UNIVERSITY OF WASHINGTON

2018 SEATTLE CAMPUS MASTER PLAN

FINAL ENVIRONMENTAL IMPACT STATEMENT

APPENDIX D
FINAL TRANSPORTATION DISCIPLINE REPORT

JULY 2017

FINAL

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1 INTRODUCTION

As an incremental step towards implementing the University of Washington's long-term campus vision, this *Transportation Discipline Report* and related *2018 Campus Master Plan* (CMP) *Environmental Impact Statement* (EIS) evaluate a maximum of 6 million square footage of net new development. This level of development is anticipated to be necessary to accommodate population and University growth over the 10-year, 2018–2028 planning horizon under a range of development options. Development beyond this 6 million gross square footage (gsf) of net new development would need to be addressed in future environmental review(s). Because the effects of transportation relate closely to the behavior of campus population, transportation and growth are analyzed based on forecasts of population (students, faculty, and staff) as noted in the alternatives discussion (Chapters 4 through 8), and travel modes.

Section 1.1 presents information related to the trip and parking caps that the University of Washington has agreed to; these caps have maintained traffic impacts below 1990 levels. This section includes local and national comparisons to neighborhoods and peer institutions, thus demonstrating the University of Washington's success at limiting vehicle impacts. Section 1.2 presents a high level preview of the report organization and content, following by a description of the alternatives in Section 1.3.

1.1 VEHICLE TRIP LIMITS—TRIP AND PARKING CAPS

The University of Washington and the City of Seattle entered an agreement referred to as the City-University Agreement (CUA) in 1998. This agreement defines maximum parking and vehicle trip "caps" that the University has agreed not to exceed. The caps were developed as part of the Transportation Management Plan developed for the University of Washington to meet the goal of limiting peak-period, peak direction vehicle trips of students, staff, and faculty to 1990 levels. The CUA allows for amending these Caps with the adoption of a new CMP. To date, the University of Washington has met these aggressive goals, while continuing to grow through strategies that reduce drive-alone behavior. The University has not exceeded these caps, which are described below, even as the population on the campus has grown. The trip caps can be changed in a new Master Plan.

CUA (City-University Agreement): An agreement between the City of Seattle and the University of Washington that among other things, defines various transportation thresholds.

Trip Caps: Developed as part of the Transportation Management Plan for the University of Washington to meet the goal of limiting peak-period, peak direction vehicle trips of students, staff, and faculty to 1990 levels.

UNIVERSITY DISTRICT CAPS – University of Washington vehicle trips in the University District, including beyond the Major Institution Overlay (MIO) boundary:

- AM peak period (7–9 AM) trip cap is **10,100 inbound**
- PM peak period (3–6 PM) trip cap is **10,500 outbound**

UW CAMPUS CAPS – University of Washington vehicle trips inside the MIO boundary:

- AM peak period (7-9 AM) trip cap is **7,900 inbound**
- PM peak period (3-6 PM) trip cap is **8,500 outbound**

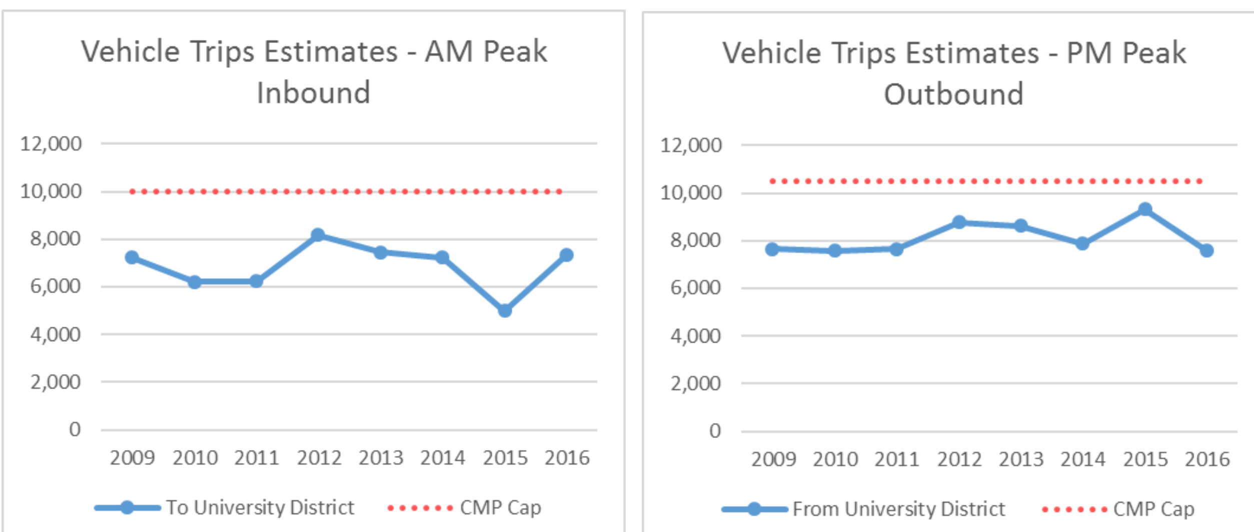
The maximum parking space cap is 12,300 spaces. This parking space cap does not include service and load zones, cycle spaces, accessory off-campus leased spaces, and spaces associated with student housing.

These caps are evaluated in more detail for each alternative in Sections 4 through 8.

U-PASS: The University of Washington's U-PASS program provides students, faculty, and staff with subsidized access to transit. Participating local agencies include King County Metro, Sound Transit, Community Transit, Pierce Transit, Kitsap Transit, and Everett Transit, as well as the King County Water Taxis and Seattle Streetcar. Unlimited rides on these transit agencies are free with the Student U-PASS, and discounts for Zipcar and car2go are also included. The Student U-PASS includes an $84 per student mandatory fee incorporated into quarterly tuition. The University's Employee U-PASS includes the same benefits as the Student U-PASS for $150 per calendar quarter.

Additional terms and descriptions can be found in **Appendix A**.

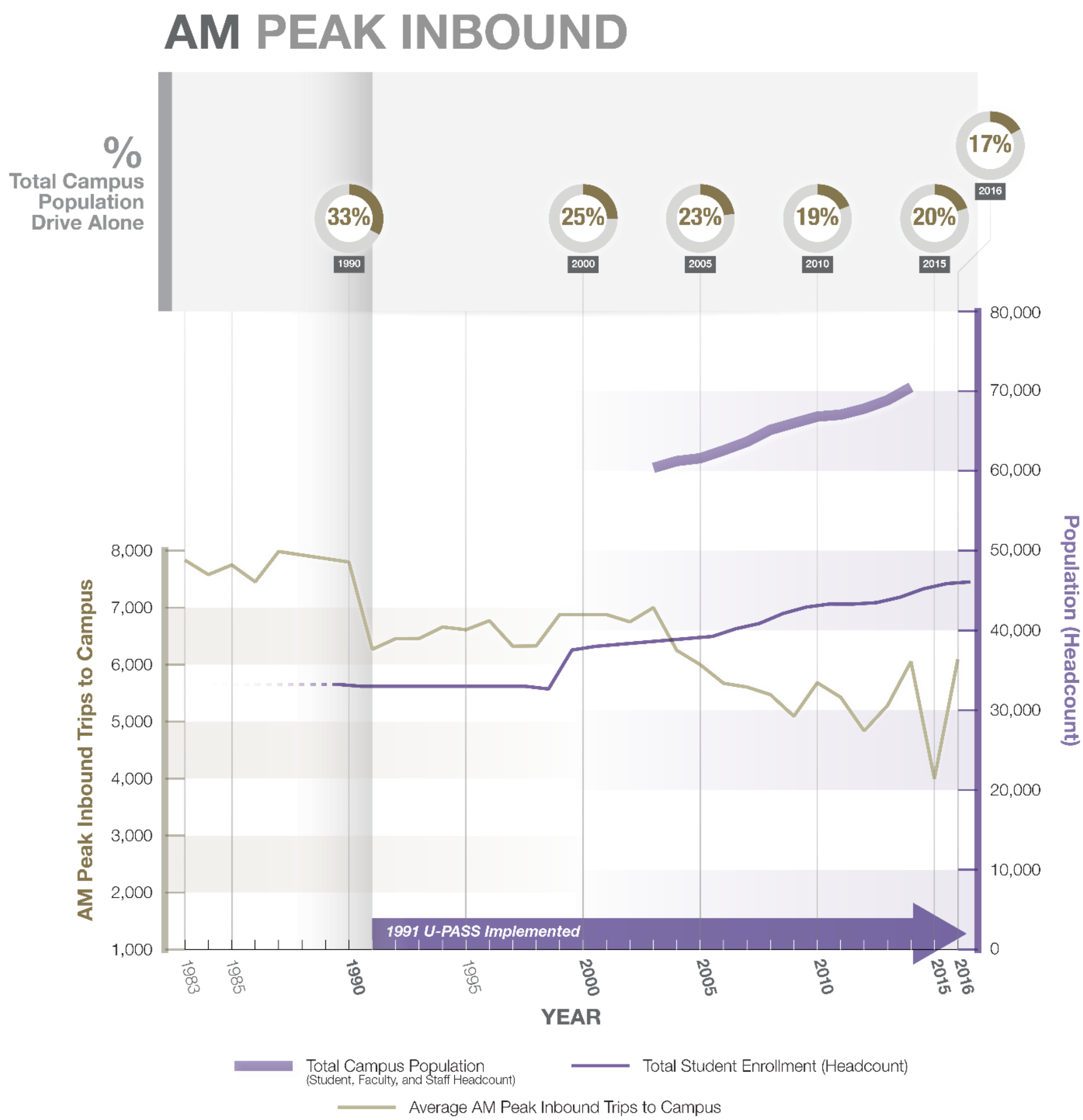
Historical Performance. The University's Transportation Management Plan can be credited for the implementation of the innovative U-PASS program and supporting strategies implemented in 1991. Transportation mode choices changed dramatically with the addition of this program. The University's U-PASS program subsidizes transit use with the addition of a transit pass included with a University member's Husky Card. The U-PASS has resulted in a substantial decline in vehicle trips to and from the University of Washington—specifically during peak commute periods. Figure 1.1 shows the historical performance of the University under the University District caps. Similarly, the University has remained under the caps.



Source: Transpo Group, 2016

Figure 1.1 Historical University Performance under Parking and Trip Caps

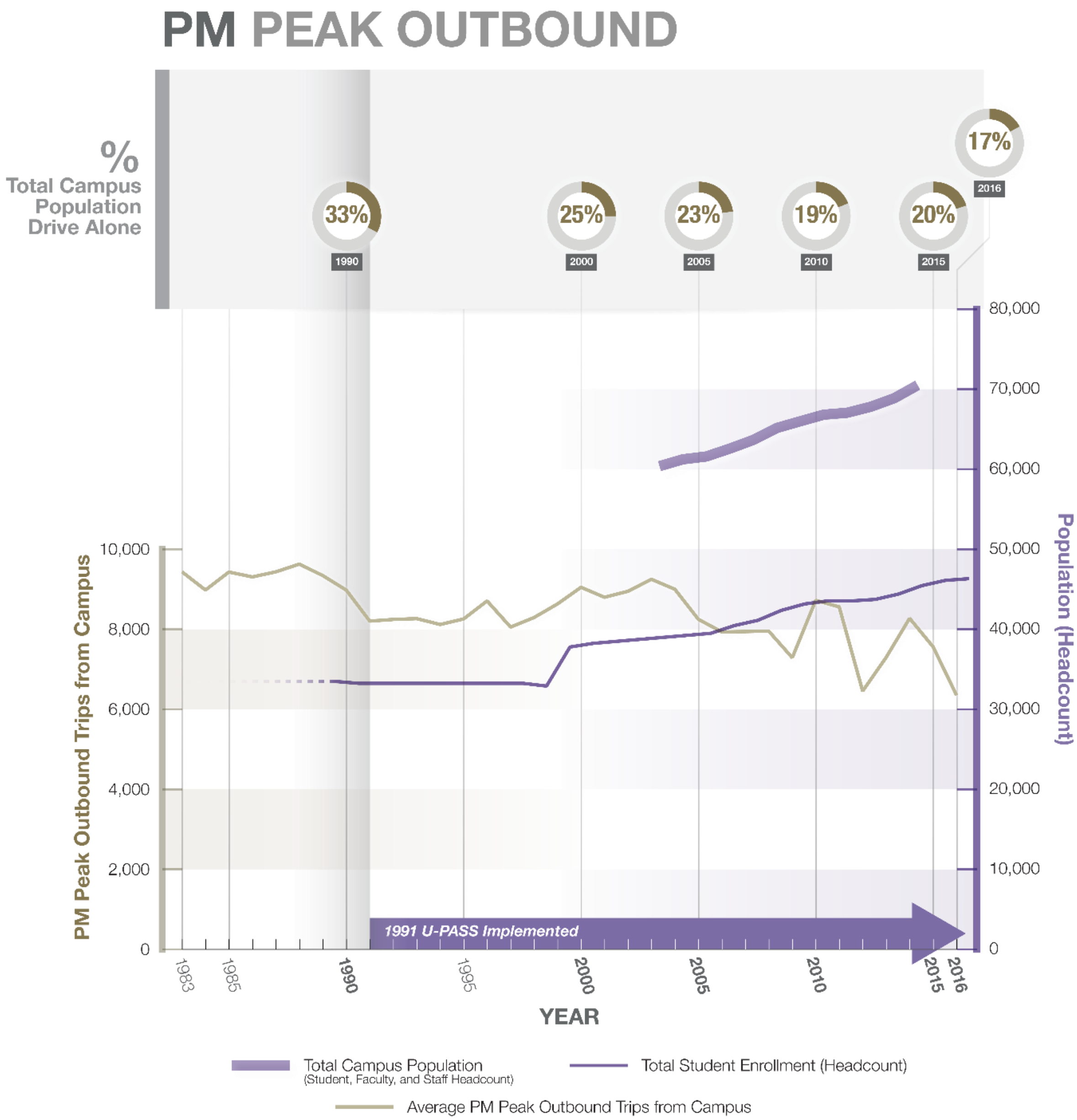
In 2003, additional locations from East Campus were added to the annual traffic count monitoring program. Average peak hour trips are shown in Figure 1.2 and Figure 1.3, in comparison to total student enrollment, including data from 1999 and 2006–2016. Peak hour trips to and from campus have declined since the implementation of the U-PASS program, despite increased student enrollment and faculty and staff employment. Notably, while student enrollment (headcount) increased, vehicle trips to the campus declined. Figure 1.2 shows how the U-PASS program has limited vehicle trips during the weekday AM peak hour. It contrasts trips with recent growth in campus population and compares trips to student enrollment. Figure 1.3 illustrates the effects of the U-PASS program on vehicle trips during the weekday PM peak hour and contrasts with recent growth in campus population. Like AM peak hour inbound trips, PM peak hour outbound vehicle trips declined while enrollment grew.



Note: Some student enrollment data and 2015 trip data not available

Source: Annual Campus Traffic Count Data Collection Summary, University of Washington Commuter Services

Figure 1.2 Effects of U-PASS Program on AM Peak Inbound Trips in Comparison to Recent Growth in Student Enrollment



Note: Some student enrollment data and 2015 trip data not available

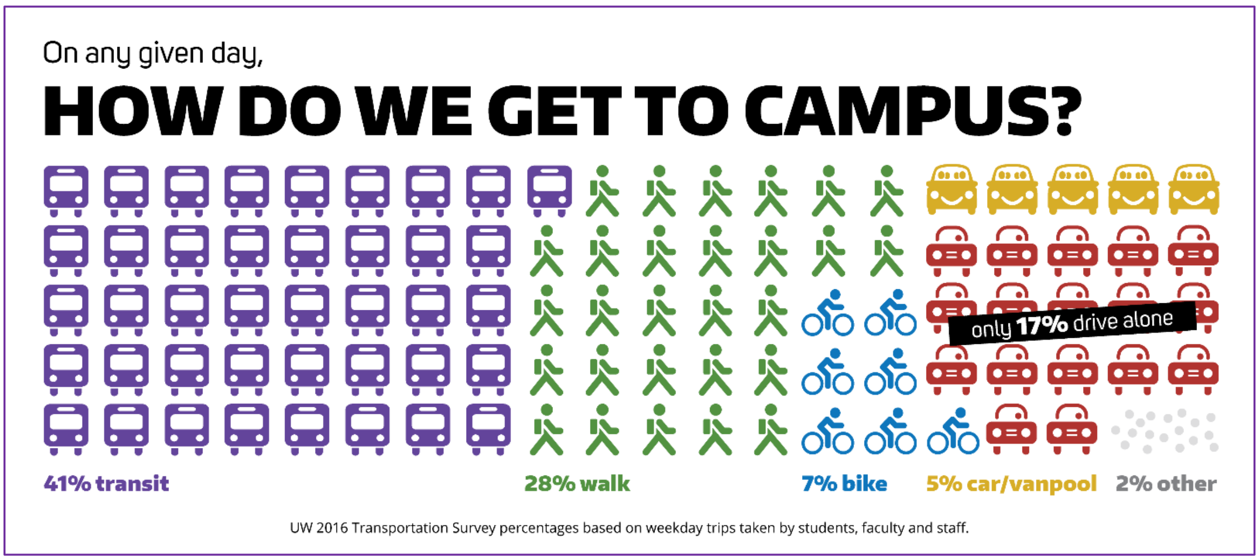
Source: Annual Campus Traffic Count Data Collection Summary, University of Washington Commuter Services

Figure 1.3 Effects of U-PASS Program on PM Peak Outbound Trips in Comparison to Recent Growth in Student Enrollment

What are the Initial Effects of Light Rail at the University of Washington? In March 2016, Link light rail opened near the University of Washington Husky Stadium to connect the University to Capitol Hill, Downtown Commercial Core, and Sea-Tac Airport. Link light rail provides fast, reliable, high-capacity access to these destinations and other areas connecting to Downtown Seattle. The most recent annual survey (University of Washington 2016 Transportation Survey) suggests that drive-alone mode split is now lower.

Drive alone mode shift assumption. Drive alone mode split went from 20 percent in 2015 to 17 percent in 2016 due in part to increased transit use. While the recent survey suggests the drive-alone mode is going down as a proportion of overall trips, this transportation analysis supporting the CMP and EIS has been conducted using the more conservative 20 percent drive-alone mode.

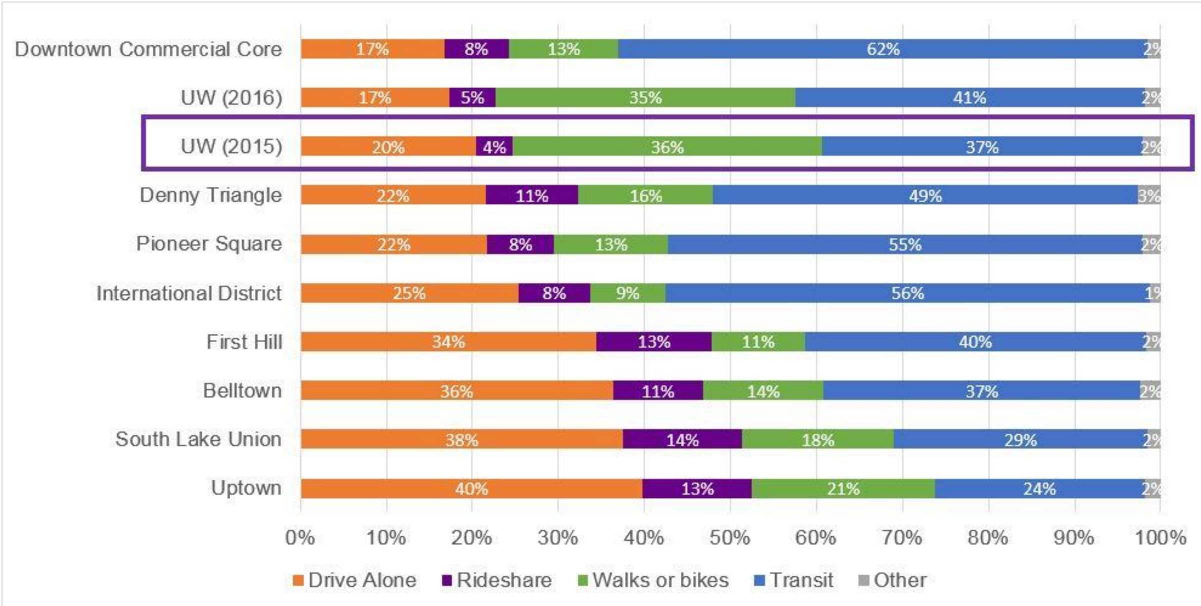
How Does the University of Washington Mode Split Compare Locally and Nationally? The University of Washington mode share, illustrated in Figure 1.4, performs very well both locally (compared to other urban neighborhoods) and nationally (compared to peer institutions).



Source: University of Washington Transportation Services (UWTS)

Figure 1.4 University of Washington 2016 Mode Share

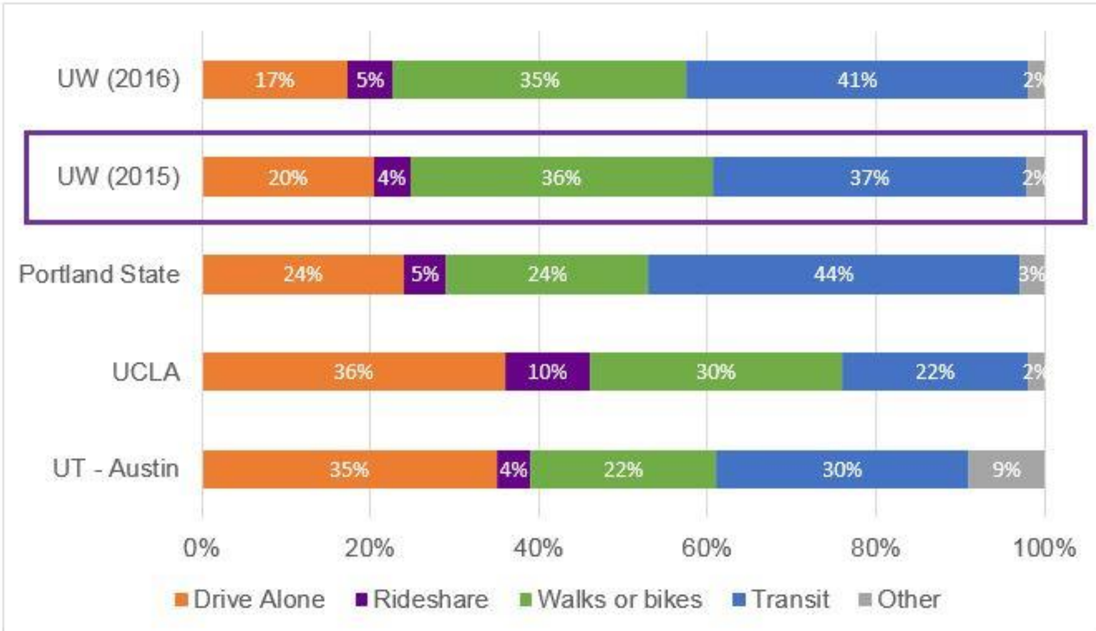
As compared to other Seattle neighborhoods, the University of Washington has one of the most successful programs for limiting drive-alone vehicular demand. Figure 1.5 shows a comparison of the University of Washington mode splits to other neighborhoods in Seattle. As shown, the campus operates with the lowest drive-alone percentage (just 20 percent) compared to these neighborhoods.



Source: Commute Seattle Center City Commuter Mode Split Survey, 2016 and University of Washington, 2016

Figure 1.5 Existing Neighborhood Mode Share Comparison

The University of Washington also compares well when considering large peer universities in urban cities with developing transit systems, as shown in Figure 1.6. Compared to nearby Seattle University, another university in a Seattle urban neighborhood, University of Washington has maintained a much lower drive alone percentage. For example, in 2007, Seattle University reported a 39 percent drive-alone percentage as compared to 23 percent reported at University of Washington for the same year.



Source: Transpo, 2016; University of Washington, Portland State University, University of California – Los Angeles, and University of Texas – Austin

Figure 1.6 Existing Peer University Mode Share Comparison

For each of the transportation system elements, the analysis in the report considers the existing and future facilities and volumes. The impacts of the development alternatives are measured based on a comparison of No Action conditions to conditions under the development alternatives. The degree of the impacts as reported inform the nature and level of mitigation that may be necessary to offset significant impacts. Where significant impacts cannot be mitigated, those are identified as significant unavoidable adverse impacts.

1.2 REPORT ORGANIZATION AND CONTENT

This report includes the following main sections:

- **Section 1.0 Introduction** – Provides a description of the alternatives, defines the study area for the analysis, and provides a general framework for the analysis.
- **Section 2.0 Analysis Methodology and Assumptions** – Defines the primary analysis assumptions, including the study area, horizon years, City investments, and performance measures for each of the travel modes evaluated within this report.
- **Section 3.0 Affected Environment** – Describes the existing conditions in the study area.
- **Section 4.0 Impacts of No Action** – Summarizes the analysis and impacts of the No Action Alternative on the transportation system.
- **Section 5.0 Impacts of Alternative 1** – Summarizes the analysis and impacts of Alternative 1 on the transportation system.

- **Section 6.0 Impacts of Alternative 2**– Summarizes the analysis and impacts of Alternative 2 on the transportation system.
- **Section 7.0 Impacts of Alternative 3** – Summarizes the analysis and impacts of Alternative 3 on the transportation system.
- **Section 8.0 Impacts of Alternative 4** – Summarizes the analysis and impacts of Alternative 4 on the transportation system.
- **Section 9.0 Mitigation –** Summarizes the mitigation identified for each alternative. This includes physical improvements or elements of the TMP.
- **Section 10.0 Significant Unavoidable Adverse Impacts** – Identifies any significant unavoidable adverse impacts associated with any of the development alternatives
- **Section 11.0 Summary of Impacts** – Summarizes the impacts of each alternative in a comparative format. Outlines the significant impacts identified and recommended mitigation measures.

The evaluation was conducted in accordance with City of Seattle State Environmental Policy Act (SEPA) standards and analyzes impacts on the following transportation elements:

- Pedestrians (safety, connectivity, capacity)
- Bicycles (safety, connectivity, parking)
- Transit (connectivity and capacity)
- Traffic Operations (intersection and corridor operations)
- Traffic Safety (collision history, trends)
- Parking (demand versus supply)
- Freight/Service (operations, patterns)

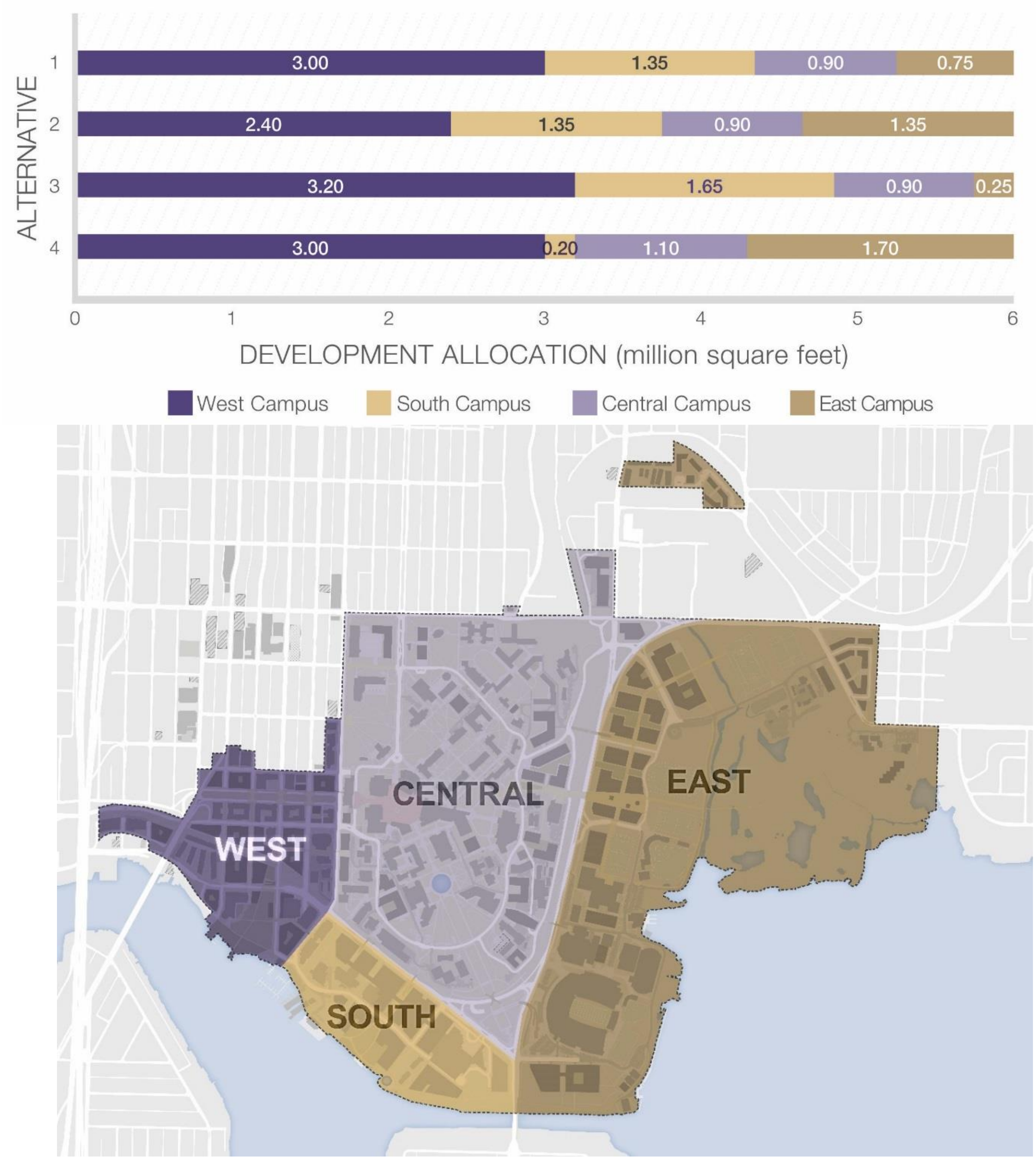
The CUA, impacts are disclosed both in terms of the comparison to the identified No Action Alternative and to the trip and parking caps that were established. This approach helps ensure that impacts are considered in both the discreet short term and in terms of the historical context that exists between the University of Washington and the City of Seattle.

1.3 DESCRIPTION OF ALTERNATIVES

As noted in the introduction, this Transportation Discipline Report (TDR) evaluates a No Action Alternative as compared to four variations of development alternatives, each with up to 6 million square footage of new development on campus, within the MIO. Each of these alternatives (1 through 4) apportion this development to campus sectors in different ways. This section provides a general description of the alternatives. Specific details of each alternative as they relate to the multimodal elements are reflected in the subsections for each alternative.

MIO (Major Institution Overlay): The Major Institution Overlay is a boundary defined by the City of Seattle Land Use and Zoning Code, noting the extents of the University of Washington.

Figure 1.7 shows the campus sectors as referenced in the description of the alternatives. The University of Washington campus has four distinct sectors today: West, South, Central, and East. All are described in terms of potential net new increase in development area relative to the No Action Alternative conditions. As shown in Figure 1.7, the development alternatives (Alternatives 1 through 4) differ in how the 6 million square footage of proposed development is apportioned to these sectors. The assignment of development square footage is shown graphically in the bar charts at the top and the sectors are noted in the map below the bars.



Source: Transpo, 2016

Figure 1.7 Campus Sectors

The development of the 6 million square footage has been identified to reflect a projected growth in head count (or population) anticipated and associated University space needs between 2018 and 2028. The population is usually defined in terms of full time equivalent (FTEs) but for this study it is converted to headcount as a basis for estimating the anticipated increase in campus-related trip generation by mode. The population forecasts used in the alternatives analysis are summarized below in Table 1.1, where the 2028 population is reflected according to the development of a net new 6 million gross square footage. As shown the University population is expected to increase by approximately 15,676 people over the 2014 population. This growth includes an additional 211,000 gross square footage of net new development that is permitted under the current 2008 Campus Master Plan. This 211,000 gross square footage is assumed as the future No Action Alternative.

Table 1.1
EXISTING (2014) AND ESTIMATED FUTURE (2028) UNIVERSITY POPULATION (HEADCOUNT)

Population	2014 (Actual)	2028 (Estimated)	Growth (Estimated)
Students	45,213	54,183	8,970
Faculty	7, 951	9,528	1,577
Staff	17,333	22,462	5,129
Total	**70,497**	**86,173**	**15,676**

Source: Sasaki Architects, Inc., 2016.

In general, this transportation analysis evaluates the growth in campus population for three components—students, faculty, and staff—to fully analyze transportation impacts. This method takes into account that each University population (students, faculty, and staff) have different travel behaviors.

1.3.1 No Action Alternative

For the purposes of this analysis, the No Action Alternative assumes the remaining development under the 2003 CMP, approximately 211,000 gsf of building capacity, would be developed in West Campus**.** It should be noted that this capacity may be constructed in any of the campus sectors, but it has been allocated to the West Campus for study purposes.

Headcount: A quantifiable count of individuals within the University of Washington population. Headcount differs from a Full Time Equivalent (FTE) count, which converts actual campus enrolled and employed students, faculty, and staff to a full time equivalency based on 8-hour days and a 40-hour work week.

CMP: Campus Master Plan, or a document guiding development on campus and within the MIO that determines how the campus can grow in the coming years while minimizing impacts to the community. The most recent University of Washington CMP for the Seattle campus was completed in 2003. A new plan is being developed for the 2018 to 2028 planning horizon.

1.3.2 Alternative 1 – CMP Proposed Allocation with Requested Height Increases

As shown in Figure 1.8, Alternative 1 has a West and South Campus development focus. This alternative includes increases in height. Under Alternative 1, NE Northlake Place east of 8th Avenue NE would be vacated. The anticipated campus sector development is as follows:

- West Campus: 3.0 million gsf
- South Campus: 1.35 million gsf
- Central Campus: 0.9 million gsf
- East Campus: 0.75 million gsf

Development on West, South, and Central Campus (indicated in purple below) represents a net increase over the existing developed areas. It is assumed that parking would be developed as part of the building development in each sector.

Source: Sasaki Architects, July 2017 CMP

Figure 1.8 Alternative 1 Potential Development Sites Representing Sector GSF

1.3.3 Alternative 2 – CMP Proposed Allocation with Existing Height Limits

As shown in Figure 1.9, Alternative 2 has a West and East Campus development focus. This alternative would include the same NE Northlake Place vacation as described in Alternative 1. The anticipated campus sector development is as follows:

- West Campus: 2.4 million gsf
- South Campus: 1.35 million gsf
- Central Campus: 0.9 million gsf
- East Campus: 1.35 million gsf

Source: Sasaki Architects, July 2017 CMP

Figure 1.9 Alternative 2 Potential Development Sites Representing Sector GSF

1.3.4 Alternative 3 – Campus Development Reflecting Increase West and South Campus Development

As shown in Figure 1.10, Alternative 3 has a West and South campus development focus. This alternative would include the vacation as described in Alternative 1. The anticipated campus sector development is as follows:

- West Campus: 3.2 million gsf
- South Campus: 1.65 million gsf
- Central Campus: 0.9 million gsf
- East Campus: 0.25 million gsf

Source: Sasaki Architects, July 2017 CMP

Figure 1.10 Alternative 3 Potential Development Sites Representing Sector GSF

1.3.5 Alternative 4 – Campus Development Reflecting Increase West and East Campus Density

As shown in Figure 1.11, Alternative 4 has a West and East campus development focus. This alternative would include NE Northlake Place vacation as described in Alternative 1. The anticipated campus sector development is as follows:

- West Campus: 3.0 million gsf
- South Campus: 0.2 million gsf
- Central Campus: 1.1 million gsf
- East Campus: 1.7 million gsf

Source: Sasaki Architects, July 2017 CMP

Figure 1.11 Alternative 4 Potential Development Sites Representing Sector GSF

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2 ANALYSIS METHODOLOGY & ASSUMPTIONS

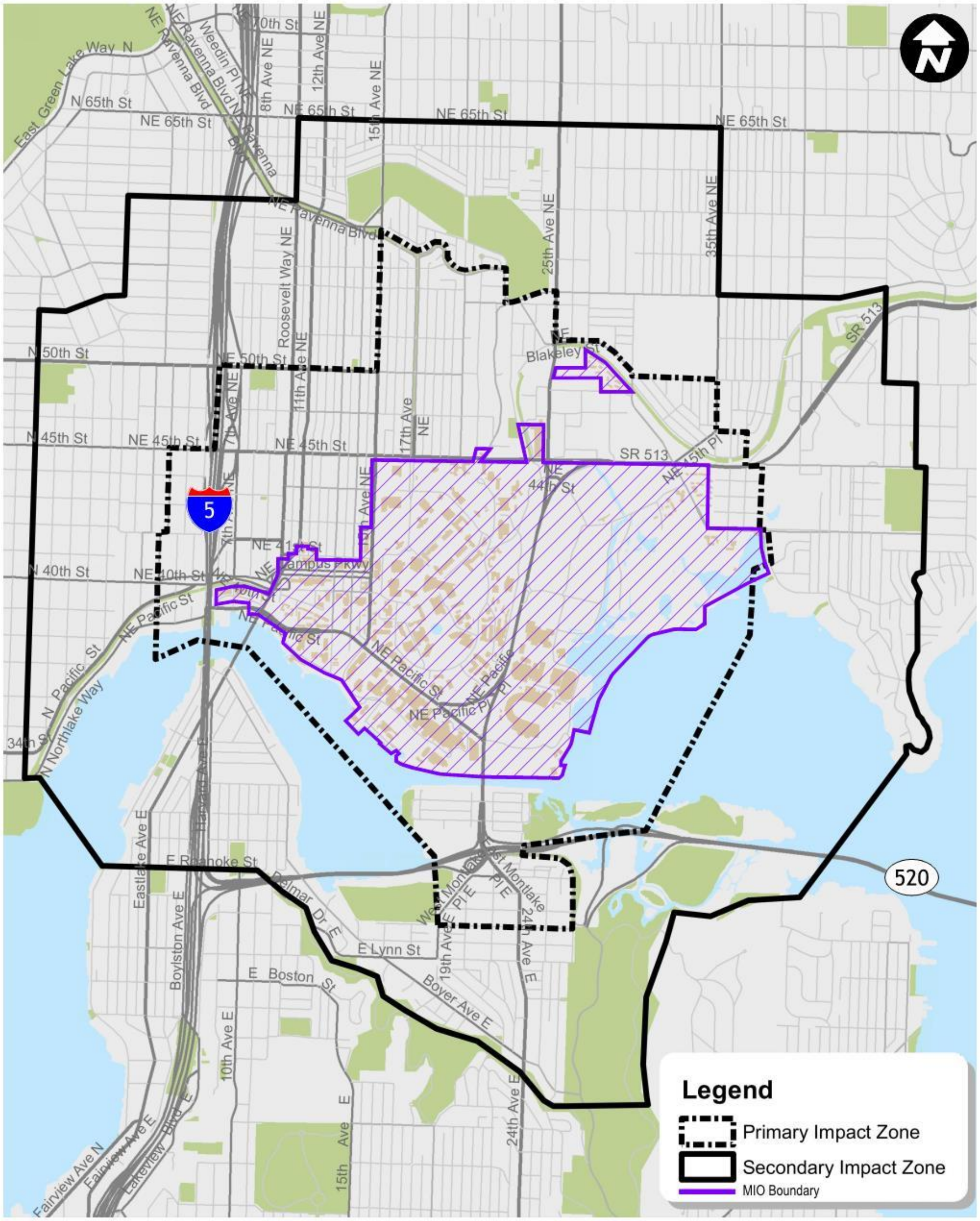
This section describes the methodology for evaluating the proposed alternatives' effects on transportation systems for the University of Washington 2018 Campus Master Plan (CMP*)* EIS. It describes analysis parameters, including the study area limits, analysis years, background transportation investments, analysis time periods, performance measures for modes and methods for calculating them, and performance thresholds. Appendix B provides more depth, data, and technical analysis supporting this section.

2.1 STUDY AREA

To evaluate impacts of the new CMP, this analysis explores the potential impacts consistent with the City-University Agreement[1] (CUA), which defines the primary and secondary impact zones. Evaluation and monitoring of the transportation-related impacts of the University will be conducted within these zones. Thus, the primary and secondary impacts zone boundaries serve as the project study limits. As the names suggest, growth at the University of Washington is expected to have greater impacts in the primary impact zone, with lesser impacts in the secondary impact zone. For this reason, the analysis conducted in the primary impact zone is more detailed, while analysis in the secondary impact zone is less detailed. The boundaries of the primary and secondary impact areas are shown in Figure 2.1.

CUA (City-University Agreement): An agreement between the City of Seattle and the University of Washington that among other things outlines the elements that will be responded to in the CMP and EIS. It also identifies which thresholds can be changed with the adoption of the CMP.

[1] 1998, City University Agreement amended November 29, 2004



Source: CUA and Transpo Group, 2017

Figure 2.1 University of Washington Primary/Secondary Transportation Impact Zones

2.2 HORIZON YEAR/ANALYSIS PERIODS/BACKGROUND IMPROVEMENTS

The CMP reflects a 10-year planning horizon with a base year for development beginning in 2018 and extending to 2028. A general list of the City of Seattle and regional transportation investments anticipated between 2016 and 2028 are noted in Table 2.1. These investments are considered as part of the background conditions for the different transportation modes.

Table 2.1
BACKGROUND IMPROVEMENTS BY 2028

Type of Improvements	Description
Pedestrians	• New multiuse trail across the Montlake Cut connecting the University of Washington with the Washington Park Arboretum as part of the Move Seattle Levy. • Continued modifications of the regional Burke-Gilman trail through the University of Washington. • Green streets, are intended to enhance and expand public open space and give priority to pedestrian circulation and open space over other transportation uses. Green streets use treatments that may include sidewalk widening, landscaping, traffic calming, and other pedestrian-oriented features. Brooklyn Avenue, NE 43rd Street, and NE 42nd Street are designated green streets in the University District. The Seattle Pedestrian Master Plan identifies gaps and defines systems such as Green Streets but does not define funded improvements in the area.
Bicycles	• As part of the Move Seattle Levy, protected bicycle lanes on 15th Avenue, N 50th Street and 35th Avenue NE and bicycle lanes on Brooklyn Avenue N are proposed but are not funded and cannot be assumed to be in place by 2028. Other routes and improvements have been identified in the Seattle Bicycle Master Plan but are currently not funded.
Transit	• The Seattle Transit Master Plan (TMP) identifies Multimodal Transit Corridor enhancements along Roosevelt Way NE/11th Avenue NE/Eastlake Avenue NE, 15th Avenue NE/NE Pacific Street/23rd Avenue NE (extension of Montlake), and Market Street/NE 45th Street. • Completion of Sound Transit 2 (ST2) extension of Link light rail from the University of Washington Station to Lynnwood, including an additional light rail station near campus (University District at Brooklyn Avenue). Completion of other Link extensions to Overlake and Kent as part of ST2 by 2023 and to Federal Way and Redmond as part of ST3 in 2024. ST3 also identifies development of BRT along SR 522 in 2024 which would improve speed and reliability for bus service between the University Campuses. • Expansion of King County Metro Express, Frequent/RapidRide, and Local service identified in METRO CONNECTS*,* the King County Metro Long-Range Plan by 2025. Is assumed as a logical service plan; however, this plan is not fully funded.
Vehicle	• A second Montlake Boulevard Bascule Bridge has been identified as part of the SR 520 Bridge Replacement project, which is funded as part of the Connecting Washington Partners Projects and expected to be completed by 2027.
Freight	• The Seattle Freight Master Plan includes designation of a network prioritized for use by freight. This plan identifies NE 45th Street, Pacific Street, Montlake Avenue, and the Roosevelt Way/11th Avenue NE couplet as Minor Truck Streets. No freight investments are identified in the project area.

Source: State Route 520 Bridge Replacement and HOV Project High Capacity Transit Plan (2008), King County Metro Draft Long-Range Plan Summary (2016), Sound Transit 2 (2008), City of Seattle Draft Pedestrian Master Plan (2016), City of Seattle Bicycle Master Plan (2015), City of Seattle Transit Master Plan (2016), and City of Seattle Draft Freight Master Plan, U District Green Streets Concept Plan (2015).

For guiding future City of Seattle infrastructure investments, the City has developed modal plans (Pedestrian Master Plan, Bicycle Master Plan, Transit Master Plan, and Freight Master Plan) that identify projects and corridor needs. These plans support an aspirational long-range (often 20-year) horizon and may not include implementation timelines nor details on how infrastructure could change. Where details are provided on implementation of investments—for example lane designations or modifications—those changes have been reflected as part of the background analysis and carried forward in the analysis of alternatives.

METRO CONNECTS: The METRO CONNECTS service network is a long-range vision that will require additional resources beyond current King County Metro revenue sources to implement. As such, the service network depicted does not represent a revenue-backed service plan, and refinements to this vision through plan updates and service processes are expected. Continued coordination between King County Metro and the University of Washington will be critical to achieving the transportation and mode shift outcomes made possible by the METRO CONNECTS service network

2.3 ANTICIPATED BACKGROUND AND PROPOSED GROWTH

The City of Seattle has adopted its 2035 Comprehensive Plan (November 2016) as well as the U District Rezone proposal (February 2017) that identifies increased density and heights in the University District surrounding the Link light rail University District Station. The City's 2035 Comprehensive Plan includes an increase of 120,000 residents and 115,000 jobs citywide by 2035. The U District Urban Design process suggests a potential increase in building heights over the 2035 Comprehensive Plan levels.

For this analysis, background growth was interpolated from the 2035 Comprehensive Plan traffic volumes, which were developed using the City-developed travel demand model, to reflect the 2028 horizon year. Land use and traffic as part of the recently adopted U District rezone proposal was also assumed as part of the background future analysis. In addition to vehicle traffic, the City-developed travel demand model provides background growth related to transit, pedestrians, and bicycles.

Alternative Population Assumptions: The No Action Alternative assumes 211,000 net new gross square footage (gsf) of development and a population increase of 1,465 people. All of the action alternatives (Alternatives 1-4) assume an additional 6 million net new gsf of development ***on top of*** the No Action 211,000 gsf. The University population for all action alternatives includes the population increase anticipated with No Action, so the 15,676 growth in population includes the 1,465 anticipated with No Action.

For the purposes of the transportation section of the EIS and this report, campus growth reflective of increased building square footage is translated to trips related to the various campus population groups, specifically students, faculty, and staff. As noted in Chapter 1, all development alternatives would result in expanded development on campus of 6 million net new gross square footage (gsf) on top of No Action increased development on campus of 211,000 net new gsf by the plan horizon year of 2028.

Table 2.2 summarizes the growth in campus population that would result from this level of development.

Table 2.2
UNIVERSITY POPULATION AND FUTURE GROWTH

Population	Existing (2014) Headcount[1]	No Action 2028	Growth over Existing with No Action Alternative	All Development Alternatives 2028[2]	Total Growth over Existing with Action Alternatives[2]
Students	45,213	46,152	939	54,183	8,970
Faculty	7,951	8,117	166	9,528	1,577
Staff	17,333	17,693	360	22,462	5,129
Total Population	70,497	71,962	1,465	86,173	15,676

1. 2014 was the most recent available information.
2. Population numbers include No Action Alternative growth (211,000 gross square footage).

An in-depth discussion and details related to the development of background growth, growth related to CMP development alternatives, and parking estimates analysis are provided in Appendix B, Methods and Assumptions.

2.3.1 CMP Development Trip Generation

Growth in traffic and visitors related to the proposed CMP alternatives, including No Action, were developed based on growth in campus population and are reflective of the anticipated development patterns of buildings apportioned by the West, South, Central, and East campus sectors. Recognizing that the campus is fairly fluid, with people moving across the campus throughout the day, for the purposes of evaluating trip impacts and growth in different sectors, new trips were assigned to campus sectors based on the proportion of overall development growth in each sector and transportation patterns.

CMP (Campus Master Plan): The University of Washington's CMP guides development on campus and within the Major Institution Overlay (MIO), which determines how the campus can grow in the future while minimizing impacts to the community. The most recent University of Washington CMP for the Seattle campus was completed in 2003 and is being updated for 2018.

