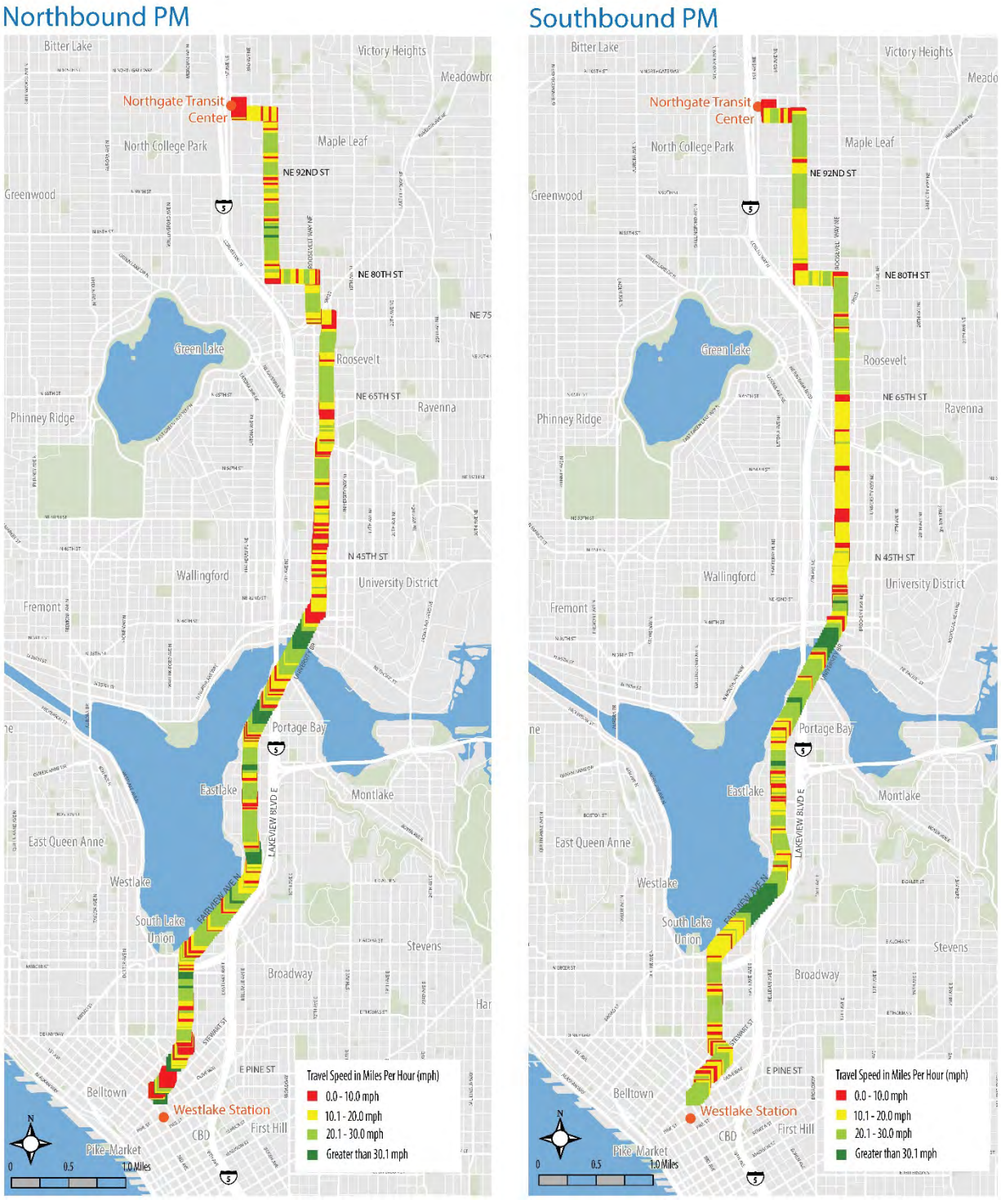
Speed surveys were performed on bus ride-alongs for the buses running through the corridor. The survey collected data using from an independent GPS device, not Metro's built-in AVL. The data was collected during the PM peak period on February 10, 2015 for the following bus routes and segments:

- Downtown to University District on Route 70 northbound;
- University District to Northgate on Route 66 northbound;
- Northgate to University Bridge on Route 66 southbound; and,
- University Bridge to Downtown on Route 70 southbound.

Traveling the entire corridor by bus during the PM peak period may take one hour or more. The corresponding average speeds across the corridor are 6.7 mph in the northbound direction and 8.1 mph in the southbound direction. These speeds were slightly slower than speeds as predicted by posted Metro bus schedules for a similar time period, which were 8.0 and 9.9 for northbound and southbound buses, respectively. However, since the GPS results stem from only a single run per route per direction, traffic volatility on this particular day may have led to similar but slightly slower travel times.

Additional delays and decreases to average speed may be caused by periodic closings of the University Bridge for passing ship traffic. Closings take an average of four minutes but are not permitted during peak periods (weekdays 7-9 AM and 4-6 PM) except for vessels over 1,000 gross tons. However, SDOT is currently proposing to the US Coast Guard to limit bridge openings in order to improve general traffic flow. Bus speeds are generally slower than those for general traffic. This was expected given that buses do not have dedicated lanes, make frequent stops to board/alight passengers, and have physical limitations when driving in congested traffic. Buses also sometimes experienced long dwell times at stops due to slow passenger boarding or passenger payment procedures. **Figure 5-12** shows the observed bus travel speed along the corridor during the PM peak period.

Figure 5-12. Observed Bus Travel Speed – PM Peak Period



5.6 Summary

The RDHCT Corridor already hosts multiple transit services, providing connectivity both along the corridor and to the rest of the Seattle region. These services along the corridor include several bus routes, which provide connections to rail lines and additional buses. These services are primarily run by King County Metro and Sound Transit, but various other smaller operators also provide select service. The existing ridership on the corridor suggests that additional high capacity service is warranted.