2.3.2 Parking

Development related to the CMP alternatives will also require some replacement or expansion of parking. In many cases, development could occur where current surface parking sites exist. This would require replacement of parking removed as well as accommodation of parking demands resulting from that increased development. For the purposes of this transportation analysis, parking demand was forecasted based on current parking data, including peak demand periods, supply, parking utilization throughout the campus, and visitors. Parking demand resulting from the alternatives was projected for each campus sector by applying the ratio of the current parking utilization to the current development and then applying that factor to future growth by sector to estimate future parking demand. In estimating spaces

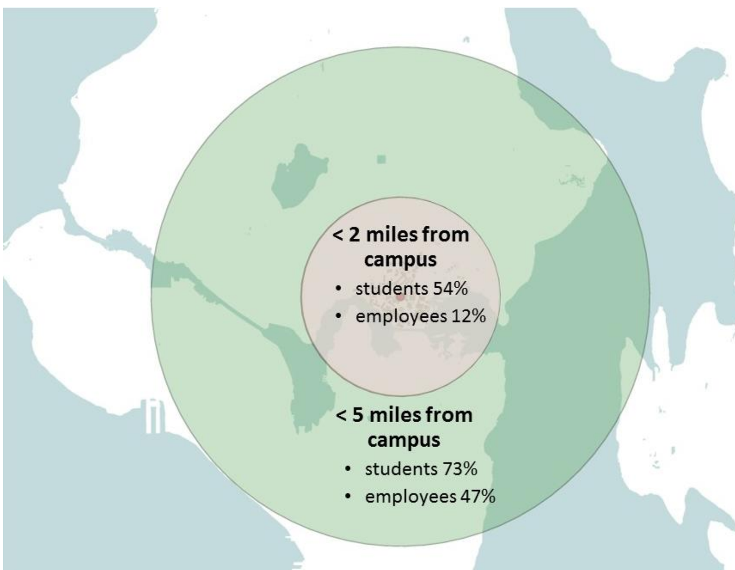
2.3.3 Visitors

With campus growth, there is also an anticipated level of growth in visitors related to new buildings. Based on campus parking data and anecdotal data from other universities, trips from visitors range from 5 to 10 percent. For the purposes of this analysis, trips from visitors were assumed to be 10 percent of the total increased trips. Visitors are encouraged to access the campus using alternatives to driving alone through information on the website and offering options on the City website. Specific details on the methods and assumptions in developing trip and parking generation are provided in Appendix B.

2.3.4 Distribution of Trips

The University of Washington campus is a unique environment where a large number of students live nearby and on campus. General distribution patterns for students, faculty, and staff were estimated based on the Comprehensive Plan 2035 travel demand model and campus surveys.

Data from the University of Washington indicate that currently more than half of the students and over 10 percent of the employees (faculty and staff) live within 2 miles of the campus, as shown in Figure 2.2 These amounts increase to almost 75 percent for students and almost half of employees when the distance increased to 5 miles. The 2035 City of Seattle travel demand model provides distribution patterns based on regional growth, changing modes, and expansion of transit.



Source: Transpo Group 2016.

Figure 2.2 Proportion of Students and Employees within 5 Miles of Campus

The increase of transit use related to new light rail access at University of Washington is expected to increase access to the University by fast, reliable transit modes. As evidenced by the immediate increase of ORCA taps (see Table 2.3) by University members using light rail, access to light rail should increase the transit mode for students, faculty, and staff. As shown in Figure 2.3 and Table 2.3, using current employee (staff and faculty) home zip code data, extension of light rail will be within convenient access for University employees. Of current employees, 24 percent live in a zip code adjacent to convenient light rail. Considering that light rail is a convenient travel destination to the University, estimates of access to light rail for all employees in adjacent zip codes in the future as light rail expands are as high as 59 percent.

ORCA, the One Regional Card for All, is a fare card providing access to the public transit buses and trains serving the Puget Sound region including the University of Washington. ORCA is incorporated into the U-PASS. By tapping the card on the bus at card readers on the bus or at stations, boarding is facilitated more efficiently than paying with cash, which is still accepted on bus service.

Connection to light rail—specifically to Sounder commuter train users, who can access light rail at the International District/Chinatown Station—has also become more convenient for locations in Pierce and Southeast King County. These connections have resulted in a 10 to 25 percent increase in Sounder-to-light rail "taps" by University-related ORCA cards as compared to 2015 (pre-light rail). As shown in Table 2.3, only 6% of the University employees (faculty and staff) live within walking distance of light rail and Sounder commuter rail. This increases to 10% with extension of light rail to Lynnwood. The proportion of employees that live adjacent (in the same zip code) of light rail or commuter rail is also shown in Table 2.3. This suggests that the proportion of employees with convenient access (through drop-offs, or other transit connection) in zip codes adjacent to light rail or commuter rail increases dramatically from just over a quarter to more than 60 percent as the system expands.

Access to rail transit Access to transit by walk mode is encouraged and for light rail it is assumed that many can walk, bike or be dropped off at rail stations. With anticipated modifications to bus transit service providing access to these rail stations, access within a zip code will become more convenient.

Table 2.3
PROPORTION OF UNIVERSITY EMPLOYEES PROXIMATE TO LIGHT RAIL

Year	½-Mile Proximity to Light Rail Station		½-Mile Proximity to Light Rail Station and 1-Mile Proximity to Commuter Rail Train Station		Zip Code adjacent to Light Rail Station		Zip Code adjacent to Light Rail and Commuter Rail Train Stations	
	Employees	Percent of Employees	Employees	Percent of Employees	Employees	Percent of Employees	Employees	Percent of Employees
Existing	844	3%	1,483	6%	6,223	24%	6,862	27%
2021 (light rail extended to Northgate)	1,383	5%	2,022	8%	12,132	47%	12,771	50%
2023 (light rail extended to Lynnwood, Federal Way, and Overlake)	1,913	7%	2,552	10%	14,850	58%	15,489	61%
2024 (light rail extended to Redmond and Federal Way)	1,973	8%	2,612	10%	15,107	59%	15,746	62%

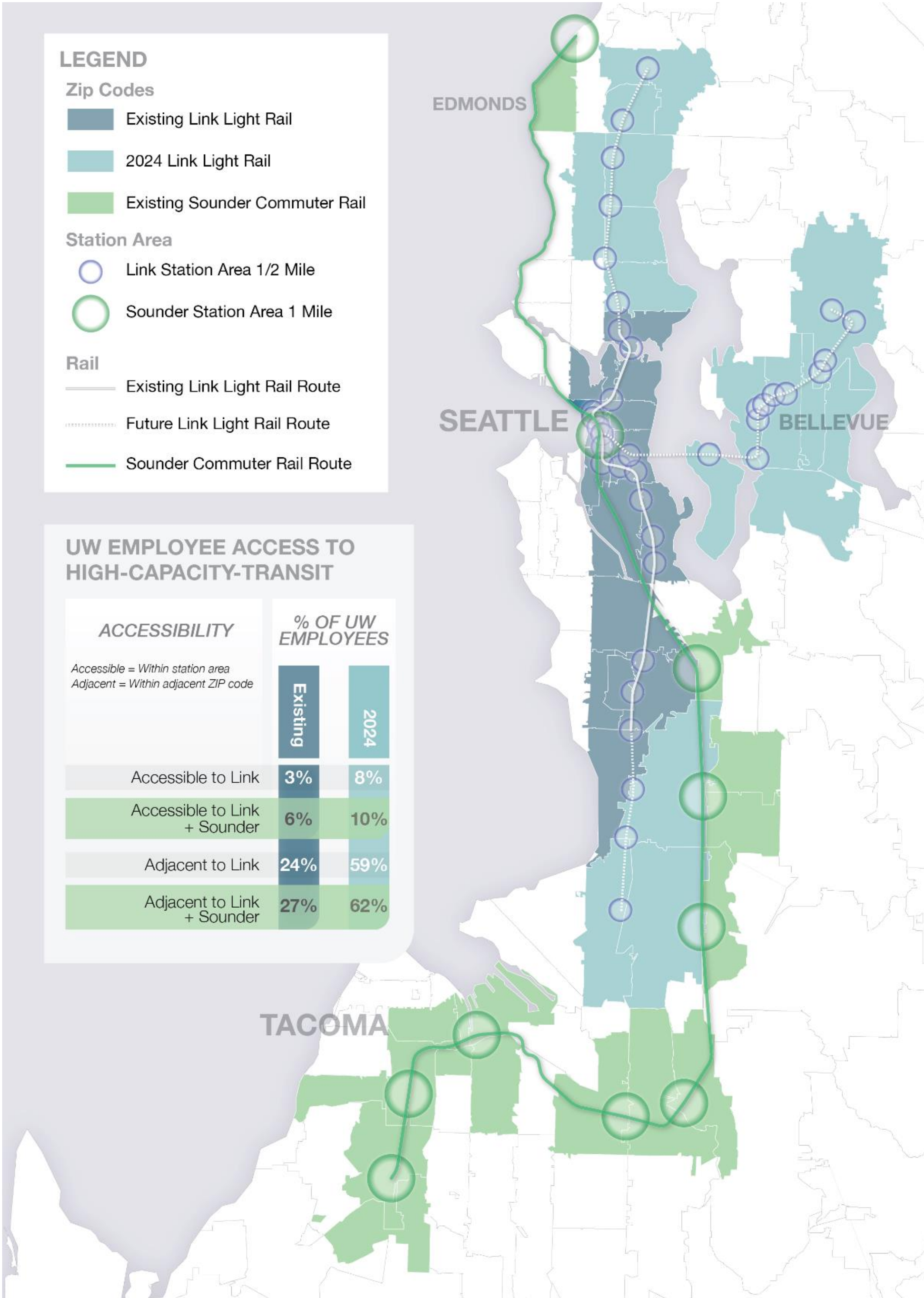
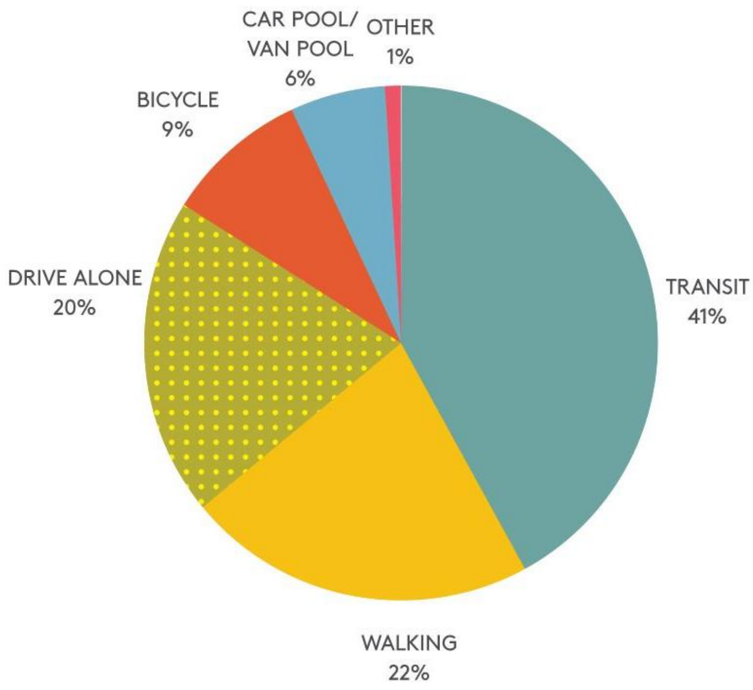


Figure 2.3 Employees Located in ZIP Codes within 1/2 Mile of Current and Future Light Rail and 1 Mile of Sounder Train

Other assumptions that support this transportation analysis are also discussed in greater detail in Appendix B Methods & Assumptions and include:

- **Peak Analysis Period** – Data collected from traffic counts at area intersections indicate that the highest demand for the study area is during the PM peak (as opposed to the AM peak) for most of the study area. This time coincides with the end of the work day for much of the University as well as people travelling through the area and the end of classes for many. As a result, the PM peak period was analyzed for all transportation operations.
- **Mode Split** – The mode split, or proportion of trips using a particular mode, is an important factor in evaluating the effects of growth. It is desirable to have students, faculty, and staff travel use lower impacting and more sustainable modes such as walking, biking, or taking transit. The University of Washington has a strong record of achieving an aggressive mode split, with drive-alone trips to the campus accounting for just 20 percent of all trips in 2015. This is significantly lower than other areas, employers, and communities in the region and has stayed near this percentage for several years. While mode split could fluctuate with the increased access to rail transit or other emerging trends, and indeed was surveyed in 2016 to have dropped to 17 percent, **for the purposes of this Transportation Discipline Report and EIS, mode split is assumed to remain a conservative 20 percent drive alone through 2028 for all alternatives**. However, the University has committed to a new SOV goal of 15% by 2028 in the 2018 Seattle CMP.



Source: University of Washington Transportation Services and Sasaki Architects, July 2017 CMP

Figure 2.4 Existing (2015) Travel Mode Split

- **Impact Analysis and Performance Measures** – Impact to transportation systems is generally assessed as a comparison between the No Action Alternative (with permitted development background growth) and each development alternative. As noted in Chapter 1, Introduction, the CMP development alternatives consist of up to 6 million square footage of additional development allocated to different sectors of the campus shown on Figure 1.7. Even though the amount of development is similar between development alternatives, the impacts may vary for transportation depending on where the development occurs. The City of Seattle has a variety of measurements for assessing impact, including screenlines as part of concurrency and the comprehensive plan. The performance measures used to evaluate transportation effects and impacts are described in Section 2.4., Performance Measures.

Screenline A hypothetical line where the aggregate of trips crossing the line is measured and compared.

- **Emerging Trends** – Table 2.4 summarizes trends and technologies that have been considered as emerging factors in this analysis; however, the impact and effects of these factors remains to be seen. The analysis was conducted applying what is known.

Table 2.4
EMERGING TRENDS AND TECHNOLOGY

Trend or Technology	Description
Changing Travel Behavior of Millennials	Changing travel behavior among millennials (defined as those reaching adulthood in the early 21st century) suggests this generation may be choosing alternatives to driving alone for travel. A study by the University of Michigan Transportation Research Institute indicates that driver licensing for teens and young adults is declining. For example, the number of 19-year-olds with drivers' licenses dropped from 87% in 1983 to 69% today.[2]
Smart Traffic Signal Technology	Traffic signal operations and control are being improved through better real time information, data fusion that improves understanding of travel patterns, and improved operations of traffic signals to better respond to actual traffic patterns and vehicle types. The City of Seattle owns, manages, and operates traffic signals around the City and would take the lead in implementing new adaptive signal control technology.
Shared Use Auto Mobility Ride-Hail and Transportation Network Companies	While rideshare programs through transportation network companies (TNCs) like Lyft and Uber and carshare programs like Car2Go, Zipcar, and ReachNow are popular and gaining in popularity, there are limited data related to these programs impact or effectiveness in reducing drive-alone behavior. Carshare is operated near the University campus, is available for student use, and is included in the Campus Transportation Management Plan as potential options to support commuting. Parking and passenger loading areas are available throughout the campus and will be assessed as needs arise.
Bikeshare	Pronto, a not-for-profit bikeshare system was implemented in 2015 with mixed success. The program, which included memberships for short- and long-term bicycle rental, ended in March 2017. The future of bikeshare is uncertain; however, there is interest in attempting to create a bikeshare program in the future as the bikeshare technology improves. Pronto stations were located at several locations within and near the campus. As a new bikeshare program evolves, the University would participate in locating and supporting that program.
Autonomous and Semi-Autonomous Vehicles	There are projections that in the next 20 years, autonomous vehicles may broadly replace the automobile fleet. Semi- autonomous vehicles are already on the market, assisting drivers and helping avoid crashes. In the future, these vehicles could be completely autonomous and potentially reduce congestion (vehicles are expected to operate safely with reduced distance between vehicles and potentially higher speeds). Autonomous vehicles have been proposed to operate cleanly (potentially electrically), for a variety of vehicle types—buses, trucks, and passenger vehicles—and potentially for shared use, thus further reducing the need for automobile ownership. As the technology evolves, autonomous vehicles may become part of the campus fleet to support mobility of people and goods. Additionally, space may be needed to accommodate drop-offs and storage.

[2] http://www.umtri.umich.edu/what-were-doing/news/more-americans-all-ages-spurning-drivers-licenses, 2016.

Other operational and policy changes – The City of Seattle and other agency partners are contemplating new policies, such as the establishment of Mobility Hubs, and service policies, such as advancing ending joint light rail and bus operations in the Downtown Seattle Transit Tunnel in 2018 as part of a planning effort called One Center City. These efforts are described below.

- **One Center City (OCC)** – In partnership with the Downtown Seattle Association, King County Metro, and Sound Transit, the City of Seattle is evaluating mobility options for the 10 City Center neighborhoods (https://www.seattle.gov/transportation/onecentercity.htm). As part of this study, the City and their partners are evaluating options for advancing the end of joint bus-light rail operations in the Downtown Seattle Transit Tunnel by fall of 2018. Ending joint operations had been planned to accommodate expansion of light rail service simultaneous with light rail extension to Northgate in 2021. Ending joint operations in 2018 would accommodate construction for rail to the eastside and the Convention Place station closure needed to support expansion of the Washington State Convention Center.

  Options being studied as part of ending joint tunnel operations include the rerouting of transit service from the Eastside (currently using SR 520 and bound for downtown) to the Link light rail University of Washington Station adjacent to Husky Stadium. This rerouting could increase transit passenger travel time and result in reduced ridership. Additionally, this rerouting could increase passenger and bus interactions around the light rail station, including adding up to six routes with an increase of over 40 buses during peak hours. It should be noted that this service concept represents a near-term option and would adapt and change to integrate with light rail station openings. The Metro transit service concept applied for the 2028 design horizon is expected to be similar to the 2025 METRO CONNECTS concept. As the City evaluates this option, the University will work with the City to evaluate impacts and potential solutions to ensure safe and efficient transit transfers.

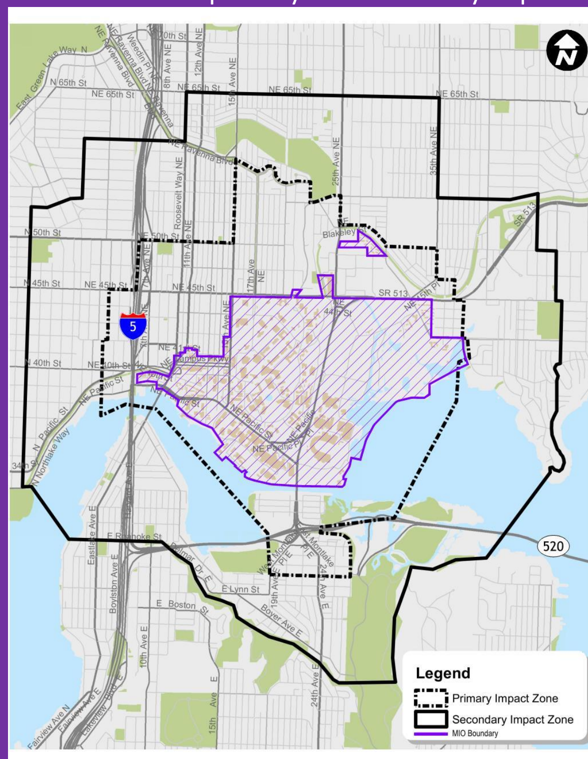
- **Mobility Hubs** – As part of the development of the One Center City multimodal planning effort, the City is exploring the development of Mobility Hubs, where planning for transportation modes is integrated to meet City objectives of reducing the proportion of drive alone trips and improve the efficiency of connecting people to transit. The City is in the process of establishing how these will function, what constitutes a hub, and how they will be developed and evaluated. The CMP is being developed to integrate transportation modes and provide connectivity across modes but does not identify "Mobility Hubs" until they are further defined (size, scale and requirements).

2.4 PERFORMANCE MEASURES

A variety of performance measures are used to analyze the effects and impacts of the proposed CMP alternatives. These performance measures are defined for the primary and secondary impact zones and apply to different transportation modes with different potential thresholds.

Primary and Secondary Impact Zones – As noted in Section 2.1, Study Area, the CUA identifies a primary and secondary impact zone to use for the purposes of analyzing impacts. The primary impact zone surrounds an area defined as the Major Institution Overlay (MIO). The impact zones suggest that impacts dissipate farther away from campus. It is expected that there will be greater impacts identified in the primary impact zone; therefore, more detailed analysis is conducted within this area. In the secondary impact zone, impacts are expected to dissipate and thus a more aggregate analysis is applied.

MIO (Major Institution Overlay): The Major Institution Overlay is a boundary defined by the City of Seattle Land Use and Zoning Code that notes the extents of the University of Washington Seattle campus. It is shown below (and larger as Figure 2.1) in reference to the primary and secondary impact zones



Thresholds – For some performance areas, there are defined and established measures of impact or thresholds, such as intersection operational analysis and parking utilization. Thresholds specific to the University of Washington are described in the CUA and include maximum allowable caps for vehicle trips to the University facilities (University cap), to University area facilities (U District cap), and University parking facilities (Parking cap) in the MIO. Where there are maximum allowable caps in specific areas, the thresholds are noted.

The performance measures applied in this Transportation Discipline Report are summarized in Table 2.5 and described in greater detail in Appendix B, Methods and Assumptions.

Table 2.5
PERFORMANCE MEASURES

Transportation Mode	Measure of Effectiveness	What it Measures?	Base Assumptions (see details in Appendix B)	Results
Pedestrian	Proportion of Development within 1/4 mile of multifamily housing	How likely are students, faculty, and staff able to live in proximity to the University campus and walk to school/work?	GIS mapping	Recently approved U District Upzoning means more multifamily housing opportunity in proximity to the University to support an improved job-housing balance within the U District and support high walk modes.
	Proportion of Development within 1/4 mile of University of Washington residence halls and multifamily housing available in the U District	How likely are students able to live in proximity to the University campus and walk to school?	GIS mapping	Current assumed campus residential is more multifamily housing in proximity to the University, which supports an improved job-housing balance within the U District and supports high walk modes.
	Quality of Pedestrian Environment	What is the quality of the walking environment inside and outside the campus area (secondary impact zone) and how will it change with growth?	Review of the existing conditions, Pedestrian Master Plan gaps, and visual / qualitative assessment of major pedestrian corridors in the secondary impact zone.	Qualitative analysis shows gaps from Mobility Plans that may impact connectivity in the secondary impact zone.

Transportation Mode	Measure of Effectiveness	What it Measures?	Base Assumptions (see details in Appendix B)	Results
	Pedestrian Screenline Demand and Capacity	Is there enough capacity for pedestrians to cross the roadways, including crosswalks and skybridges, around the edge of the campus to accommodate growth?	2016 pedestrian counts at all crossings. Include transit trips that start as pedestrian. Add background growth associated with Brooklyn Station. Pedestrians are apportioned by subarea growth. Maintain existing ped bridges. Transit Cooperative Research Methods 165.	There is adequate capacity for pedestrian growth to cross the arterial roadway edges within crosswalks at intersection, mid-block crosswalks, and sky bridges. Adequate capacity is available even without sky bridges.
	Pedestrian Transit Station/Stop Area LOS	Is there enough space at transit stop areas to accommodate growth in pedestrians and transit riders at transit stops/station areas?	Existing counts at busiest stops. Background growth of 12%. Stop area measurements from the field excluding walk ways. Methods in the Transit Cooperative Research Program 165.	Current transit stop areas are adequate to accommodate increased growth overall. Stops at NE Pacific Street/ 15th Avenue NE (under pedestrian bridge) and at NE 42nd Street/ 15th Avenue NE fall below LOS D with the addition of development-related growth. The stops could be expanded.

Transportation Mode	Measure of Effectiveness	What it Measures?	Base Assumptions (see details in Appendix B)	Results
Ped/ Bicycle	Burke-Gilman Trail Capacity	Is there adequate capacity along the Burke-Gilman Trail to accommodate background and campus growth in pedestrian and bicycle travel?	Burke-Gilman Study from 2011. Add projections and increase with background and CMP growth.	In 2011 the University completed a plan for the Burke-Gilman Trail defining the need for separated trails. With the separation, the trail meets future demand.
Bicycle	Bicycle Parking & Utilization	Is there adequate bicycle parking on campus to help encourage and meet the needs of those choosing bicycling now and into the future?	Current bicycle utilization.	Adequate capacity exists today with only 60-70% of available racks utilized. As new development occurs, the amount of bicycle racks will increase accordingly.
	Bikeshare Utilization and Distribution	How has bikeshare worked to promote alternative modes of transportation? How can future bikeshare serve to promote alternative modes?	Data was collected from Pronto on popular stations and routes within the area.	Pronto bikeshare ended in March 2017. Future plans for bikeshare are uncertain.

Transportation Mode	Measure of Effectiveness	What it Measures?	Base Assumptions (see details in Appendix B)	Results
	Quality of Bicycle Environment	What is the quality of the riding environment inside and outside the campus area (secondary impact zone) and how will it change with growth?	Review of the existing conditions and plans. Visual assessment of major pedestrian corridors in the secondary impact zone.	Qualitative analysis shows planned improvements provide additional connectivity where gaps are present today.
Transit	Proportion of Development within 1/4 mile of RapidRide routes	How likely are campus students, faculty, and staff in new developments able to be in proximity (within 1/4 mile) to new regional RapidRide transit corridors?	Anticipated development within a 1/4 mile distance (as the crow flies).	Most new development would be within 1/4 mile of RapidRide routes and stops
	Proportion of Development within 1/2 mile of Light Rail	How likely are campus students, faculty, and staff in new developments able to be in proximity (1/2 mile) to existing and proposed light rail stations?	Anticipated development within a 1/2 mile distance (as the crow flies) from Link stations.	Most new development would be within 1/2 mile of planned light rail stations.
	Transit Stop Capacity	How will growth in transit riders and planned service impact capacity at key	Counts at key stops. Physical features at stops and transit patron growth.	Current transit stops are adequate to accommodate anticipated transit volumes, with the

Transportation Mode	Measure of Effectiveness	What it Measures?	Base Assumptions (see details in Appendix B)	Results
		transit stops serving the campus?		exception of the NE Pacific St/15th Ave NE and NE 42nd St/15th Ave NE.
	Transit Travel Times and Delay	How would increased growth in transit passengers and vehicle traffic impact transit travel time?	Current transit speeds and speed differential between transit and vehicles and increased delays due to growth in transit patrons.	Transit travel speeds decrease with No Action and Action Alternatives development.
	Transit Loads at Screenlines	How would growth in transit riders impact ridership and transit loads on planned service?	Current transit patrons at key screenlines. Background growth. All CMP transit growth assigned to key transit stops.	University Way NE (the Ave) and 11th Ave NE transit loads may exceed capacity.
All Vehicles	Arterial Corridor Operations	How will growth in vehicle traffic impact key corridor travel speeds?	Volumes and Intersection data. Synchro delays and corridor travel times. Existing travel times.	Increases in travel times at some corridors.
	Intersection Operations	How will growth in vehicle traffic impact individual intersection operations?	Volumes and intersection data. Synchro intersection delays.	Some signalized and unsignalized intersections meet an impact criteria of 10% development trips, and poor LOS.
	Comprehensive Plan Screenline Volumes	How will growth in vehicle traffic impact estimated comprehensive plan screenlines?	Intersection and link volumes.	Comprehensive plan screenlines would not be exceeded.

Transportation Mode	Measure of Effectiveness	What it Measures?	Base Assumptions (see details in Appendix B)	Results
	Secondary Impact Zone Analysis	How will growth in vehicle traffic impact individual intersection volumes in the secondary impact zone?	assigned Intersection and turn movement volumes and signal timing. Background growth from travel demand model. Synchro delays. Alternatives to proposed parking facilities for growth for each alternative.	Intersection operations at seven key intersections within the secondary impact zone.
	University Cap[1]	How will growth in vehicle traffic impact the University trip cap?	Mode split 20% drive alone. Growth projections.	May exceed the AM cap in 2025; however, a lower mode split would not break the cap.
	U District Cap[1]	How will growth in vehicle traffic impact the U District trip cap?	Mode Split 20% drive alone. Growth projections.	May exceed the AM cap in 2025. A lower mode split would not break the cap as in prior result.
	Parking Supply & Utilization	How will growth in vehicle traffic and visitors impact parking for different growth scenarios? Are some parking areas overcapacity?	Campus-wide data from survey.	Overall utilization would not be exceeded.
	Parking Cap[1]	How will growth in vehicle traffic impact the parking cap?	Mode Split 20% drive alone.	Parking cap would not be exceeded.

Transportation Mode	Measure of Effectiveness	What it Measures?	Base Assumptions (see details in Appendix B)	Results
	Freight Corridor Impact	How will growth impact freight/services-related traffic?	Qualitative analysis on the anticipated impacts on freight routes.	Discussion of anticipated results

1. Caps as defined by the CUA agreement

Synchro 9 A software program that uses Highway Capacity Manual (HCM) methodology to evaluate intersection LOS and average vehicle delays.

Cordon A hypothetical boundary where trips are measured crossing in and or out of that boundary is measured and compared.

Level of Service (LOS) Traffic operations for an intersection or corridor can be described alphabetically with a range of LOS values (LOS A through F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays. Intersection LOS incorporates intersection signal timing, signal phasing, channelization, traffic volumes, and pedestrian volumes for both signalized and unsignalized intersections, as applicable.

Intelligent Transportation Systems (ITS) Technology that can prioritize modes and reduce overall delay for vehicles as well as optimize to meet key objectives such as moving people (for example prioritizing higher occupancy vehicles).

3 AFFECTED ENVIRONMENT

This chapter describes the current transportation system that serves the University of Washington in Seattle. This system extends beyond the Major Institution Overlay (MIO) boundary and connects the students, faculty, staff, and visitors to homes and other destinations. Like many campuses, the University of Washington has a large resident student population living in dormitories or in housing within easy walking distance. As a major institution in a dense urban environment, the University of Washington relies on a well-developed, multi-modal transportation system to support mobility. This transportation system, described in this chapter, provides students, faculty, and staff access to a broad range of transportation choices—regional trails, bicycle facilities, light rail, frequent bus service, arterial streets, and close access to interstate and state highways—to name a few.

Major Institution Overlay (MIO): The Major Institution Overlay is a boundary defined by the City of Seattle Land Use and Zoning Code, noting the extents of the University of Washington.

For its part, the University has encouraged optimization of the transportation system by implementing a robust Transportation Management Plan that includes the U-PASS, and monitors utilization through annual surveys conducted by the University of Washington Transportation Services (UWTS). Transportation demand management and operation programs, including the U-PASS, enable the University to maintain an exceptionally low drive alone access mode, which results in a more efficient and sustainable use of the transportation system.

This chapter describes the transportation system currently used by the University population of students, faculty, and staff including parking of vehicles and bicycles. Because effects of growth on the transportation system are tied to the modes used, the proportion of the population using specific modes of travel is described in detail. Therefore, this chapter is organized by major modes of travel, consistent with the UWTS Mode Hierarchy triangle (Figure 3.1, right). Based on information found in the 2014 UWTS Climate Action Strategy for Transportation, mode hierarchy is determined from average emissions of travel modes. Travel modes with lower carbon emissions—including walk, bicycle, and telecommute modes—are shown at the top of the hierarchy, while higher-carbon travel modes such as driving alone are placed at the bottom of the hierarchy.

Figure 3.1 UWTS Mode Hierarchy Triangle
Source: UWTS Climate Action Strategies for Transportation, 2014

For each mode of access, a description of the system and how that system is used today, including demand, capacity, safety, and overall operations, follows.

3.1 EXISTING CAMPUS CHARACTERISTICS

As an institution in a densely populated city, the University of Washington's Seattle campus has flourished by relying on urban amenities, such as access to high-capacity transit, while also maintaining a pedestrian-focused setting within its core.

3.1.1 Mode of Access or Mode Split

A key element of this transportation analysis relies on mode of access, or how the students, faculty, and staff choose to travel to and within the MIO. The University of Washington supports various transportation choices so these populations have transit, rideshare, and non-vehicle transportation options. Mode choice is measured through an annual survey conducted by the University of Washington and by analyzing traffic counts. Current modes for campus populations include driving alone, carpooling, taking transit, walking, and riding bicycles. Student, faculty, and staff campus populations differ in the transportation modes they choose: students heavily favor pedestrian and transit modes; faculty and staff tend to drive alone or use transit. Over time, with the addition of the U-PASS program, non-single occupant vehicle (SOV) travel has increased for all population groups, while driving alone has declined. The mode split for the campus suggests that approximately 20 percent of the campus population travels by drive alone vehicles (based on 2015 survey data of modes). A recent survey for 2016 indicated that this drive alone number had dropped to 17 percent as more people opt to take transit. This new trend suggests that the opening of the Link light rail University of Washington Station in March 2016, is encouraging transit use. While the change is positive, the analysis presented in this report assumes a more conservative 20 percent drive alone mode split.

Table 3.1 provides a summary of the existing (2014) population in terms of headcount for students, faculty, and staff. These headcounts represent the most recently available data and are the basis for forecasting with future campus development Headcount or campus population for students, faculty and staff reflects the actual enrollments and employment for the campus. Surveys for the campus indicate that this headcount is higher than the number of actual trips that show up on campus each day due to the flexible schedules of students and faculty. Factoring down to reflect that students and faculty do not spend five days and 40 hours on campus each week was applied with the result being full-time equivalents. These full-time equivalents (FTEs) were used as the basis for evaluating parking. The FTE reduction is noted in Table 3.1. For the purposes of the transportation modal analysis, headcount was applied as it is more closely tied to anticipated growth projections.

Table 3.1
EXISTING (2014) UNIVERSITY POPULATION

Population	Headcount	FTE
Students	45,213	43,724
Faculty	7,951	7,107
Staff	17,333	16,324
Total Population	**70,497**	**67,155**

Source: Sasaki Architects, Inc., 2016

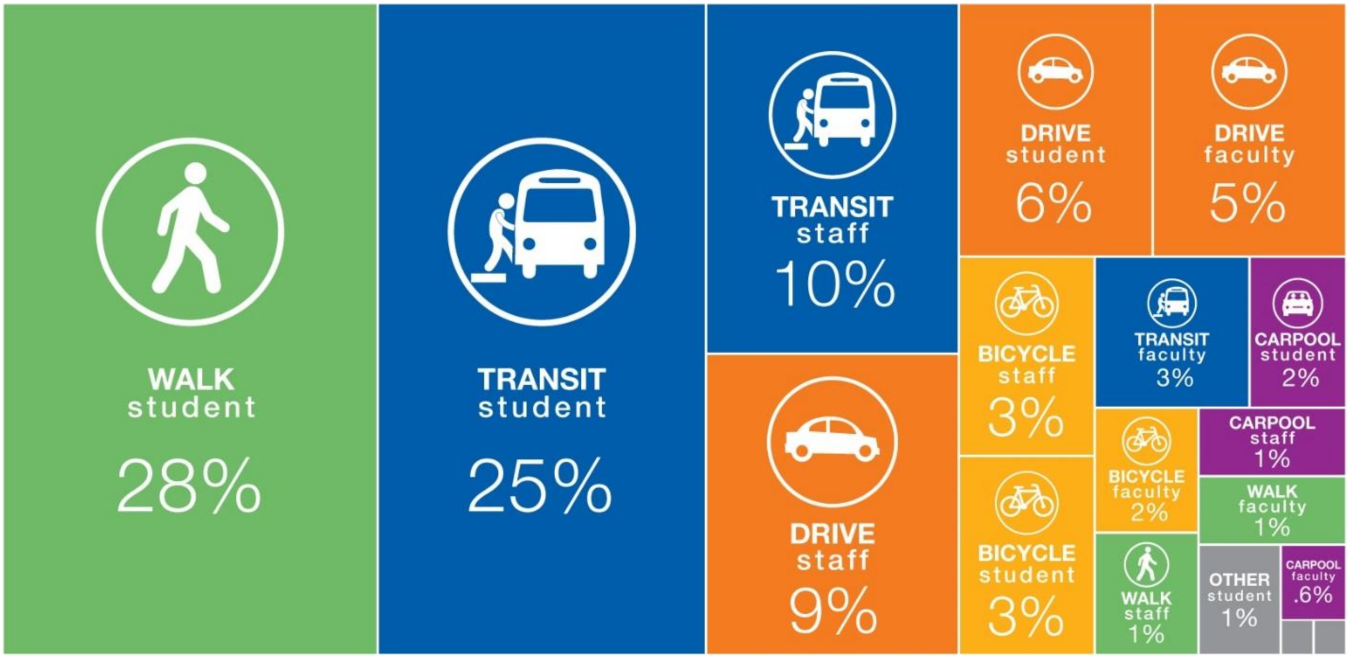
A summary of the existing 2014 headcount population by mode for each campus group (students, faculty, and staff) is provided in Table 3.2 below.

Table 3.2
EXISTING (2014) HEADCOUNT BY MODE (POPULATION)

Population	Drive Alone	Carpool	Transit	Walk	Bicycle	Other	TOTAL
Students	3,720	1,887	19,894	16,277	3,165	270	45,213
Faculty	3,539	583	1,988	557	1,113	171	7,951
Staff	5,683	1,966	7,280	693	1,300	411	17,333
Total Population	**12,942**	**4,436**	**29,162**	**17,527**	**5,578**	**852**	**70,497**

Source: Transpo Group, 2015

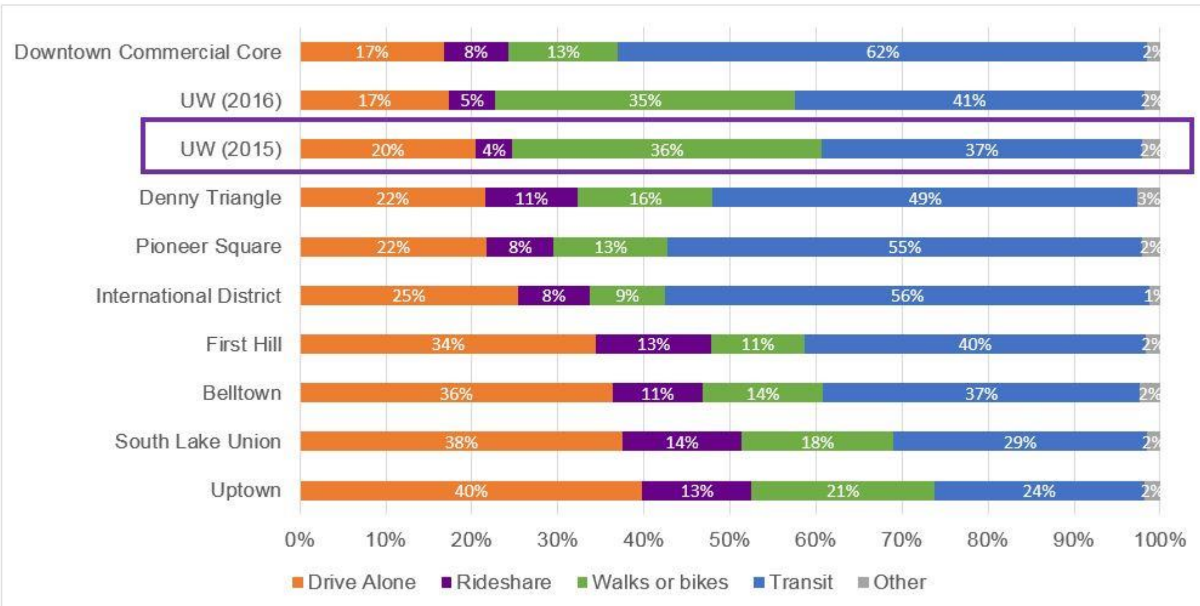
Another way to view mode choice for the whole campus is illustrated in Figure 3.2. The proportional graph shows the mode split survey from 2015 by mode for each population and reflects the high student population (as compared to faculty and staff). As shown in the graphic, considering all trips, over 50 percent of total campus trips are the student walk (28 percent of all trips) and student transit (25 percent of all trips). This pattern is likely due to the University of Washington's focused strategies in promoting lower impacting modes of travel.



Source: University of Washington Transportation Services, 2015 Survey, Transpo Group, 2016

Figure 3.2 2015 Total Campus Mode Choice Visual Representation

As compared to other City of Seattle neighborhoods, the University of Washington has one of the most successful programs for promoting modes other than drive alone. Figure 3.3 provides a comparison of the University of Washington mode splits to other City of Seattle neighborhoods. As shown, the campus operates with one of the lowest drive alone percentage as compared to these neighborhoods.



Source: Commute Seattle Center City Commuter Mode Split Survey, 2016 and University of Washington, 2016

Figure 3.3 Existing Neighborhood Mode Share Comparison

Such positive results in demand management can be credited, in part, to the implementation of the U-PASS. The University of Washington's U-PASS program subsidizes transit use by including a transit pass with a university member's Husky Card. Since its inception in 1991, the U-PASS has resulted in a substantial reduction in vehicle trips to and from campus. Also, the University has seen continued success in reducing SOV travel to the campus in subsequent years.

3.2 PEDESTRIANS

According to existing (2014) data, as shown in Table 3.2, a total of 17,527 people choose walking as their mode to access the University of Washington campus. Of these individuals, most (16,277) are students that live on or near campus, over 550 are faculty members, and almost 700 are staff. According to the 2015 University of Washington Transportation Study survey, just under one-third of trips accessing campus are walking trips.

3.2.1 Pedestrian Facilities

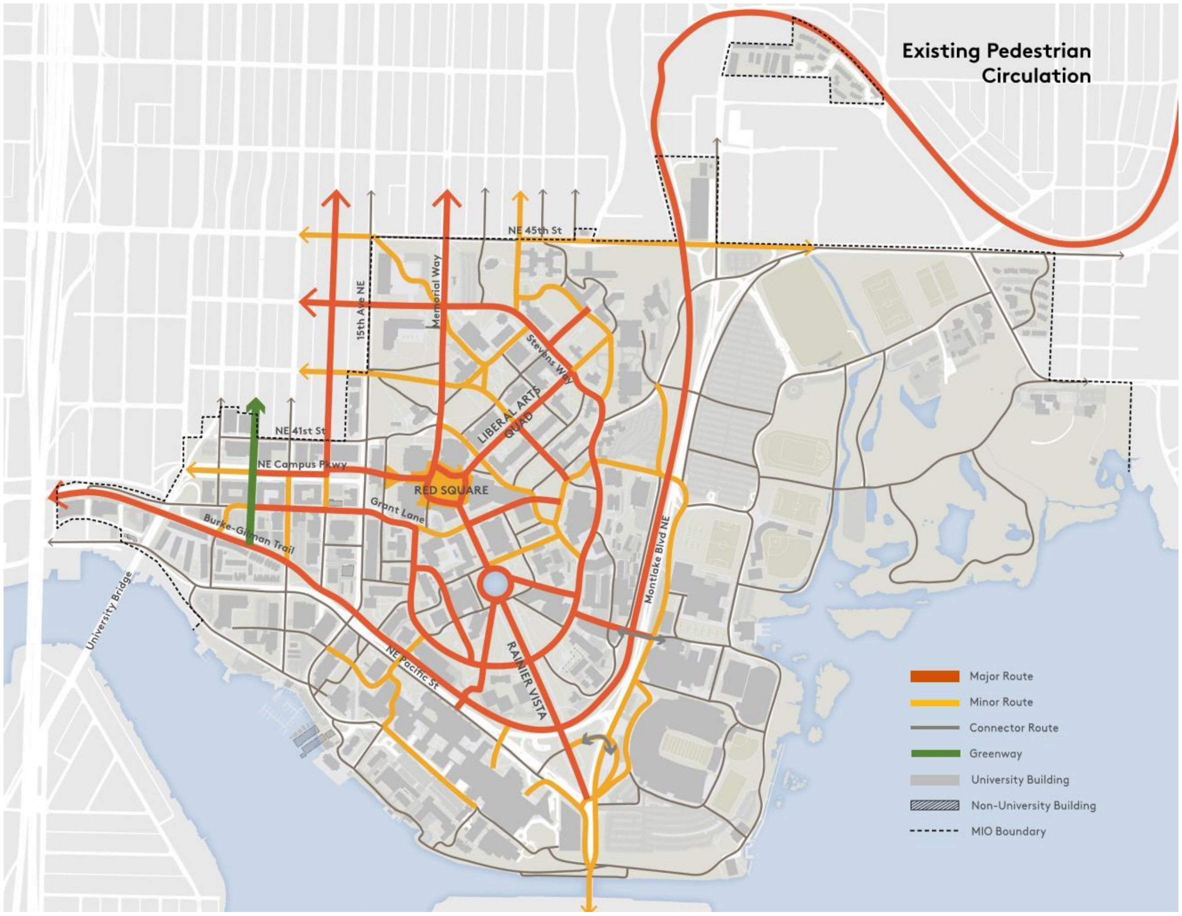
The system of pedestrian facilities serving the University of Washington consists of a network of pathways and sidewalks throughout campus. The pathways have been designated as **major** or **minor** in the Campus Master Plan (CMP). Major pathways for pedestrians include the Burke-Gilman Trail, Stevens Way, Memorial Way NE/17th Avenue NE, and NE Campus Parkway, as well as connecting pathways through Red Square, Rainier Vista, and the Quad, among others. The Burke-Gilman Trail—although under City of Seattle jurisdiction in other neighborhoods—is owned and maintained by the University of Washington within the MIO boundary. Minor pedestrian pathways function as connections between major routes, including pedestrian pathways between the Husky Union Building (HUB) and Drumheller Fountain, and sidewalks along 19th Avenue NE and in the vicinity of Husky Stadium, among others. New light rail stations are also a priority for pedestrian pathways to the campus.

Central Campus is separated from other subareas of the campus by a series of barriers including arterials 15th Ave NE, NE Pacific Street, and Montlake Boulevard NE, as well as topographical barriers for universal access. Some of these barriers are noted in Figure 3.4. The Draft Pedestrian Master Plan Update identifies locations within Seattle with missing sidewalks and with widely spaced crosswalks and safety concerns; however, no specific projects have been identified to correct these barriers at this time.

Pedestrian connectors function as sidewalks and pathways less traveled than major and minor routes. For example, sidewalks along 18th Avenue NE and pedestrian pathways along Snohomish Lane and Walla Walla Road are classified as pedestrian connectors. The general network of existing pedestrian facilities within the campus is shown in Figure 3.5. The pedestrian network outside the campus is also well developed and serves pedestrians commuting from nearby residential areas, generally north and west. Standard city sidewalks are provided along the major arterials in the area.

Source: Sasaki Architects, July 2017 CMP

Figure 3.4 Barriers and Existing Edge Conditions



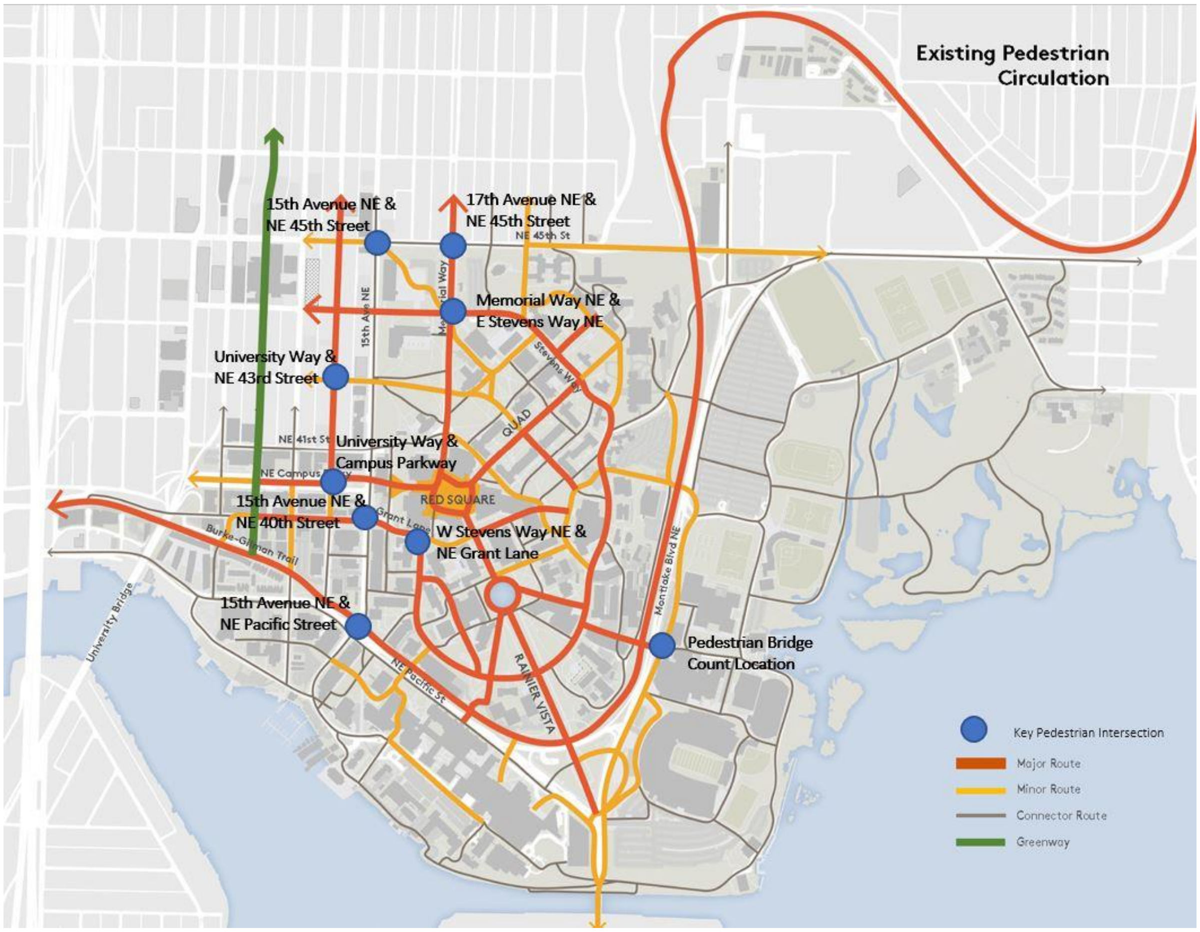
Source: Sasaki Architects, July 2017 CMP

Figure 3.5 Existing Pedestrian Facilities Classifications

Within the 1998 University Community Urban Center Plan, the City of Seattle designated NE 42nd Street, NE 43rd Street, and Brooklyn Avenue NE as neighborhood "Green Streets" to provide attractive and highly landscaped pedestrian routes in the University District (U District). In the spring of 2015, the City published a Green Streets Concept Plan further defining these routes. These designated streets enhance the pedestrian environment and will connect to the U District Station (Link light rail) that is currently under construction. Green Streets rely on partnerships with private development.

3.2.2 Pedestrian Counts

Figure 3.6 shows locations of key pedestrian intersections and reflects the extents of the areas of campus-related pedestrian trips and the CMP designations of major and minor pedestrian facilities. Based on high pedestrian counts, several intersections are noted as major pedestrian routes along one or both approaches. In the fall of 2016, a campus-wide count of pedestrians crossings at intersections and pedestrian bridges was conducted during the PM peak period prior to a major event (September 30th football game versus Stanford)



Source: Transpo Group, 2015

Figure 3.6 Key Pedestrian Intersections

Table 3.3 summarizes pedestrian volumes for each of the intersections highlighted above during the existing (2015) weekday PM peak hour. It should be noted that the 15th Avenue NE/ NE 40th Street/ NE Grant Lane intersection includes an all-walk pedestrian phase, with a walk phase for all pedestrian approaches occurring simultaneously.

Table 3.3
EXISTING (2015) WEEKDAY PM PEAK HOUR PEDESTRIAN VOLUMES AT KEY INTERSECTIONS

Intersection	Northbound Approach Crossings	Southbound Approach Crossings	Eastbound Approach Crossings	Westbound Approach Crossings
University Way / NE 43rd Street	240	140	550	470
University Way / Campus Parkway (West)	440	850	650	490
Memorial Way NE / E Stevens Way NE	440	80	300	170
W Stevens Way NE / NE Grant Lane	0[1]	710	0[1]	370
15th Avenue NE / NE 45th Street	270	300	200	160
15th Avenue NE / NE 40th Street / NE Grant Lane	970	490	110	120
15th Avenue NE / NE Pacific Street	260	80	120	160
17th Avenue NE / NE 45th Street	150	170	260	350

1. Construction activity closed segments of Stevens Way resulting in 0 pedestrian counts.

Source: Transpo Group, 2015

With the opening of the University of Washington Station in March 2016 near Husky Stadium, a new pedestrian bridge was constructed over Montlake Boulevard that included installation of a pedestrian/bicycle counter.

Pedestrian counts were also taken throughout the campus at all crosswalks and pedestrian bridges on September 30, 2016 during the PM peak period when there was a University of Washington football game. This period reflects a peak, saturation condition and a maturation of use for the light rail station. These counts also helped compare actual (video-taped counts) to automated counts on the NE Pacific Place pedestrian crossing that estimates pedestrian and bike counts.

The counts in 2015 and 2016 provide an opportunity to compare pedestrian counts prior to and after the opening of the University of Washington light rail station and also to compare volumes on days with and without events. The pedestrian bridge connecting the University of Washington light rail station to the campus opened in spring 2016 includes pedestrian and bicycle counting equipment. A same-day comparison of video counts of pedestrians and bicycles using the bridge to data from the counting equipment indicate that the automated counters may be undercounting by approximately 50 percent.

Pedestrian Bridges and Connection Points

Sky bridges and connection points provide pedestrian access from Central Campus to the other campus sectors. Existing pedestrian bridges provide grade-separated access with no vehicle conflicts over the arterials surrounding the campus. Across Montlake Boulevard, pedestrian bridges are located at NE Pacific Place, Snohomish Lane N (also known as Hec Ed), Wahkiakum Road, and the E1 parking area. The steep terrain from the central campus to the East sector and high speed, high volume Montlake Boulevard (State Route 513), pose barriers for pedestrians. These bridges provide unimpeded, safe, and more direct access to Husky Stadium, Alaska Airlines Arena, and other University of Washington athletic facilities, as well as the University of Washington Station. Pedestrian routes between campus and University Village, the

Center for Urban Horticulture, and neighborhoods east of Montlake Boulevard use these pedestrian bridges. All of these bridges are maintained by the University of Washington with the exception of the Snohomish Lane bridge (also known as Hec Ed), which is owned and operated by the City of Seattle Across NE Pacific Street, pedestrian bridges at the T-Wing and Hitchcock overpasses connect the campus and Burke-Gilman Trail with the University of Washington Medical Center.

Table 3.4 provides a summary of weekday PM peak hour counts on these facilities.

Table 3.4
EXISTING (2016) EVENT PM PEAK HOUR PEDESTRIAN VOLUMES AT PEDESTRIAN BRIDGES

Pedestrian Crossing Location	Crossing Roadway	PM Peak Hour Volume	Percent of Total Volume
E-1 Pedestrian Bridge	Montlake Boulevard	682	5%
Wahkiakum Road Pedestrian Bridge	Montlake Boulevard	3,724	27%
Snohomish Lane Pedestrian Bridge (at Alaska Airlines Arena) or “Hec Ed” bridge	Montlake Boulevard	2,938	21%
NE Pacific Place Pedestrian Bridge (at University of Washington Station)	Montlake Boulevard	4,198	30%
T-Wing Overpass Pedestrian Bridge	NE Pacific Street	264	2%
Hitchcock Overpass Pedestrian Bridge	NE Pacific Street	243	2%
Campus Parkway Pedestrian Bridge	15th Avenue NE	1,770	13%
Total PM Peak Hour Volume		**13,819**	**100%**

Source: Transpo Group, September 2016

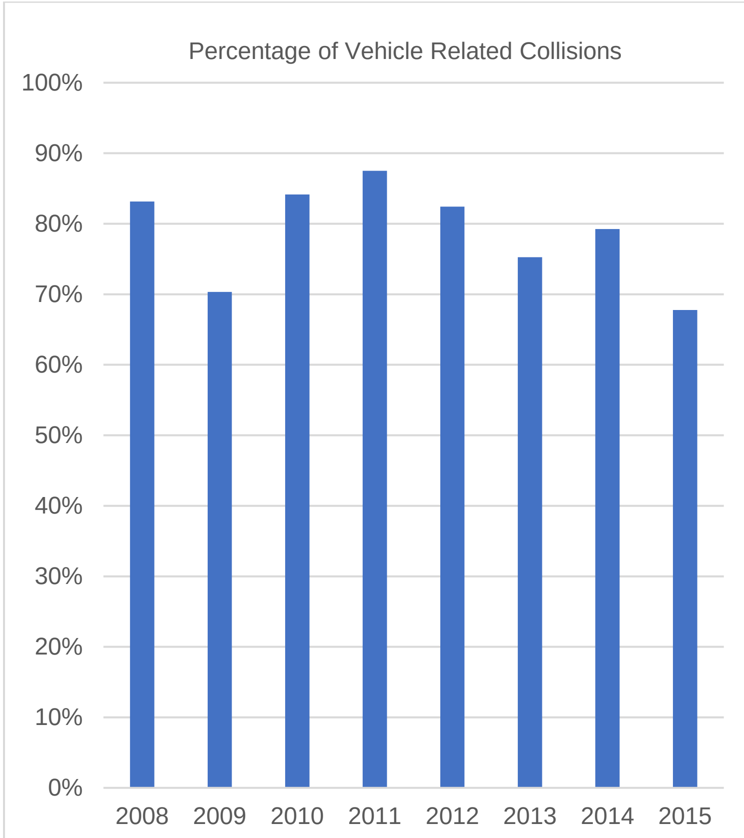
Aside from these connections, there is only one signal-controlled mid-block at-grade crossing of NE Pacific Street for pedestrians. Across 15th Avenue NE there is one pedestrian bridge at approximately Campus Parkway connecting Red Square and the Henry Art Gallery with Schmitz Hall. Other at-grade crossings of 15th Avenue occur at signal-controlled intersections at Pacific/ Burke-Gilman Trail, mid-block south of NE 40th Street, NE 40th Street/Stevens Way, NE 42st Street, NE 42nd Street, NE 43rd Street, and NE 45th Street.

Pedestrian and bicycle volumes were collected at the pedestrian overpass location above Montlake Boulevard NE, which connects the Burke-Gilman Trail with the E1 parking area in the East Campus sector. Data were collected in 15-minute intervals over one day in May 2016, from 7 am to 7 pm, at the east and west sides of the pedestrian bridge. From this data, a peak hour of 4:30 pm to 5:30 pm was determined, with a maximum of about 220 hourly pedestrian crossings (Transpo Group 2016).

3.2.3 Pedestrian Collision Data

Pedestrian and Bicycle Collisions

Based on data provided by UWTS, pedestrian and bicycle collisions are largely vehicle-related. Figure 3.7 below shows the percentage of vehicle-related collisions with pedestrians and bicycles from 2008 to 2015 in and around campus.

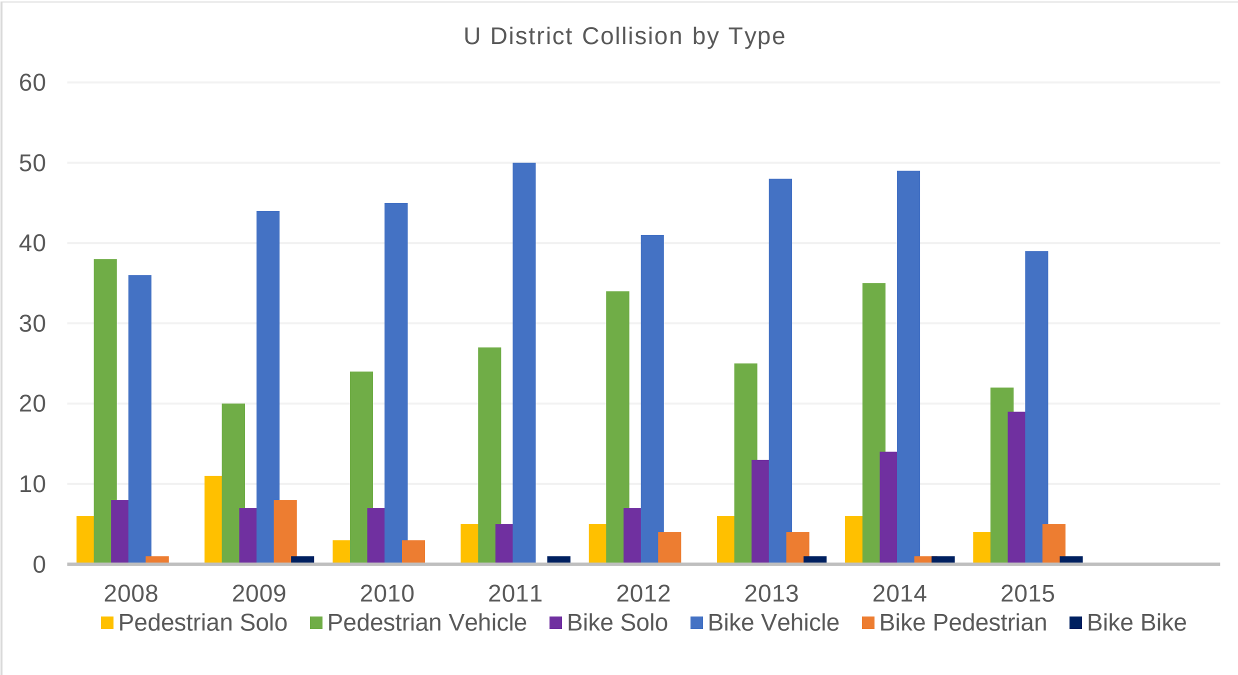


Source: UWTS

Figure 3.7 Historic Percentage of Vehicle-Related Pedestrian/Bicycle Collisions (Campus)

The same data is shown in more detail in Figure 3.8, which groups annual pedestrian and bicycle collisions by type. Between 2008 and 2015, pedestrian-vehicle and bicycle-vehicle collisions combined comprised the majority of all annual collisions involving pedestrians or bicycles, ranging from 82 to 106 collisions per year. Of these, on average, vehicles were involved in 79 percent of reported pedestrian and bicycle collisions.

The City of Seattle also collects collision data. Through an evaluation of Washington State Department of Transportation (WSDOT) and Seattle Department of Transportation (SDOT) information, there were 49 collisions that involved pedestrians, which averages to 16 per year for this eight-year period. Of the pedestrian collisions, four were reported at the Brooklyn Avenue NE/NE 50th Street, Roosevelt Way NE/NE 45th Street, and 11th Avenue NE/NE 45th Street intersections, and six were reported at the Brooklyn Avenue NE/NE 45th Street intersection. Continued focus on pedestrian safety by implementing both the Pedestrian Master Plan and Vision Zero will continue to improve these conditions.



Source: UWTS

Figure 3.8 U District Pedestrian-Bicycle Collisions by Type

A map of pedestrian and bicycle collisions is shown and described in further detail in Section 3.3.4, Bicycle Collision Data.

3.2.4 Performance Measures

Pedestrian performance measures have been developed to assess and compare alternatives. These measures assess impacts to pedestrian travel throughout the study area including the MIO, primary impact zone, and secondary impact zone. They are a mixture of quantitative and qualitative measures and are listed below and described in more detail throughout this section.

- Proportion of Development within 1/4 Mile of Multifamily Housing
- Proportion of Development within 1/4 Mile of University of Washington Residence Halls
- Quality of Pedestrian Environment
- Burke-Gilman Trail Capacity
- Pedestrian Screenline Demand and Capacity
- Pedestrian Transit Station/Stop Area LOS

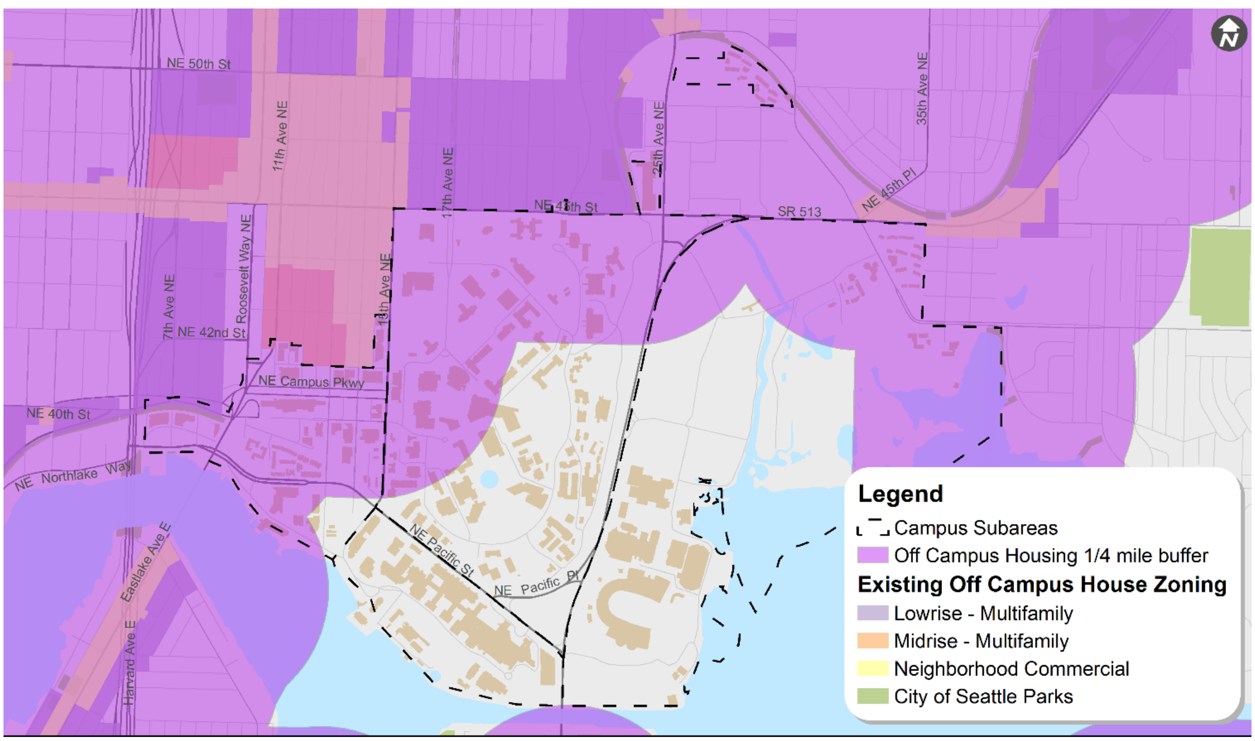
These measures reflect the effectiveness of the pedestrian network in providing safe, comfortable, and easy access to pedestrian destinations. Specifically, they should include housing to maintain a high walk mode choice on campus among students. For this analysis, each alternative was assessed based on future conditions of the pedestrian network and the effects of growth.

Proportion of Development Within 1/4 Mile of Multifamily Housing

Walking makes up over 30 percent of all existing campus-related trips. Proximity of campus development to housing is therefore one important measure to assessing the propensity of people to walk. This measure assesses the proximity of the current campus buildings and development to nearby multifamily housing. The measure determines the proportion of each sector within a 1/4 mile walk of areas currently zoned by the City of Seattle for multifamily housing (including lowrise, midrise, highrise, and neighborhood commercial developments). Of the current 16.8 million gross square footage of campus development, roughly 63 percent is within 1/4 mile of multifamily housing. Percentages for each area are shown in Table 3.5 and Figure 3.9.

Table 3.5
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF MULTIFAMILY HOUSING

Sector	Existing
West	80%
South	0%
Central	44%
East	69%
Average	**63%**

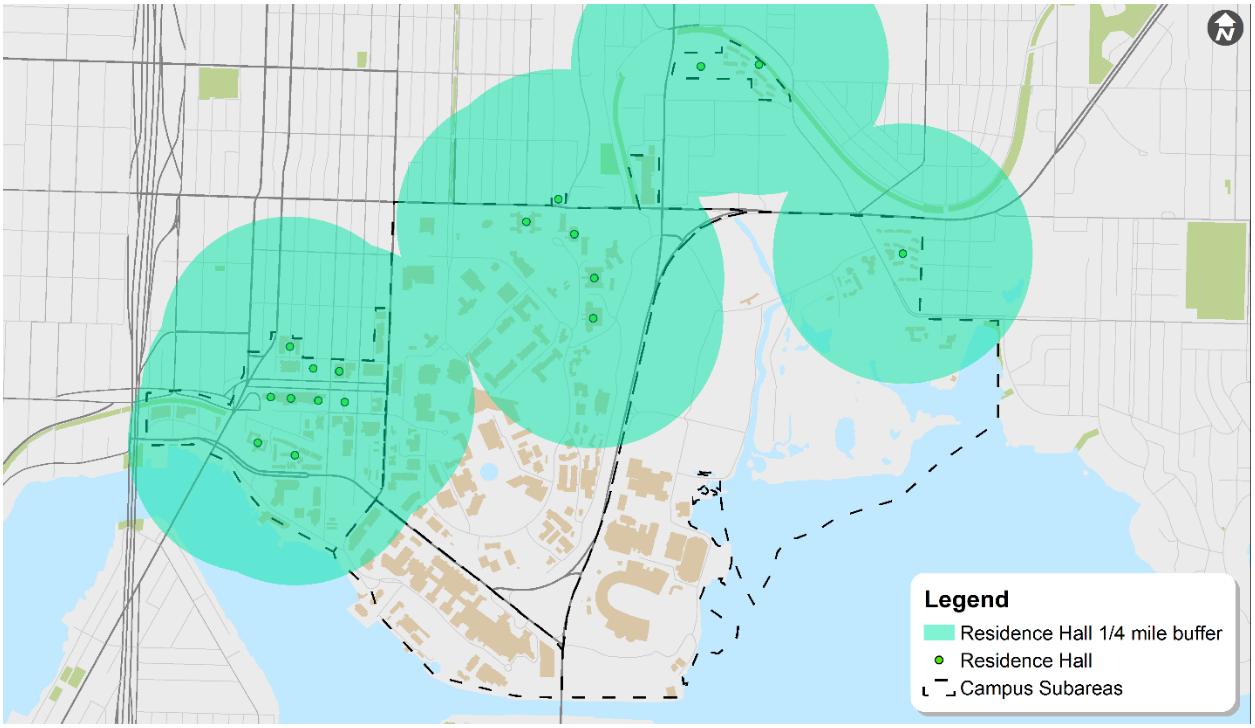


Source: Transpo Group, 2016

Figure 3.9 Proportion of Development within 1/4 Mile of Multifamily Housing

Proportion of Development Within 1/4 Mile of University of Washington Residence Halls

This performance measure assesses the proportion of campus development within walking distance of residence halls. Specifically, University of Washington residence halls were identified and then buffered by 1/4 mile, as shown in Figure 3.10 below. The percentage of each sector covered by this buffer was then used to scale an "average" percentage of development that might be expected to be within the 1/4 mile buffer. Notably, areas outside this buffer include athletic facilities and the University of Washington Medical Center.



Source: Transpo Group, 2016

Figure 3.10 Proportion of Development within 1/4 Mile of Residence Halls

Of the current 16.8 million gross square footage of campus development, roughly 76 percent is within 1/4 mile of residence halls. Percentages for each sector are shown in Table 3.6 below.

Table 3.6
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF RESIDENCE HALLS

Sector	Existing
West	80%
South	11%
Central	60%
East	80%
Average	**76%**

Quality of Pedestrian Environment

This measure determines the quality of the pedestrian environment within the primary and secondary impact zones. The assessment draws from the City of Seattle Draft Pedestrian Master Plan and others, such as the University District Green Streets Plan and the SR 520 Bridge Replacement and HOV Project, when specific projects are identified. While other measures focus on pedestrian volumes in locations where capacity limitations may exist, this measure more generally addresses where pedestrian travel might be expected to change.

Currently, the quality of the pedestrian environment varies throughout the impact zones. Within the MIO, and particularly on Central Campus, pedestrian travel is well accommodated with a connected and generally high-quality pedestrian network.

Pedestrian Bridges

Pedestrian barriers surrounding Central Campus, such as Montlake Avenue NE and NE Pacific Street, are accommodated by a number of pedestrian bridges. Along 15th Avenue NE and NE 45th Street, at-grade crossings and one pedestrian bridge provide access to campus. Travel for people with limited mobility is more disconnected due to grade changes; however, mobility is specifically addressed through a holistic approach including a Dial-A-Ride shuttle system and others.

A new pedestrian and bicycle bridge near the University of Washington Station improves connectivity from campus to light rail, the Montlake Bridge, and areas to the south. Improvements to pedestrian facilities across major barriers such as I-5 and the Montlake Cut have been identified.

Sidewalk Facilities

Within the U District, pedestrians travel along a dense, regular street grid providing good connectivity with sidewalks on both sides in most areas. Sidewalk facilities in the district are generally older, which is reflected in both their design and worn condition. Pedestrian demand is higher along University Way, NE 45th Street, Campus Parkway, and a number of other streets with dense housing or other features. Pedestrian improvements along Roosevelt Way, NE 42st Street, and NE 43nd Street have been identified.

Specifically, the City of Seattle Pedestrian Master Plan (Updated April 2017) has identified several locations as having missing sidewalk connections within the Pedestrian Priority Investment Network, a list of long-term priorities in pedestrian infrastructure.

Within the primary impact zone, the following locations are missing all or portions of their sidewalk connections:

- The north side of NE Pacific Street, between 15th Avenue NE and NE Pacific Place.
- NE 45th Street, between 22nd Avenue NE and Montlake Boulevard NE, along the northern portion of the roadway.
- Both NE 40th Street and 5th Avenue NE are missing pedestrian connections intermittently along the roadways.
- Parts of Lake Washington Boulevard E
- Additional local roads south of the Montlake Bridge.

Extending to the secondary impact zone, the following locations are missing connection features:

- Connections are missing south of the Cheshiahud Lake Union Loop, such as Harvard Avenue E, Fairview Avenue E, and Franklin Avenue E.

- East of University Village, portions of Union Bay Place NE, NE Blakely Street, 35th Avenue NE, and Princeton Avenue NE are missing sidewalks.

Neighborhood Greenways

Currently, the U District has two Neighborhood Greenways that are intended to prioritize cycling and walking. The existing Neighborhood Greenway within the primary impact zone is located on 12th Avenue NE, extending north from NE Campus Parkway. This pathway provides a north/south connection through the study area. In the secondary impact zone, a Neighborhood Greenway exists on 40th Avenue NE, east of the primary impact zone. This connection extends north of the Burke-Gilman Trail.

Safety

As described previously, an average of 16 collisions involving pedestrians occurred per year during the eight-year period of 2008–2015. Of those 16 pedestrian collisions, the majority were reported at the following intersections:

- 11th Avenue NE/ NE 45th Street
- Brooklyn Avenue NE/ NE 50th Street
- Brooklyn Avenue NE/ NE 45th Street
- Roosevelt Way NE/ NE 45th Street

More detailed pedestrian collision analysis is found in Section 3.2.3, Pedestrian Collision Data.

Pedestrian Screenline Demand and Capacity

This performance measure determines the adequacy of current crossings in accommodating future background growth and anticipated growth from the master plan. Peak hour demand, capacity, and level of service (LOS) were measured at all at- and above-grade (sky bridge) crossing locations along the edge of the Central Campus. The screenline locations were Montlake Boulevard NE, NE Pacific Street, 15th Avenue NE, and NE 45th Street. The following sections summarize pedestrian screenline volumes within the affected environment.

Screenline: An imaginary line across which the number of passing vehicles is counted.
Level of Service: Level of service or quality of service is a qualitative measure of how well a facility operates. Quantitatively it is often defined as a comparison of demand to theoretical capacity. An illustration is provided below.

Existing Data

Existing (2016) pedestrian screenline volumes were based on counts conducted at locations shown in Figure 3.11 during the PM peak period on Friday, September 30, 2016. These counts represented a peak pedestrian demand, capturing the congestion generated from the 5:30 pm University of Washington V. Stanford football game on that date. All pedestrian crossing locations were evaluated at the screenlines as shown in Figure 3.11 and listed in Table 3.7 and include at-grade crosswalks and grade-separated bridges. All pedestrian crossings were aggregated into four screenlines: Montlake Boulevard NE, NE Pacific Street, 15th Avenue NE, and NE 45th Street.

Figure 3.11 Pedestrian Screenline Capacity Analysis Study Area

Table 3.7
STUDY AREA PEDESTRIAN CROSSING LOCATIONS

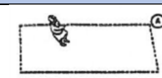
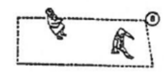
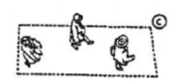
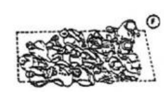
Screenline	Crossing Location	Crossing Type	Campus Sector
Montlake Boulevard NE	Pend Oreille Road NE/ NE 44th Street	North approach leg	East
	Pend Oreille Road NE/ NE 44th Street	South approach leg	East
	E-1 Lot Pedestrian Bridge	Above-grade pedestrian bridge	East
	IMA Pedestrian Bridge	Above-grade pedestrian bridge	East
	Hec Edmundson Pedestrian Bridge	Above-grade pedestrian bridge	East
	Husky Stadium Pedestrian Bridge	Above-grade pedestrian bridge	East
	NE Pacific Street	North approach leg	South
	NE Pacific Street	South approach leg	South
NE Pacific Street	Montlake Boulevard NE	East approach leg	South
	Montlake Boulevard NE	West approach leg	South
	UWMC Access	East approach leg	South
	UWMC Access	West approach leg	South
	UWMC East Pedestrian Bridge	Above-grade pedestrian bridge	South
	UWMC mid-block crossing	At-grade mid-block crossing	South
	UWMC West Pedestrian Bridge	Above-grade pedestrian bridge	South
	15th Avenue NE	East approach leg	South
	15th Avenue NE	West approach leg	South
15th Avenue NE	NE Pacific Street	North approach leg	South
	NE Pacific Street	South approach leg	South
	15th Avenue mid-block crossing	At-grade mid-block crossing	West
	NE 40th Street/ Stevens Way NE	North approach leg	West
	NE 40th Street/ Stevens Way NE	South approach leg	West
	Campus Parkway Pedestrian Bridge	Above-grade pedestrian bridge	West
	NE 41st Street	North approach leg	West
	NE 41st Street	South approach leg	West
	NE 42nd Street	North approach leg	West
	NE 42nd Street	South approach leg	West

Screenline	Crossing Location	Crossing Type	Campus Sector
	NE 43rd Street	North approach leg	West
	NE 43rd Street	South approach leg	West
	NE 45th Street	North approach leg	West
	NE 45th Street	South approach leg	West
NE 45th Street	15th Avenue NE	East approach leg	West
	15th Avenue NE	West approach leg	West
	17th Avenue NE	East approach leg	Central
	17th Avenue NE	West approach leg	Central
	18th Avenue NE	East approach leg	Central
	18th Avenue NE	West approach leg	Central
	19th Avenue NE	East approach leg	Central
	19th Avenue NE	West approach leg	Central
	20th Avenue NE	East approach leg	Central
	20th Avenue NE	West approach leg	Central

Pedestrian walkway capacity at all screenline crossings was determined from the Walkway LOS, as stated in the Transit Cooperative Highway Research Program (TCRP) Report 165: Transit Capacity and Quality of Service Manual, 3rd Edition. Capacity was calculated for each crossing location and aggregated by screenline using the pedestrian space and walk speed metrics shown in Table 3.8 to determine the crossing level of service (LOS). Based on the metrics shown in Table 3.8, each screenline is assigned a letter grade A to F where LOS A represents low density of people in the crosswalk and LOS F represents a high density of people in the cross walk. Capacity at LOS E, as shown in Table 3.9, was assumed to be maximum saturation flow or a theoretical capacity.

FINAL

Table 3.8
PEDESTRIAN WALKWAY LEVEL OF SERVICE

LOS	Pedestrian Space (ft^2/person)	Average Speed (ft/min)	Walkway Characteristics	Illustration
A	≥ 35	260	Walking speeds freely selected; conflicts with other pedestrians unlikely.	
B	25–35	250	Walking speeds freely selected; pedestrians respond to presence of others.	
C	15–25	240	Walking speeds freely selected; passing is possible in unidirectional streams; minor conflicts for reverse or cross movement.	
D	10–15	225	Freedom to select walking speed and pass others is restricted; high probability of conflicts for reverse or cross movements.	
E	5–10	150	Walking speeds and passing ability are restricted for all pedestrians; forward movement is possible only by shuffling; reverse or cross movements are possible only with extreme difficulty; volumes approach limit of walking capacity.	
F	< 5	< 150	Walking speeds are severely restricted; frequent, unavoidable contact with others; reverse or cross movements are virtually impossible; flow is sporadic and unstable.	

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition; Highway Capacity Manual

Table 3.9
MAXIMUM PEDESTRIAN CAPACITY BY SCREENLINE

Screenline	Maximum Capacity (People/hour at LOS E)
Montlake Boulevard NE	102,345
NE Pacific Street	67,326
15th Avenue NE	58,104
NE 45th Street	24,366

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition

Additional field characteristics used to determine capacity for each pedestrian crossing included crossing area, walk time, and flash-don't-walk time where applicable. A combined walk and flash-don't-walk time per hour was determined for each crossing location. Unsignalized mid-block crossings and pedestrian bridges were assumed to be unconstrained for the hour.

Existing pedestrian crossing volumes were determined from the September 2016 counts. A scaling factor was applied to crossing locations closest to Husky Stadium, accounting for the high volume of pedestrians generated by the evening football game. The scaling factor was developed from the differences between the PM peak hour pedestrian counts and WSDOT's automatic counter data at the Husky Stadium pedestrian bridge adjacent to the University of Washington Station. Existing scaled peak hour pedestrian volumes summarized by screenline are shown in Table 3.10.

Table 3.10
EXISTING (2016) PEAK HOUR PEDESTRIAN VOLUME AND LEVEL OF SERVICE

Screenline	Pedestrian Volume (People/ hour)	Level of Service
Montlake Boulevard NE	12,742	A
NE Pacific Street	3,252	A
15th Avenue NE	7,866	A
NE 45th Street	2,051	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition

As shown in Table 3.10, the existing (2016) peak hour aggregate pedestrian volumes for all screenlines operated at LOS A indicating that there is available capacity at crosswalks.

Pedestrian Transit Station/Stop Area LOS

The transit stop space analysis for pedestrians evaluates the peak hour demand, capacity, and LOS at key transit stops along Montlake Boulevard NE, NE Pacific Street, and 15th Avenue NE. Ten stops were identified that reflect the higher level of stop activity based on passenger count data from transit agencies.

The following sections summarize the pedestrian space per person and LOS at these locations within the affected environment.

Existing Data

Existing pedestrian space was measured in square footage per person at 10 key transit stops in the study area, as shown in Figure 3.12 and listed in Table 3.11. Existing data is based on counts and field observations conducted during the PM peak hour on Tuesday, January 31, 2017. Pedestrian counts at each transit stop were collected via a two-hour video recording at each location, during the PM peak hour of 4 pm to 6 pm. Video data were summarized to determine the 15-minute period with the greatest number of pedestrians (the peak 15-minute pedestrian count) waiting at each transit stop analyzed. Field observations were conducted on Monday, January 30, 2017. Field data recorded the measurements of obstacles that may have impeded pedestrian waiting areas. Obstacles that were considered included pedestrian walkway space, trees, garbage cans, fire hydrants, and other objects that may have impacted the available waiting area. For analysis, the area occupied by obstacles was removed from the total area at each transit stop location. The effective area represented the remaining available space utilized by waiting transit riders. However, the effective area of each transit stop location excludes space for circulation and walkways; these areas are summarized in Table 3.11.

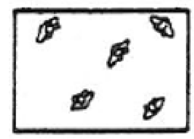
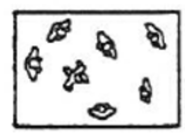
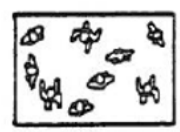
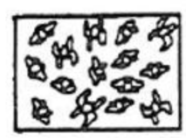
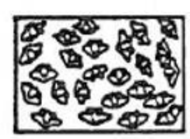
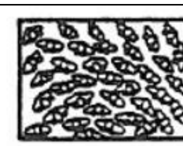
Figure 3.12 Pedestrian Transit Stop Space Analysis Study Area

Table 3.11
STUDY AREA TRANSIT STOP LOCATIONS

Stop ID Number	King County Metro Stop Number	Roadway	Stop Location	Description	Campus Sector	Effective Area (ft^2)
1	29,247	Montlake Boulevard NE	NE Pacific Street	Bay 1, south side of NE Pacific Street	South	1,930
2	29,405	Montlake Boulevard NE	NE Pacific Street	Bay 2, south side of NE Pacific Street	South	1,930
3	29,240	NE Pacific Street	Mid-block	North side of NE Pacific Street, under pedestrian bridge	South	315
4	29,440	15th Avenue NE	NE Campus Parkway	East side of 15th Avenue NE, north of Stevens Way NE	West	2,625
5	11,352	15th Avenue NE	NE 42nd Street	East side of 15th Avenue NE, north of NE 42nd Street	West	235
6	10,912	15th Avenue NE	NE 43rd Street	West side of 15th Avenue NE, south of NE 43rd Street	West	2,534
7	25,240	Montlake Boulevard NE	NE Pacific Place	Bay 4, east side of Montlake Boulevard, adjacent to Husky Stadium	East	1,072
8	25,765	Montlake Boulevard NE	NE Pacific Place	Bay 3, west side of Montlake Boulevard	East	2,990
9	75,410	Stevens Way NE	Pend Oreille Road	East side of Stevens Way NE	East	564
10	75,403	Stevens Way NE	Benton Lane	West side of Stevens Way NE, adjacent to the Husky Union Building	East	1,122

Pedestrian queuing capacity at each transit stop was determined from the Waiting Area LOS, as stated in the Transit Cooperative Highway Research Program (TCRP) Report 165: Transit Capacity and Quality of Service Manual, 3rd Edition. Capacity at LOS A to F was calculated for each crossing location and aggregated by campus sector using the pedestrian space metric shown in Table 3.12. Pedestrian space was calculated using the peak 15-minute pedestrian count and effective area at each location. Effective area was assumed to be constant throughout existing and future analysis years.

Table 3.12
PEDESTRIAN QUEUING AREA LEVEL OF SERVICE

LOS	Pedestrian Space (ft^2/person)	Queuing Area Characteristics	Illustration
A	≥ 13	Standing and free circulation through the queuing area is possible without disturbing others in the queue.	
B	10–13	Standing and partially restricted circulation to avoid disturbing others in the queue is possible.	
C	7–10	Standing and restricted circulation through the queuing area by disturbing others is possible; this density is within the range of personal comfort.	
D	3–7	Standing without touching is impossible; circulation is severely restricted within the queue and forward movement is only possible as a group; long-term waiting at this density is discomforting.	
E	2–3	Standing in physical contact with others is unavoidable; circulation within the queue is not possible; queueing at this density can only be sustained for a short period without serious discomfort.	
F	< 2	Virtually all personal within the queue are standing in direct physical contact with others; this density is extremely discomforting; no movement is possible within the queue; the potential for pushing and panic exists.	

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition; Highway Capacity Manual

Pedestrian space and LOS was determined at each location based on the PM peak pedestrian count and effective area as described above. Existing pedestrian space and LOS at each transit stop is summarized in Table 3.13. Note that the existing (2016) peak hour pedestrian space for all transit stop locations is at LOS C or better.

Table 3.13
EXISTING (2016) PEAK HOUR PEDESTRIAN SPACE AND LEVEL OF SERVICE

Stop Location	Stop ID Number	King County Metro Stop Number	Campus Sector	Pedestrian Space (ft^2/person)	Level of Service
NE Pacific Street Bay 1	1	29,247	South	49	A
NE Pacific Street Bay 2	2	29,405	South	43	A
NE Pacific Street at 15th Avenue NE	3	29,240	South	8	C
15th Avenue NE at Campus Parkway	4	29,440	West	109	A
15th Avenue NE at NE 42nd Street	5	11,352	West	88	A
15th Avenue NE at NE 43rd Street	6	10,912	West	49	A
Montlake Boulevard Bay 4	7	25,240	East	43	A
Montlake Boulevard Bay 3	8	25,765	East	120	A
Stevens Way NE at Pend Oreille Road	9	75,410	East	21	A
Stevens Way NE at Benton Lane	10	75,403	East	40	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition

3.3 BICYCLES

Within the campus community, approximately 5,600 individuals choose to bicycle to the University of Washington campus based on mode share data shown in Table 3.2. Most (over 3,100) are students. Faculty and staff combined that choose to bicycle to the campus total approximately 2,400.

3.3.1 Bicycle Facilities

The existing University of Washington bicycle system includes designated streets and pathways as well as end-of-trip facilities such as short-term bicycle parking, secured and covered bicycle parking, and shower/changing facilities.

Protected Bicycle Lane (PBL): A protected bicycle lane separates bicycles from pedestrians and vehicles on a roadway, creating safe and inviting facilities for people riding bikes of all ages and abilities.

Figure 3.13 shows the existing bicycle network near or serving the campus, including protected and unprotected bicycle lanes, shared lanes, greenways, and trails. Northeast Campus Parkway, NE 40th Street, and Roosevelt Way NE offer protected bicycle lanes, while 11th Avenue NE, parts of Brooklyn Avenue NE, and parts of University Way NE provide unprotected bicycle lanes. Stevens Way NE, Pend Oreille Road NE, and NE 45th Street have shared marked lanes for bicycle riders, and the Burke-Gilman Trail provides a paved, flat route for riders traveling throughout campus.

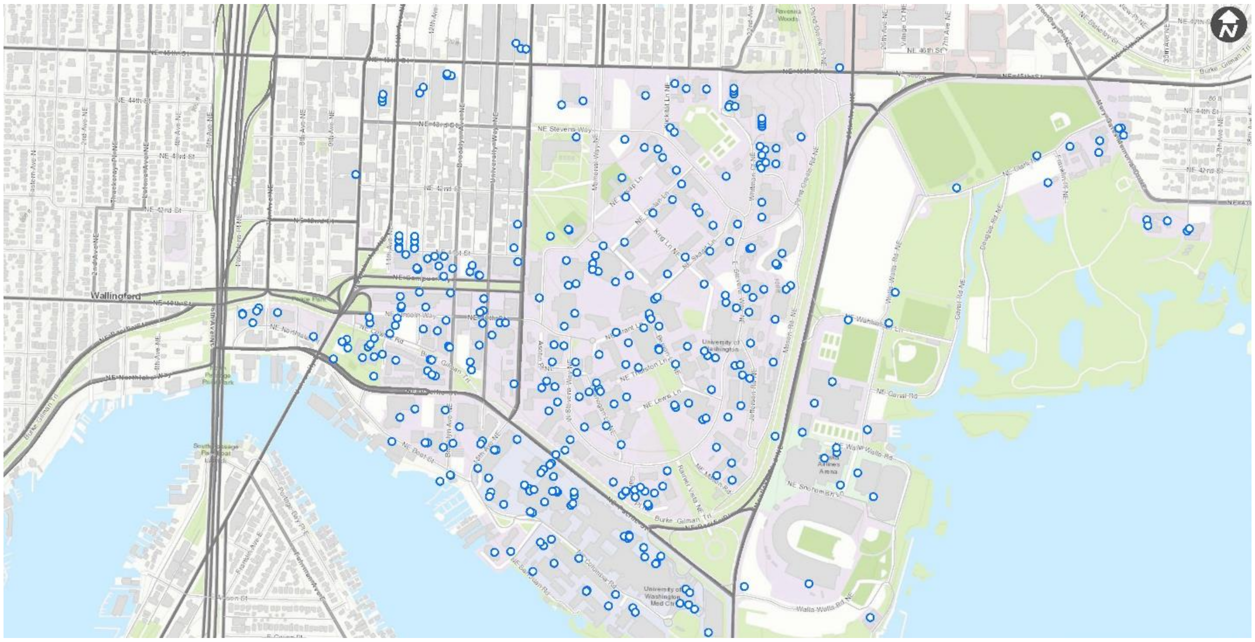
Source: Sasaki Architects, July 2017 CMP

Figure 3.13 Existing (2015) Bicycle Facilities

3.3.2 Bicycle Parking and Bikeshare Facilities

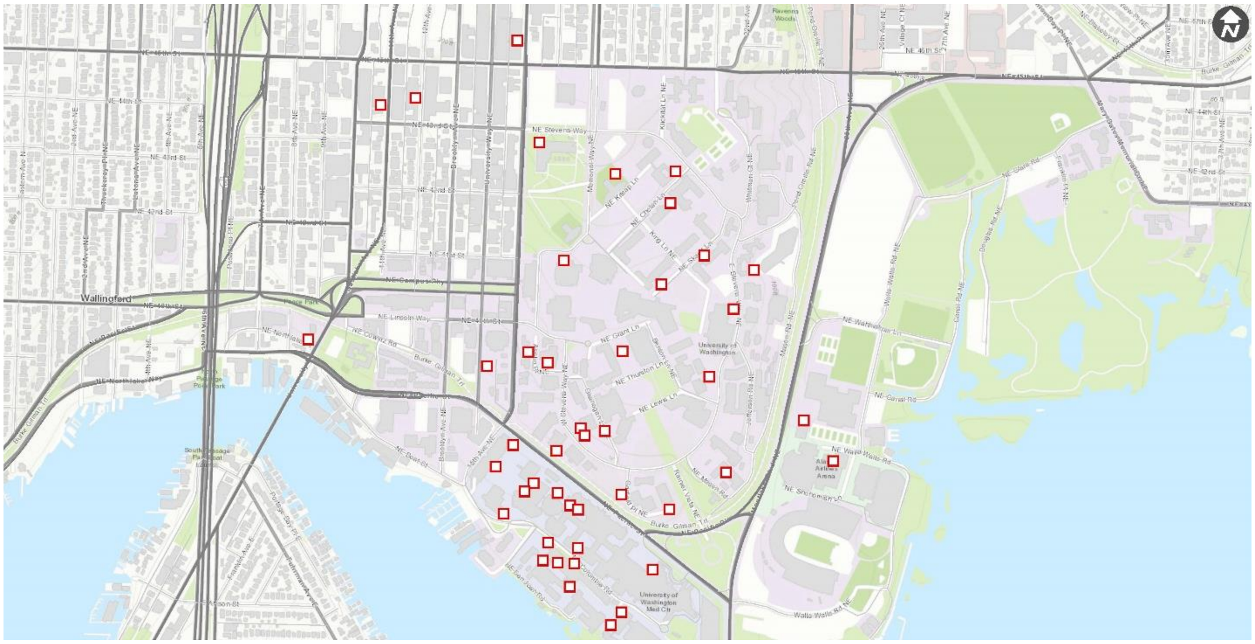
Bicycle Parking

Bicycle parking supply and accessibility provides an additional opportunity to support and encourage bicycle travel throughout the campus network. Existing (2016) bicycle rack locations and secure bicycle houses and lockers are shown in Figure 3.14 and Figure 3.15, respectively.



Source: University of Washington Transportation Services, 2016

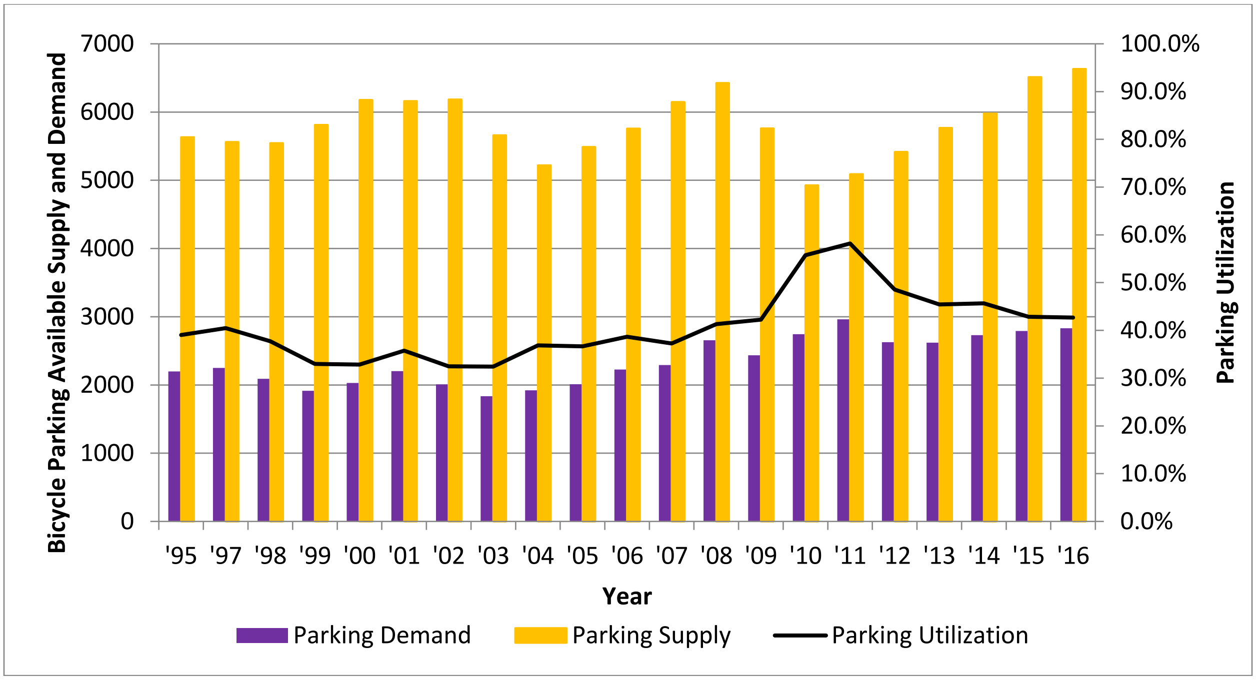
Figure 3.14 Existing (2016) Bicycle Rack Locations



Source: UWTS, 2016.

Figure 3.15 Existing (2016) Secure Bicycle House and Locker Locations

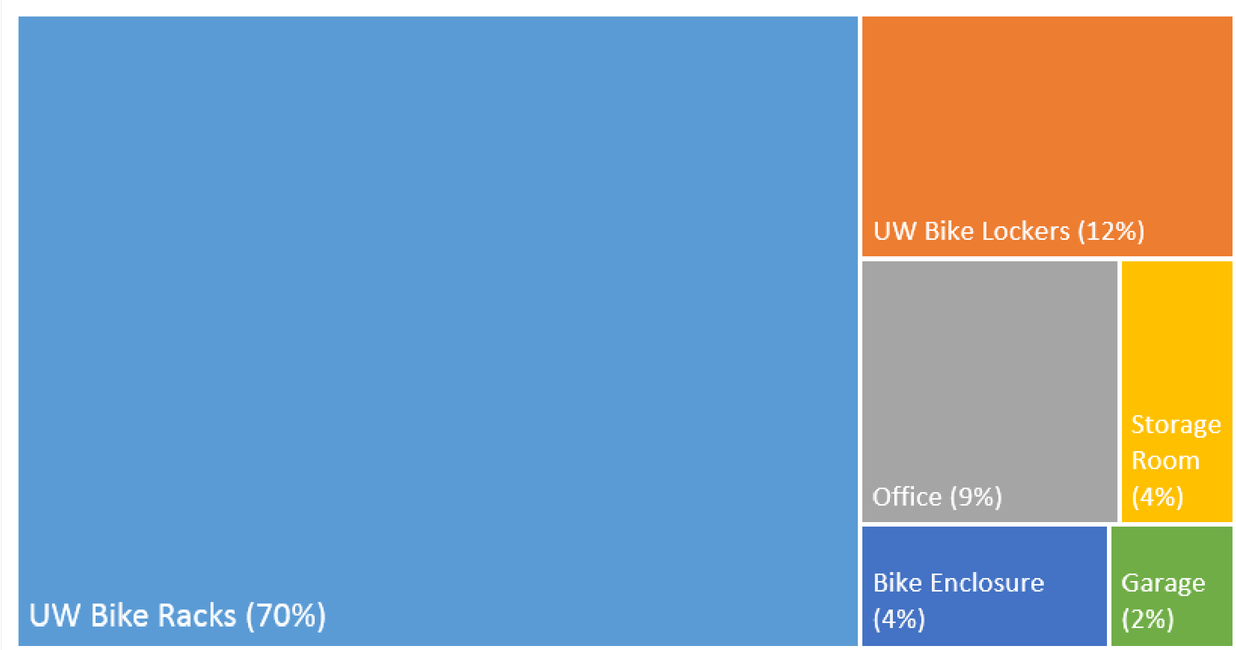
Figure 3.16 shows bicycle parking utilization trends from 1995 to 2016. The increase in bicycle parking utilization between 2009 and 2011 is a reflection of adjustments for real-world rather than theoretical capacity. Since then, the University of Washington has increased capacity by roughly 1,500 spaces. At the same time, utilization has dropped by about 20 percent from its peak. These statistics demonstrate how the University has effectively managed ongoing needs by ensuring that bicycle parking supply outpaces demand.



Source: UWTS, 2016

Figure 3.16 Campus-Wide Bicycle Parking Utilization Trends

Data shown in Figure 3.17, which is derived from the biennium transportation telephone survey of students, faculty, and staff, suggests that 30 percent of these populations do not use the bicycle racks provided by the University of Washington. The survey indicates that, overall, an estimated 82 percent of campus bicycle riders use bicycle storage facilities provided by the University. Of this number, some 70 percent use bicycle racks throughout campus and 12 percent use bicycle lockers. This data, in combination with other survey results, seems to indicate an ongoing desire for more secure bicycle storage on campus. The University is working to address this issue, especially as part of new construction.

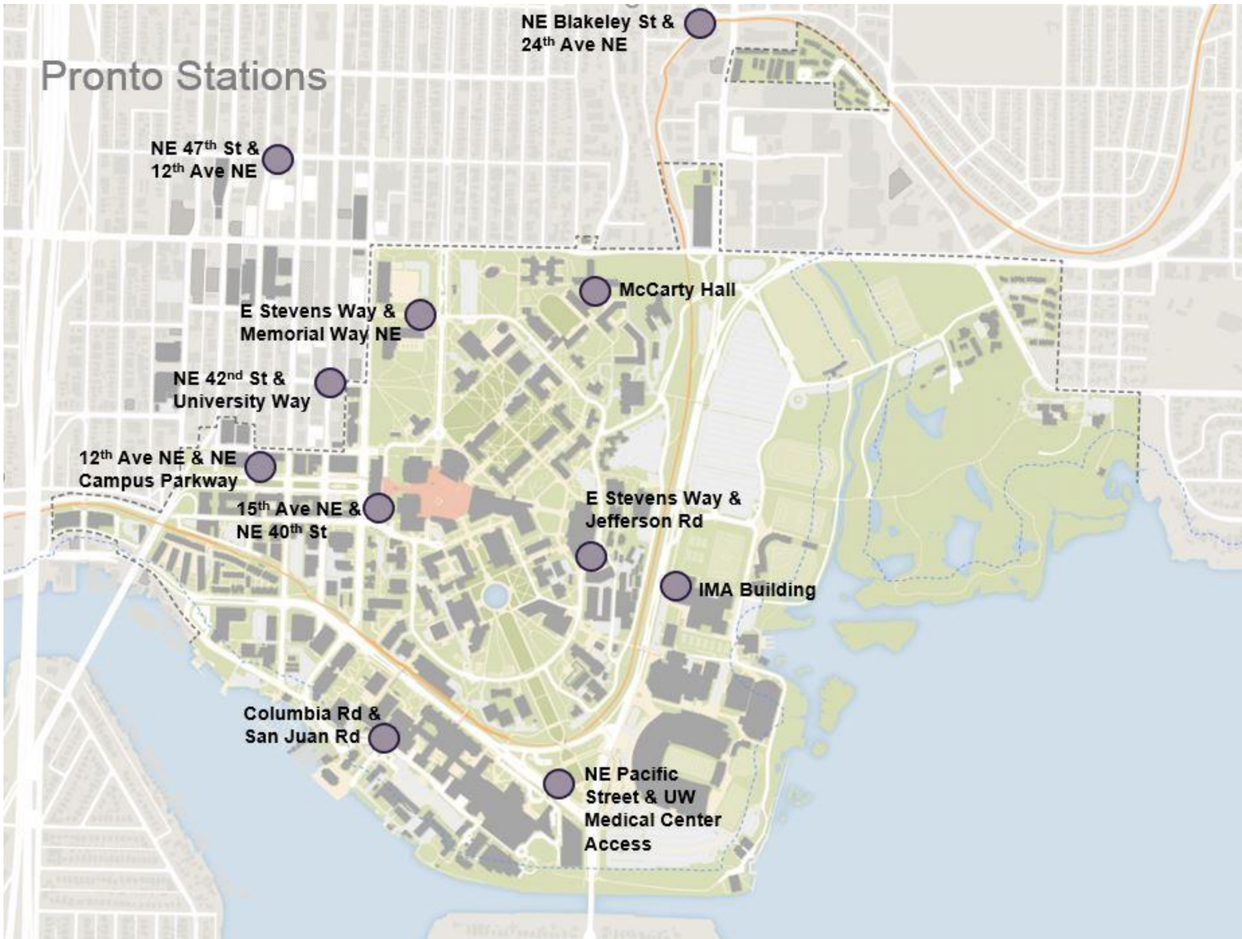


Source: UWTS

Figure 3.17 Bicycle Parking Locations

Bikeshare Program

The Pronto Cycle Share program (Pronto) was managed by the City of Seattle to promote biking and reduce dependence on automobiles. Eleven Pronto stations were positioned within the primary and secondary impact zones. These stations located in the University District are shown in Figure 3.18. As of March 31, 2017, the City of Seattle has discontinued the program.



Source: Transpo Group, 2015

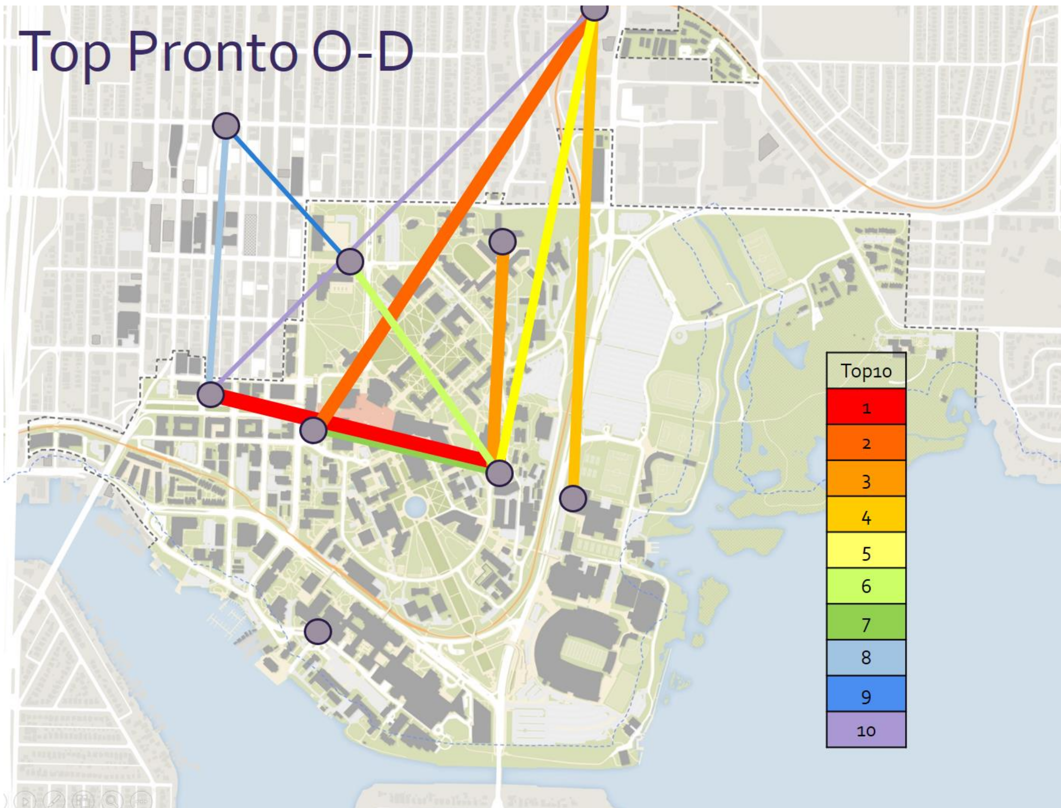
Figure 3.18 Pronto Cycle Share Stations

The performance of the Pronto program on the University of Washington campus was low in comparison to other Pronto stations. Based on 2015 Pronto ridership data, all University of Washington stations averaged four Pronto trips per station per day or fewer and ranked in the bottom 30 percent in average trips per day. The most frequently used Pronto station was located at the 12th Avenue NE/NE Campus Parkway intersection, with 4.14 trips per day. The fewest Pronto trips per day (1.22) occurred at the McCarty Hall/Whitman Court station.

In comparison, the highest volume of Pronto trips per day (over 15) occurred at the 3rd Avenue/Broad Street station in Downtown Seattle. The most common trip to and from U District Pronto stations occurred between the 12th Avenue/NE Campus Parkway station and the East Stevens Way NE/Jefferson Road station. With the opening of the light rail University of Washington Station, Pronto use was expected to increase. The light rail station is currently the end of the line, which could have made bicycle mode options more desirable.

The top 10 origin-destination pairs for historic Pronto use in the U District are shown in Figure 3.19. The map indicates that travel to/from the HUB was popular for short trips between areas of campus. The data also shows that three of the top five origin-destinations involved the station near 25th Ave NE and

Ravenna Place NE near Nordheim Court, which is a flat, comfortable bicycle ride to campus via the Burke-Gilman Trail.



Source: Transpo Group, 2015

Figure 3.19 Top Pronto Origin-Destination Pairs

3.3.3 Bicycle Counts

Bicycle ridership data from the SDOT includes 2011 and 2012 bicycle counts at intersections throughout Seattle, including three U District locations.

Table 3.14 summarizes bicycle counts and suggests that bicycle travel is increasing in these locations.

Table 3.14
ANNUAL BICYCLE VOLUMES AT U DISTRICT LOCATIONS

Location	2012 Total	2011 Total	Percent Change	Absolute Change
NE 45th Street/Brooklyn Avenue NE	765	579	32%	186
Montlake Boulevard NE/NE Pacific Street	2,188	1,817	20%	371
University Bridge	2,768	1,815	53%	953

Source: SDOT, 2012.

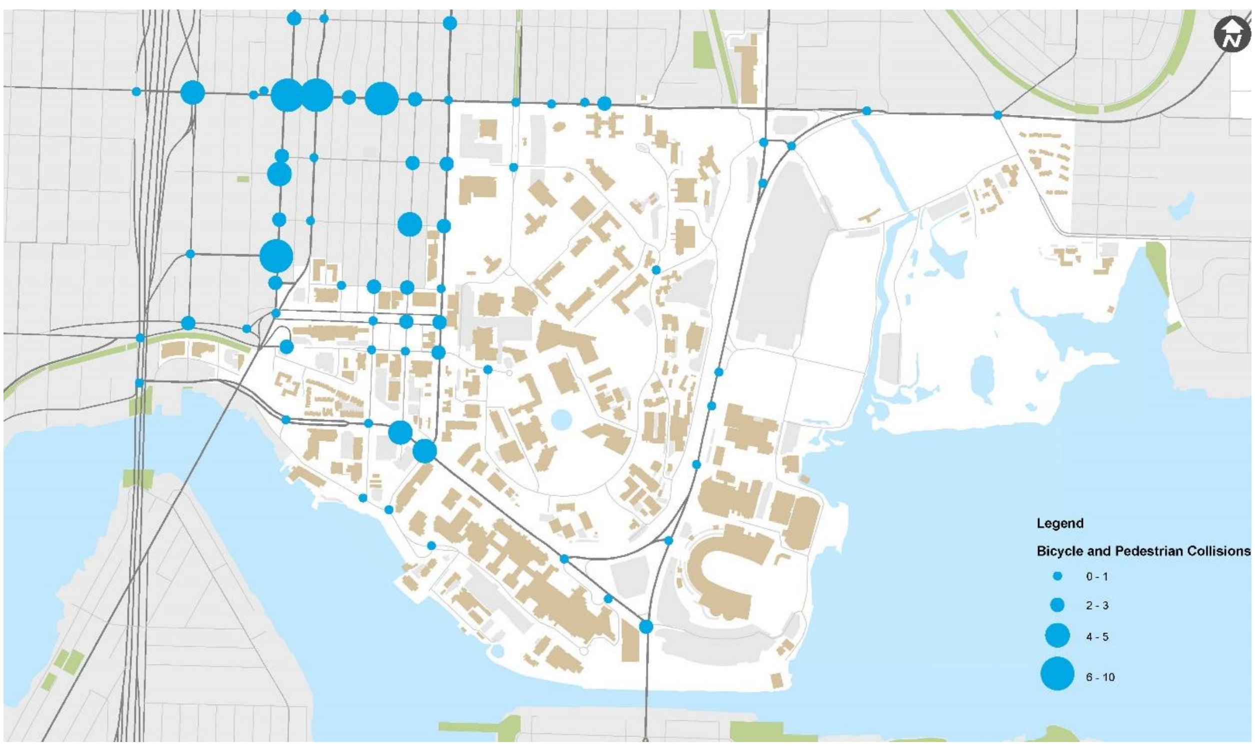
Additional bicycle volumes along the Burke-Gilman Trail are provided in Figure 3.21. Bicycle mode share growth trends for students and staff have been somewhat flat from 2009 to 2014

3.3.4 Bicycle Collision Data

Collision data for bicycles was also evaluated for the years 2008–2015 by UWTS and are reported with pedestrian-related collisions in Figure 3.8. Based on this data, bicycle-vehicle collisions are the highest reported with roughly 40 collisions per year.

Figure 3.20 summarizes bicycle and pedestrian collisions in the study area during the previous five-year period. Intersections with the highest number of collisions during that period are listed below:

- 11th Avenue NE/ NE 45th Street
- Brooklyn Avenue NE/ NE 45th Street
- Roosevelt Way NE/ NE 45th Street
- Roosevelt Way NE/ NE 42nd Street



Source: Transpo Group, 2016

Figure 3.20 Bicycle and Pedestrian Collisions

A review of the data provided by SDOT for the primary and secondary impact zone also addresses bicycle collisions; they are described in Section 3.5.4, Collision History.

3.3.5 Performance Measures

The following bicycle system performance measures have been developed to assess and compare alternatives:

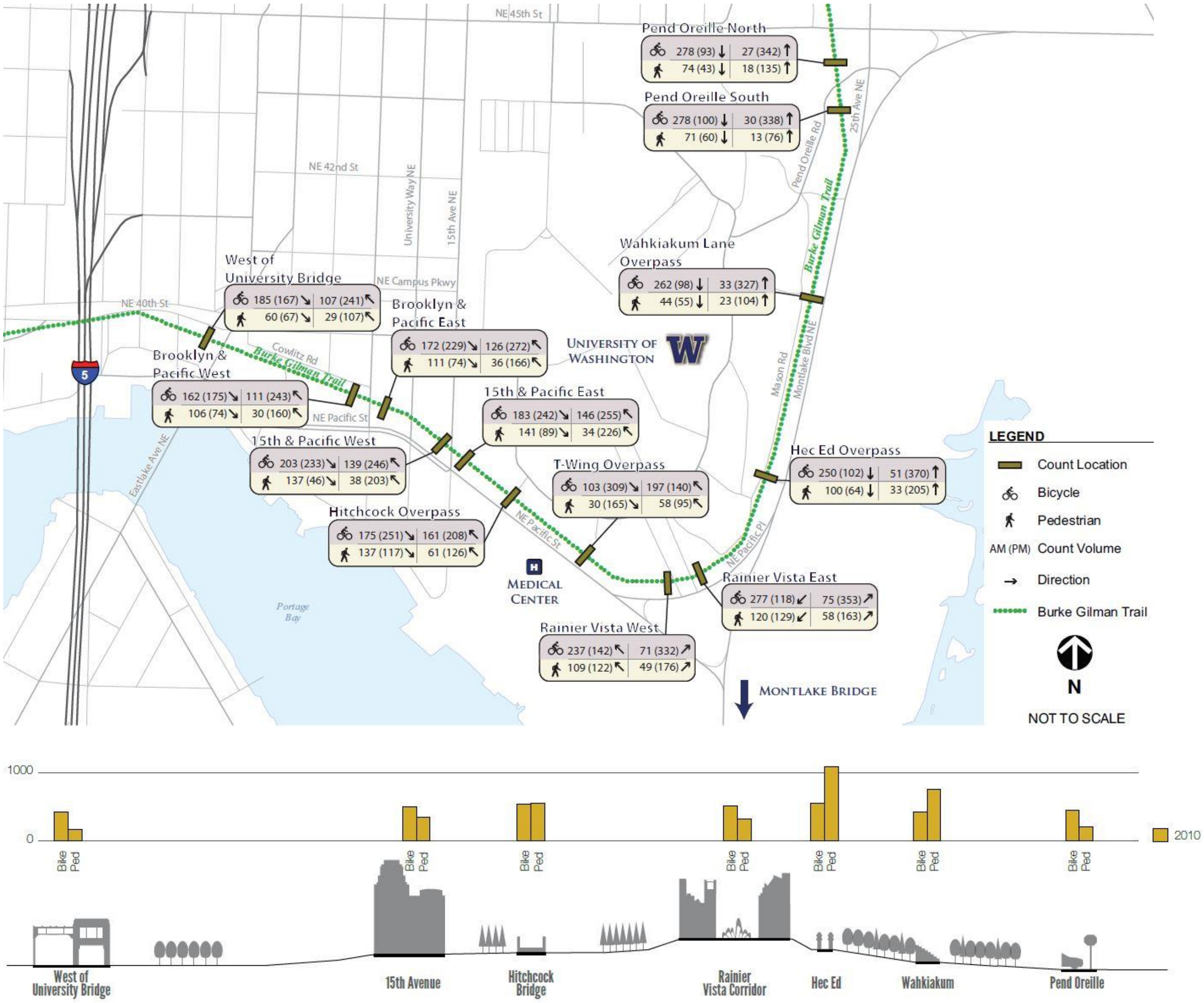
- Burke-Gilman Trail Capacity
- Bicycle Parking and Utilization
- Quality of Bicycle Environment

These measures include a mixture of quantitative and qualitative measures. They are described in more detail throughout this section.

Burke-Gilman Trail Capacity

The University of Washington owns the Burke-Gilman Trail throughout the MIO. The University conducted two detailed studies, one in 2011 to study the trail and one in 2012 to define a plan, that identify how best to improve the capacity and aesthetics of the corridor. Weekday AM and PM count volumes from the 2010 study of pedestrians and bicycles are shown in Figure 3.21; PM peak hour counts are summarized in Table 3.15.

FINAL



Source: University of Washington Burke-Gilman Trail Corridor Study, July 2011

Figure 3.21 Pedestrian and Bicycle Counts Along Burke-Gilman Trail Corridor

Table 3.15
2010 BURKE-GILMAN TRAIL WEEKDAY PM PEAK HOUR PEDESTRIAN AND BICYCLE COUNTS

Location	Bicycle Count (Both Directions)	Pedestrian Count (Both Directions)
West of University Bridge	408	174
West of 15th Avenue NE	479	249
Hitchcock Bridge	459	243
T-Wing Overpass	449	260
Rainier Vista West	474	298
Hec Edmundson Bridge	472	269
Wahkiakum Lane	425	159
South of Pend Oreille Road NE	438	136
North of Pend Oreille Road NE	435	178

Source: University of Washington Burke-Gilman Trail Corridor Study, July 2011

Combined, these two studies provide a long-term study and implementation plan for the trail including ongoing capital investments. Recent upgrades were completed along the trail between 15th Avenue NE and Rainier Vista, along parts of West Campus, and at the bridge connection to the University of Washington Station. The previous trail design mixed pedestrian and bicycle uses; the improvements separate pedestrian and bicycle modes. Ultimately improvements to the Burke-Gilman Trail, separating the trail for its entire length through the campus as noted in the 2012 plan will meet long term needs and address pedestrian-bicycle conflict points through grade separation and bicycle speed control tactics.

Burke-Gilman Trail Level of service was evaluated with methods used in the 2011 and 2012 studies, including the use of the Federal Highway Administration's Shared-Use Path Level of Service Calculator (SUPLOS). SUPLOS evaluates trail segments using factors including trail width, directional bicycle and pedestrian volumes, and the presence of a striped centerline. (University of Washington Burke-Gilman Trail Corridor Study, July 2011). Existing level of service includes 2010 weekday PM peak hour pedestrian and bicycle counts in the operational analysis. The existing weekday PM peak hour level of service along trail segments is summarized in Table 3.16.

Table 3.16
EXISTING BURKE-GILMAN TRAIL WEEKDAY PM PEAK HOUR LEVEL OF SERVICE

Location	Level of Service Score	Level of Service Grade
West of University Bridge	3.74	B
West of 15th Avenue NE	3.71	B
Hitchcock Bridge	3.80	B
WWMC T-Wing Overpass	4.12	A
Rainier Vista West	3.10	C
Hec Ed Bridge	2.85	D
Wahkiakum Lane	2.04	E
South of Pend Oreille Road NE	2.15	E
North of Pend Oreille Road NE	1.89	F

Pedestrian-bicycle conflict points along the Burke-Gilman Trail, along with collisions that occurred on the trail between 2008 and 2014, are shown in Figure 3.22 below. Locations with a higher number of collisions in the primary impact zone within the MIO boundary include trail intersections at 15th Avenue NE and Adams Lane NE (near the Mercer Court residence halls). In the primary impact zone but outside of the MIO boundary, bicycle collisions occurred along the Burke-Gilman Trail at the Latona Avenue NE/ NE Pacific Street, 25th Avenue NE/ NE Blakeley Street, and Union Bay Place NE/ NE 49th Street intersections.

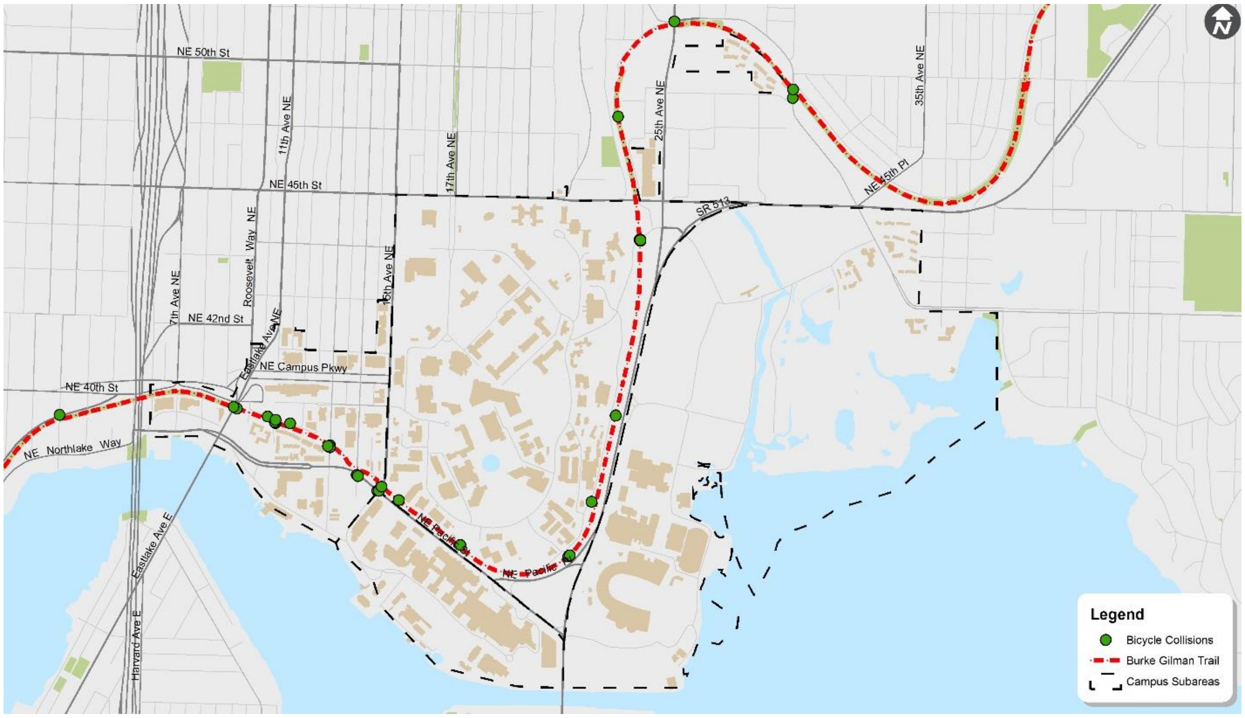


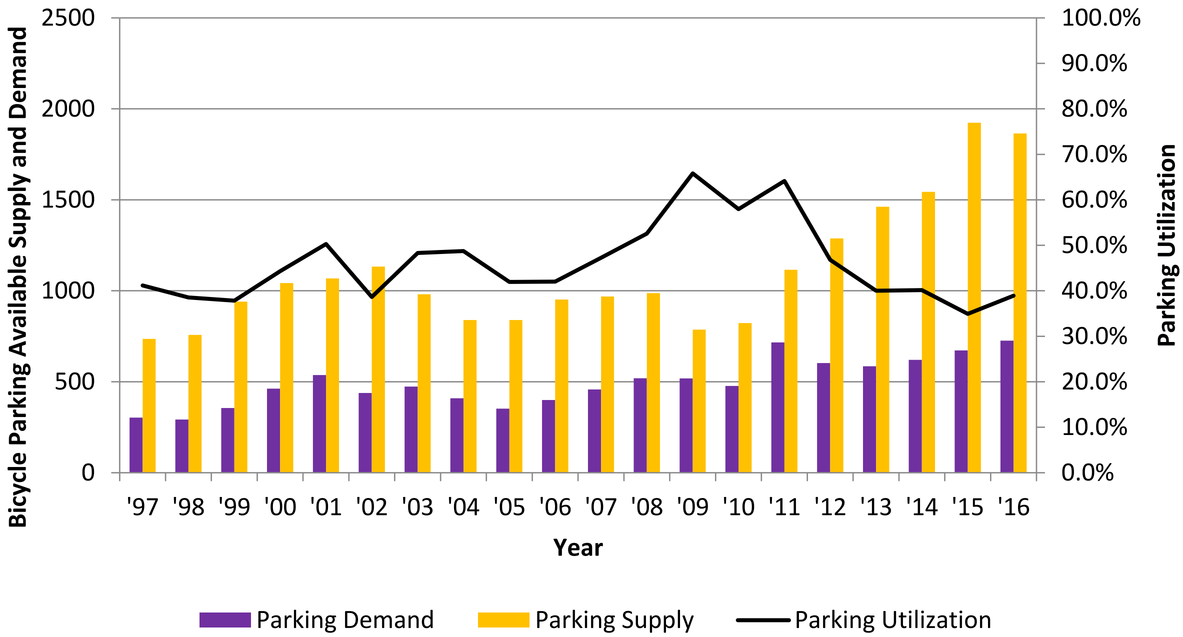
Figure 3.22 Burke-Gilman Trail Bicycle Collision Locations

Pedestrian and bicycle collision analysis is described in detail in Section 3.2.3, Pedestrian and Collision Data, Section 3.3.4, Bicycle Collision Data, and Section 3.5.4, Collision History.

Bicycle Parking and Utilization

As discussed in Section 3.3.2, Bicycle Parking and Bicycle Share Facilities, the University has a long track record of managing bicycle parking supply, ensuring that it can meet demand from students, faculty, and staff. Bicycling is an important travel mode for these populations because it helps to reduce drive alone trips to campus, is relatively inexpensive to promote (compared to transit), and is highly beneficial to health and the environment. Currently, the University provides roughly twice the number of bicycle parking spaces as required by the City of Seattle Municipal Code (SMC 23.54.015.K.1). To stay ahead of demand, the University continues to add parking spaces, especially those that are covered and include security features.

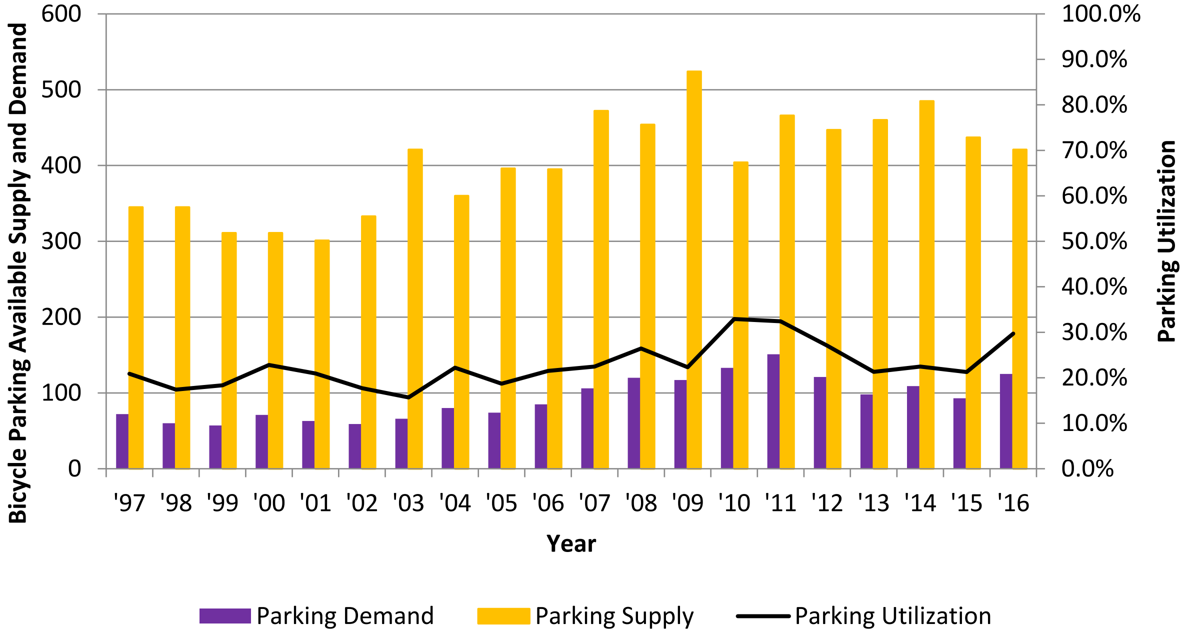
Figure 3.23 below shows bicycle parking supply, demand, and utilization from 1997 through 2016 in West Campus, which has seen redevelopment of numerous University-owned properties over the last five years. As one of the more heavily utilized bicycle parking areas, this figure shows that the University has nearly doubled bicycle parking supply in this growing area which more than meets the demand for parking. University-wide data is discussed in Section 3.3.2, Bicycle Parking and Bicycle Share Facilities, and shows bicycle parking needs are being met and utilization has gone down from a high in 2010–2011.



Source: UWTS, 2016.

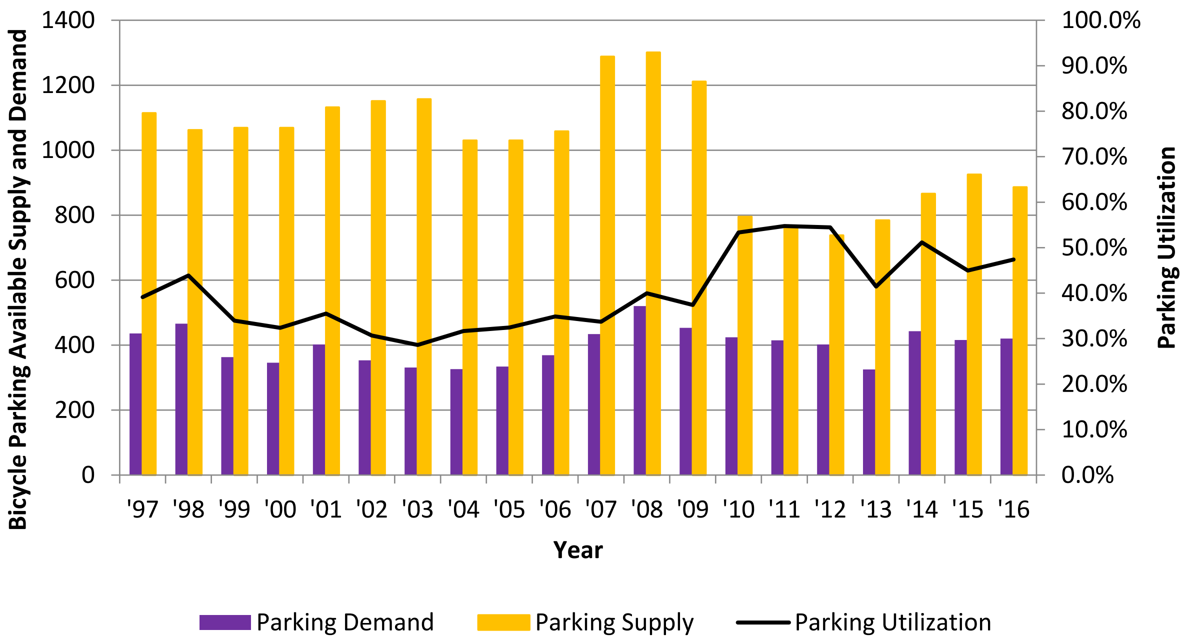
Figure 3.23 Bicycle Parking in West Campus

Figure 3.24, Figure 3.25, and Figure 3.26 show bicycle parking supply, demand, and utilization in East Campus, South Campus, and Central Campus, respectively. Similar to West Campus data in Figure 3.23, the following graphs show utilization trends from 1997 through 2016.



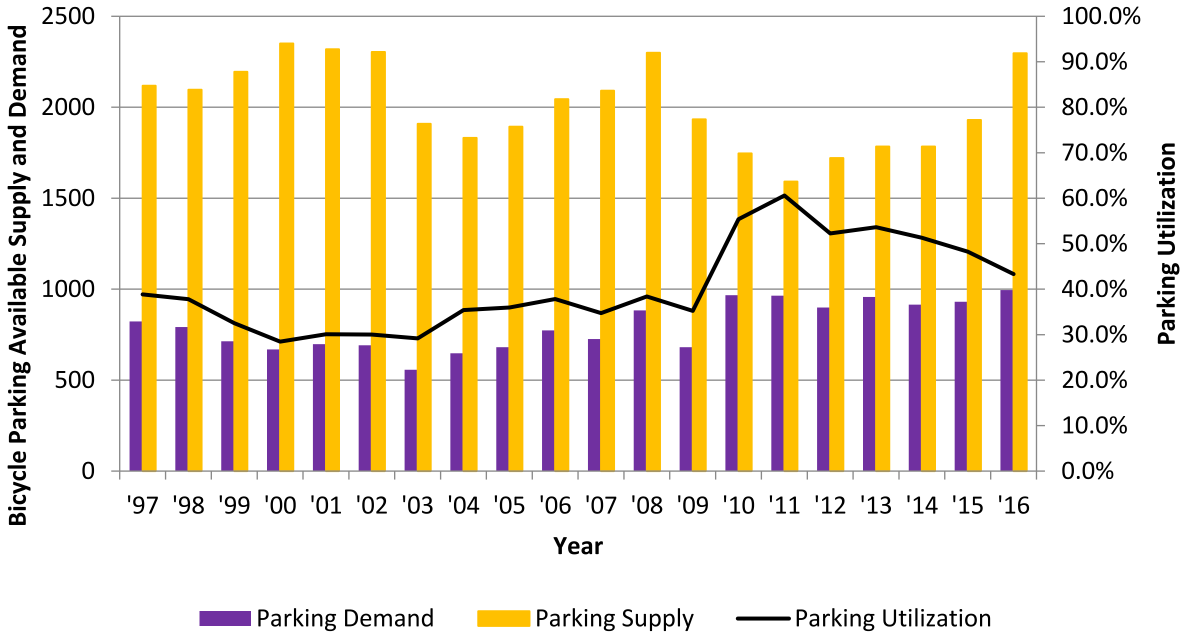
Source: UWTS, 2016.

Figure 3.24 Bicycle Parking in East Campus



Source: UWTS, 2016.

Figure 3.25 Bicycle Parking in South Campus



Source: UWTS, 2016.

Figure 3.26 Bicycle Parking in Central Campus

As shown in West Campus, as sites are redeveloped additional bicycle parking supply has been provided. Additionally, although supply in East and South Campus has decreased since 2009 the demand is still being met. The above data show that the University has effectively managed bicycle parking demand, as new buildings are constructed; more than sufficient parking supply is provided. For these reasons, additional bicycle parking analysis for the development alternatives was not completed.

Quality of Bicycle Environment

Bicycle travel in the primary and secondary impact zones has seen recent improvements; however, some long-standing connectivity gaps remain. This qualitative assessment of the bicycle environment provides comparisons between the development alternatives where discernible, and includes projects by the SDOT, WSDOT, and the University of Washington. In general, bicycle travel does not face capacity limitations, so this assessment focuses primarily on improvements to the bicycle network and general changes to travel patterns and demand. Bicycle travel on the Burke-Gilman Trail, which can have capacity issues, is analyzed above.

The Burke-Gilman Trail currently provides a strong bicycle backbone through much of the primary and secondary impact zones with connections throughout the area. In Central Campus Grant Lane, and Memorial Way provide access to the campus, while circulation around campus primarily occurs along Stevens Way, although none of these roads has dedicated bicycle facilities. Bicyclists use paths noted as minor routes on the Pedestrian system to travel through campus; however, during passing periods, their travel in the Central Campus is restricted both by University policy and the capacity limitations of paths.

The bicycle network in West Campus is more developed and of higher quality with a number of protected bicycle lanes and other shared facilities. Several additions to this area are fairly new; however, some gaps exist. South Campus and East Campus have limited bicycle networks and access to/from the Burke-Gilman Trail represents their primary bicycle connection.

The new pedestrian and bicycle bridge to the University of Washington Station improves travel between the Burke-Gilman Trail and the Montlake area; however, the Montlake Bridge and I-5 represent long-standing barriers to bicycle travel.

Bicycle facilities exist within the secondary impact zone, providing connections to the Burke-Gillman Trail. Along 40th Avenue NE, east of the primary impact zone, a Neighborhood Greenway provides a north/south connection from the Burke-Gillman Trail. Latona Avenue NE and 2nd Avenue NE include local in-street bicycle lanes within the secondary impact zone, west of the primary impact zone. These lanes connect north/south to the Burke-Gillman Trail, also providing a link to an east/west local Neighborhood Greenway along N 44th Street.

Sections 3.3.4, Bicycle Collision Data, and 3.5.4, Collision History, offer detailed information about bicycle collisions in the study area. As stated previously, bicycle-vehicle collisions are the highest reported, with roughly 40 collisions per year between 2008 and 2015. As described in Section 3.5.4, Collision History, and listed below, three locations in the study area are identified by SDOT as High Collision Locations (HCL), meeting the criteria of five or more pedestrian or bike collisions in the previous three-year period:

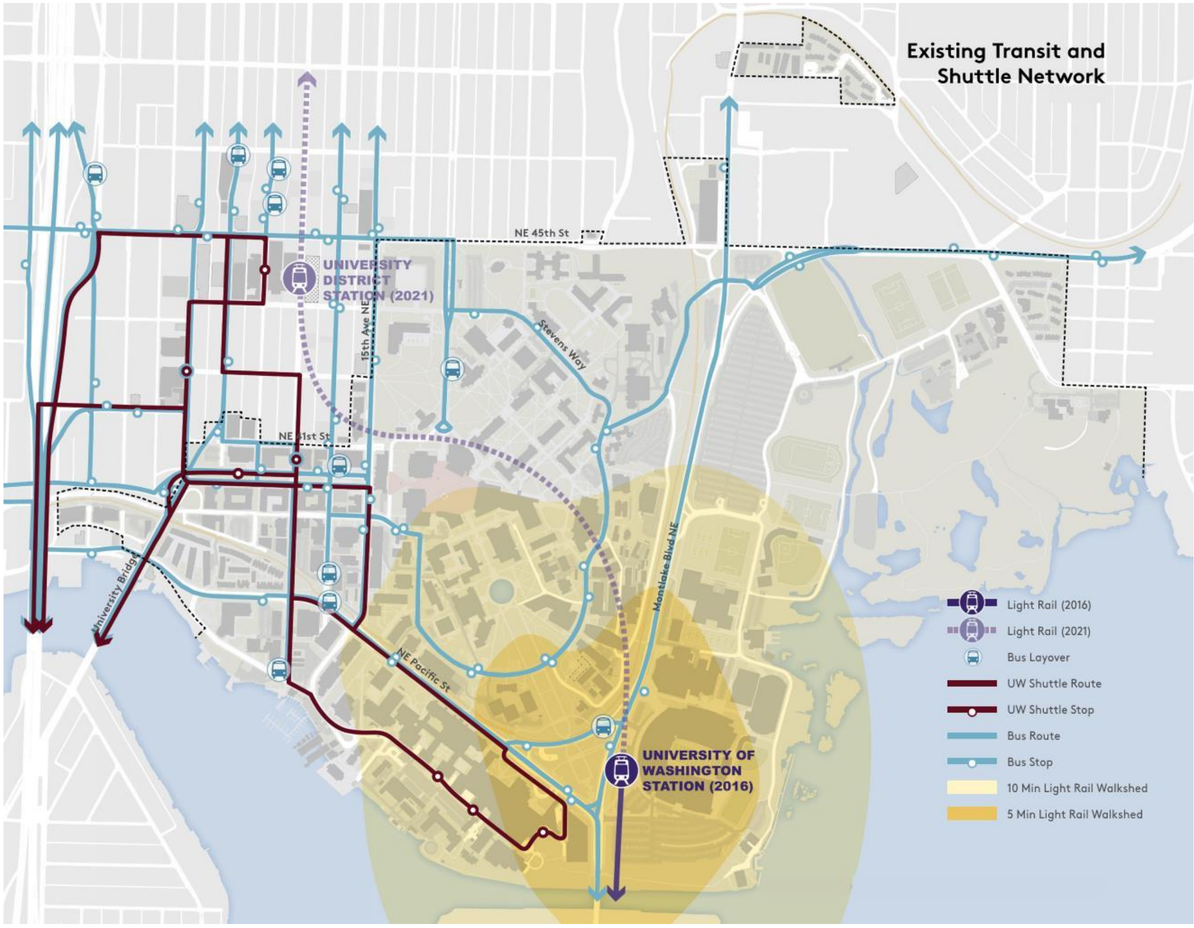
- Brooklyn Avenue NE/ NE 45th Street
- Brooklyn Avenue NE/ NE 50th Street
- Roosevelt Way NE/ NE 45th Street

3.4 TRANSIT

Of the campus community, approximately 29,000 people `access the University of Washington using transit, based on mode share data shown in Table 3.2. Of these trips, almost 19,900 are students, some 2,000 are faculty, and 7,280 are staff.

3.4.1 Transit Stops and Facilities

The transit network throughout the University of Washington campus and surrounding U District incorporates King County Metro (Metro), Sound Transit (ST), Community Transit (CT), and the recent University of Washington Station at Husky Stadium. Figure 3.27 shows existing transit facilities throughout the University of Washington campus, including shuttles and public transit. The figure includes walksheds from the existing light rail station, which currently serves as the end of the line and requires integration with all modes of travel to campus and surrounding neighborhoods. Figure 3.27 also indicates current layover areas along Memorial Drive, University Way, Brooklyn Avenue, and 12th Avenue. Layover locations were negotiated in an agreement between Metro and the City of Seattle in 1999.

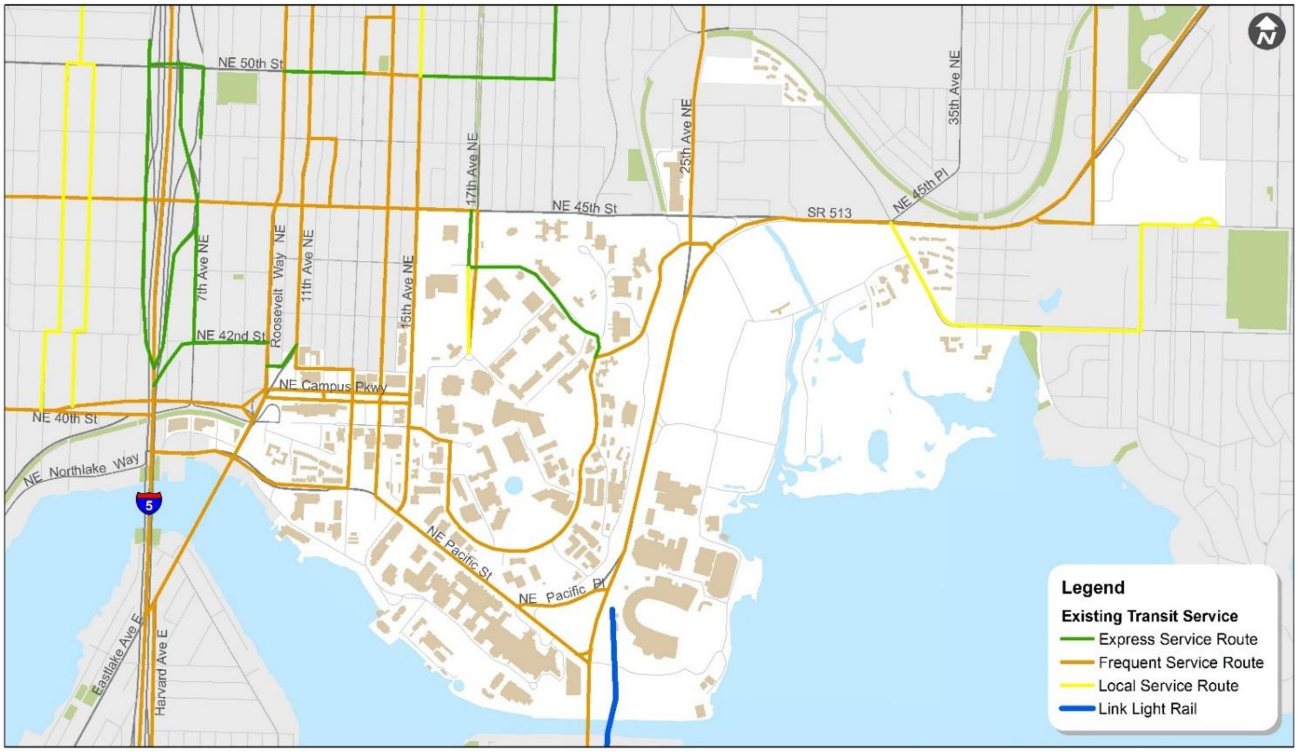


Source: Sasaki Architects, July 2017 CMP

Figure 3.27 Existing Transit Network and Light Rail Walkshed

3.4.2 Existing Routes/Layover and Connections

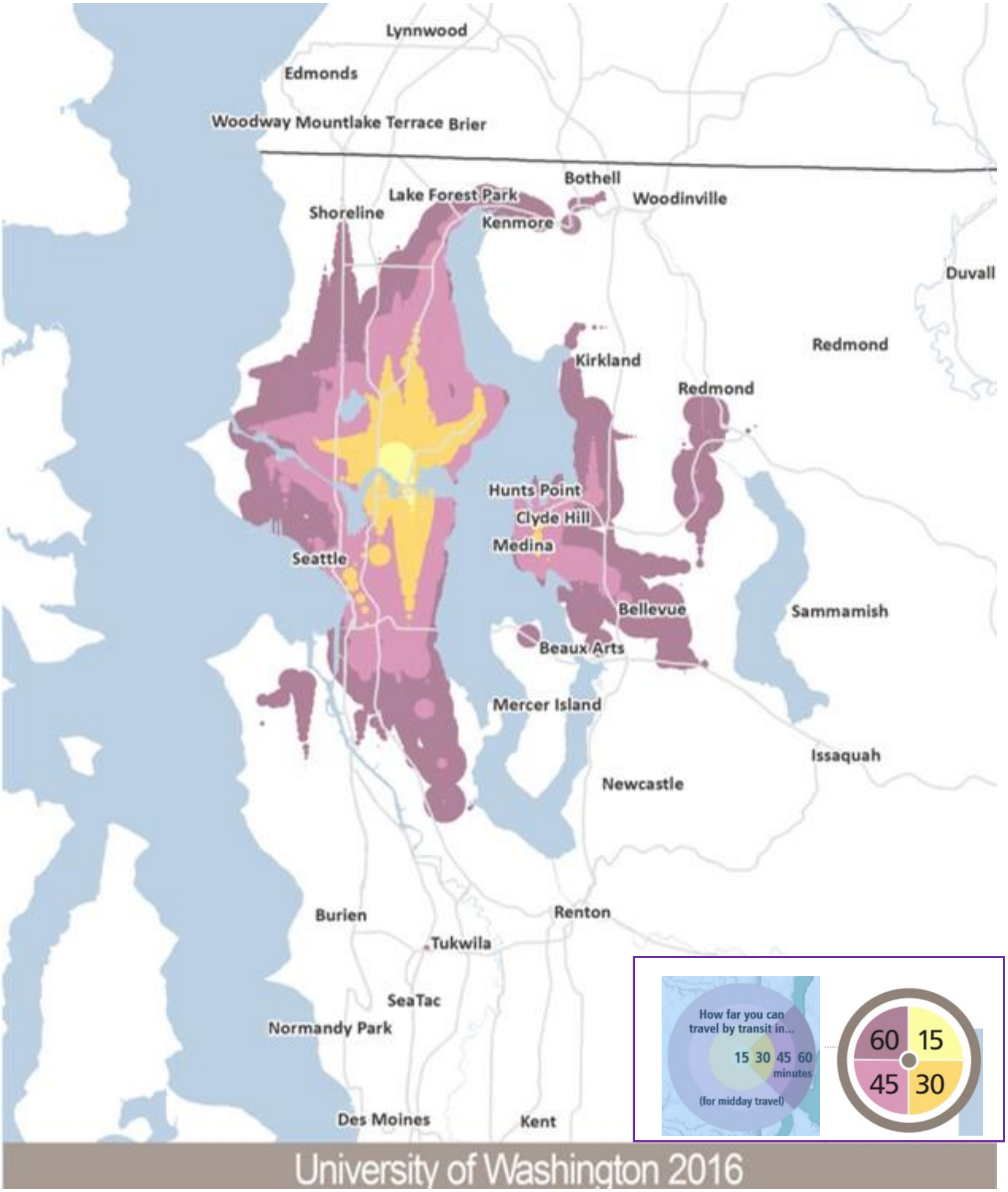
Figure 3.27 shows Metro transit lines after the March 2016 service changes. Routes were restructured to provide better connections to the existing and upcoming light rail stations.



Source: King County METRO CONNECTS, 2016

Figure 3.28 Existing Transit Service Types

Figure 3.29 shows travel times from the University of Washington using existing (2016) transit service, as provided in the 2016 METRO CONNECTS Plan. Colors indicate travel times from the University of Washington within 15, 30, 45, and 60 minutes, as shown in the legend.

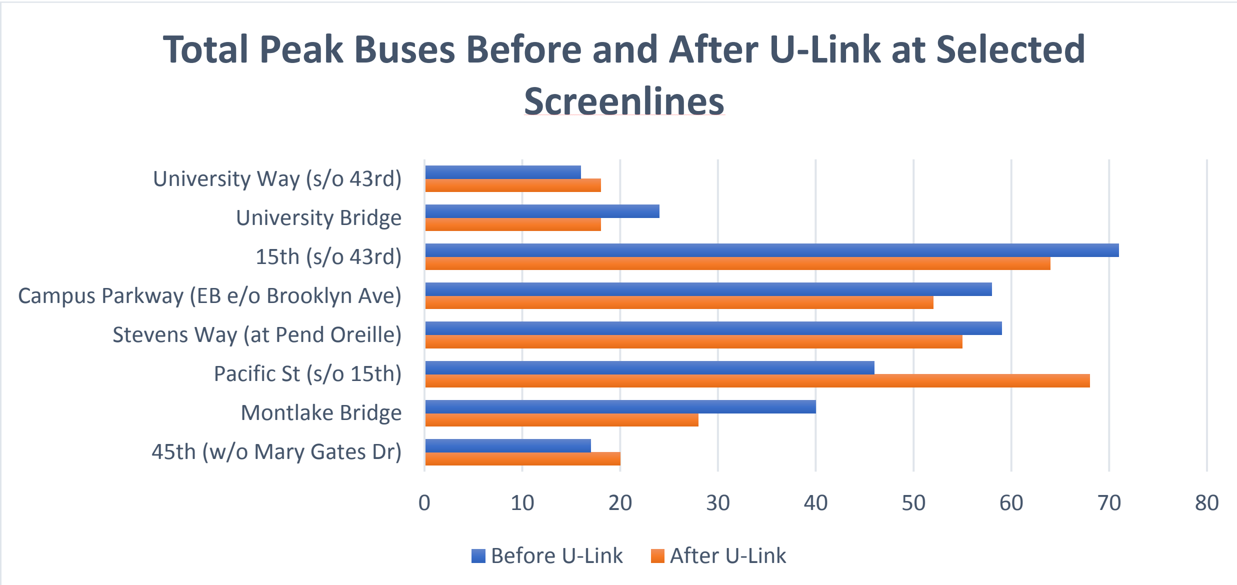


Source: King County METRO CONNECTS, 2016

Figure 3.29 Existing (2016) Transit Travel Times from the University of Washington

Figure 3.29 also shows that existing Metro transit service provides access within 60 minutes to the Seattle area, as well as north to Shoreline, Kenmore, and Bothell, and east to Redmond, Kirkland, and Bellevue. These travel times include transfers.

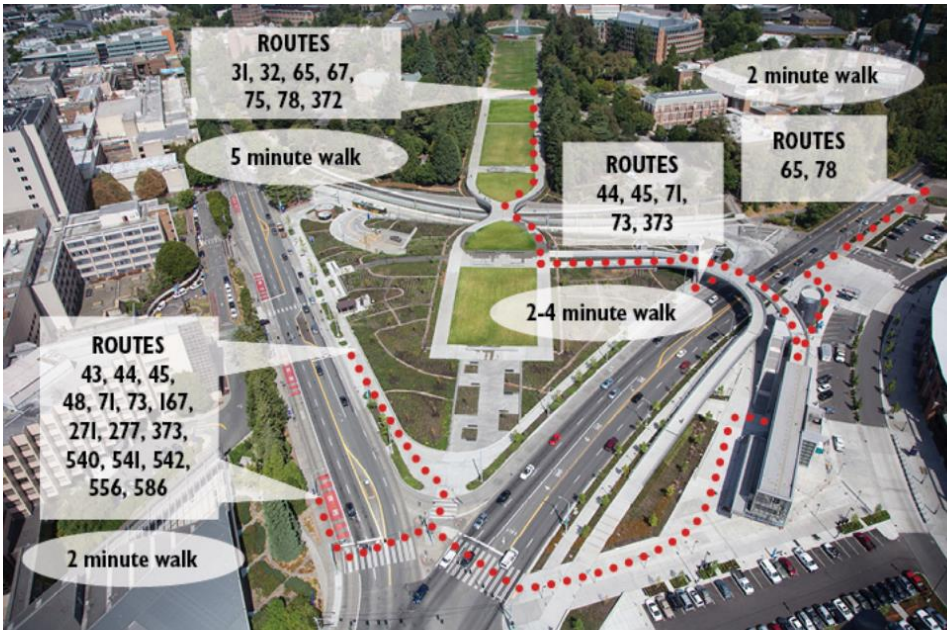
Figure 3.30 shows peak hour bus volumes grouped by screenline location, for pre- and post- U-Link (light rail extension to the University of Washington Station) opening. Transit volumes have decreased at the University Bridge, 15th Avenue NE, Campus Parkway, Stevens Way, and Montlake Bridge screenlines due to service changes that orient to the University of Washington Station. In contrast, peak hour bus volumes at the University Way NE, NE Pacific Street, and NE 45th Street screenlines have increased since the station opened. These revisions reflect a service concept integrated with the light rail station.



Source: UWTS, 2016

Figure 3.30 Peak Buses per Hour by Screenline Location Before and After Opening of U-Link

Figure 3.31 below illustrates the available transit connections from the University of Washington Station. Bus routes 31, 32, 65, 67, 75, 78, and 372 are accessible via an estimated five-minute walk to Stevens Way NE. Routes 65 and 78 are accessible with an estimated two-minute walk north on Montlake Boulevard NE. Routes 43, 44, 45, 48, 71, 73, 167, 271, 277, 373, 540, 541, 542, 556, and 586 are accessible via an estimated two-minute walk to connection points at NE Pacific Street adjacent to the University of Washington Medical Center.



Source: Transpo Group, 2015

Figure 3.31 Available Transit Connections from University of Washington Station

Initial data of light rail ridership after the University of Washington Station opened in March 2016 are shown in Table 3.17, indicating an overall increase of 13 percent over a one-year period.

Table 3.17
CHANGE IN U-PASS USE – COMPARISON OF MAY 2015 TO MAY 2016 (AFTER OPENING OF U-LINK LIGHT RAIL)

Services	2015	2016	Changes	Ratio
By Provider				
Community Transit	28,468	28,834	366	1%
Everett Transit	227	216	-11	-5%
King County Metro	614,834	582,836	31,998	5%
Kitsap Transit	610	958	348	57%
Pierce Transit	1,147	1,056	-91	-8%
Sound Transit	65,378	189,827	124,449	190%
By Mode				
Bus	46,671	51,189	4,518	10%
Demand Response	2	81	79	3,950%
Commuter Rail	4,697	5,682	985	21%
Light Rail	14,008	132,875	118,867	849%
Total	**710,664**	**803,727**	**93,063**	**13%**

Source: UWTS, 2016

3.4.3 Transit Walkshed and Connectivity

Providing walkable access to transit ensures that it will remain a viable transportation choice. With existing transit walksheds, the recently opened University of Washington light rail station is within a 10-minute walk of approximately half the campus. With the anticipated opening of the U District Station in 2021, most of the campus would be within a 10-minute walk of light rail.

3.4.4 Performance Measures

Transit is critical for the mobility of University of Washington populations. Every day, roughly 4 out of 10 students, faculty, and staff use transit facilities to get to and from campus. The following transit performance measures have been developed to assess and compare alternatives:

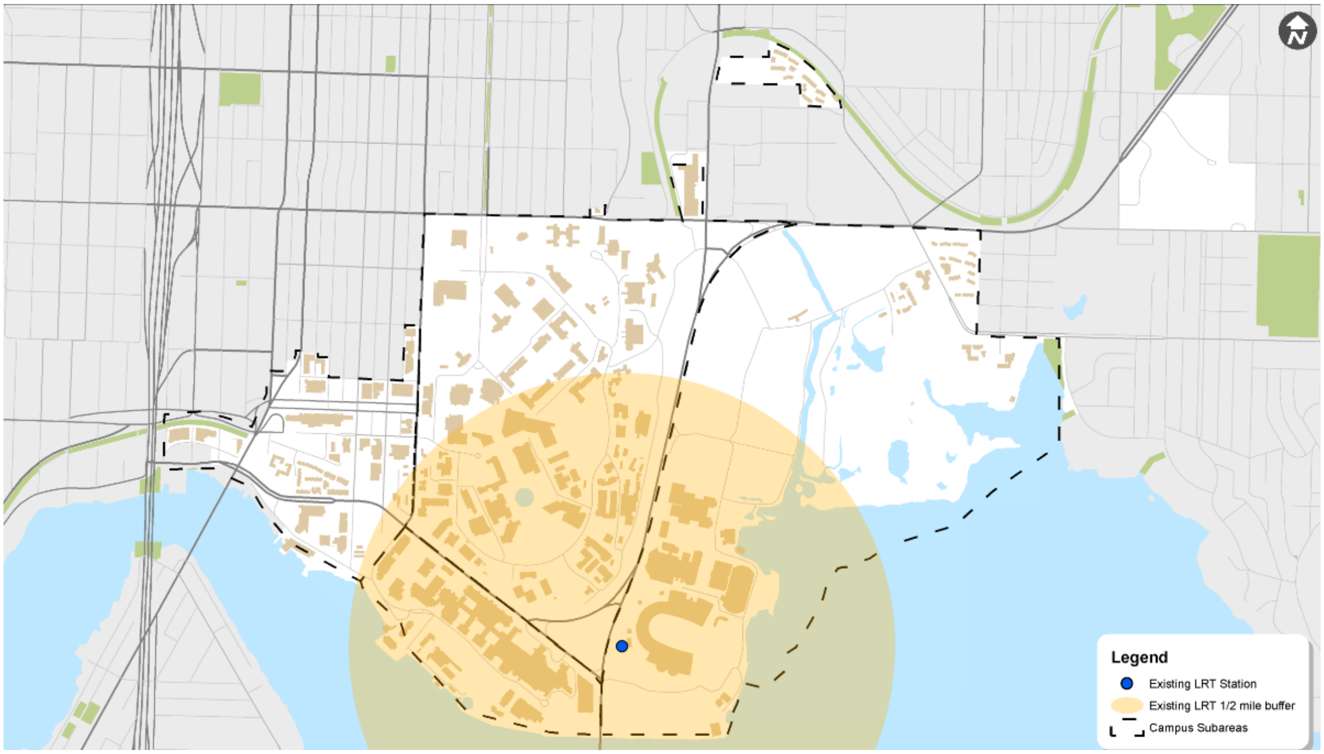
- Proportion of Development Within 1/4 Mile of RapidRide
- Proportion of Development Within 1/2 Mile of Light Rail
- Transit Stop Capacity
- Transit Travel Times and Delay
- Transit Loads at Screenlines

Proportion of Development Within 1/4 Mile of RapidRide

This measure determines the proportion of development within 1/4 mile of RapidRide service to the University of Washington. Proximity to transit is an important factor in ridership. Since 40 percent of trips to and from the University of Washington are currently on transit, this measure can help to inform how each of the development alternatives would perform relative to transit accessibility. Currently, no RapidRide service is provided to the University of Washington; however, changes will take place in the future No Action case and for each development alternative.

Proportion of Development Within 1/2 Mile of Light Rail

This measure determines the proportion of development within a 1/2 mile walkshed of light rail stations. With future development alternatives, proximity to light rail will include the U District Station assumed to be completed in 2021. Proximity to transit is an important factor in transit ridership. Since 40 percent of trips to and from the University of Washington are currently on transit, this measure can help to inform how each of the development alternatives would perform relative to transit accessibility. The current 1/2 mile proximity to the University of Washington Station is shown in Figure 3.32 below.



Source: Transpo Group, 2016

Figure 3.32 1/2-Mile Walkshed of Existing Light Rail

In future scenarios, the proportion of new development within the 1/2 mile walkshed of campus will be measured. In the existing condition, the total area of each campus sector was measured instead. Table 3.18 below shows that a little more than half of the campus area is within a 1/2 mile proximity to light rail.

Table 3.18
PROPORTION OF EXISTING CAMPUS WITHIN ½ MILE OF LIGHT RAIL

Sector	Existing
West	6%
South	100%
Central	49%
East	42%
Total	**54%**

Transit Stop Capacity

This measure evaluates the ability of transit stops and curb spaces to accommodate the buses that are predicted to use the stops within a one-hour period. This analysis was conducted for four pairs (one in each direction) of stops on the busiest transit corridors around the University of Washington: 15th Ave NE, NE 45th St, Montlake Boulevard, and Pacific Street, as shown in Figure 3.33. The following section summarizes the bus stop capacity and the bus demand at each of these stops within the affected environment.

Figure 3.33 Transit Stop Capacity Study Area

Existing Transit Stop Capacity and Demand

This measure applies the methods published in the Transit Cooperative Research Program (TCRP) Report 165 – Transit Capacity and Quality of Service Manual to develop estimates. The methodology incorporated inputs of stop dwell times, stop locations, stop types, proximity to intersections, conflicting right-turn volumes, and other data into a spreadsheet to estimate the number of buses that each stop could process within one hour. The number of buses traveling through each stop was taken from the current scheduling of Metro, CT, and ST services. The results of this analysis are provided in Table 3.19.

Table 3.19
TRANSIT STOP CAPACITY AND EXISTING DEMAND

Stop	Capacity (buses/hour)	Existing Demand (buses/hour)
NE 15th Avenue at NE 42nd Street (NB)	68	30
NE 15th Avenue at NE43rd Street (SB)	69	30
NE 45th Street & University Way NE (EB)	56	18
NE 45th Street & Brooklyn Avenue NE (WB)	39	18
NE Pacific Street & 15th Avenue NE (SEB)	70	35
NE Pacific Street & 15th Avenue NE (NWB)	82	35
Montlake Boulevard NE & Pacific Place (NB)	28	18
Montlake Boulevard NE & Pacific Place (SB)	67	18

As shown in Table 3.19 there is available capacity at each of the transit stops reviewed to accommodate current bus stop demand.

Transit Travel Times and Delay

This measure evaluates the PM peak hour transit travel speeds on key corridors around and on the University of Washington campus and the impact of background and CMP growth on travel time speeds. These corridors, which overlap with arterials evaluated for automobile travel, are shown in Figure 3.34 and listed below:

- NE 45th Street
- Pacific Street
- 11th Avenue NE
- Roosevelt Way NE
- 15th Avenue NE
- Montlake Boulevard
- Stevens Way NE

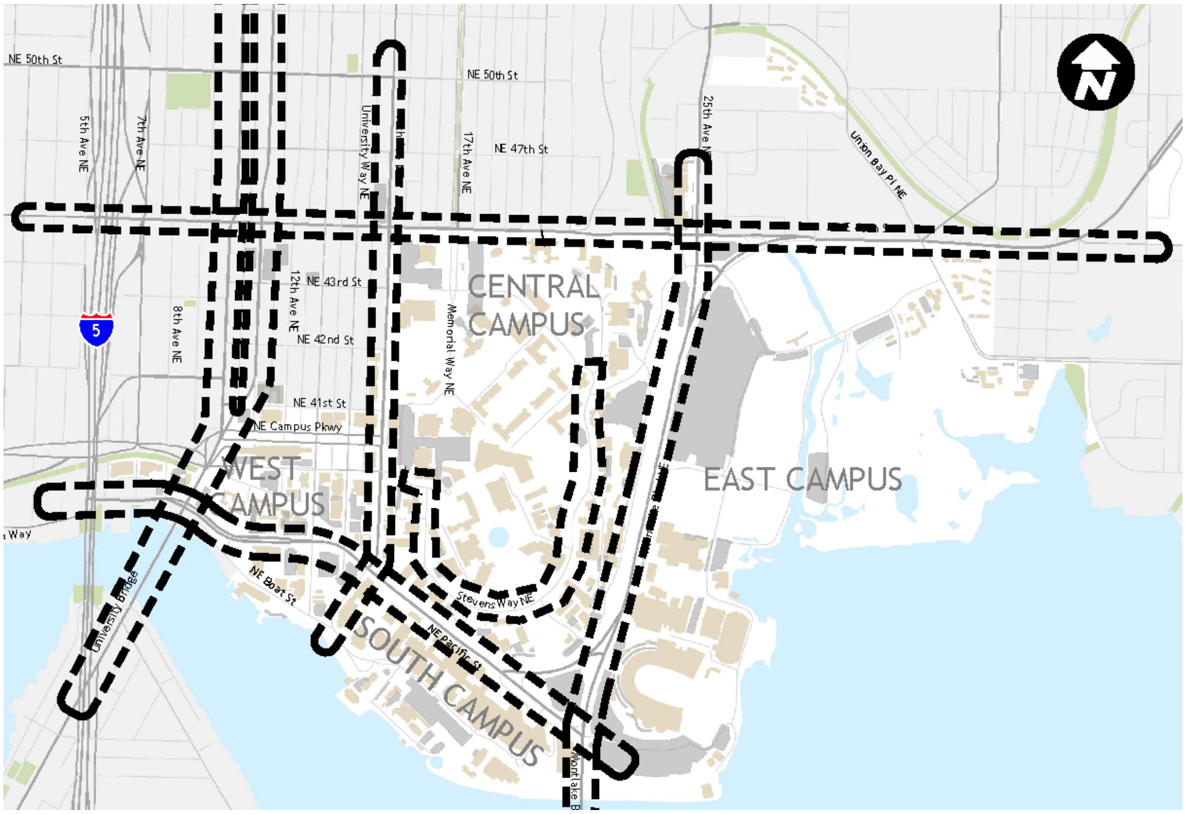
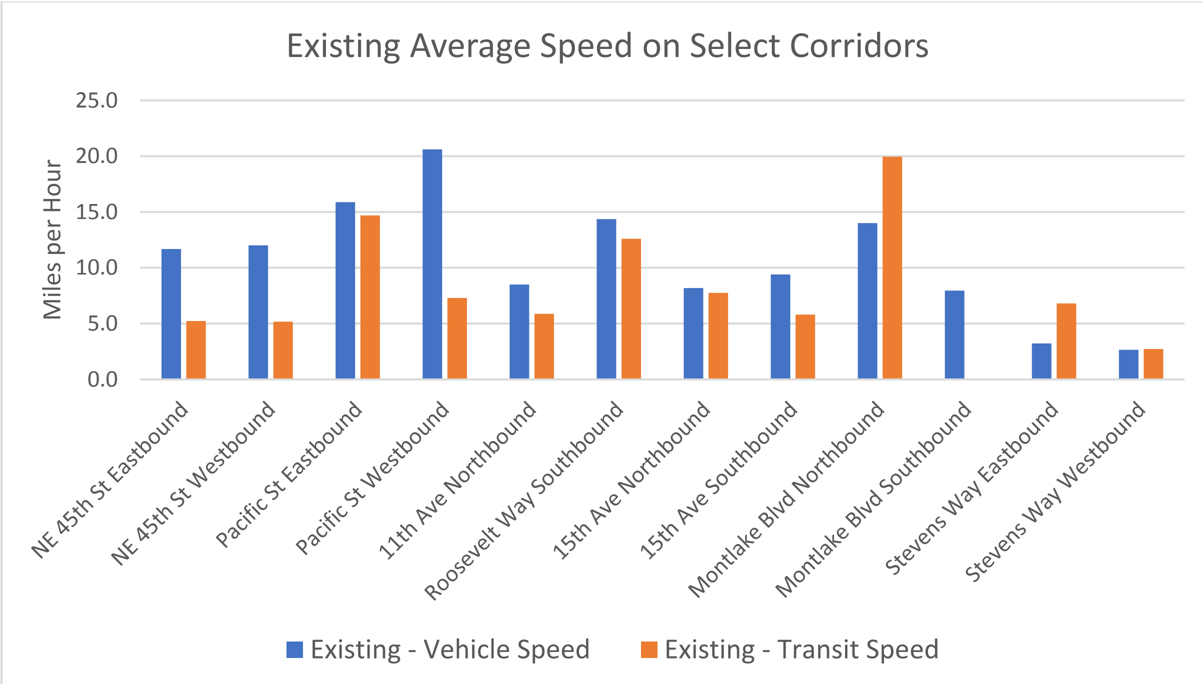


Figure 3.34 Transit Study Corridors

Existing Data

Existing transit speeds were measured from automatic vehicle location data for three days in October 2016. That three-day period occurred after the opening of the University of Washington Station and when student activity was normal. The data was provided by Metro, Community Transit, and Pierce Transit operating Sound Transit for all routes currently operating within and around the University of Washington. Transit speeds were evaluated by measuring roadway distances between stops, calculating the travel time between each stop (from arrival to arrival), and dividing the distances by the travel times. Figure 3.35 below shows the existing average transit and vehicle speeds (for comparison) on each corridor. Average vehicle speeds were calculated using Synchro and based on PM peak hour turning movement counts. These data were validated by field surveys of actual travel times using floating car surveys.



Source: Transpo Group, 2016

Figure 3.35 Existing Corridor Speed Comparison (Transit and Vehicle)

As shown in Figure 3.35, transit travel speeds are generally slower than those for automobiles because transit involves scheduled stops, slower vehicle speeds, and dwell times to pick up passengers. The greatest disparity in travel times was along NE Pacific Street in the westbound direction, where the bus travel speeds were nearly one-third slower than those for automobiles. However, there was one anomaly—northbound Montlake Boulevard—where transit travel speeds were noted to be faster than auto travel times. This was due in part to the lack of transit stops on Montlake northbound and potential vehicle queuing at driveways.

Transit Loads at Screenlines

This measure calculates the peak hour demand or load against available capacity on bus and light rail service at key transit corridors in the U District. These corridors are along NE 45th Street, Roosevelt Way, NE 11th Avenue NE, 15th Avenue NE, University Way NE, Campus Parkway, NE Pacific Street, Montlake and University bridges, and at the University of Washington and U District Light Rail stations. The following sections summarize transit screenline load demand and capacity within the affected environment. Demand and capacity values represent the number of available and occupied transit-user spaces on each transit mode.

Existing Data

Existing (2016) transit screenline load values were based on data collected at locations shown in Figure 3.36 below, which represented trips during the weekday PM peak hour. These values demonstrated peak transit demand and capacity, capturing the congestion generated during an average commute. All transit routes crossing these locations were evaluated across the screenlines shown in Figure 3.36 and listed in Table 3.21. Existing data were collected for both demand and capacity and were calculated using different methodologies:

- **Demand** – Existing demand values were collected from Average Passenger Count (APC) data received from Metro, Pierce Transit operating Sound Transit Regional Express, Community Transit, and Sound Transit light rail. The data generally represented 2016 average conditions. This period reflects the service changes after the opening of the University of Washington Station and related bus transit service changes. Vehicle loads served by routes crossing transit screenlines were found and aggregated into a single screenline existing demand for bus and rail transit.
- **Capacity** – To develop capacity values, existing Metro, Sound Transit, and Community Transit schedules were parsed for route frequency during the peak hour for all routes crossing transit screenlines. The peak frequency was used to determine the number of peak trips individual routes would make during the peak hour. Peak hour trip totals were reduced by one bus to account for the fact that shuttles arrive at stop locations at staggered times throughout the peak hour. (For example, for a route with 10-minute headways, it was assumed that five buses would serve the route in an hour instead of six).

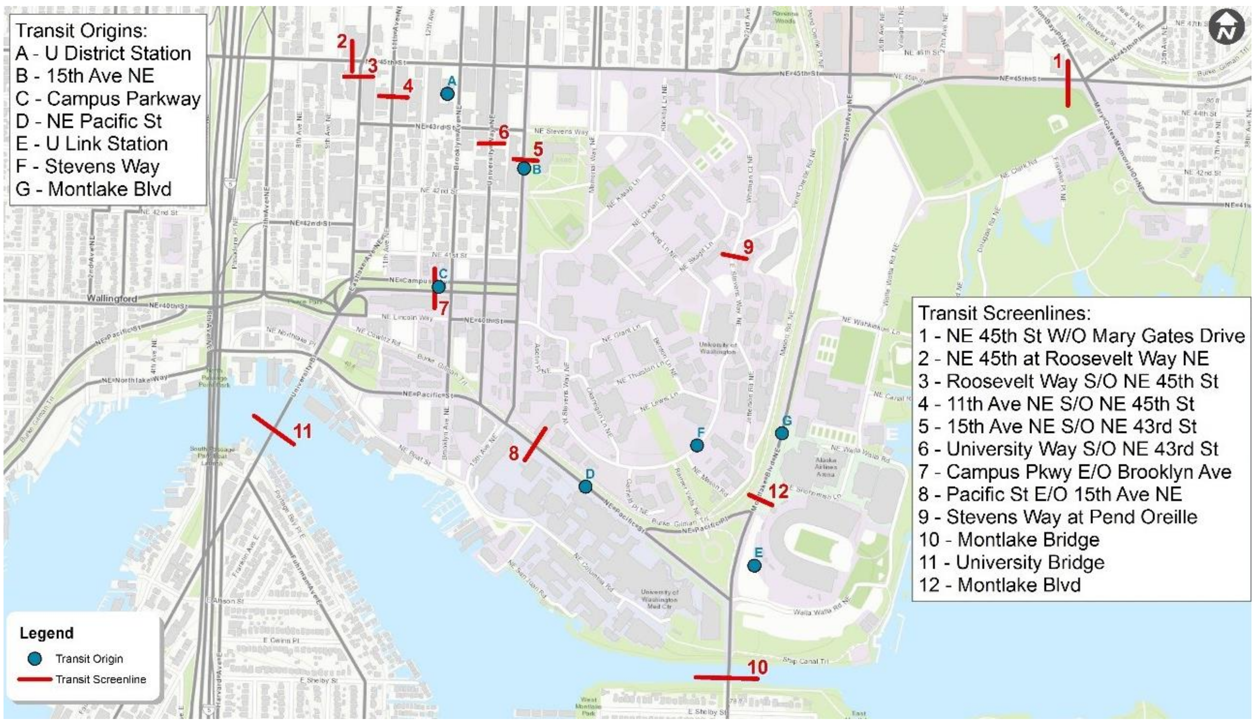


Figure 3.36 Transit Screenlines Analysis Study Area

Total capacity for each route was calculated by using the number of peak trips per hour on individual routes and multiplying that result by an assumed coach/train capacity. Coach capacities varied by vehicle size (40-foot standard bus or 60-foot articulated bus). Assumed transit capacities are shown in Table 3.20. For existing analysis, light rail trains were assumed to consist of three cars arriving with six-minute headways.

Table 3.20
TRANSIT CAPACITY ASSUMPTIONS

Vehicle Type	Assumed Capacity
40-foot Standard Bus	40 passengers
60-foot Articulated Bus	65 passengers
Link	150 passengers per car

Table 3.21
EXISTING TRANSIT SCREENLINE DEMAND AND CAPACITY

Screenline #	Location	Capacity	Demand	Existing D/C
1	NE 45th Street West of Mary Gates Drive	920	584	63%
2	NE 45th Street West of Brooklyn Avenue NE	2,240	641	29%
3	Roosevelt Way NE South of NE 45th Street	520	108	21%
4	11th Avenue NE South of NE 45th Street	520	386	74%
5	15th Avenue NE South of NE 43rd Street	3,600	967	27%
6	University Way NE South of NE 43rd Street	1,040	820	79%
7	Campus Parkway East of Brooklyn Avenue NE	1,810	1,110	61%
8	NE Pacific Street East of 15th Avenue NE	4,400	865	20%
9	Stevens Way NE at Pend Oreille	1,810	1,049	58%
10	Montlake Bridge	2,190	977	45%
11	University Bridge	920	646	70%
	Bus Total	**19,970**	**8,153**	**41%**
Link A	U District Station (opens 2021)	-	-	-
Link B	University of Washington Station	8,550	1,400	16%
	Link Total	**8,550**	**1,400**	**16%**
	Grand Total	**28,520**	**9,553**	**33%**

Table 3.21 shows the existing capacity, demand, and demand-to-capacity (D/C) for each at each of the transit screenlines. D/C rates are found by dividing the demand by capacity. Currently, each of the

screenlines in aggregate has adequate transit capacity to accommodate existing demand. University Way NE ("the Ave") has the highest D/C ratio at 0.79.

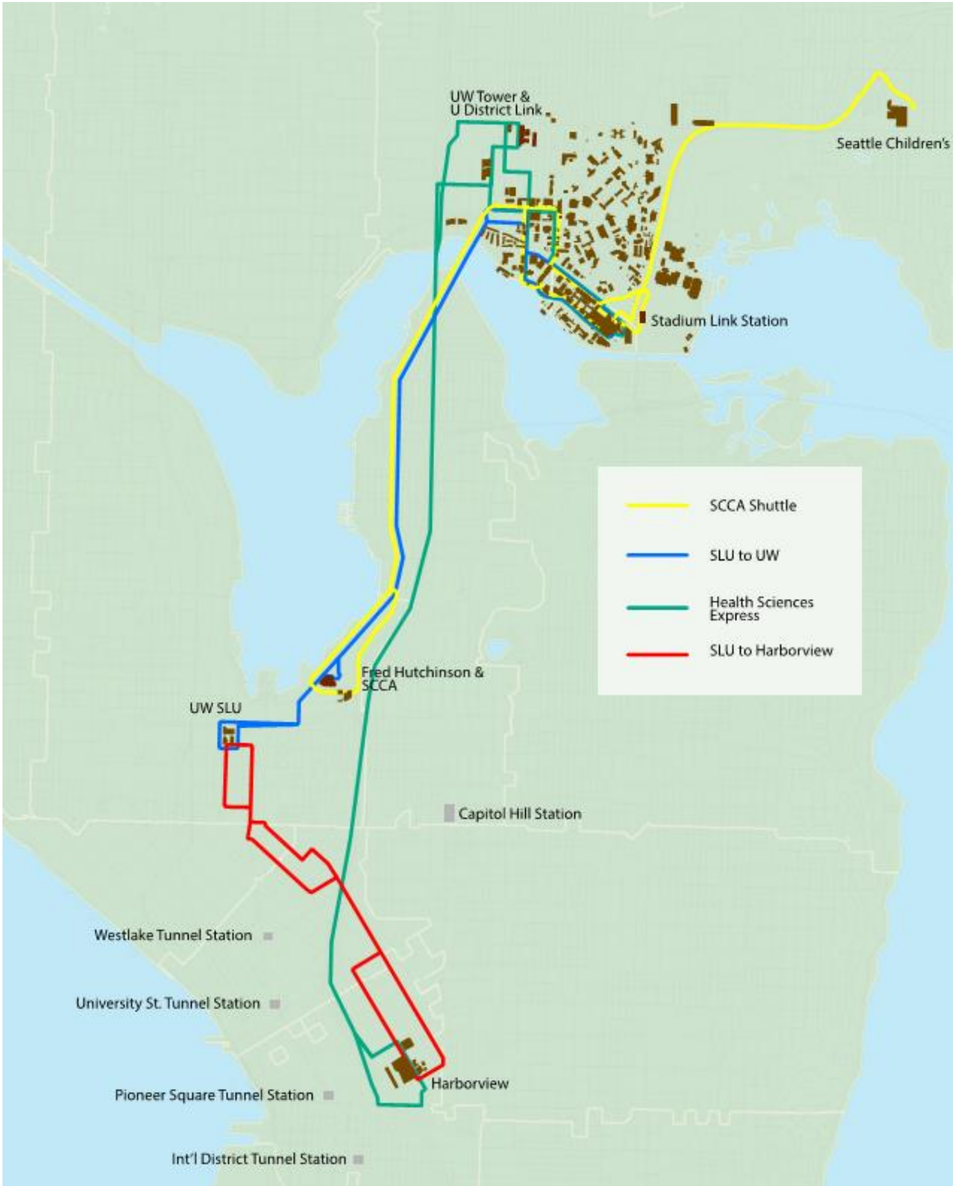
3.4.5 Shuttles Shared Use and Transportation Network Companies

Shuttles serve as auxiliary transit and provide direct connections between University properties. The University of Washington shuttle system extends throughout the campus, providing access to University of Washington Medical Center facilities on campus and in South Lake Union. Shuttles also travel between the U District and Seattle Children's Hospital as well as between Fred Hutchinson and Seattle Cancer Care Alliance (SCCA) in South Lake Union and Harborview Medical Center. The shuttle system is fare free with multiple funding partners.

Shuttle routes include the Health Sciences Express. This service travels between the north and west areas of the campus to south campus and the University of Washington Medical Center, then continues on to the University of Washington Station, University of Washington South Lake Union research facilities, and Harborview Medical Center. University of Washington shuttle services also include NightRide and Dial-a-Ride vehicles.

An additional shuttle route sponsored by Seattle Children's Hospital travels from Children's Hospital to the University of Washington Station and then to the South Lake Union research facilities.

Although fare free, primary customers for the University of Washington shuttles can include patients or others conducting business between facilities. Passenger volumes are modest in comparison to the university population. Although shuttles are far reaching to Seattle Children's Hospital, South Lake Union, and Harborview Medical Center, routes are indirect, infrequent, and do not serve all areas of the U District. The shuttle systems serving the campus are shown in Figure 3.37.



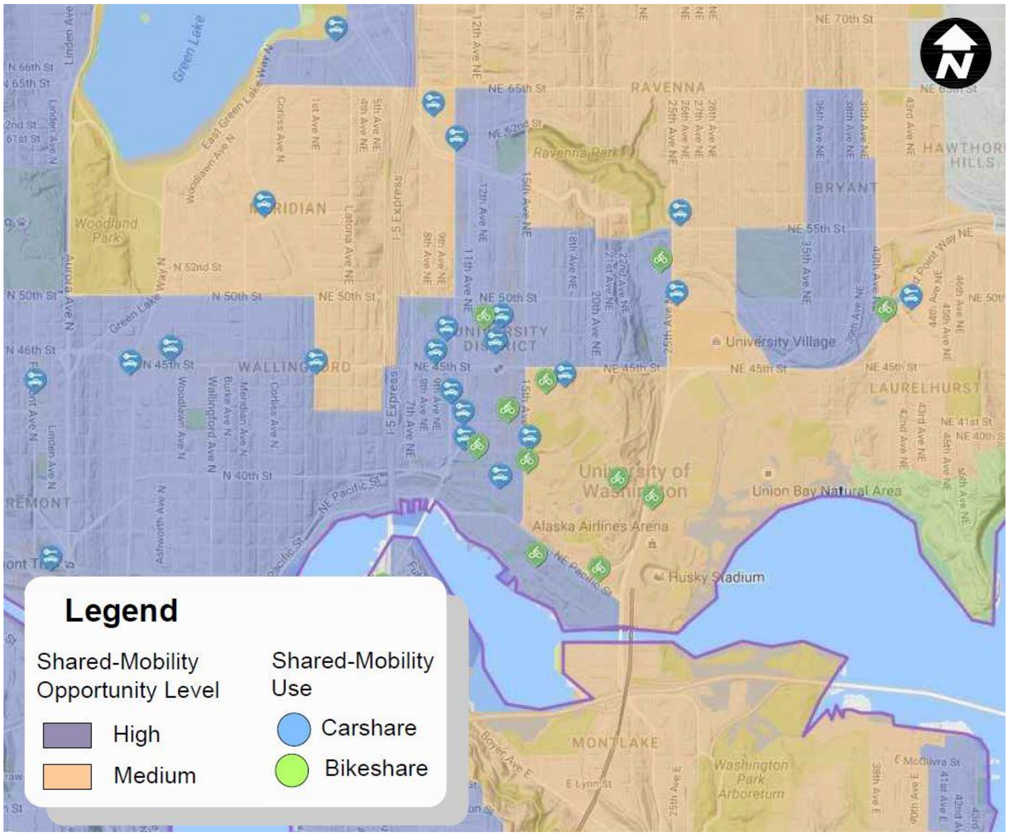
Source: UWTS, 2016

Figure 3.37 Existing University of Washington Shuttle Routes

Private car sharing services, such as Car2Go, ReachNow, and Zipcar, as well as Transportation Network Companies (TNCs), including Uber and Lyft, operate in the study area, providing an alternative to private automobile use and parking for campus communities. In the future, these car sharing and livery services can provide options for first and last mile access to transit. The Shared Use Mobility Center provides data and mapping of shared use opportunities (http://maps.sharedusemobilitycenter.org/sumc/).

This web tool also suggests that areas around the campus have relatively high shared use mobility opportunities. It should be noted that data from TNCs is not available. Maintaining passenger loading areas throughout the campus in the future can help foster use of TNCs. The web tool offers information on bikeshare facilities; however, the Pronto Cycle Share program was discontinued in March 2017.

Figure 3.38 shows car- and bikeshare facilities in and around campus.



Source: Shared Use Mobility Center, Transpo Group, 2016 prior to Pronto closure (http://maps.sharedusemobilitycenter.org/sumc/)

Figure 3.38 Shared Use Mobility in the Area and Shared Mobility Opportunity Level

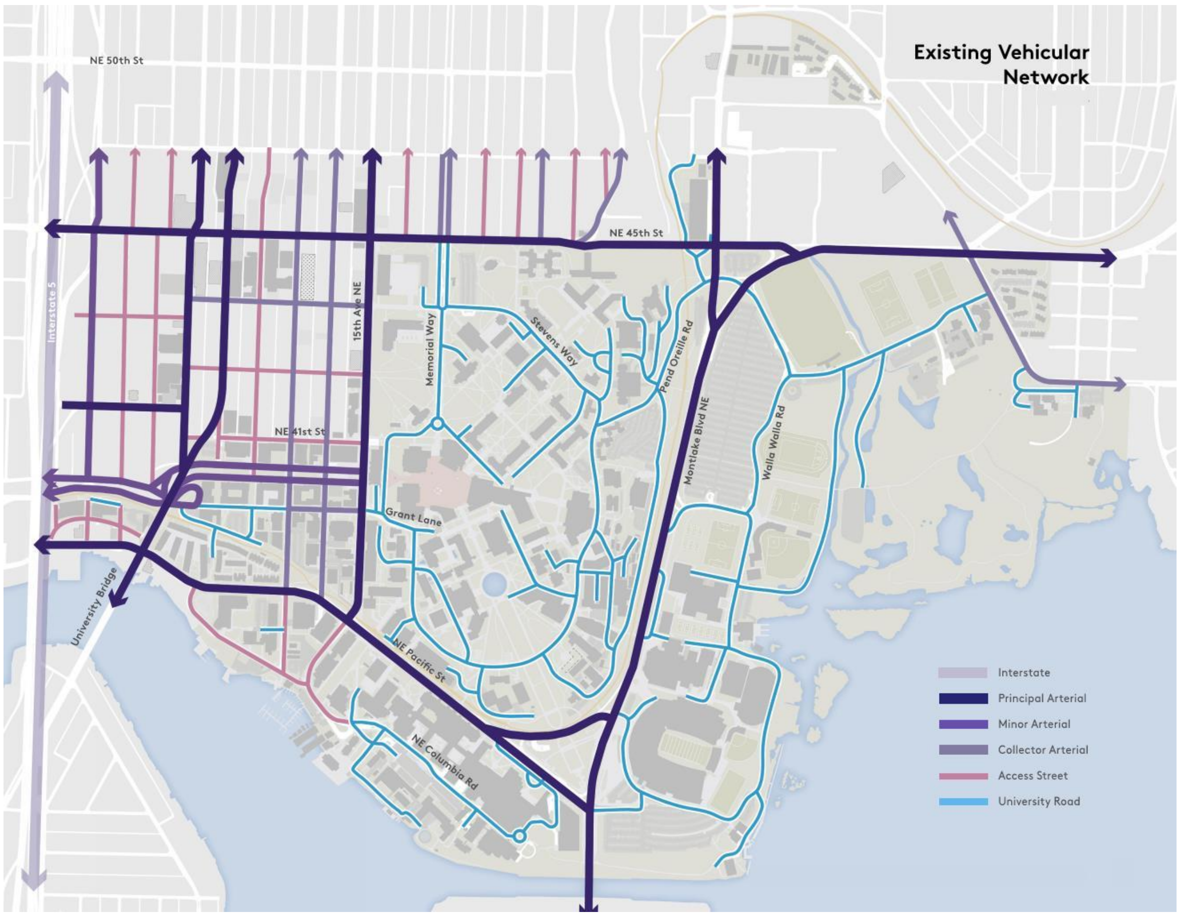
3.5 VEHICLE

As shown in Table 3.2, approximately 13,000 people access the campus using SOVs. Of these trips, 3,720 are students, 3,539 are faculty, and 5,683 are staff. Additionally, more than 4,000 individuals access the campus using carpools.

3.5.1 Street System

The street system in the vicinity of the University of Washington campus is comprised of different classes of roadways serving multiple functions. City of Seattle roadways are classified as principal arterials, minor arterials, collector arterials, and local access streets. Roadways owned by the University of Washington do not have separate functional classifications but are generally similar in nature to local access streets. Broader regional access to the University of Washington campus is provided via Interstate 5 (I-5) to the west and State Route 520 (SR 520) to the south. Connections between the campus and these regional facilities are generally provided via principal arterials.

Figure 3.39 shows the City of Seattle's street classifications in the study area and identifies University of Washington-owned roads. Table 3.22 summarizes the characteristics of major corridors within the study area (principal and minor arterials) including each roadway's functional classification, speed limit, number of lanes, parking, and general characteristics of non-motorized facilities. The City also designates streets with freight, pedestrian, and transit classifications. The current classifications for the streets included in the study area are also noted in Table 3.22.



Source: Sasaki Architects, July 2017 CMP

Figure 3.39 Arterial Classifications in the Study Area

Table 3.22
STUDY AREA EXISTING ROADWAY NETWORK SUMMARY

Street	Classification	Posted Speed Limit	Number of Travel Lanes	Parking	Sidewalks and Bicycle Facilities
NE 50th Street	Principal Arterial[1] Minor Transit	25 mph	2 travel lanes in each direction	No	Sidewalks on both sides
NE 45th Street	Principal Arterial Major/Minor Transit	25 mph	1–3 EB travel lanes; 2-3 WB travel lanes	No	Sidewalks on both sides; sharrows
NE 42nd Street	Principal Arterial/Access Street Major Transit	25 mph	1 travel lane in each direction	Intermittent both sides; peak hour restrictions	Sidewalks on both sides
NE Northlake Way	Collector Arterial	25 mph	1–2 travel lanes in each direction	Intermittent both sides; peak hour restrictions	Sidewalks mostly on both sides but intermittent
NE Pacific Street	Principal Arterial Principal/Minor Transit	25 mph	1–2 travel lanes in each direction; EB bus only near Montlake Boulevard NE	No	Sidewalks on both sides west of 15th Avenue NE; south side only east of 15th Avenue NE
Roosevelt Way NE	Principal Arterial Major Transit	25 mph	2 one-way southbound travel lanes	Intermittent paid	Sidewalks on both sides; cycle track
11th Avenue	Principal Arterial Major Transit	25 mph	2–3 one-way northbound travel lanes	Intermittent paid & time limited	Sidewalks on both sides
Eastlake Avenue NE	Principal Arterial Major Transit	25 mph	2 travel lanes in each direction	No	Sidewalks & bicycle lanes on both sides
15th Avenue NE	Principal Arterial Principal Transit	25 mph	2 travel lanes in each direction	Intermittent paid	Sidewalks on both sides
Montlake Boulevard NE	Principal Arterial Principal/Major Transit	25–35 mph	2–3 travel lanes in each direction	No	Sidewalks on both sides south of NE Pacific Place; east side only north of NE Pacific Place
25th Avenue NE	Principal Arterial Minor Transit	25 mph	2 travel lanes in each direction	No	Sidewalks on both sides
NE 40th Street	Minor Arterial/Collector Minor/Local Transit	25–30 mph	1 travel lane in each direction	Intermittent paid	Sidewalks on both sides
NE Campus Way	Minor Arterial Major Transit	25 mph	2 travel lanes in each direction	Intermittent paid	Sidewalks on both sides

EB = Eastbound, NEB = Northeast-bound, NWB = Northwest-bound, SWB = Southwest bound, WB = Westbound
1. NE 50th Street is a collector arterial east of 15th Avenue.

Source: Transpo Group, 2016

In addition to functional classification, the City also classifies roadways as Major and Minor Truck Streets and Green Streets. Neighborhood Green Streets are roadways where pedestrian circulation and open space are prioritized over other transportation uses through design and operational features. Within the study area, NE Pacific Street, NE 45th Street, and Montlake Boulevard south of NE Pacific Street are designated as Minor Truck routes. Several Neighborhood Green Streets are located within the study area and include Brooklyn Avenue NE, NE 43rd Street, and NE 42nd Street. Routes designated for trucks in the Freight Master Plan are shown in Figure 3.49 in Section 3.5.5, Existing Service Routes and Loading.

3.5.2 Traffic Volumes

Performance Measures

Six measures of effectiveness were analyzed to evaluate the impact of the campus growth on the surrounding transportation network:

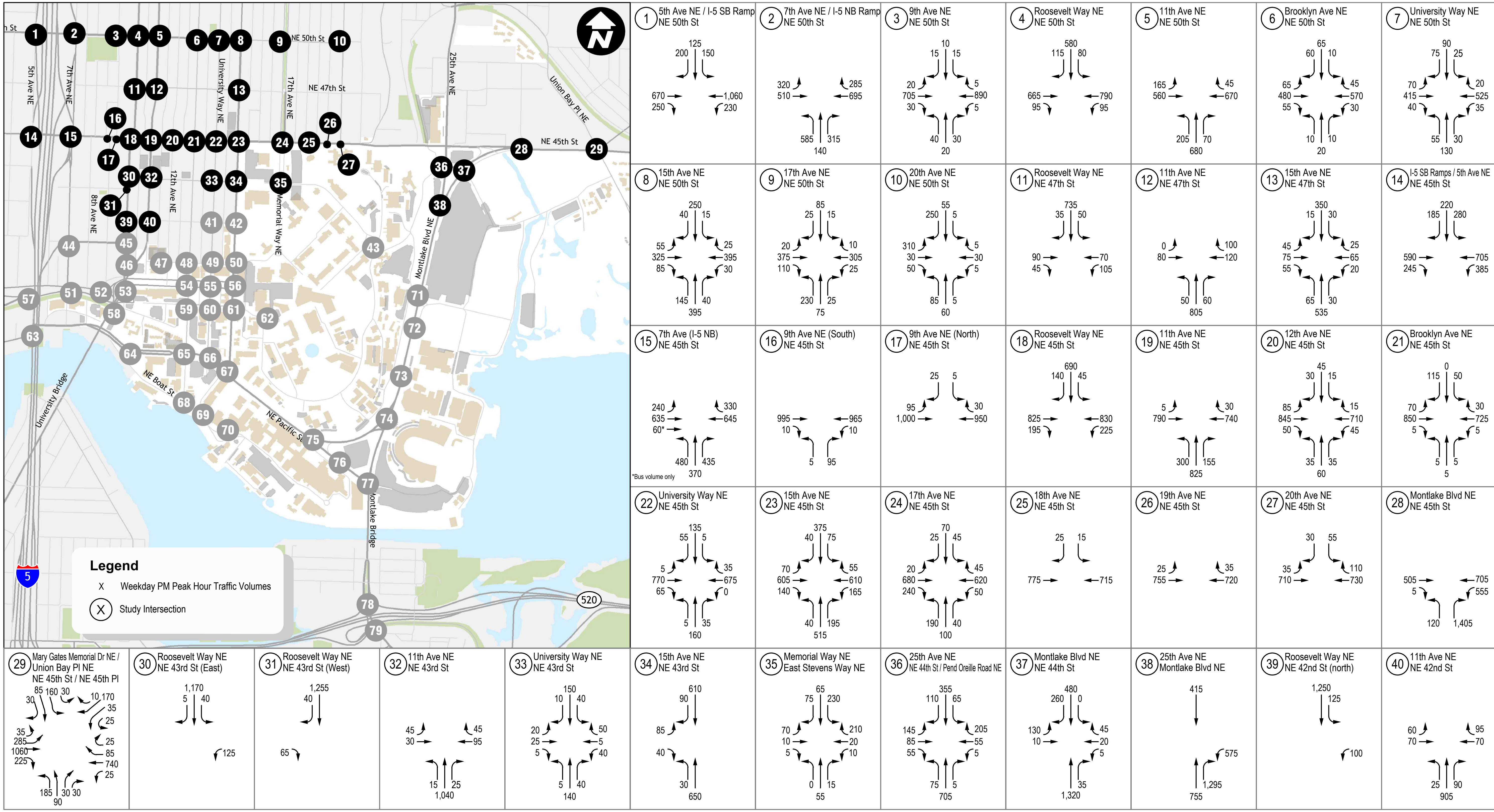
- Intersection operational level of service for intersection located in the primary and secondary impact area
- Arterial Corridor Operations
- Screenline Volumes
- Cordon Volumes
- Caps are set as 1990 trip levels to the University District and University (MIO)
- Freight Corridor Impact

Primary Impact Zone

Traffic data were obtained for all study area intersections from counts commissioned by Transpo Group and performed by Quality Counts between October and November 2015. The existing weekday PM peak hour traffic volumes are shown in Figure 3.40 and Figure 3.41 below.

In the vicinity of the University of Washington campus, and typical of their functional classification, vehicular traffic volumes are greatest along the principal arterial roadways. West of the campus, the highest volume roadway is the Roosevelt Way NE-11th Avenue NE couplet, which currently serves a combined 1,700 to 2,700 vehicles during the weekday PM peak hour. The remaining principal arterials serve the following vehicular volumes during the weekday PM peak commute period:

- NE 45th Street - between 1,500 to 2,000 vehicles per hour
- NE 50th Street - approximately 1,500 vehicles per hour
- 15th Avenue NE - approximately 1,100 to 1,400 vehicles per hour



Existing (2015) (Intersections 1-40) Weekday PM Peak Hour Traffic Volumes

FIGURE

3.40

University of Washington 2018 Campus Master Plan

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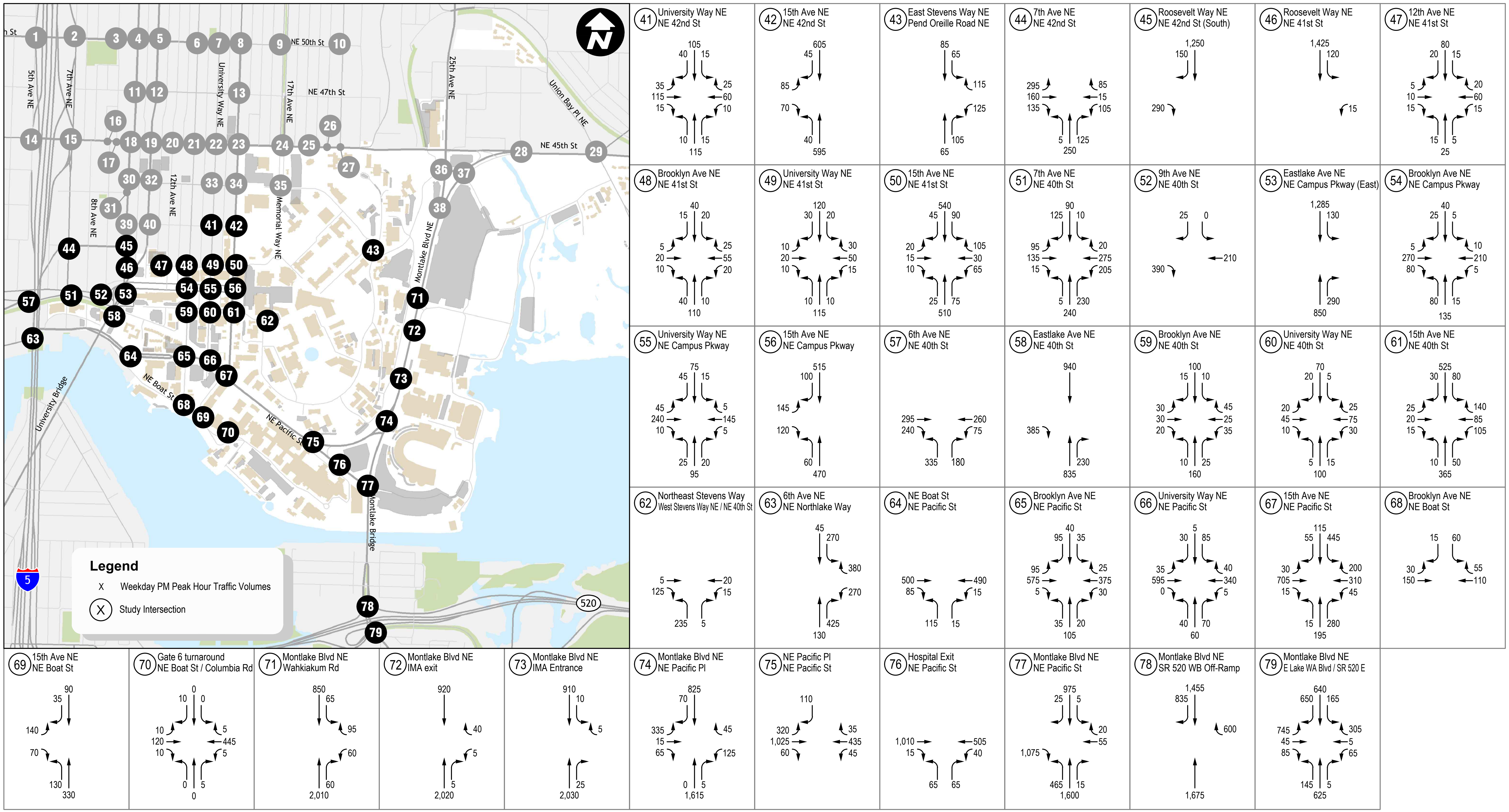


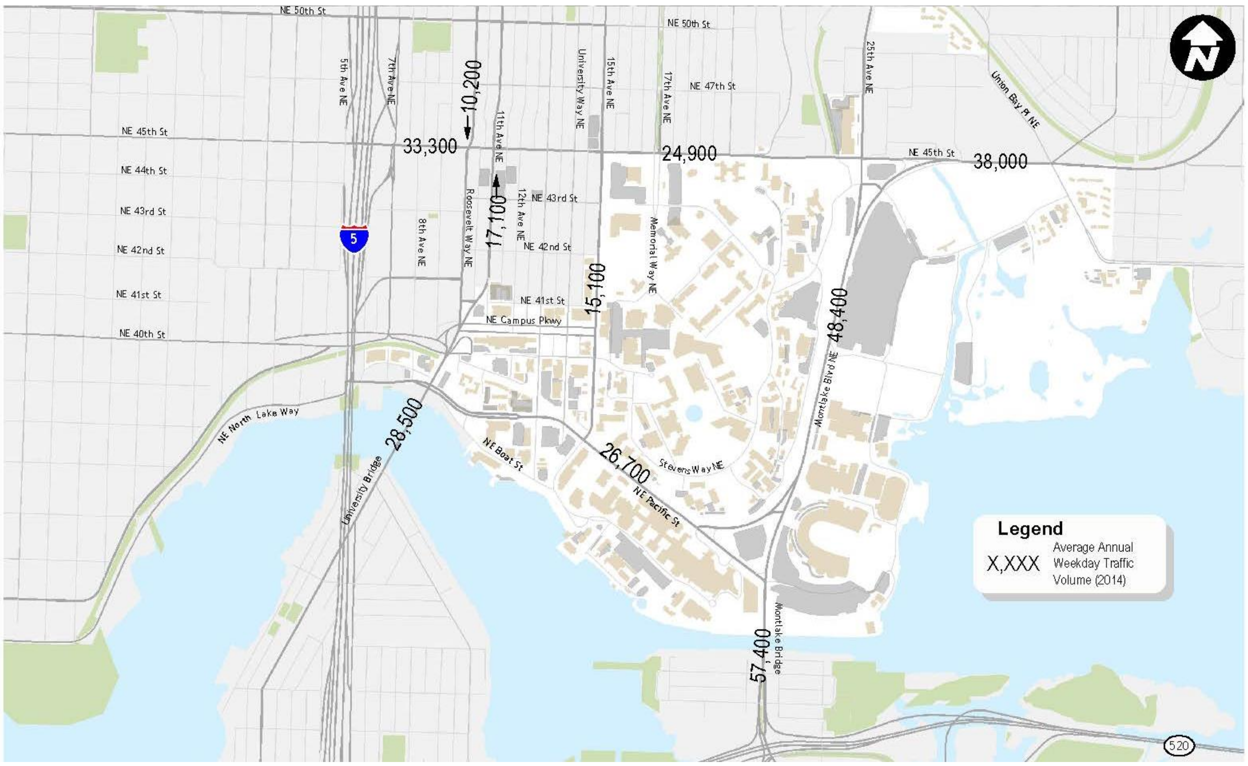
Existing (2015) (Intersections 41-79) Weekday PM Peak Hour Traffic Volumes

University of Washington 2018 Campus Master Plan

FIGURE **3.41**

transpogroup WHAT TRANSPORTATION CAN BE.

The remaining principal arterials in the vicinity of the University of Washington campus include NE Pacific Street and Montlake Boulevard NE. NE Pacific Street serves approximately 1,400 to 1,800 vehicles during the weekday PM peak hour. Montlake Boulevard serves approximately 3,000 vehicles per hour north of NE Pacific Street and 4,000 to 4,500 vehicles per hour near the SR 520 interchange. Existing (2014) Average Annual Weekday Traffic (AAWDT) volumes are shown in Figure 3.42. AAWDT volumes are based on SDOT's Traffic Flow Data and Maps. Year 2014 data is the most recent available.



Source: SDOT Traffic Flow Data and Maps

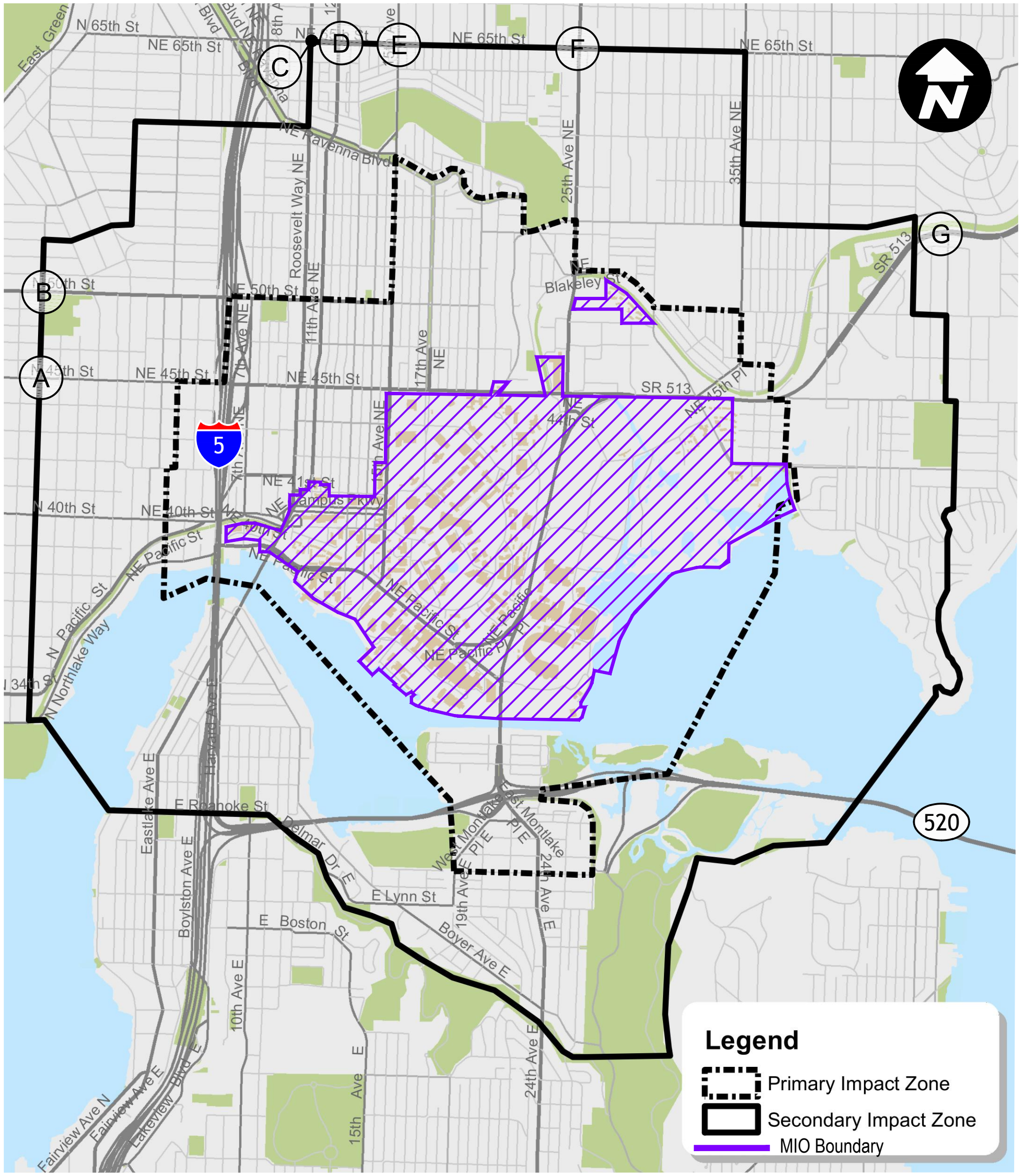
Figure 3.42 Average Annual Weekday Traffic Volumes in the Study Area

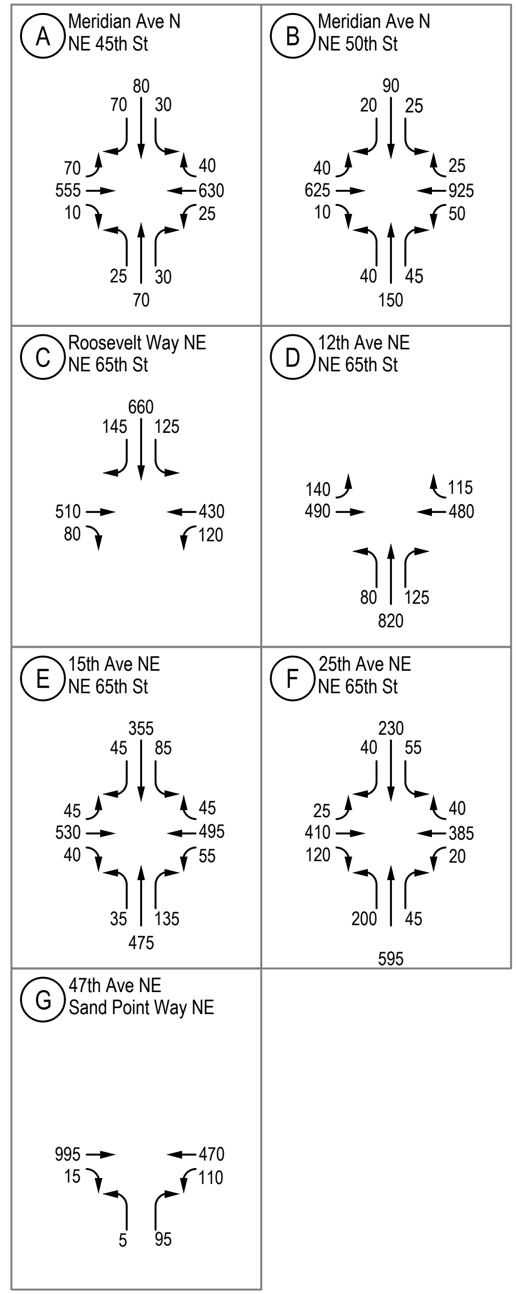
As shown in Figure 3.42, Montlake Boulevard NE carries the highest AAWDT volumes of the study area corridors included in this analysis.

Secondary Impact Zone

In addition to the 79 study intersections analyzed in the primary impact zone, 7 study intersections located in the secondary impact zone were included for analysis and comparison of PM peak hour volume growth. Traffic volumes in the secondary impact zone are anticipated to dissipate resulting in lesser impacts as compared to the primary impact zone. As such, a smaller study area was selected in for analysis in the secondary impact zone. The study intersections located in the secondary impact zone are shown in Figure 3.43 and include:

A. Meridian Avenue N/NE 45th Street
B. Meridian Avenue N/NE 50th Street
C. Roosevelt Way NE/NE 65th Street
D. 12th Avenue NE/NE 65th Street
E. 15th Avenue NE/NE 65th Street
F. 25th Avenue NE/NE 65th Street
G. 47th Avenue NE/Sand Point Way NE





Existing (2017) Secondary Impact Zone Weekday PM Peak Hour Traffic Volumes

University of Washington 2018 Campus Master Plan

FIGURE **3.43**

transpogroup
WHAT TRANSPORTATION CAN BE.

3.5.3 Traffic Operations Performance

Detailed methods for evaluation of traffic operations are described in Appendix B: Methods and Assumptions. Arterial LOS was evaluated along seven corridors within the primary impact zone and include:

- 11th Avenue NE, Northbound (NE Campus Parkway to NE 50th Street)
- 15th Avenue NE, Northbound/Southbound (NE Boat Street to NE 50th Street)
- Montlake Boulevard E, Northbound/Southbound (E Lake Washington Boulevard to NE 45th Street)
- NE 45th Street, Eastbound/Westbound (5th Avenue NE to Union Bay Place NE)
- NE Pacific Street (NE Northlake Way), Eastbound/Westbound (6th Avenue NE to Montlake Boulevard E)
- Roosevelt Way NE, Southbound (NE Campus Parkway to NE 50th Street)
- Stevens Way NE, Eastbound/Westbound (15th Avenue NE to 25th Avenue NE)

Arterial performance is based on the average vehicle speed and the arterial class of the corridor. The average speed along the corridor includes vehicle travel time and the delay from traffic signals. Signal delay for arterial LOS is based on Synchro 9 methodology. The arterial class is determined by Synchro 9 based on the speed limit and intersection spacing of the corridor.

Intersection Operations – Primary Impact Zone

As part of the intersection operations analysis, signal timing, and phasing information was obtained from the SDOT. Lane geometrics and traffic control were confirmed through a review of aerial images from 2015 and field visits. Because of peak period on-street parking restrictions, the functional lane geometry changed at some of the study area intersections between the weekday AM and PM peak periods. At intersections with transit lanes (for example Pacific Avenue), modifications were made to the Synchro 9 model to account for the bus lanes. The intersection levels of service also considered pedestrian volumes, bicycle volumes, heavy vehicle volumes, and intersection peaking characteristics from the traffic volume counts. Note that operations at the intersections of Brooklyn Avenue NE/ NE Campus Parkway and University Way NE/ NE Campus Parkway were reviewed as either separate or combined intersections, considering the overall weighted average delay. This method of analysis was performed to account for the current configuration of the intersections. Additional discussion regarding these intersections is included in Appendix B: Methods and Assumptions.

As illustrated in Figure 3.44, all primary impact zone study area intersections currently operate at LOS D or better, with the exception of the following 11 intersections that operate at LOS E or F:

- 16. 9th Avenue NE (South)/NE 45th Street
- 31. Roosevelt Way NE/NE 43rd Street (West)
- 46. Roosevelt Way NE/NE 41st Street
- 47. 12th Avenue NE/NE 41st Street
- 49. University Way NE/NE 41st Street
- 51. 7th Avenue NE/NE 40th Street
- 57. 6th Avenue NE/NE 40th Street
- 71. Montlake Boulevard NE/Wahkiakum Road
- 78. Montlake Boulevard NE/SR 520 WB Off-Ramp
- 79. Montlake Boulevard NE/E Lake Washington Boulevard/SR 520 EB Ramps

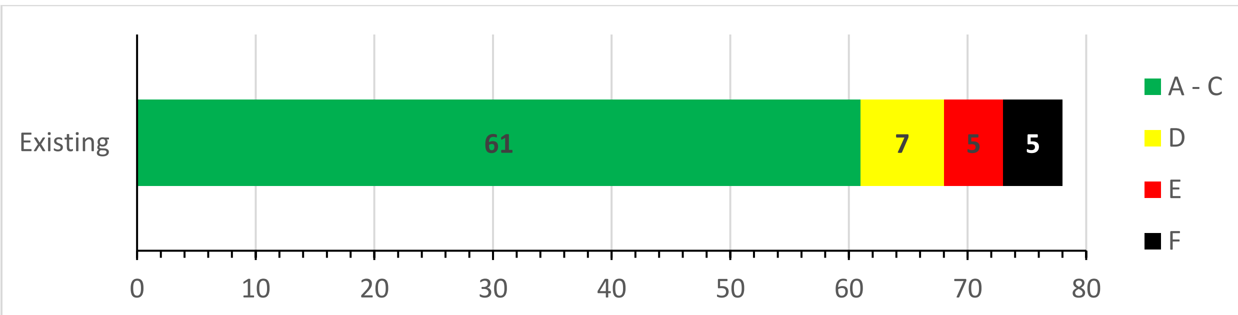
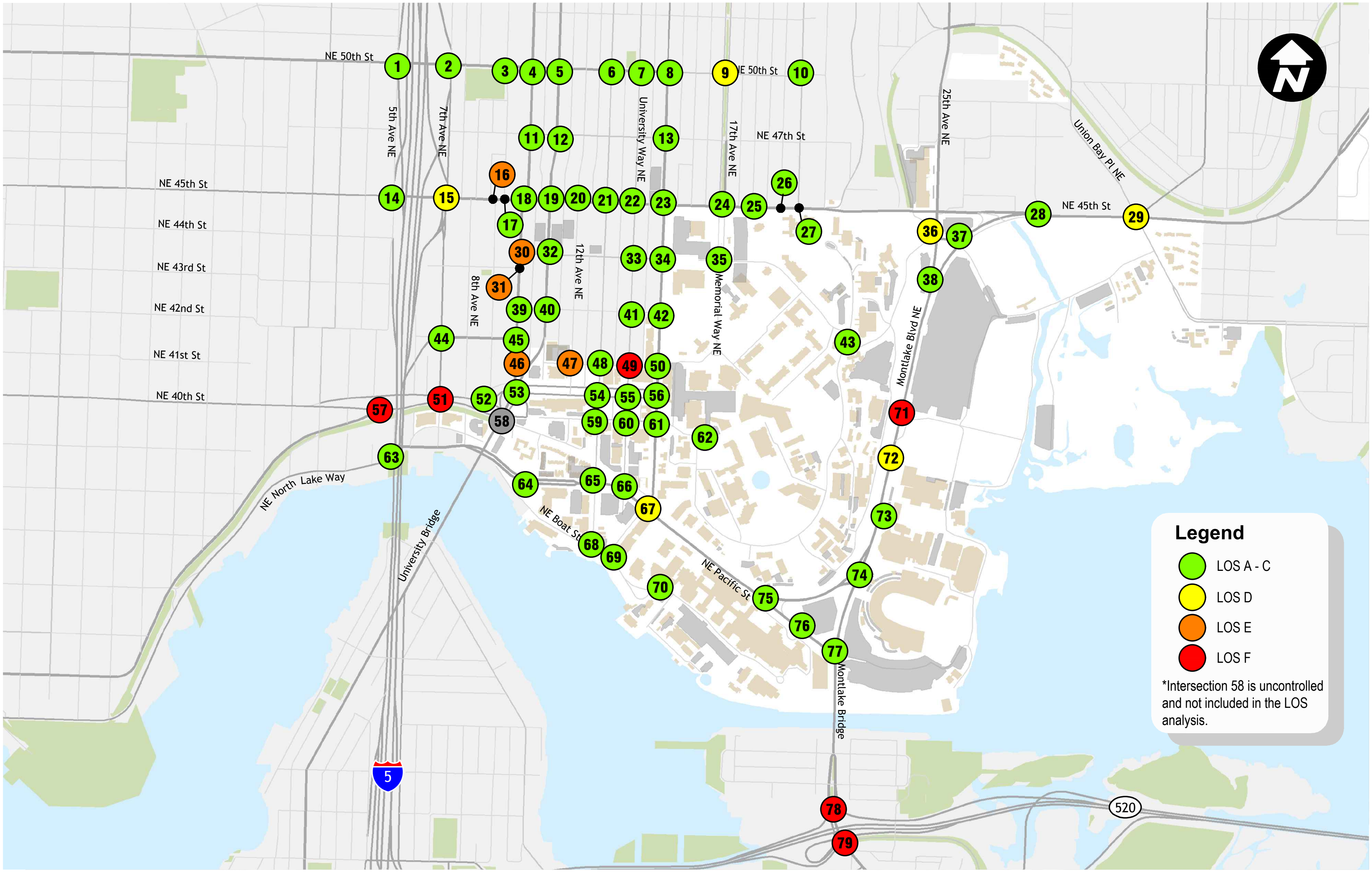


Figure 3.44 Existing (2016) Weekday PM Peak Intersection Level of Service Summary

Intersection LOS is shown for all study area intersections in Figure 3.45 for the weekday PM peak hour. Intersection summary tables for LOS results are included in Appendix C. Detailed level of service worksheets are also included in Appendix C.



Existing (2015) Weekday PM Peak Hour Traffic Operations

FIGURE **3.45**

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Intersection Operations – Secondary Impact Zone

Weekday PM peak hour intersection traffic operations under existing conditions at seven intersections in the Secondary Impact Zone are shown in Table 3.23. Complete intersection LOS summaries are provided in Appendix C.

Table 3.23
INTERSECTION LEVEL OF SERVICE SUMMARY – SECONDARY IMPACT ZONE

Intersection	Existing	
	LOS[1]	Delay[2]
A. Meridian Avenue N/N 45th Street	B	11
B. Meridian Avenue N/N 50th Street	B	13
C. Roosevelt Way NE/NE 65th Street	D	41
D. 12th Avenue NE/NE 65th Street	C	23
E. 15th Avenue NE/NE 65th Street	F	133
F. 25th Avenue NE/NE 65th Street	E	78
G. 47th Avenue NE/Sand Point Way NE	C	19

*Volume exceeds capacity and Synchro could not calculate the delay.
1. Level of service.
2. Average delay per vehicle in seconds rounded to the whole second.

As shown in Table 3.23, the secondary impact zone intersections are anticipated to operate at LOS D or above with the exception of the 15th Avenue NE/ NE 65th Street and 25th Avenue NE/ NE 65th Street intersections. The 15th Avenue NE/ NE 65th Street intersection is anticipated to operate at LOS F with approximately 133 seconds of delay, and the 25th Avenue NE/ NE 65th Street intersection is anticipated to operate at LOS E with approximately 78 seconds of delay.

Arterial Operations

Route performance along key corridors was evaluated within the study area to provide an additional level of analysis regarding the overall operations of the roadway network. Methods for calculating arterial operations is described in Appendix B: Methods and Assumptions. Table 3.24 provides a summary of the existing calibrated travel times and average speeds. Detailed data, including travel times measured in the field, existing uncalibrated travel times from the Synchro model, and the resulting adjustment factor can be found in Appendix C.

Table 3.24
EXISTING FACTORED WEEKDAY PM PEAK HOUR ARTERIAL TRAVEL TIMES AND SPEEDS

Corridor	Existing Factored Model Output[1]	
	Travel Time (m:ss)[2]	Average Speed (mph)
11th Avenue NE between NE Campus Parkway and NE 50th Street		
Northbound	4:19	8.5
15th Avenue NE between NE Boat Street and NE 50th Street		
Northbound	6:58	8.2
Southbound	6:03	9.4
Montlake Boulevard NE between E Lake Washington Boulevard and NE 45th Street		
Northbound	5:32	14.0
Southbound	11:01	8.0
NE 45th Street between 5th Avenue NE and Union Bay Place NE		
Eastbound	8:25	11.7
Westbound	7:51	12.0
NE Pacific Street (NE Northlake Way) between 6th Avenue NE and Montlake Boulevard E		
Eastbound	4:32	15.9
Westbound	3:30	20.6
Roosevelt Way NE between NE Campus Parkway and NE 50th Street		
Southbound	5:21	14.4
Stevens Way NE between 15th Avenue NE and 25th Avenue NE		
Eastbound	7:38	3.2
Westbound	5:26	2.7

1. Existing factored model output is Synchro output data that has been adjusted to account for existing field measurements and takes into account operational impacts such as mid-block crosswalks and parking maneuvers.
2. m:ss = minutes and seconds.

As shown, the weekday PM peak travel speeds took into account free-flow travel times and intersection-related delay. Overall, the travel times and speeds indicated existing congestion in both directions, but particularly so in the southbound direction along Montlake Boulevard E. With future traffic growth, all directional travel times would increase and travel speeds would decrease.

The arterial analysis was performed using the Synchro 9 software and determined arterial LOS based on travel speed between points. The results are summarized in Table 3.25**.** Detailed arterial LOS calculations are included in Appendix C. Traffic conditions can be worse when extreme congestion on I-5 and SR 520 constrains access onto the freeway.

Table 3.25
EXISTING PM PEAK ARTERIAL LEVEL OF SERVICE SUMMARY

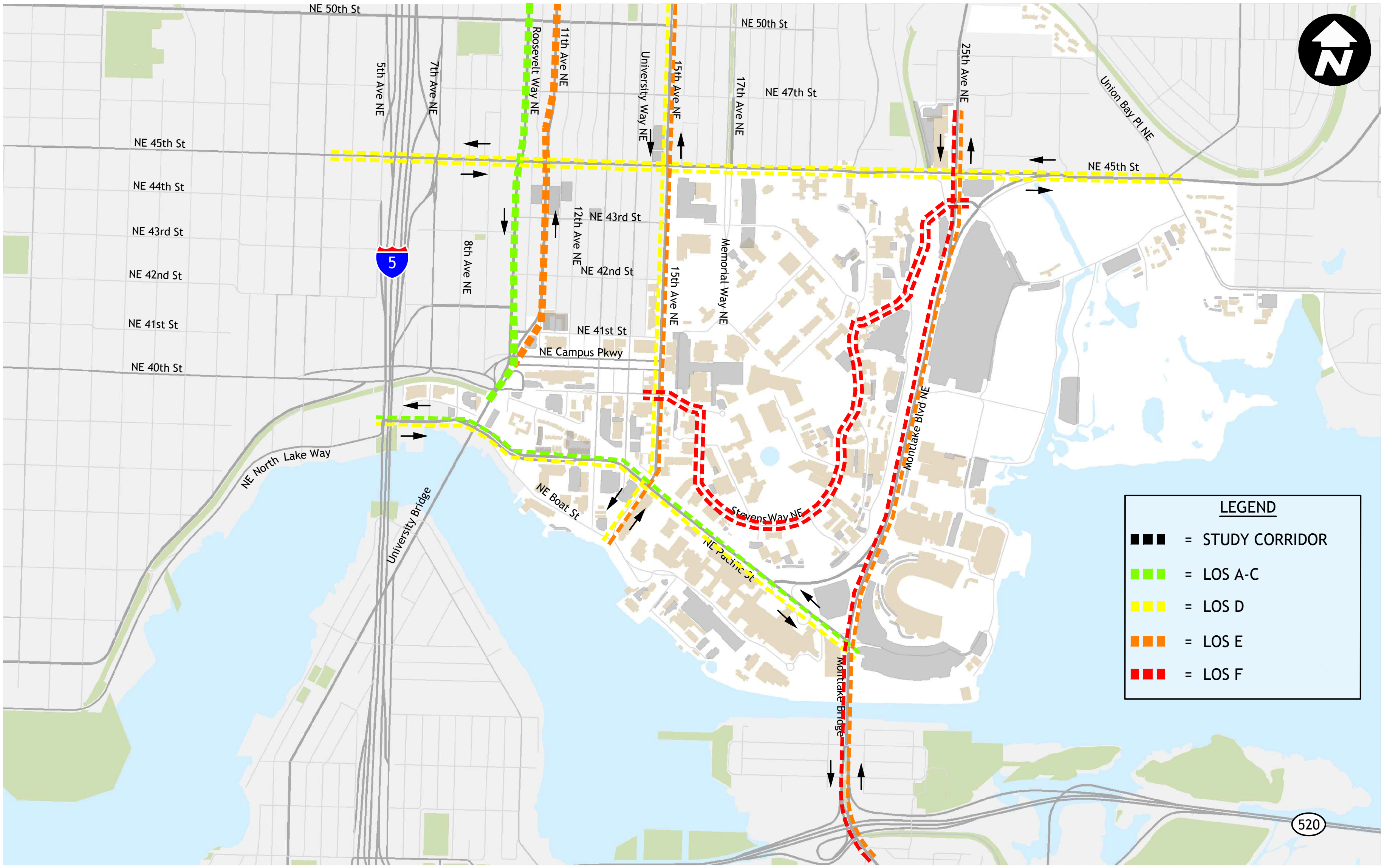
Corridor	Existing PM Peak Hour	
	Level of Service (LOS)	Speed (mph)
NE 45th Street, Eastbound (5th Avenue NE to Union Bay Place NE)	D	11.7
NE 45th Street, Westbound (5th Avenue NE to Union Bay Place NE)	D	12.0
NE Pacific Street (NE Northlake Way), Eastbound (6th Avenue NE to Montlake Boulevard E)	D	15.9
NE Pacific Street (NE Northlake Way), Westbound (6th Avenue NE to Montlake Boulevard E)	C	20.6
11th Avenue NE, Northbound (NE Campus Parkway to NE 50th Street)	E	8.5
Roosevelt Way NE, Southbound (NE Campus Parkway to NE 50th Street)	C	14.4
15th Avenue NE, Northbound (NE Boat Street to NE 50th Street)	E	8.2
15th Avenue NE, Southbound (NE Boat Street to NE 50th Street)	D	9.4
Montlake Boulevard NE, Northbound (E Lake Washington Boulevard to NE 45th Street)	E	14.0
Montlake Boulevard NE, Southbound (E Lake Washington Boulevard to NE 45th Street)	F	8.0
Stevens Way NE, Eastbound (15th Avenue NE to 25th Avenue NE)	F	3.2
Stevens Way NE, Westbound (15th Avenue NE to 25th Avenue NE)	F	2.7

Source: Transpo Group, 2016

As shown in Figure 3.46, three arterials analyzed currently operate at either LOS D or better during the weekday PM peak hour conditions. The following arterials operate at LOS E or worse:

- 11th Avenue NE in the northbound direction (LOS E)
- 15th Avenue NE northbound (LOS E)
- Montlake Boulevard NE northbound (LOS E)
- Montlake Boulevard NE southbound (LOS F)
- Stevens Way NE eastbound (LOS F)
- Stevens Way NE westbound (LOS F)

These arterials serve as the main routes to/from I-5 and the University of Washington campus and experience congestion during the peak periods resulting from heavy commuting traffic volumes.



Existing (2015) Weekday PM Peak Hour Corridor Traffic Operations

University of Washington 2018 Campus Master Plan

transpogroup
WHAT TRANSPORTATION CAN BE.

FIGURE
3.46

Mar 27, 2017 - 8:39am francescal \\srv-dfs-wa\MM_Projects\Projects\14\14284.03 - UW Master Plan EIS\Graphics\Draft EIS Graphics_Existing.dwg Layout: Corridor_Ex

Screenline Analysis: Primary Impact Zone

The following section describes the analysis completed for two designated screenlines within the study area, consistent with the City of Seattle's Transportation Concurrency system. Screenlines are imaginary lines across which the number of passing vehicles is counted. In this study, screenlines were selected to count vehicle traffic entering and exiting the University of Washington primary and secondary impact zones. As part of the 2035 Comprehensive Plan (City of Seattle, 2016), two screenlines were identified within the vicinity of the University of Washington, as shown in Figure 3.47. Screenline 5.16 is an east-west screenline, measuring north-south travel, and extending along the ship canal to include the University and Montlake bridges. Screenline 13.13 is a north-south screenline, measuring east-west travel, and extending east of I-5 between NE Pacific Street and NE Ravenna Boulevard.

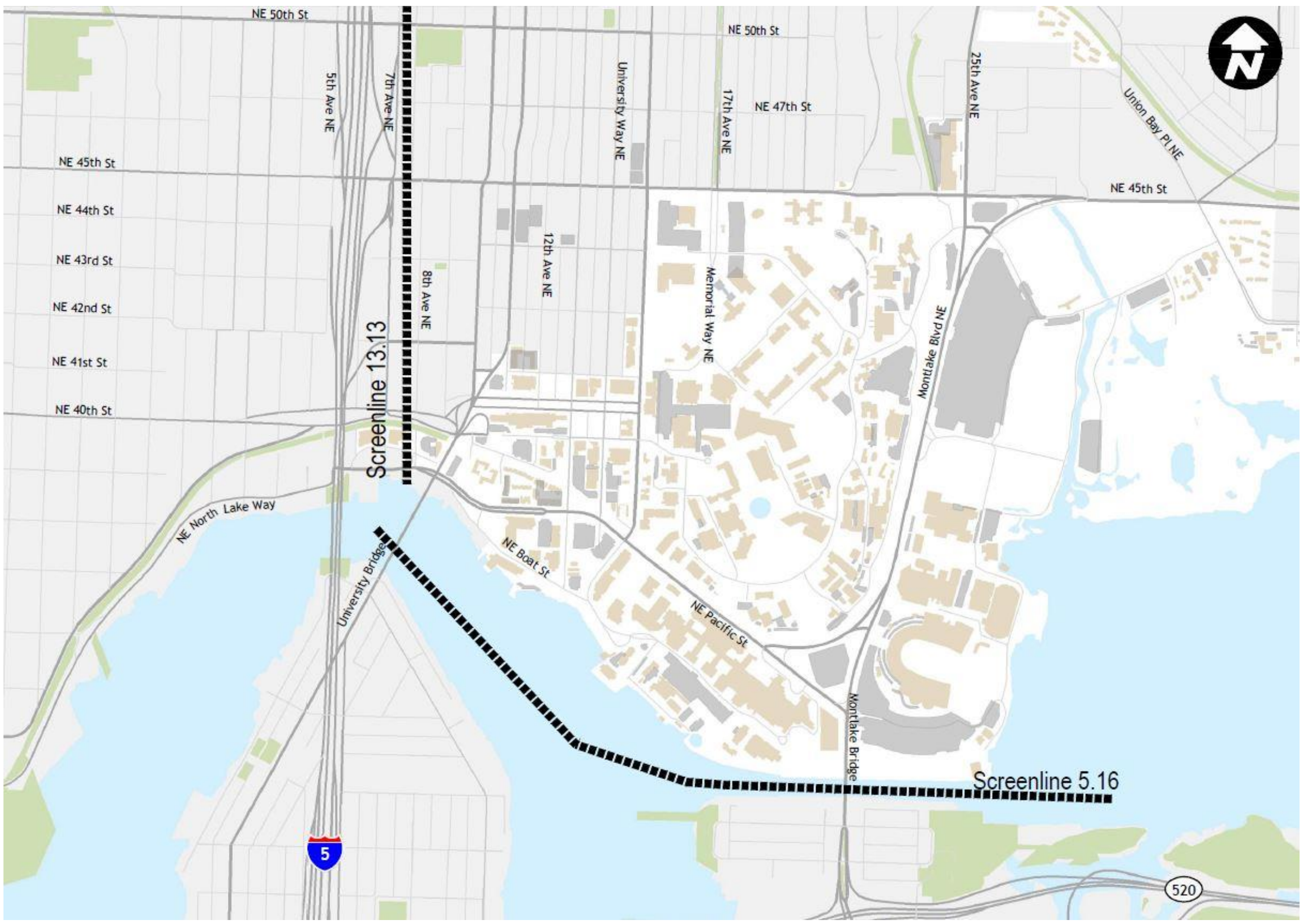


Figure 3.47 Study Area Screenlines

The screenline analysis included volume-to-capacity (V/C) calculations for the vehicles traversing the screenlines using existing (2015) traffic volumes and roadway capacity estimates. Existing roadway capacity estimates are shown in Table 3.26 below.

Table 3.26
ROADWAY CAPACITY ASSUMPTIONS

Roadway Description	Capacity (per direction, per hour)
Two-lane street	800
Four-lane street	1,600
Six-lane street	2,400
Two-lane street with frequent buses	750
Four-lane street with frequent buses	1,450
Six-lane street with frequent buses	2,150

Source: NACTO and Transpo Group, 2016

LOS standards for the screenline analysis were based on the V/C ratio of a screenline. As described in the Seattle Comprehensive Plan Update EIS, the LOS standard V/C ratio for Screenline 5.16 and Screenline 13.13 were 1.20 and 1.00, respectively. The existing conditions screenline analysis is included in Table 3.27. Detailed screenline volumes and V/C calculations are included in Appendix C.

Table 3.27
EXISTING SCREENLINE ANALYSIS

Screenline	Screenline Volume	Capacity	V/C	LOS Standard V/C
5.16 – Ship Canal, University and Montlake Bridges				
Northbound	3,340	3,850	0.87	1.20
Southbound	3,615	3,850	0.94	1.20
13.13 – East of I-5, NE Pacific Street to NE Ravenna Boulevard				
Eastbound	3,245	6,100	0.53	1.00
Westbound	3,620	6,100	0.59	1.00

Source: NACTO, Seattle Comprehensive Plan Update EIS, and Transpo Group, 2016

As shown in Table 3.27, all existing screenline V/C ratios meet the acceptable LOS standard.

3.5.4 Collision History

Recent collision records were reviewed within the study area to identify existing traffic safety issues at the study intersections. The most recent three-year summary of collision data from the SDOT and WSDOT is for the period between January 1, 2012 and December 31, 2014. Collisions were summarized at study locations for vehicle, bicycle, and pedestrian modes. Locations with an average of three or more collisions per year and total three-year bicycle and pedestrian collisions are summarized in Table 3.28.

SDOT annually reviews the previous year's collisions within the City and creates a list of "high collision locations" (HCLs) that are monitored or reviewed in the next year. The review screens the previous year collisions for signalized intersections with 10 or more collisions in a year, unsignalized intersections with five or more collisions, and locations with five or more pedestrian or bicycle collisions in the previous three years. SDOT's Draft Candidate Locations for 2015 HCL Reviews shows the following locations in the study area:

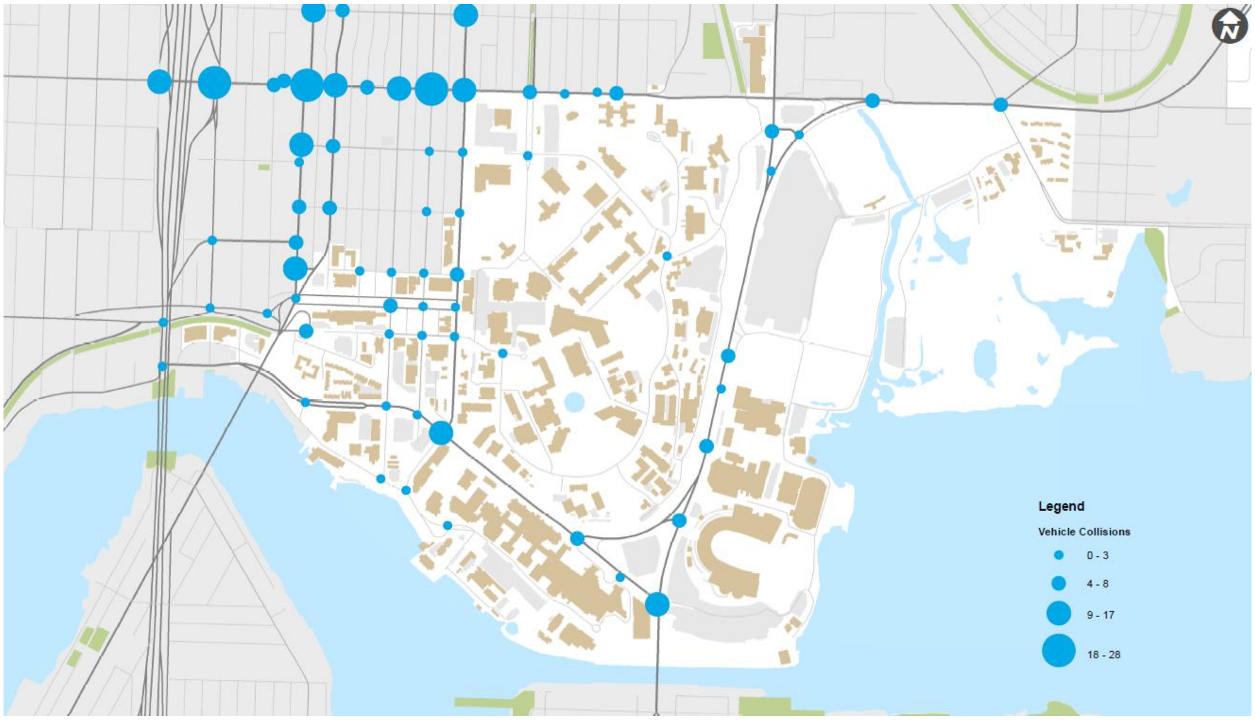
- **Roosevelt Way NE / NE 45th Street**: This intersection experienced nine collisions in 2014. Additionally, this location had four pedestrian collisions during the three-year period. A repaving project in 2015 included improvements for pedestrians.
- **Brooklyn Avenue NE / NE 45th Street:** This location experienced seven pedestrian collisions during the three-year period. The City monitored this location in 2013.
- **Brooklyn Avenue NE / NE 50th Street:** This location experienced four pedestrian collisions during the three-year period.

Table 3.28
THREE-YEAR COLLISION SUMMARY

Location	Three-Year Total (1/2012–12/2014)			
	Pedestrian/ Bicycle	Total Fatalities	Total Vehicle Collisions	Annual Average Vehicle Collisions
7th Avenue (I-5 NB) / NE 45th Street	3	0	18	6
Roosevelt Way NE / NE 45th Street	5	0	18	6
Brooklyn Avenue NE / NE 50th Street	4	0	17	5.7
11th Avenue NE / NE 50th Street	5	0	15	5
Roosevelt Way NE / NE 50th Street	3	0	14	4.7
15th Avenue NE / NE 50th Street	1	0	14	4.7
University Way NE / NE 45th Street	2	0	14	4.7
University Way NE / NE 50th Street	5	0	13	4.3
Brooklyn Avenue NE / NE 45th Street	6	0	12	4
9th Avenue NE / NE 50th Street	1	0	10	3.3
Roosevelt Way NE / NE 41st Street	2	0	10	3.3
Montlake Boulevard NE / E Lake WA Boulevard / SR 520 E	2	0	10	3.3
7th Avenue NE / I-5 NB Ramp / NE 50th Street	2	0	9	3
Montlake Boulevard NE / NE Pacific Street	1	0	9	3

Source: SDOT and WSDOT

A hotspot analysis showing the number of collisions within the study area is shown in Figure 3.48.



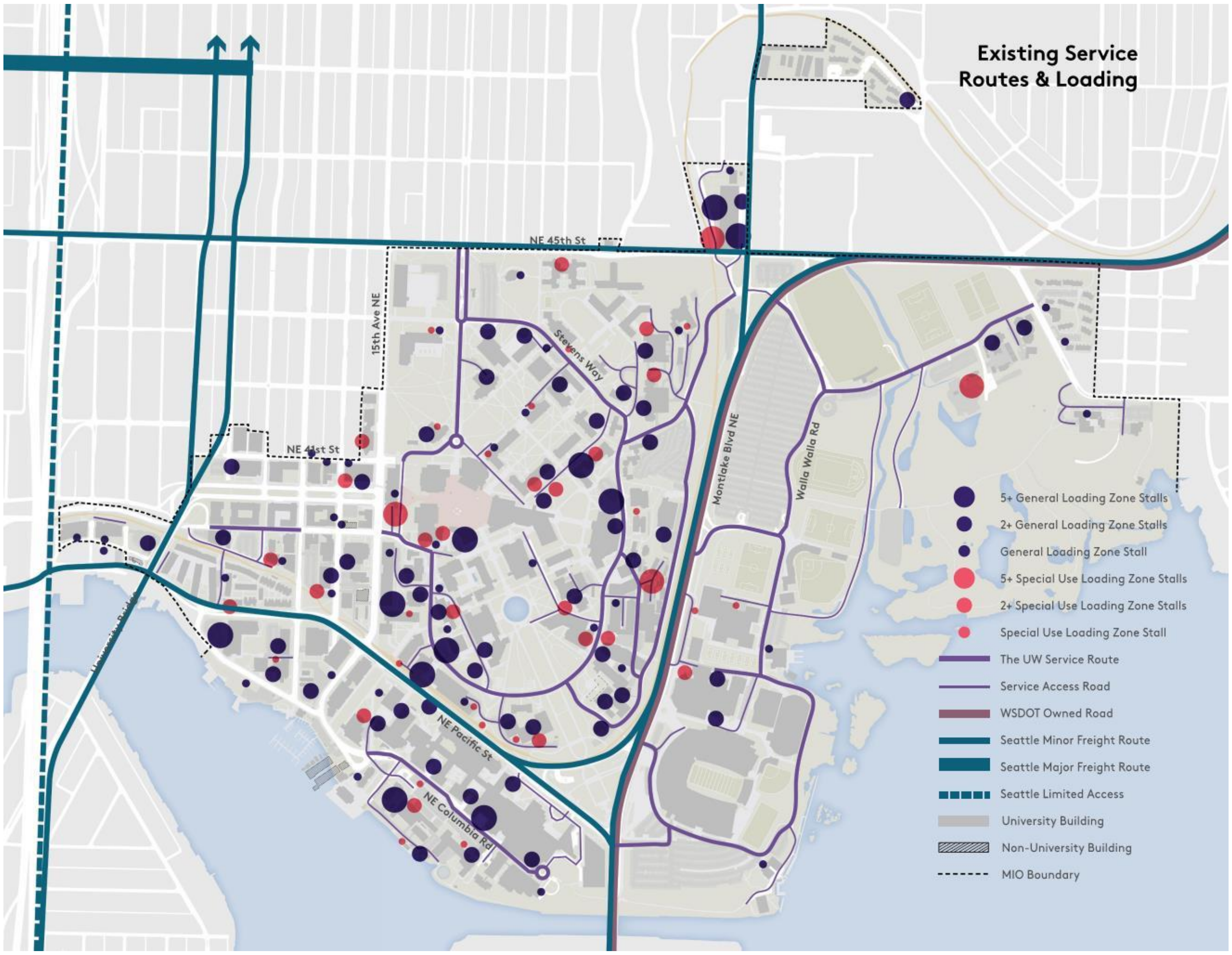
Source: Transpo Group, 2016

Figure 3.48 Intersection Vehicle Collision Summary

3.5.5 Service/Freight Routes

> **Freight Master Plan**: The City of Seattle has published their first Freight Master Plan in 2016. The plan includes a network of designated Major and Minor Truck Streets, limited access facilities, and first/last mile connectors that are planned and designed to accommodate truck movements.

Freight deliveries occur throughout campus directly from shippers to individual buildings. Interdepartmental deliveries also occur. Figure 3.49 highlights the existing loading zones, service access roads, and University of Washington service routes. Loading zones include on-street loading zones and dedicated off-street zones. Vehicles may access the site using one of the many arterials such as NE 45th Street, Montlake Boulevard NE, or any of the local streets depending on the nature of the delivery. Figure 3.49 also shows designated Major and Minor Truck Streets as designated in the City of Seattle Freight Master Plan. The Freight Master Plan identifies areas where freight vehicles are constrained on the freight network. The plan identifies a bottleneck on Montlake Boulevard at the Hec Edmondson Bridge which has a low clearance of 12’ 6” clearance and is subject to bridge strikes. It also notes congestion areas and a medium high bottleneck for freight on Montlake Boulevard along the campus edge.



Source: Sasaki Architects, July 2017 CMP

Figure 3.49 Existing Service Routes and Loading

Table 3.29 summarizes heavy vehicle percentages along Stevens Way NE, based on 2015 PM peak hour turning movement counts. Two study intersections are located along Stevens Way NE, at the W Stevens Way NE/ NE Grant Lane and E Stevens Way NE/ Pend Oreille Road NE intersections. PM peak hour heavy vehicle percentages are shown in the Table 3.29 below.

Table 3.29
STEVENS WAY NE HEAVY VEHICLE PERCENTAGES

Intersection	Heavy Vehicle Percentage by Movement			
	NB	SB	EB	WB
W Stevens Way NE/ NE Grant Lane/ NE 40th Street	14.3%	0%	11.0%	0%
E Stevens Way NE/ Pend Oreille Road NE	8.4%	16.7%	0%	5.9%

Source: Transpo Group, 2016

3.5.6 Parking

The University of Washington parking is managed by UWTS. Parking on campus consists largely of paid permit parking on weekdays between 6 am and 9 pm, and on Saturday from 7 am to noon. Students, faculty, and staff generally have pre-assigned parking areas; visitors are allocated to open spaces on a day-by-day basis depending on demand characteristics. Complimentary parking is available on weekdays after 9 pm until 6 am, on Saturdays from noon until 6 am, and all day on Sundays and holidays. The methodology for evaluating parking demands as well as the supply of existing and future conditions is described in the Appendix B: Methods and Assumptions. Parking supply and demand are described below for existing University of Washington conditions.

Parking Supply

The existing CMP limits on-campus parking to a maximum of 12,300 spaces. This parking space cap does not include service and load zones, cycle spaces, accessory off-campus leased spaces, and spaces associated with student housing. Of the 12,545 spaces on campus, the University currently reports 10,667 spaces in the most recent parking cap calculation for City-University Agreement (CUA) compliance, which is well below the allowed cap of 12,300 spaces the University could supply.

Parking Supply Cap: The University of Washington has an obligation as part of the City-University Agreement (CUA) with the City of Seattle to meet parking caps. The current on-campus parking limit is 12,300 spaces.

This parking analysis focuses on the current cap supply because this captures the supply available to accommodate campus growth.

Figure 3.50 shows existing campus parking supply by sector.

Source: UWTS

Figure 3.50 Existing Campus Cap Parking Supply by Sector

Parking Demand

Peak parking demand at the University of Washington occurs midday between 11 am and 2 pm, which is consistent with class and work schedules as well as visitors coming to/from campus. Table 3.30 summarizes the existing 2015 peak parking demand counts for the campus. This parking demand analysis included spaces used within the cap parking supply. It also considered other parking demand scenarios that may utilize cap supply in the future such as current on-street parking or other areas of campus not subject to the parking cap. Visitor parking demand was also included as part of the analysis.

Table 3.30
EXISTING PEAK PARKING DEMAND BY POPULATION

	Vehicles Parked[1]			
	Students[2]	**Faculty[2]**	**Staff[2]**	**Total**
On-Campus[2]	1,844	1,090	3,786	6,720
On-Street[2]	134	49	93	276
Total	**1,978**	**1,139**	**3,879**	**6,996**

1. Based on University of Washington 2015 parking counts, which includes visitor parking. Peak parking demand occurs during the weekday midday period.
2. Demand by population and parking destinations based on a three-year average of the University of Washington Transportation Surveys (2012, 2013, and 2014).

Source: Transpo Group, 2016

As shown in the table, the peak on-campus parking demand for this analysis was approximately 6,700 vehicles, which resulted in approximately 63 percent of the cap parking supply being utilized. In addition, parking occurs on-street within the MIO and surrounding areas. However, there are some on-street parking restrictions such as time limits and restricted parking zones. Based on commute trip survey responses, it was estimated that, during the weekday peak period, approximately 275 vehicles associated with the University of Washington were parked on-street. Field observations indicated that on-street parking was generally full in the vicinity of the University of Washington.

The on-campus parking demand and utilization was also reviewed by sector to provide context on where parking was occurring (see Table 3.31). Allocation of existing parking demand by sector was based on the University of Washington parking counts that indicated where vehicles were parked on-campus.

Table 3.31
EXISTING SUPPLY AND WEEKDAY PEAK PARKING DEMAND BY SECTOR

Sector	Campus Parking Supply		Existing Parking Demand[1]	
	No. Lots	Cap Supply	Demand (vehicles)	% Utilization
West	26	1,524	1,428	94%
South	12	1,161	1,139	98%
Central	42	3,129	2,689	86%
East	21	4,853	1,464	30%
Total	**101**	**10,667**	**6,720**	**63%**

Source: Transpo Group, 2016

1. Based on 2015 parking counts conducted by University of Washington Transportation Services, which includes visitor parking. Peak parking demand occurs during the weekday midday period.

As shown in the table, the West and South Campus sector parking areas are the most highly utilized on the campus. This utilization is reflective of the majority of activity occurring at the University of Washington Medical Center and student and staff parking permits being allocated to the South and Central Campus sectors. The East Campus sector is the farthest from most of the academic buildings, therefore, parking is less utilized during the peak midday period. The South and West Campus sectors experience the highest level of peak utilization at 93 to 98 percent, which is effectively at or near capacity when the search for parking is considered. In fact, some of the reported demand in the West Campus sector is likely parking that would occur in the South Campus sector, if it were not redirected to available parking in West Campus garages and lots.

Parking utilization for each campus lot is included in the following tables. As shown in the campus parking supply and demand by sector, this data is also based on the 2015 parking counts conducted by UWTS.

Table 3.32
EXISTING WEEKDAY PARKING UTILIZATION BY LOT – WEST CAMPUS

Lot Number	2015 Parking Percent Utilization
W08 (Lander)	0%
W10	82%
W11	77%
W12	93%
W13	82%
W20	65%

Lot Number	2015 Parking Percent Utilization
W21	82%
W22	53%
W23	34%
PBG Total	91%
W24	0%
W27 (UTC)	78%
W28(Gravel)	0%
W29	65%
W32	78%
W33	78%
W34	0%
W35	89%
W36	87%
W39 (Mercer)	87%
W40 Total	72%
W41	66%
W42	51%
W44 Ben Hall Total	59%
W45 (Building B)	76%
W46 (Building A)	89%
W51	71%
W52	71%
Parrington	100%
Frontage Road (S99)	100%
Spokane Lane (Savery)	100%
Surgery Pavilion	85%
Fisheries Dock	63%
Stadium Garage	0%
Laurel Village (H12)	22%
Gilman Building (4725 30th Avenue NE, Blakely Village - H14)	22%
Nordheim Court	22%
Chelan Lane (Raitt)	100%
Skagit Lane (Music)	76%
Bowman Building (4625 Union Bay Place)	22%

Lot Number	2015 Parking Percent Utilization
4541 Union Bay Place	22%
Radford Court	97%
Roosevelt Clinic 1 (4225 Roosevelt Way NE)	80%
Roosevelt Clinic 2 (4245 Roosevelt Way NE)	80%
Marina 1 (1409 NE Boat Street)	81%
Marina 2 (3537 12th Avenue NE)	59%

Table 3.33
EXISTING WEEKDAY PARKING UTILIZATION BY LOT – SOUTH CAMPUS

Lot Number	2015 Parking Percent Utilization
S1 (Top)	96%
S1 (Middle)	96%
S1 (Bottom)	96%
S1 Total	96%
S5	75%
S6	56%
S7	56%
S8	94%
S9	71%
S12	87%

Table 3.34
EXISTING WEEKDAY PARKING UTILIZATION BY LOT – CENTRAL CAMPUS

Lot Number	2015 Parking Percent Utilization
C01	92%
C02	75%
C03	87%
C04	82%
C05	93%
C06	91%
C07	50%
C08	72%
C09	67%
C10	88%
C12	80%
C14	71%
C15	88%
C17	86%
C19	75%
C20 (Triangle upper)	91%
C21 (Triangle lower)	91%
Triangle Total	91%
C23	75%
N01	89%
N02	0%
N03	94%
N05	92%
N07	67%
N08	76%
N09	88%
N10	30%
N11	13%
N12	29%
N13	96%
N14	30%
N15	51%
N16	91%
N18	87%
N20	83%

Lot Number	2015 Parking Percent Utilization
N21	80%
N22	85%
N24	75%
N25	64%
N26	64%
N28	80%

Table 3.35
EXISTING WEEKDAY PARKING UTILIZATION BY LOT – EAST CAMPUS

Lot Number	2015 Parking Percent Utilization
E1	19%
E2	30%
E3	35%
E4	13%
E6	74%
E8	57%
E8R	75%
E9	68%
E12	37%
E14 (GDR)	17%
E16	35%
E17	33%
E18	35%
E19	98%
E97 (Graves)	57%
E98 (IMA)	57%

Secondary Parking Impacts

Given the cost of parking and the U-PASS program that provides transit passes, there is likely some parking that occurs outside the primary impact zone surrounding the campus. This would include vehicles within transit-served areas with unrestricted parking and then using transit to travel to campus. It is difficult to quantify to what degree parking in neighborhood areas adjacent to the campus is occurring given that the City of Seattle and surrounding areas are well served by transit.

Figure 3.51 shows on-street parking designations within the primary and secondary impact areas based on data available from the City of Seattle. It also indicates areas where on-street parking is unrestricted and subject to casual parking by people going to campus and avoiding paying for parking. This on-street parking in unrestricted areas by campus students, faculty or staff has been noted as a nuisance to property owners although the spaces are open to all.

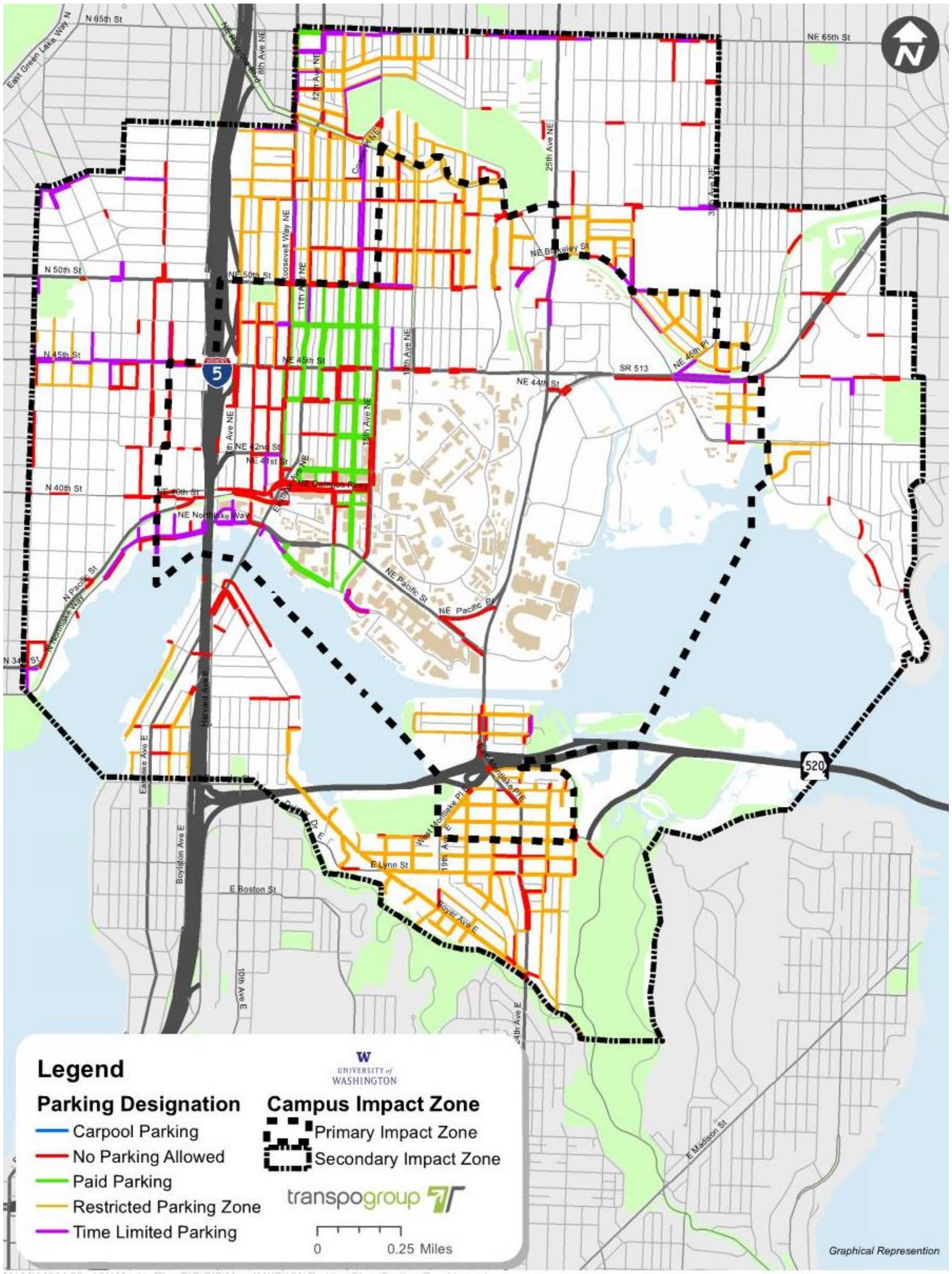


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Figure 3.51 Primary and Secondary Impact Zone On-Street Parking Designations

3.5.7 City University Agreement – Trip and Parking Caps

CUA (City-University Agreement): An agreement between the City of Seattle and the University of Washington, that among other things defines various transportation thresholds.

Transportation Management Plan (TMP): A transportation management Plan provides strategies for limiting traffic impacts and promoting active communities by managing vehicle trips and parking, as well as accommodating transit and non-motorized travel modes.

The University of Washington has a continuing obligation as part of the City-University Agreement with the City of Seattle (CUA) to meet vehicle trip and parking caps consistent with traffic levels reached in 1990 unless changed with this new Master Plan. With the introduction of the U-PASS program in 1991, and ongoing attention to U-PASS and other measures identified in the existing Transportation Management Plan (TMP), the University of Washington has maintained compliance with these goals every year since 1991, despite a 35 percent growth rate in campus population.

Vehicle Trips. The University has a program of monitoring, evaluating, and reporting transportation conditions through data collection and survey. Through an annual telephone survey, students, faculty, and staff provide a basis for annual calculations of vehicle trips subject to limits (trip caps), which is reported in the Annual CMP Monitoring Report. Table 3.36 illustrates the 2016 campus surveys of students, faculty, and staff results for peak period travel compared to the trip caps relative to 1990 impact levels.

Table 3.36
TRIP CAP SUMMARY –2016

Location/Peak Period	Trip Cap (vph)	2015	2016
University of Washington Campus			
AM Peak Period Inbound (7–9 am)	7,900	3,997	6,093
PM Peak Period Outbound (3–6 pm)	8,500	7,562	6,351
U District			
AM Peak Period Inbound (7–9 am)	10,100	4,988	7,328
PM Peak Period Outbound (3–6 pm)	10,500	9,329	7,588

Source: UWTS, Annual CMP Monitoring Reports

Figure 3.52 illustrates the historical compliance with the U District trip caps dating back to 2009.

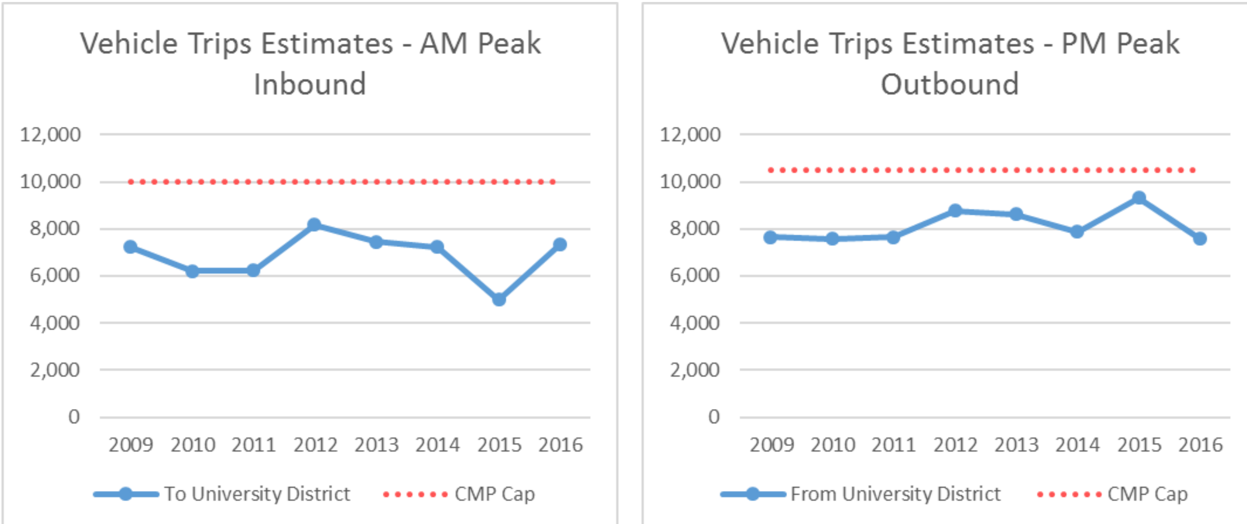

Figure 3.52 Historic AM and PM Trip Cap Summary

Parking Caps. In addition to the trip cap, which is monitored annually, the University has maintained a cap on total parking supply of 12,300 spaces for student, faculty, and staff. This parking cap does not include handicapped or visitor spaces, service and load zones, bicycle spaces, accessory off-campus leased spaces, and spaces associated with student housing. The University of Washington currently has 10,667 spaces included in the most recent parking cap calculation for CUA compliance.

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4 IMPACTS OF NO ACTION

This chapter evaluates all modes of travel and compares existing conditions to the No Action Alternative, defined as operations in the horizon year 2028 with 211,000 gsf of new development.

This chapter describes effects on the transportation system with the No Action Alternative, which assumes buildout of the current 2003 University of Washington Campus Master Plan (CMP). This analysis reflects the impacts associated with approximately 211,000 gross square footage (gsf) of development occurring in the West Campus sector.

This analysis evaluates all modes of travel and compares current transportation system operations noted in Chapter 3, Affected Environment, to operations for a horizon year of 2028, with 211,000 gsf of new development. This No Action Alternative also assumes a proportion of the development assumed in the City of Seattle adopted 2035 Comprehensive Plan and the adopted U District Rezone.

4.1 FUTURE CAMPUS CHARACTERISTICS, POLICY, AND TECHNOLOGY TRENDS

As noted in Chapter 2, Analysis & Methodology Assumptions, several trends and technologies have been considered as emerging factors in travel mode and behavior. While these trends could change transportation, data and information related to each are limited. For the long-range planning horizon, the effects of these policies and technologies were not considered to impact overall transportation results to present a more conservative analysis. Each technology and its impact on the University of Washington are described in Table 4.1.

Table 4.1
EMERGING TRANSPORTATION POLICY AND TECHNOLOGY TRENDS

Technology	Effectiveness and Impact for the UW CMP
Changing Behavior of Millennials – Changing travel behavior among millennials (defined as those reaching adulthood in the early 21st century) suggests this generation may be choosing alternatives to driving alone for travel. A study by the University of Michigan Transportation Research Institute indicates that driver licensing for teens and young adults is declining (for example, the number of 19 year olds with driver's licenses dropped from 87% in 1983 to 69% today[1]).	This trend may result in an overall increased dependence on transit and shared use mobility options in lieu of automobile ownership and may increase demand for transit and other modes, while diminishing drive alone modes. As noted below, increased dependence on shared use mobility is emerging. While overall auto ownership may decline, increased use of autos by Transportation Network Companies (TNCs) may increase and compete with transit.

Technology	Effectiveness and Impact for the UW CMP
Smart Traffic Signal Technology – Traffic signal operations and control are being improved through better real time information, data fusion that improves understanding of travel patterns, and improved operations of traffic signals to better respond to actual traffic patterns and vehicle types. The City of Seattle owns, manages, and operates traffic signals around the city and would take the lead in implementing new adaptive signal control technology.	This technology is being piloted as part of the Next Generation ITS (Intelligent Transportation System) plans of the City of Seattle. This technology can prioritize modes and reduce overall delay for vehicles and be optimized to meet key objectives such as moving people (for example, prioritizing higher occupancy vehicles).
Shared Use Auto Mobility Ride-hail and Transportation Network Companies – While rideshare programs through TNCs like Uber and Lyft and carshare programs like car2go, Zipcar, and ReachNow are popular and gaining in popularity, there are limited data related to the impact or effectiveness in reducing drive alone behavior. Carshare is operated near the University of Washington and is available for student use and is included in the Campus Transportation Management Plan as potential options to support commuting. Parking and passenger loading areas are available throughout the campus and will be assessed as needs arise.	This technology supports student and employee ability to rely less on automobile ownership and reduce drive alone behavior. Effectiveness has been mostly positive when combined with other travel choices such as transit; however, increased circulation and vehicle miles traveled of empty ride-hail/TNC vehicles has not been fully evaluated.
Bikeshare – Pronto, a not-for-profit bikeshare system was implemented in 2015 with mixed success. The program, which included memberships for short- and long-term bicycle rental, ended in March 2017. The future of bikeshare is uncertain; however, there is interest in attempting to create a bikeshare program in the future as bikeshare technology improves. Pronto stations have been located at several locations within and near the campus. As a new bikeshare program emerges, the University would participate in locating and supporting that program.	Emerging technologies where people can use transportation options temporarily, such as bikeshare and rideshare, are being implemented today. Outcomes of these technologies are emerging. While efficacy of bikeshare, specifically Pronto in Seattle, has been mixed and the program ended in March 2017, bikeshare has been identified as desirable by the City if it can be made to be successful in the future.

Technology	Effectiveness and Impact for the UW CMP
Autonomous and Semi-Autonomous Vehicles – There are projections that in the next 20 years, autonomous vehicles may broadly replace the automobile fleet. Semi-autonomous vehicles are already on the market assisting drivers and helping avoid crashes. In the future, these vehicles could be completely autonomous and potentially reduce congestion (vehicles are expected to operate safely with reduced distance between vehicles and potentially higher speeds). Autonomous vehicles have been proposed to operate cleanly (potentially electrically) for a variety of vehicle types (uses, trucks, and passenger vehicles and potentially for shared use), thus further reducing the need for auto ownership. As the technology evolves, autonomous vehicles may become part of the campus fleet to support mobility of people and goods. Additionally, space may be needed to accommodate drop-offs and storage.	This emerging technology has tremendous support and growing advocacy, specifically for its potential to reduce crashes. With added benefits of electrified vehicles and a combination with shared use and driverless mobility, the use and application of autonomous vehicles is expansive. In addition to improving safety, they could: - Increase flexibility of working hours (workers may include commute time in their work time) - Reduce desire for auto ownership - Accommodate rideshare/carshare and vanpooling - Support mobility options for those with disabilities or older drivers - Reduce overall parking needs, including at residences as vehicles are circulating and only need parking in times of low use - Potentially increase vehicle miles traveled - Potentially reduce jobs (drivers) Untested is whether autonomous vehicles could reduce congestion, especially if vehicles are circulating empty or with few passengers and compete with higher-occupancy modes such as transit.

1. http://www.umtri.umich.edu/what-were-doing/news/more-americans-all-ages-spurning-drivers-licenses, 2016.

4.1.1 Future Trip Generation by Mode

The following provides a summary of the methodology used to estimate the pedestrian, bicycle, transit, and vehicle trip generation volumes for all alternatives presented herein. Trip generation for the University of Washington is divided among four categories: students, faculty, staff, and campus visitors. For this analysis, the same methodology was utilized to forecast each category of the trip generation, with the exception of visitors. The technical analysis presented in the following section is based on population projections as enabled by the 211,000 gsf of development.

Trip Generation Methodology

The methodology used to forecast the trip generation for the various transportation modes is based on mode split data for each population group. The basis for the mode split assumes a conservative 2015 mode split of 20% drive alone from the annual survey conducted by the University of Washington Transportation Services (UWTS). The University uses a survey to evaluate the effectiveness of the U-PASS program among students, faculty, and staff. The information is also used to help meet Washington State Commute Trip Reduction (CTR) Law requirements.

The most recent available information provides insight into trends and modes for students, faculty and staff. The 2015 survey reflects a conservative 20% drive alone modes split while a recent survey conducted after the opening of the University of Washington light rail station indicates the drive alone mode split is 17%. The surveys typically capture information from approximately 1,500 to 1,600 students, faculty, and staff, including how many days per week they come to campus; how they get to campus; if they commute, how many people are in the vehicle; how far they live from campus; and the type of parking utilized. Based on the surveys, the following existing characteristics are identified and summarized in Table 4.2. Where available, more data were used, specifically for the time of day and direction of trip (inbound/outbound). Additionally, the survey asks the typical time of arrival and departure. This helps determine if the trip is inside the typical AM (7 to 9 am) and PM (3 to 6 pm) commute periods.

Table 4.2
THREE-YEAR AVERAGE CAMPUS COMMUTE PROFILE[1]

Mode	Students	Faculty	Staff
Transit	44%	25%	42%
Walk	36%	7%	4%
Bicycle	7%	14%	8%
Other	1%	2%	2%
Sub-Total, Non-Vehicular	88%	48%	56%
Vehicle			
Drive Alone	8%	45%	33%
Carpool	4%	7%	11%
Carpool Vehicle Occupancy			
Average Vehicle Occupancy	2.22	2.12	2.15

Source: University of Washington Transit Services surveys.
1. Based on an average of the most recent 3 years (2012, 2013, and 2014) of transportation survey results. Data from 2015 and 2016 not available at time of analysis.

As shown in Table 4.2, a majority (88 percent) of students utilized non-drive alone or carpool modes of transportation to commute to campus. Additionally, approximately 48 percent of faculty and 56 percent of staff utilized non-drive alone or carpool modes.

The daily, AM, and PM peak hour trip generation was developed for existing and future (No Action) conditions. Existing trip generation was estimated to develop the net new trips anticipated to campus, assuming average mode splits. No Action Alternative trip generation was developed first by determining the forecasted student enrollment, faculty, and staff headcount. The No Action trip generation was based on approximately 211,000 gsf of building capacity remaining under the 2003 CMP. A conservative 20 percent cumulative drive alone rate, consistent with the 2015 survey mode split, was utilized for No Action trip generation.

The vehicle trip generation accounts for drive alone vehicles and carpools. Carpools account for the average vehicle occupancy (AVO), as noted above and collected as part of the survey. The resulting vehicle trip generation is summarized in Table 4.3. The daily trip generation by non-vehicle modes is summarized in Table 4.4

In addition to faculty, students, and staff trip generation, other activity from campus visitors also impact the overall traffic levels. Visitor traffic was assumed to equal 10 percent of the net No Action trip generation associated with any of the EIS alternatives.

Table 4.3
ESTIMATED NET NO ACTION ALTERNATIVE VEHICLE TRIPS

Trip Type	Daily Trips	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
No Action Trips	150	35	15	45	20	30	50
Visitors (10%)	15	5	0	5	0	5	5
Total Trips	**165**	**40**	**15**	**50**	**20**	**35**	**55**

Source: Transpo Group, 2016

As shown in Table 4.3, the trip generation associated with the remaining 211,000 gsf under the CMP would be approximately 165 daily trips. Approximately 50 of these trips would occur during the AM peak hour and 55 during the PM peak hour and include visitors. Notably, the PM peak hour would be slightly higher, which aligns with the analysis to address PM peak operations.

Table 4.4
ESTIMATED NET NO ACTION ALTERNATIVE DAILY NON-VEHICLE TRIPS

Trip Type	Transit	Walk	Bicycle	Other
Student	220	290	55	5
Faculty	20	10	20	0
Staff	250	15	20	5
Total Trips	**490**	**315**	**95**	**10**

Source: Transpo Group, 2016

Table 4.4 reflects net No Action Alternative trips based on current daily non-vehicle mode splits for each campus population group. As shown in Table 4.4, under No Action conditions, campus development is anticipated to generate approximately 490 daily transit trips, 315 walk trips, 95 bicycle trips, and 10 other trips.

4.2 PEDESTRIANS

4.2.1 Planned Improvements

Pedestrian Master Plan (PMP): The Pedestrian Master Plan identifies priorities for investments to make improvements within the pedestrian realm. An update to the City of Seattle's Pedestrian Master Plan was approved in the Spring 2017.

Planned pedestrian improvements in the University District would work in conjunction with transit additions, including increased King County Metro services and the development of the Sound Transit Link light rail extensions. Green Streets proposed by the City of Seattle to promote a pedestrian environment are identified on NE 43rd Street, NE 42nd Street, and Brooklyn Avenue NE. A proposed future pedestrian network is shown in Source: **Sasaki Architects, July 2017 CMP**

Figure 4.1.

Source: Sasaki Architects, July 2017 CMP

Figure 4.1 Future Pedestrian Circulation

Green Streets: A Green Street is a street right-of-way that, through a variety of design and operational treatments, gives priority to pedestrian circulation and open space over other transportation uses. Treatments may include sidewalk widening, landscaping, traffic calming, and other pedestrian-oriented features. In 2015, the City of Seattle finalized the U District Green Streets Concept Plan.

The University District is included along a 6.1-mile corridor from the Roosevelt District to Downtown Seattle evaluated for high-capacity transit (HCT) within the Seattle Department of Transportation (SDOT) 2016 Transit Master Plan. Improved pedestrian facilities for transit riders would be included along this planned HCT corridor. These facilities would improve pedestrian access along Brooklyn Avenue NE, the Roosevelt Way NE / 11th Avenue NE couplet, and the University Bridge connection to Eastlake Avenue E. Improvements would include pedestrian shelters at transit stops and safe walking routes to the planned light rail stations at Brooklyn Avenue NE and Roosevelt Way NE.

The Move Seattle Strategy shows the Roosevelt to Downtown Complete Street project is planned to be implemented by 2024. Figure below shows an overview of the section of the proposed HCT corridor in the study area.

Source: SDOT 2016 Transit Master Plan

Figure 4.2 Roosevelt to Downtown Complete Street Corridor

> **Move Seattle**: A citywide strategic vision and 9-year levy for transportation investments in Seattle.

Additional planned improvements proposed by Move Seattle include those identified as part of multimodal corridors like Roosevelt Avenue to Eastlake Avenue, 23rd Avenue E Corridor, and NW Market Street to NE 45th Street Improvements. These changes would include improved sidewalks along a corridor connecting to the University of Washington network via Montlake Boulevard. Phase 4 of the 23rd Avenue East Corridor Improvements will reach the transportation network just south of the Montlake Cut.

The SR 520 Bridge Replacement and HOV Program will improve pedestrian connections across the SR 520 corridor and along Montlake Boulevard. This program is fully funded as the “SR 520 Rest of the West” through the Connecting Washington Partners package and will continue to add pedestrian facilities and connections to the Montlake area and existing University of Washington pedestrian network. This includes pedestrian paths and sidewalks connecting to the Burke-Gilman Trail north of the Montlake Cut, as well as connecting to the Washington Park Arboretum Waterfront Trail south of the Cut. In addition to providing safe walking routes, these pedestrian facility additions will connect to existing and planned transit hubs in the U District.

4.2.2 Performance Measures

As noted in Chapter 3, Affected Environment, the following pedestrian-related performance measures have been identified to assess and compare alternatives:

- Proportion of Development within 1/4 Mile of Multifamily Housing
- Proportion of Development within 1/4 Mile of University of Washington Residence Halls
- Quality of Pedestrian Environment
- Pedestrian Screenline Demand and Capacity
- Pedestrian Transit Station/Stop Area LOS

These measures reflect the effectiveness of the pedestrian network in providing safe and easy access to pedestrian destinations, specifically housing, and thereby maintaining a high walk mode choice on campus. Comparisons of No Action conditions to existing conditions is provided for each measure below:

Proportion of Development within 1/4 Mile of Multifamily Housing

Walking makes up nearly one-third of all existing campus-related trips to and from campus. Proximity of campus development to housing is therefore one important measure for assessing the propensity of people to walk. This measure assesses the proximity of the current campus buildings and development to nearby multifamily housing. Similar to existing conditions, with all development occurring in the West Campus sector, 100 percent of the growth would be within 1/4 mile of multifamily housing.

Proportion of Development within 1/4 Mile of University of Washington Residence Halls

Similar to the previous measure, this performance measure assesses the proximity of campus development within walking distance of residence halls, which were identified and then buffered by 1/4 mile. Similar to existing conditions, with all development occurring in the West Campus sector, 100 percent of the growth would be within 1/4 mile of University of Washington residence halls.

Quality of Pedestrian Environment (Primary and Secondary Impact Zones)
The quality of pedestrian travel would largely remain unchanged under the No Action Alternative. Pedestrian travel to/from and around the Link light rail U District Station would be expected to increase. Sound Transit plans to improve pedestrian capacity immediately adjacent to the station along Brooklyn Avenue NE and NE 43rd Street. Improvements to pedestrian travel to/from and across the SR 520 bridge will also be improved with completion of the bridge replacement project.

According to the City of Seattle's Pedestrian Master Plan updated in Spring 2017, additional locations are planned to become Neighborhood Greenways within the primary and secondary impact zones. In addition to the existing 12th Avenue NE Neighborhood Greenway, several new Neighborhood Greenways are proposed within the primary impact zone. These include a southern extension of the 12th Avenue NE Greenway, Walla Walla Road, NE Boat Street from NE Pacific Street to 15th Avenue NE, 20th Avenue NE north of NE 45th Street, NE 47th Street west of 20th Avenue NE, and NE Clark Road. The NE Boat Street Neighborhood Greenway will improve pedestrian connectivity from the Cheshiahud Lake Union Loop to the University of Washington campus. The 20th Avenue NE and NE 47th Street Greenways will increase pedestrian connectivity to the secondary impact zone and connect to planned greenways, including 11th Avenue NE, NE 55th Street, and NE 62nd Street. In the east section of the of the secondary impact zone, new Neighborhood Greenways are planned along 5th Avenue NE, NE 46th Street, and Keystone Place N. Planned improvements on the west side of the secondary impact zone include NE Surber Drive and NE 50th Street.

Pedestrian Screenline Capacity
For the pedestrian screenline capacity analysis, the peak hour demand, capacity, and level of service (LOS) at all at- and above-grade crossing locations along Montlake Boulevard NE, NE Pacific Street, 15th Avenue NE, and NE 45th Street were evaluated. The following sections summarize pedestrian screenline volumes due to background growth and the No Action Alternative.

Background Growth

Conservative background growth estimates were applied to existing peak hour pedestrian counts at all crossing locations to account for an increase in pedestrians on campus between the existing (2016) and (2028) horizon year. A 10 percent background growth increase was applied to existing peak hour pedestrian counts at all crossing locations. In addition, 1,500 additional trips crossing 15th Avenue were applied to the crossings that will be impacted by the 2021 opening of the Link light rail U District Station on Brooklyn Avenue NE. The pedestrian growth from the new light rail station was applied to crossings at the 15th Avenue NE/ NE 41st Street, 15th Avenue NE/ NE 42nd Street, and 15th Avenue NE/ NE 43rd Street intersections. Approximately 1,500 new pedestrians to these crossings was applied during the PM peak hour (60-minute) period to reflect the station opening.

No Action Alternative Growth

Development growth in the No Action Alternative would be focused primarily in the West Campus sector. Therefore, an overall 3 percent increase was applied to each pedestrian crossing located in West Campus, or a total increase of 258 pedestrians in the one-hour peak period. The total No Action Alternative peak hour pedestrian volumes, including background growth, are summarized by screenline in Table 4.5.

Table 4.5
EXISTING (2016) AND NO ACTION ALTERNATIVE (2028) PEAK HOUR PEDESTRIAN VOLUME AND SCREENLINE LEVEL OF SERVICE

	Existing		No Action Alternative	
Screenline	Pedestrian Volume (People/hour)	Level of Service	Pedestrian Volume (People/hour)	Level of Service
Montlake Boulevard NE	12,742	A	14,770	A
NE Pacific Street	3,252	A	3,744	A
15th Avenue NE	7,866	A	12,078	A
NE 45th Street	2,051	A	2,272	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition; Highway Capacity Manual.

As shown in Table 4.5, the No Action Alternative peak hour aggregate pedestrian volumes for all screenlines would be at LOS A.

Pedestrian Transit Stop Space Analysis

The pedestrian transit stop space analysis evaluates the peak hour demand, capacity, and LOS at key transit stops along Montlake Boulevard NE, NE Pacific Street, and 15th Avenue NE. The following sections summarize the pedestrian space per person and LOS at these locations within the affected environment.

Background Growth

Conservative background growth estimates were applied to existing peak hour pedestrian counts at all transit stop locations to account for an increase in pedestrians on campus between the existing (2016) and 2028 horizon year. A 10 percent total background increase was applied to existing peak hour pedestrian counts at all transit stop locations to reflect background growth between 2016 and 2028. In addition, a 1,500-person increase was applied only to transit stop locations that will be impacted by the 2021 opening of the U District Station. The growth due to the new light rail station was applied to transit stops at the 15th Avenue NE/ NE Campus Parkway, 15th Avenue NE/ NE 42nd Street, and 15th Avenue NE/ NE 43rd Street intersections.

No Action Alternative Growth

Growth under the No Action Alternative that would occur without the updated CMP would be focused primarily in the West Campus sector. Therefore, an overall 3 percent increase was applied to each transit stop located in West Campus. The total No Action Alternative peak hour pedestrian volumes, including background growth, are summarized by transit stop in Table 4.6.

Table 4.6
EXISTING (2016) AND NO ACTION ALTERNATIVE (2028) PEAK HOUR PEDESTRIAN SPACE AND LEVEL OF SERVICE

Stop Location	Stop ID Number	Existing		No Action Alternative	
		Pedestrian Space (square feet/person)	Level of Service	Pedestrian Space (square feet /person)	Level of Service
NE Pacific St Bay 1	1	49	A	45	A
NE Pacific St Bay 2	2	43	A	39	A
NE Pacific St at 15th Ave NE	3	8	C	8	C
15th Ave NE at Campus Pkwy	4	109	A	62	A
15th Ave NE at NE 42nd St	5	88	A	51	A
15th Ave NE at NE 43rd St	6	49	A	28	A
Montlake Blvd Bay 4	7	43	A	39	A
Montlake Blvd Bay 3	8	120	A	109	A
Stevens Way at Pend Oreille Rd	9	21	A	19	A
Stevens Way at Benton Ln	10	40	A	36	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition; Highway Capacity Manual.

As shown in Table 4.6, the No Action Alternative peak hour aggregate pedestrian volumes for all transit stop locations would be at LOS C or better.

4.3 BICYCLES

4.3.1 Planned Improvements

Based on SDOT's 2015–2019 Bicycle Master Plan Implementation Plan, additional protected bicycle lanes and Neighborhood Greenways are planned for implementation between 2015 and 2019. In 2015, planned construction began for protected bicycle lanes along Roosevelt Way NE and NE Campus Parkway throughout the U District. Additional construction is planned in 2018 for protected bicycle lanes along Ravenna Place NE that will connect to the existing U District bicycle network. These improvements will incorporate a block of Brooklyn Avenue NE between NE Campus Parkway and NE 40th Street to integrate with existing campus bicycle network and Burke-Gilman Trail access. A summary of planned protected bicycle lane improvements in the U District area is included in Table 4.7.

Table 4.7
PLANNED AND RECENTLY COMPLETED BICYCLE NETWORK IMPROVEMENTS – PROTECTED BICYCLE LANES, 2015–2019

Primary Street	Project Extents	Total Project Length (miles)	Planned Construction Year
Roosevelt Way NE	NE 40th Street to NE 45th Street	0.30	Complete
Roosevelt Way NE	NE 42nd Street	0.05	Complete
Roosevelt Way NE	NE 45th Street to NE 65th Street	1	Complete
NE Campus Parkway	University Way NE to Eastlake Avenue NE	0.34	Complete
University Bridge	NE Campus Parkway to Fuhrman Avenue E	0.35	Complete
Ravenna Place NE	NE 55th Street to Burke-Gilman Trail	0.17	2018

Source: Seattle Department of Transportation (SDOT).

Protected bicycle lanes have also been identified on 15th Avenue NE adjacent to campus in the Bicycle Master Plan that are not identified in the Bicycle Implementation Plan. As such, they have not been reflected in the analysis. Additional bicycle network improvements in the University of Washington vicinity include construction of a Neighborhood Greenway along NE 66th Street/NE 68th Street between 8th Avenue NE and 50th Avenue NE. Construction of this 2.2-mile project is planned for 2019. In addition, the University Bridge improvements are included as a catalyst project. A proposed future bicycle network is shown in Figure 4.3.

Source: Sasaki Architects, July 2017 CMP

Figure 4.3 Future Bicycle Network

4.3.2 Bicycle Parking/Bicycle Share Facilities

A study completed by UWTS in 2012 shows recent trends of bicycle parking utilization on campus. Based on the results of this survey, UWTS is working with University of Washington Department of Capital Planning and Development and the University of Washington Office of Planning and Budgeting to install additional indoor and outdoor bicycle storage facilities on campus. In addition, UWTS continues an improved bicycle parking inventory system implemented in 2013.

4.3.3 Performance Measures

As noted in Chapter 3, Affected Environment, the following bicycle-related performance measures have been identified to assess and compare alternatives:

- Burke-Gilman Trail Capacity
- Bicycle Parking and Utilization
- Quality of Bicycle Environment

Burke-Gilman Trail Capacity

Bicycle traffic along the Burke-Gilman Trail is anticipated to increase with the No Action Alternative from citywide growth and growth in travel to and from the Link light rail University of Washington Station as ridership of the system increases. Local pedestrian traffic along and across the Burke-Gilman Trail is also anticipated to increase but by a lesser amount. As shown in Table 4.8 bicycle and pedestrian volumes are projected to increase between 1 and 6 percent per year along the various segments. These increases would result from overall area growth and changing transportation mode choices as new transit investments are implemented, including new light rail stations (University of Washington and U District).

Table 4.8
BURKE-GILMAN TRAIL FORECASTED GROWTH 2010 TO 2030

Trail Location	2010		2028[1]		2030		Bicycle % Annual Change (2010–2030)	Pedestrian % Annual Change (2010–2030)
	Bicycle Counts	Pedestrian Counts	Bicycle Counts	Pedestrian Counts	Bicycle Counts	Pedestrian Counts		
West of University Bridge	408	174	1,230	251	1,321	260	6%	2%
West of 15th Avenue NE	479	249	1,441	341	1,548	351	6%	2%
Hitchcock Bridge	459	243	1,457	634	1,568	677	6%	5%
T-Wing Overpass	449	260	1,459	783	1,571	841	6%	6%
Rainier Vista West	474	298	1,415	357	1,520	364	6%	1%
Hec Edmundson Bridge	472	269	1,431	409	1,537	424	6%	2%
Wahkiakum Lane	425	159	1,290	277	1,386	290	6%	3%
South of Pend Oreille Road	438	136	1,330	249	1,429	261	6%	3%
North of Pend Oreille Road	435	178	1,321	299	1,419	312	6%	3%

Source: University of Washington Burke-Gilman Trail Corridor Study, SvR 2011; Transpo Group.

1. 2028 volumes estimated with straight-line interpolation from 2010 data and 2030 projections.

As pedestrian and bicycle volumes increase, the trail is expected to become more congested along segments that have not been upgraded to separate pedestrians and bicycles. According to analysis from the University of Washington Burke-Gilman Trail Corridor Study (July 2011), without separating pedestrians and people riding bicycles, LOS for both pedestrians and people riding bicycles will operate poorly (LOS F) regardless of the width of the joint use trail. The study recommends separating the trail into pedestrian- and bicycle-only facilities to accommodate an increase by the general public, new trips generated by the light rail station as well as University students, faculty and staff. A 2012 study (Burke-Gilman Trail Concept Design, Alta 2012) provided design options and recommendations for the trail. The University has completed expansion of two trail segments: a portion of the Neighborhood Reach from the University Bridge to Nordheim Court and the Campus Reach from 15th Avenue NE to Rainier Vista (completed in summer of 2016). The University is continuing to expand the trail to meet future campus and other regional growth within their 1.7-mile ownership of the trail.

Burke-Gilman Trail Concept: The University of Washington has developed conceptual plans to expand the Burke-Gilman Trail by creating separated facilities along their 1.7-mile ownership. The University of Washington Burke-Gilman Trail Design Concept Plan, Place Studio and Alta Planning + Design, 2012, created segments or reaches of the Burke-Gilman Trail and defines design concepts. Some of these segments, including portions of the Neighborhood Reach and the Campus Reach, have been completed.

As described in the Affected Environment Section, Burke-Gilman Trail level of service was evaluated with methods used in the 2011 and 2012 studies, including the use of the Federal Highway Administration's Shared-Use Path Level of Service Calculator (SUPLOS). SUPLOS evaluates trail segments using factors including trail width, directional bicycle and pedestrian volumes, and the presence of a striped centerline. (University of Washington Burke-Gilman Trail Corridor Study, July 2011). Future No Action Alternative level of service includes 2028 weekday PM peak hour pedestrian and bicycle counts in the operational analysis. The Future No Action Alternative weekday PM peak hour level of service along trail segments is summarized below. Additional detail on the operational analysis can be found in the Methods & Assumptions Appendix.

Table 4.9
NO ACTION ALTERNATIVE BURKE-GILMAN TRAIL WEEKDAY PM PEAK HOUR LEVEL OF SERVICE

Location	2028 No Action Projected Pedestrian Volume	2028 No Action Projected Bicycle Volume	Combined Trail		Separated Trail	
			Level of Service Score	Level of Service Grade	Level of Service Score	Level of Service Grade
West of University Bridge	251	1,230	NA	NA	4.16	A
West of 15th Avenue NE	341	1,441	NA	NA	4.15	A
Hitchcock Bridge	634	1,457	NA	NA	4.11	A
T-Wing Overpass	783	1,459	NA	NA	4.26	A
Rainier Vista West	357	1,415	1.45	F	3.86	B
Hec Edmundson Bridge	409	1,431	1.26	F	3.76	B
Wahkiakum Lane	277	1,290	0.82	F	3.46	C
South of Pend Oreille Road NE	249	1,330	0.82	F	3.44	C
North of Pend Oreille Road NE	299	1,321	0.68	F	3.43	C

Source: University of Washington Burke-Gilman Trail Corridor Study, SvR 2011; Transpo Group. NA means the trail is separated today.

As indicated in the July 2011 corridor study, a combined trail for both pedestrian and bicycle modes results in a much lower level of service than a separated trail. Level of service along the Burke-Gilman Trail can be improved by allowing for separation of bicycle and pedestrian modes. The segments of the Burke-Gilman trail have been developed as a separate trail form the west edge of the study area to Rainier Vista and will meet current and future demand. The segments east and of Rainier Vista operate with a poor level of service and will only improve when the trail is separated as planned.

Bicycle Parking and Utilization

As described in the Affected Environment chapter, the University has effectively managed bicycle parking demand. As new buildings are constructed, more than sufficient parking supply is provided. For these reasons, additional bicycle parking analysis for the No Action Alternative was not completed.

Quality of Bicycle Environment (Primary & Secondary Impact Zones)

Under the No Action Alternative, improvements to the bicycle environment associated with City and WSDOT investments are expected along with growth in bicycle travel demand associated with expanded Link light rail access and citywide growth. Improvements to bicycle travel, including upgrades to bicycle facilities along NE 40th Street and 11th Avenue NE, will be completed by SDOT before 2020, with additional investments possible thereafter. These investments will expand connectivity of facilities for all ages and abilities, especially in West Campus. Completion of the SR 520 HOV and Bridge Replacement Project will also improve regional bicycle travel to the Eastside, improve bicycle travel in the Montlake neighborhood, and provide new connectivity between the University, Capitol Hill, and Eastlake neighborhoods.

As mentioned in Section 4.2.2, additional Neighborhood Greenways are planned within the study area. Neighborhood Greenways accommodate both pedestrians and people riding bicycles. These Greenways will improve bicycle connectivity throughout the study area, especially between the primary and secondary impact zones.

The recently installed protected bike lane running north-south along Roosevelt Way NE highlights bicycle connectivity improvements within the primary impact zone. Protected bike lanes are also planned by the City along 11th Avenue NE, 12th Avenue NE, and along NE 40th Street, west of Brooklyn Avenue NE. This would connect with the existing cycling infrastructure on NE 40th Street and improve connectivity to campus.

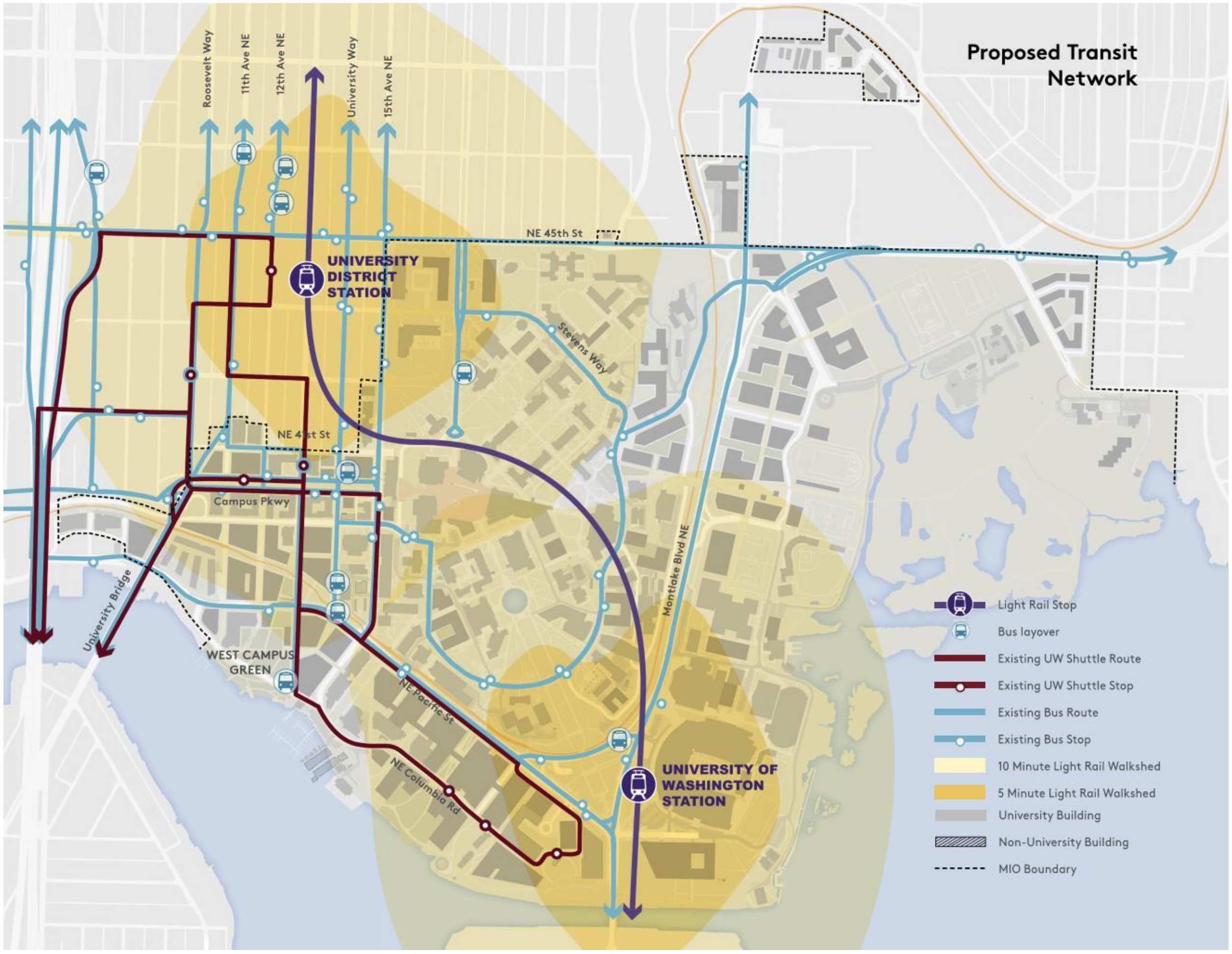
In addition to bicycle improvements within the primary impact zone, improvements are planned within the secondary impact zone. A new protected bike lane along Ravenna Place NE will provide a direct connection between the Burke-Gillman Trail and Ravenna Park. In addition, a protected bike lane along 36th Avenue NE will increase bicycle connectivity in the north/south directions to the secondary impact zone. A planned Neighborhood Greenway along Fairview Avenue E will increase the bicycle rider connection to campus from the south.

4.4 TRANSIT

4.4.1 Planned Improvements

Planned transit improvements will alter the transit system framework in the University District. The Sound Transit University Link Extension, which was completed in 2016, connects Link light rail as far north as Husky Stadium from Downtown. Current funding supports the Sound Transit Northgate Link Extension scheduled to be completed in 2021 and the Lynnwood Link Extension scheduled to be completed in 2023. The Northgate Link Extension will consist of a 4.3-mile-long light rail extension that connects the University of Washington Station with a planned Northgate Station, including stops at the U District and Roosevelt stations. Source: **Sasaki Architects, July 2017 CMP**

Figure 4.4 includes the planned transit network and walksheds from the U District Station and the existing University of Washington Station.



Source: Sasaki Architects, July 2017 CMP

Figure 4.4 Planned Transit Network and Walkshed

The Sound Transit Northgate Link light rail extension is funded and included in the Sound Transit 2 (ST2) System Plan project phasing. Other planned Sound Transit improvements are included in the Sound Transit 3 (ST3) System Plan approved in November 2016. ST3 improvements within the plan horizon include extension of light rail to downtown Redmond and extension of bus rapid transit (BRT) to Bothell. Other ST3 investments include light rail extensions and BRT and Sounder rail investments that could occur beyond the University Campus Master Plan planning horizon year of 2028.

The growth of transit use from new light rail access at the University of Washington is expected to increase access to campus by fast, reliable transit modes. As evidenced by the immediate increase of ORCA taps (Table 2.3) by University members using light rail, access to light rail should increase the transit mode for students, faculty, and staff. As shown in Figure 2.3 and Table 2.3, using current employee (staff and faculty) home ZIP code data, extension of light rail will be within convenient access for University employees. Roughly 24 percent of University employees will be within a 1-mile travelshed of new stations. Considering light rail is a convenient travel mode to the University of Washington, estimates of access to light rail for all employees in adjacent ZIP codes is as high as 59 percent.

Connections to Link light rail from Sounder Commuter Rail, whose riders can access light rail at the International District/Chinatown Station, has also become more convenient for locations in Pierce and Southeast King County. These connections have resulted in an increase of Sounder Light Rail taps by University of Washington-related ORCA cards from 10 to 25 percent over 2015 (pre-light rail). As shown in the Table 2.3, including those employees adjacent to Sounder rail stations along with light rail riders shows an increase in future access to 27 percent. These findings are also summarized in Figure 2.3.

Table 4.10
PROPORTION OF EMPLOYEES PROXIMATE TO LIGHT RAIL

	½-Mile Proximity to Light Rail Station		½-Mile Proximity to Light Rail Station and 1-Mile Proximity to Sounder Rail Station		ZIP Code Adjacent to Light Rail Station		ZIP Code Adjacent to Light Rail Station and 1-Mile Proximity to Sounder Rail Station	
Year	Employees	Percent of Employees	Employees	Percent of Employees	Employees	Percent of Employees	Employees	Percent of Employees
Existing	844	3%	1,483	6%	6,223	24%	6,862	27%
2021 (Light Rail extended to Northgate)	1,383	5%	2,022	8%	12,132	47%	12,771	50%
2023 (Light Rail extended to Lynnwood, Federal Way, and Overlake)	1,913	7%	2,552	10%	14,850	58%	15,489	61%
2024 (Light Rail extended to Redmond)	1,973	8%	2,612	10%	15,107	59%	15,746	62%

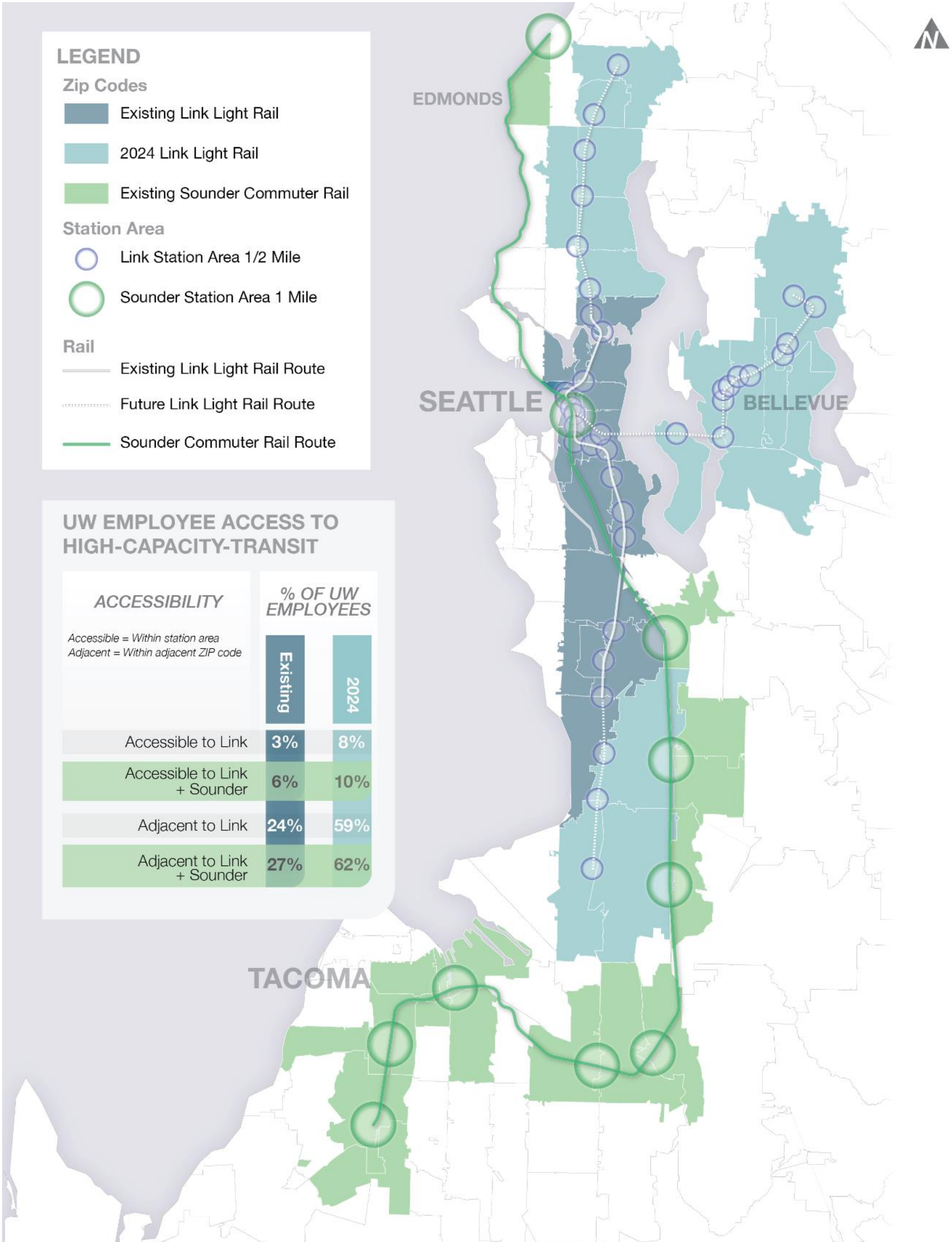


Figure 4.5 Employees Located in ZIP Codes within 1/2 Mile of Light Rail 1 Mile of Sounder Commuter Rail

The City of Seattle Transit Master Plan, which was updated in 2016, identifies a set of RapidRide Transit Priority Corridors. These corridors include enhancements to support transit, including amenities at stops such as shelters, real-time information, transit signal priority, and off-board fare payment. Three of these are funded as part of the Move Seattle levy: RapidRide corridors 4 (U District to Rainier Valley), 5 Ballard to U District), and 7 (Northgate to Downtown by way of the U District).

4.4.2 Route Modifications

The King County METRO CONNECTS plan includes proposed routes for plan horizon years 2025 and 2040. Twelve new RapidRide routes are proposed for implementation in 2025, with four servicing the University of Washington campus or the U District. Table 4.11 summarizes King County Metro's proposed RapidRide expansion routes by 2025 in the University of Washington vicinity.

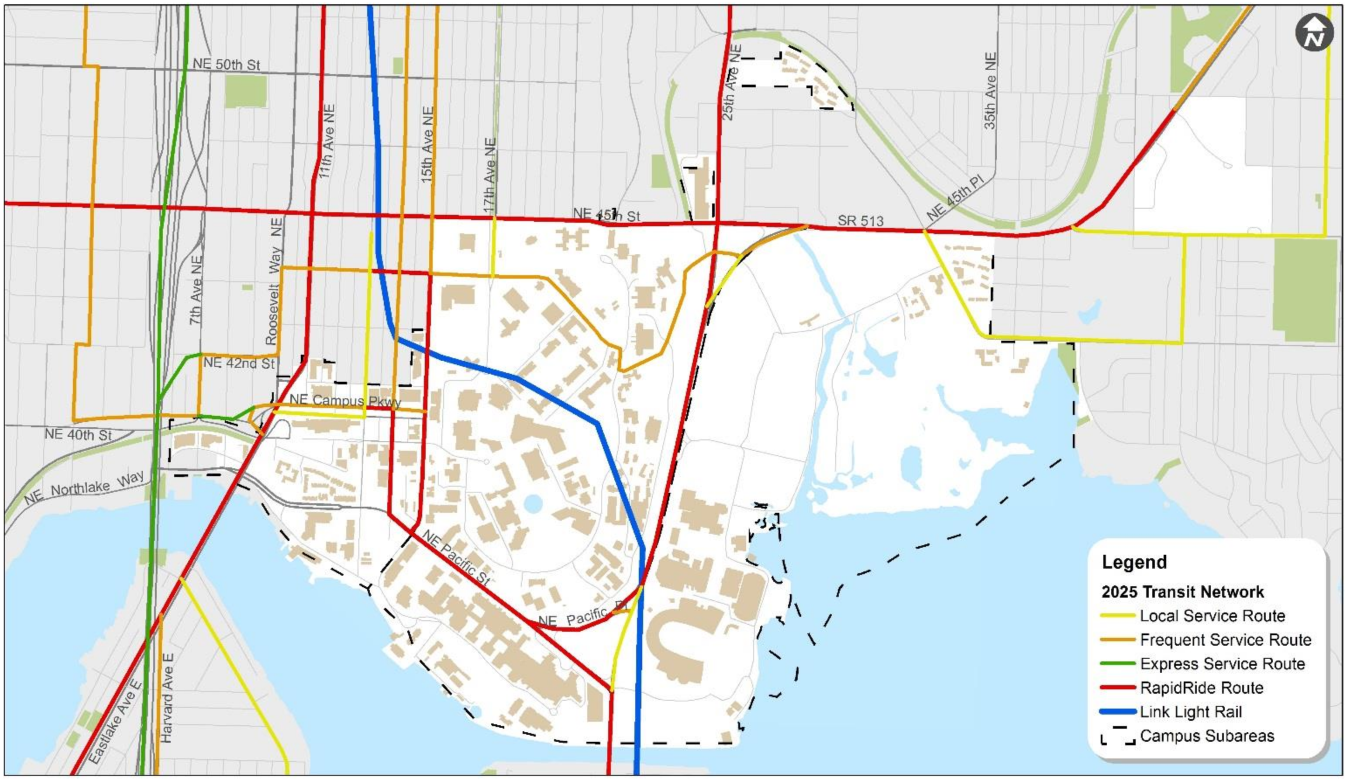
Table 4.11
KING COUNTY METRO PROPOSED RAPIDRIDE ROUTES, 2025

Primary Current Route(s)	Routing	Route Miles
372	Bothell – University of Washington – Lake City	13.3
44	Ballard – Children's Hospital – Wallingford	5.9
7s, 48s	U District – Rainier Beach – Mount Baker	10.7
7n, 70	U District – Mount Baker – Seattle Central Business District	7.7

Source: King County Metro Future RapidRide Expansion, 2016.

Based on the King County METRO CONNECTS Long-Range Plan 2016, King County Metro plans to expand frequent, express, and local services throughout Seattle to reach 6 million service hours from the existing 3.5 million hours. Frequent service includes arrivals every 5 to 15 minutes (or better) on weekdays and arrivals every 15 minutes on weekends. Frequent service also includes RapidRide routes. King County Metro plans to add bus lanes, transit signal priority, and transit queue jumps to allow for additional frequent and RapidRide service. Express service includes arrivals every 15 to 30 minutes during the day, which will serve large population areas along main travel corridors. Local service will include arrivals every 30 to 60 minutes throughout the day, with increased frequency during peak periods. Stops along local service routes are typically 0.25 to 0.5 miles apart, and service is geared towards lower-density areas with less access to transit.

Figure 4.6 illustrates the overall 2025 transit service network, including King County Metro's planned improvements.

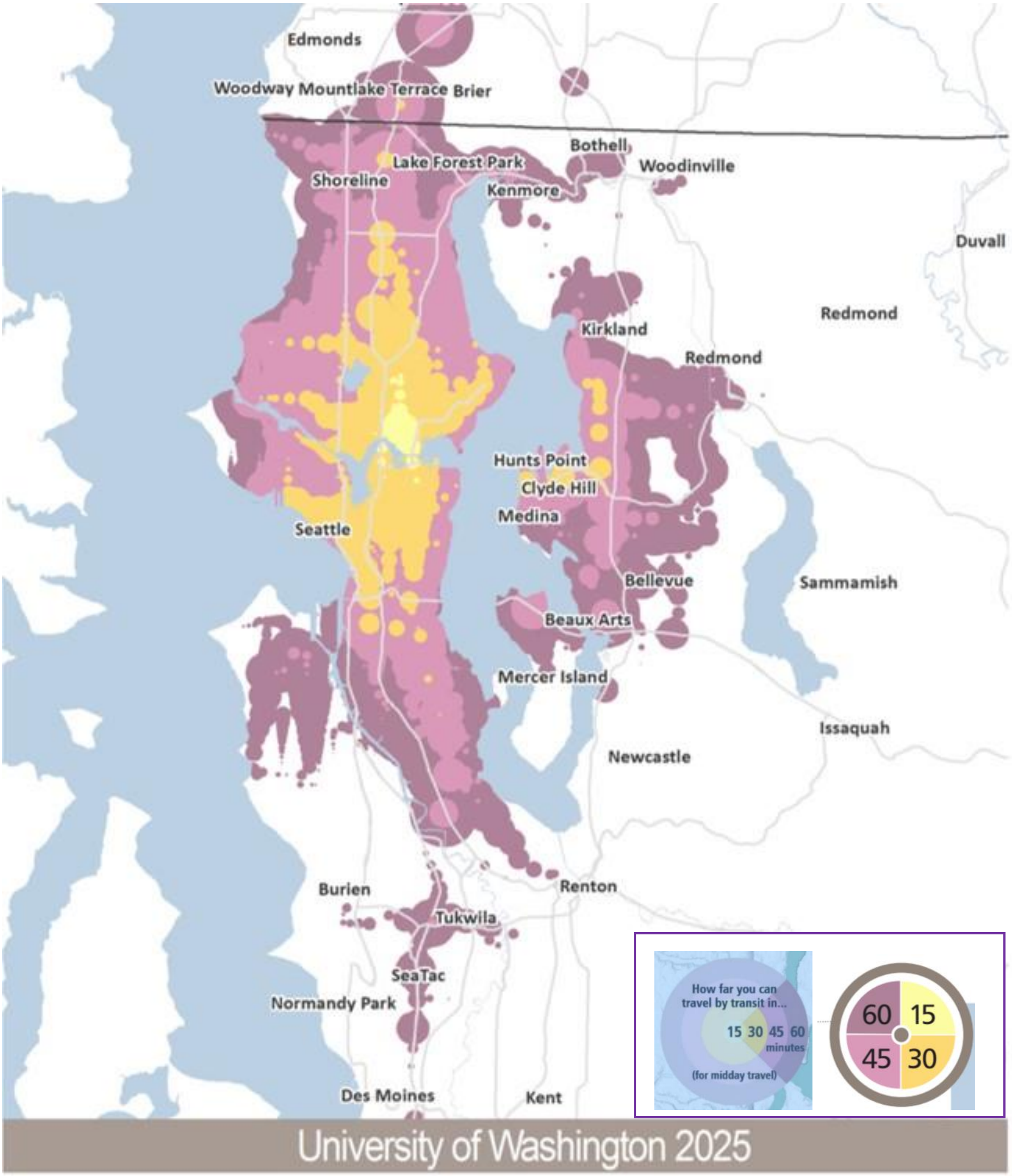


Source: King County Metro Draft Long-Range Plan Online Service Network Map, Spring 2016

Figure 4.6 King County METRO CONNECTS 2025 Service Network

As shown in Figure 4.6, King County Metro's planned 2025 service network will include frequent, express, and local routes with access to the University of Washington campus and U District.

Figure 4.7 shows transit travel times from the University of Washington based on King County Metro's planned 2025 service network METRO CONNECTS. Colors indicate travel times within 15, 30, 45, and 60 minutes, as shown in the legend.



Source: METRO CONNECTS, 2016

Figure 4.7 Future (2025) Transit Travel Times from the University of Washington

As shown in Figure 4.7, the planned 2025 Metro service network will extend transit service to within 30 minutes of Bellevue, parts of Kirkland, Shoreline, and Lake Forest Park. Transit service within 60 minutes will expand eastward to include more of Mercer Island, Kirkland, and Redmond. Extending north, Woodinville, Mountlake Terrace, and Lynnwood will be accessible within 60 minutes. South of Seattle, transit service within 60 minutes will extend to Burien, Renton, Tukwila, SeaTac, and Des Moines.

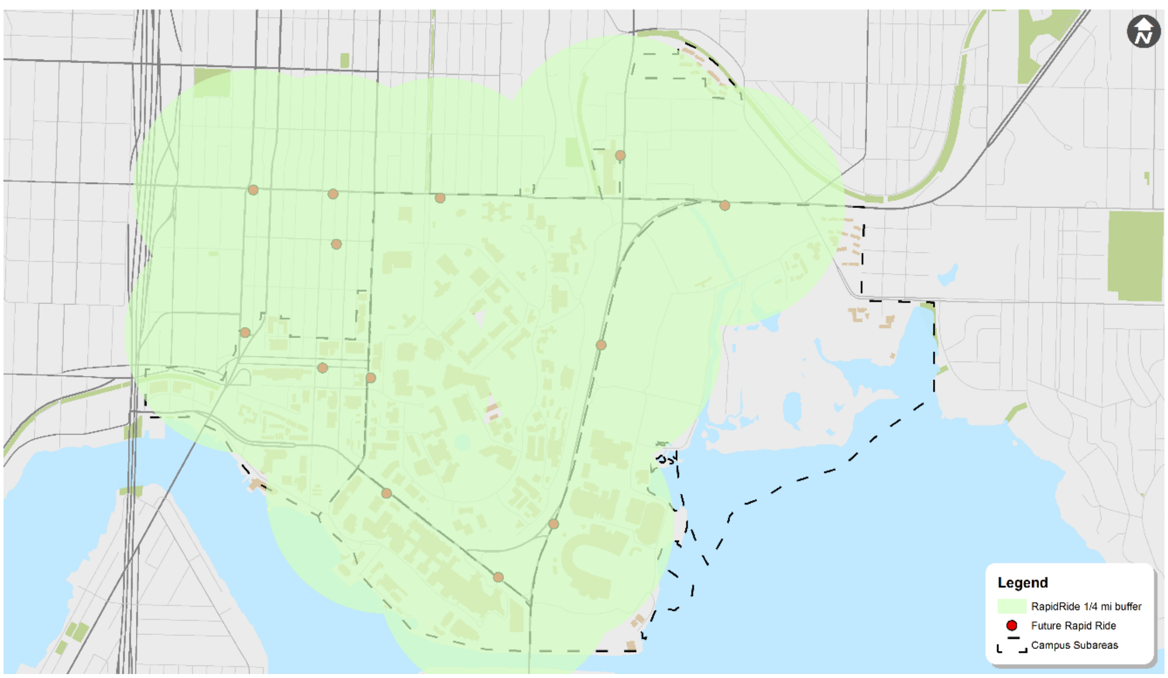
4.4.3 Performance Measures

As noted in Chapter 3, Affected Environment, the following transit-related performance measures have been identified to assess and compare alternatives:

- Proportion of Development within 1/4 mile of RapidRide
- Proportion of Development within 1/2 mile of Light Rail
- Transit Stop Capacity
- Transit Travel Times and Delay
- Transit Loads at Screenlines

Proportion of Development within 1/4 Mile of RapidRide

This measure calculates the proportion of development that will occur within 1/4 mile of RapidRide service to the University of Washington. The details of forecasted RapidRide service are outlined in King County Metro's METRO CONNECTS Long-Range Plan 2016. The envisioned number of RapidRide stops and 1/4 buffer distances are shown below in Figure 4.8.



Source: Transpo Group, 2016.

Figure 4.8 Future RapidRide Stop Locations and 1/4-mile buffer

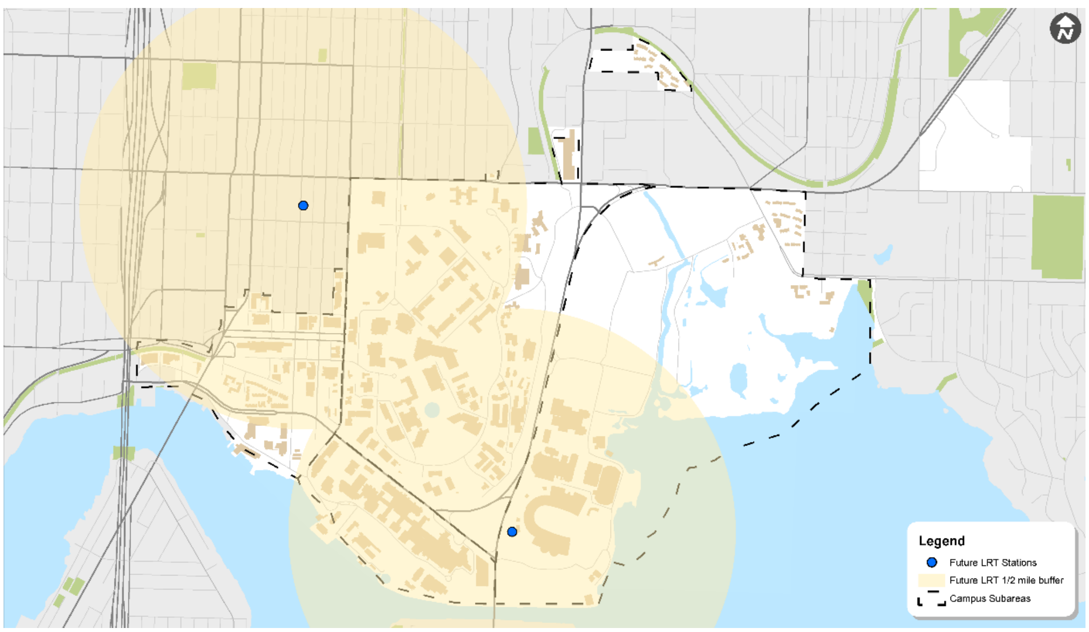
As shown in Figure 4.8, almost the entire campus is within the 1/4-mile walkshed of future RapidRide stops. All of the growth associated with the No Action Alternative would be located within the 1/4 mile walkshed of future RapidRide stops, as indicated in Table 4.12.

Table 4.12
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF RAPIDRIDE

Sector	No Action Alternative
West	211,000 gross square footage (gsf)
South	NA
Central	NA
East	NA
Total	**211,00 gsf**
Percent	***100%***

Proportion of Development within 1/2 Mile of Light Rail

This measure evaluates the proportion of development within a 1/2 mile walkshed of Link light rail stations. This evaluation includes the U District Station at Brooklyn Avenue NE between NE 45th and NE 43rd streets, assumed to be completed in 2021. The future 1/2 mile walkshed to both of the University of Washington area Link light rail stations is shown in Figure 4.9.



Source: Transpo Group, 2016.

Figure 4.9 Proportion of Development within 1/2 Mile of Future Light Rail

The proportion of development with the No Action Alternative that would fall within the 1/2 mile walkshed of Link light rail stations is shown in Table 4.13.

Table 4.13
DEVELOPMENT WITHIN 1/2 MILE OF LIGHT RAIL

Sector	No Action Alternative
West	181,460 gross square footage (gsf)
South	NA
Central	NA
East	NA
Total	**181,460 gsf**
Percent	***86%***

Transit Stop Capacity

Transit Stop Capacity evaluates the number of buses that a bus stop can process in an hour. This analysis was done for four pairs of stops on key transit corridors around the University of Washington: 15th Avenue NE, NE 45th Street, Montlake Boulevard NE, and NE Pacific Street. The following section summarizes the bus stop capacity and the bus demand at each of these stops with the No Action alternative.

Existing and Future Transit Stop Capacity and Demand

Transit Stop Capacity was estimated using the Transit Cooperative Research Program (TCRP) Report 165 – Transit Capacity and Quality of Service Manual. This methodology provides a spreadsheet that uses inputs like stop dwell times, stop location, stop type, proximity to intersection, conflicting right-turn volumes, and others to estimate the number of buses that each stop can process. The number of buses forecast to be traveling through each stop was taken from the METRO CONNECTS Long-Range Plan 2016. It was assumed that all buses traveling along the corridors would stop at each of the stops being analyzed. The results of this analysis are provided in Table 4.14.

Table 4.14
TRANSIT STOP CAPACITY – EXISTING AND NO ACTION DEMAND

Stop	Capacity (buses/hour)	Existing Demand (buses/hour)	No Action Alternative Forecast Demand (buses/hour)
15th Ave NE at NE 42nd St (northbound)	68	30	35
15th Ave NE at NE 43rd St (southbound)	69	30	35
NE 45th St & University Way (eastbound)	56	18	8
NE 45th St & Brooklyn Ave NE (westbound)	39	18	8
NE Pacific St & 15th Ave NE (southeast bound)	70	35	33
NE Pacific St & 15th Ave NE (northwest bound)	82	35	33
Montlake Blvd NE & Pacific Pl (northbound)	28	18	19
Montlake Blvd NE & Pacific Pl (southbound)	67	18	19

The No Action Alternative forecast demand decreases from existing demand at stops along NE 45th Street and NE Pacific Street, while the No Action Alternative forecast demand increases at stops along 15th Avenue NE and Montlake Boulevard NE.

Transit Travel Times and Delay

The Transit Travel Speed analysis evaluates the PM peak hour transit travel speeds on key corridors around and on the University of Washington campus for the year 2028. This assumes background development and implementation of the U District Rezone. These corridors are listed below and are shown on Figure 4.10:

- NE 45th Street
- NE Pacific Street
- 11th Avenue NE
- Roosevelt Way NE
- 15th Avenue NE
- Montlake Boulevard NE
- Stevens Way NE

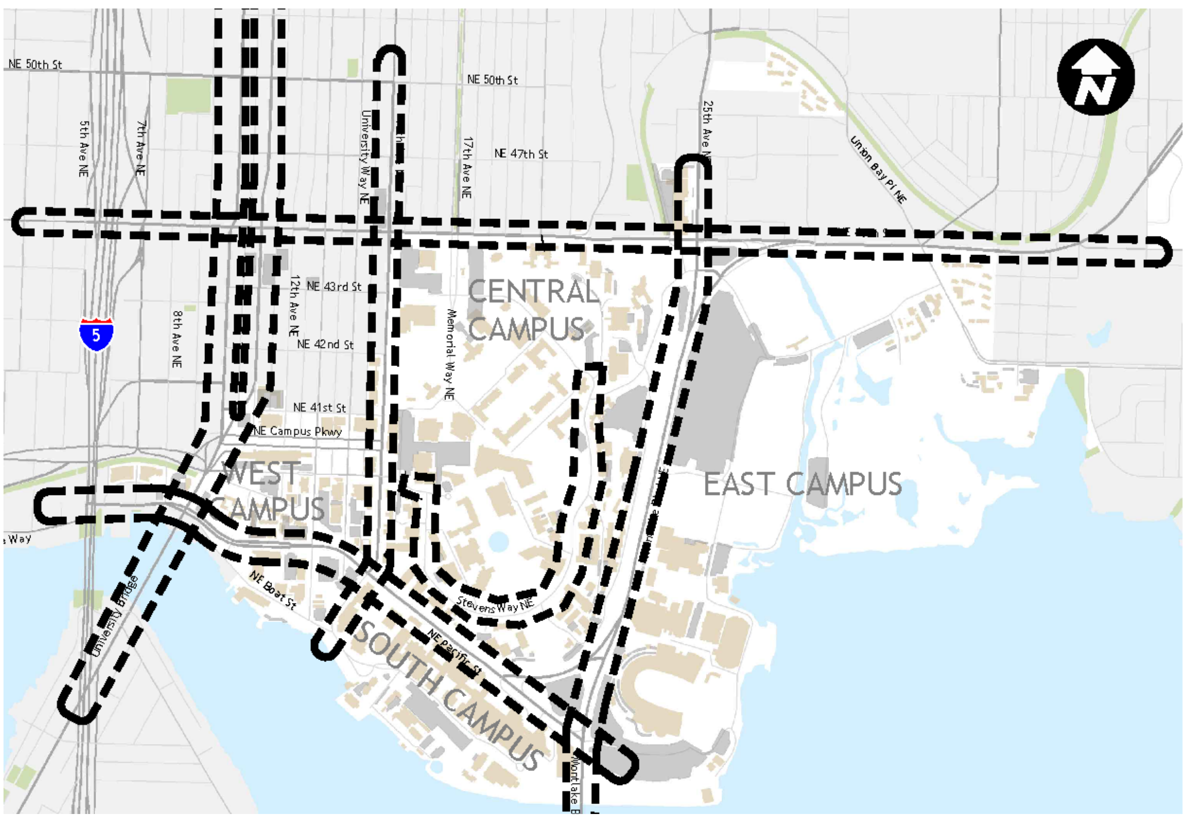


Figure 4.10 Transit Study Corridors

Background Transit Service Changes

Between the existing (2016) and 2028 horizon year, the transit service network surrounding the University of Washington will be completely transformed. The new Link light rail U District Station will be opening on Brooklyn Avenue NE between NE 43rd and NE 45th streets (open 2021), and multiple RapidRide corridors will be serving the University of Washington. King County Metro's recently adopted METRO CONNECTS long-range plan was used as the baseline condition for all future (2028) horizon year transit operations. A current planning process by the City of Seattle—One Center City—is considering transit service changes for 2018. This would involve in the near-term reallocating SR 520 transit service from the Eastside and destined to Downtown to truncate to the University of Washington Station. In the longer term, it is likely that the METRO CONNECTS service plan would be in place as opposed to the One Center City 2018 service concept.

Community Transit currently provides direct connections between Snohomish County communities and the University of Washington. When light rail extends north to Lynnwood in 2023, their intention is to no longer serve communities along I-5 in King County, specifically Downtown Seattle and the U District. In projecting volumes, no reassignment of Community Transit route volumes was conducted for this analysis. For example, Route 41 to Northgate may be eliminated when it becomes redundant with light rail.

Forecasting Transit Speeds Methodology

To forecast transit speeds, the change in travel speeds between existing and 2028 horizon vehicle speeds (from Synchro traffic models) was added to the existing transit speeds, and new dwell times were calculated based on projected transit passenger volumes. The existing average number of passenger boardings and alightings at each stop was calculated from the existing automatic passenger count data provided by King County Metro and Community Transit, and then a growth rate of 12 percent was applied to forecast to 2028 conditions. Given the number of passengers boarding and alighting at each station, a dwell time of 2.75 seconds per boarding and 2.5 seconds per alighting was used to compute the forecast dwell conditions. Detailed methodology can be found in the Methodology and Assumptions Appendix.

To summarize, the 2028 Transit Speed = Existing Transit Speed + (No Action Vehicle Speeds – Existing Vehicle Speeds) + (Forecast Dwell Time – Existing Dwell Time).

Table 4.15 summarizes the No Action Alternative transit travel speeds and compares them to existing transit speeds.

Table 4.15
EXISTING AND NO ACTION ALTERNATIVE TRANSIT TRAVEL SPEEDS

Corridor	Existing Transit Speed (mph)	No Action Transit Speed (mph)
NE 45th Street Eastbound	5.2	4.8
NE 45th Street Westbound	5.2	4.0
NE Pacific Street Eastbound	14.7	12.3
NE Pacific Street Westbound	7.3	18.3
11th Avenue NE Northbound	5.9	5.1
Roosevelt Way NE Southbound	12.6	4.9
15th Avenue NE Northbound	7.8	14.1
15th Avenue NE Southbound	5.8	6.8
Montlake Boulevard NE Northbound	20.0	15.1
Stevens Way NE Eastbound	6.8	8.8
Stevens Way NE Westbound	2.7	3.0

Note: mph = miles per hour

As expected, most corridors would see a decline in transit travel speeds. Notably, Roosevelt Way NE northbound speeds would decline by more than half. Two corridors are anticipated to see an improvement from existing to No Action conditions: NE Pacific Street westbound and 15th Avenue NE northbound. According to METRO CONNECTS, both of these corridors are future RapidRide corridors that will serve between 40 and 65 buses an hour, thus resulting in a very low average number of boardings and alightings per bus. As a result, dwell times are forecasted to decrease significantly and overall transit speed is forecasted to increase on these corridors under the No Action Alternative.

Transit Loads at Screenlines

Forecast Data

Forecast (2028) transit screenline values are based on data collected at the same locations as identified in the existing conditions analysis presented in Chapter 3, Affected Environment. The forecast capacity analysis used the same methodology as in the existing conditions analysis; however, the routes assumed are based on the 2025 planned routes identified in the recently adopted METRO CONNECTS. Two forecast demand scenarios were analyzed: (1) 2028 horizon year with background growth and (2) 2028 with background growth and an increase in University of Washington pedestrian trips generated by new campus development proposed in the 2018 CMP.

- **2028 Capacity** – Transit screenline demand was calculated using the same methodology as for the existing conditions analysis in Chapter 3, Affected Environment. To determine future routes passing through transit screenlines, King County Metro's Service Network Map, a component of METRO CONNECTS, was used. King County Metro provides planned 2025 route information, including service type (frequent, express, local, and RapidRide). The service type was used to estimate the type of bus that would serve the route, and the assumed bus service was used in the analysis. Values assumed in the capacity analysis are found in the following table.

- **2028 Demand** – Baseline demand was developed to represent background growth. A 12 percent growth rate was applied to the load at existing transit screenlines to arrive at 2028 background demand. At both the Link light rail University of Washington and U District stations, through-trips were added to the baseline boardings develop total screenline demand. Sound Transit's estimate of 60,000 daily riders on the Lynnwood Link Extension was used to determine these through-trips.

Table 4.16
NO ACTION ALTERNATIVE TRANSIT ROUTES, FREQUENCY, AND CAPACITY

Route[1]	Peak Headway[2]	Peak Trips[3]	Route Type[4]	Seated Capacity[5]
31	20	2	Local	40
32	20	2	Local	40
540	20	2	ST	40
542	15	3	ST	65
554	30	1	Express	65
556	30	1	ST	65
1002	10	5	Frequent	65
1009	10	5	Rapid	65
1012	10	5	Rapid	65
1013	10	5	Frequent	65
1014	10	5	Frequent	65
1019	10	5	Frequent	65
1063	10	5	Rapid	65
1064	10	5	Frequent	65
1071	10	5	Rapid	65
1996	10	5	Frequent	65
2004	10	5	Frequent	65
2516	15	3	Express	65
2998	15	3	Express	65
3008	30	1	Local	40
3101	30	1	Local	40
3122	30	1	Local	40
3123	30	1	Local	40
3208	30	1	Local	40
Link	3	39	Rail	600[6]

1. Identified using METRO CONNECTS Service Network Map for 2025
2. From King County Metro's METRO CONNECTS Long-Range Plan 2016
3. Calculated based on 60-minute peak hour with a reduction of one vehicle to account for scheduling shifts
4. Identified using METRO CONNECTS Service Network Map for 2025
5. Estimated using values found in Transit Capacity and Quality of Service Manual, 3rd Edition (TRB)
6. 150 passengers, 4 cars

Transit Screenline Analysis

To determine the effectiveness of the future transit network to service 2028 demand in the study area, transit screenline demand-to-capacity (D/C) rates were calculated by aggregating total screenline demand and aggregating total planned transit capacity. With the No Action Alternative, two locations could potentially experience capacity issues: 11th Avenue NE south of NE 45th Street and University Way south of NE 43rd Street. These screenlines would operate at a utilization of over 100 percent, which indicates that there would be insufficient transit capacity at these locations. Total bus D/C would be 46 percent and total Link D/C would be 61 percent, with 56 percent overall D/C across all modes and screenlines. Transit users at the screenlines, which are over capacity during the PM peak hour, could shift to other screenlines as a screenline approaches capacity. Screenline D/C for the No Action Alternative is shown in Table 4.17.

Table 4.17
NO ACTION ALTERNATIVE TRANSIT SCREENLINE DEMAND-TO-CAPACITY

Screenline Number	Location	Capacity		Demand		No Action D/C (Demand to Capacity)
		Passengers	Change from Existing	Passengers	Change from Existing	
1	NE 45th St west of Mary Gates Drive	2,430	1,250	655	71	27%
2	NE 45th & Roosevelt Way NE	1,040	-690	610	66	59%
3	Roosevelt Way NE south of NE 45th St	325	-195	121	13	37%
4	11th Ave NE south of NE 45th St	325	-195	216	-170	67%
5	15th Ave NE south of NE 43rd St	4,200	600	1,084	117	26%
6	University Way NE south of NE 43rd St	650	-390	459	-361	71%
7	Campus Pkwy east of Brooklyn Ave NE	1,210	-600	995	-115	82%
8	NE Pacific St east of 15th Ave NE	4,140	-520	969	104	23%
9	Stevens Way at Pend Oreille	1,860	-210	1,175	126	63%
10	Montlake Bridge	2,270	80	1,095	118	48%
11	University Bridge	1,380	460	724	78	52%
12	Montlake Blvd NE	730	-50	333	36	46%
Bus Total		**19,830**	**-410**	**8,103**	**-250**	**41%**
Link A	U District Station	23,400	23,400	16,275	16,275	70%
Link B	University of Washington Station	23,400	14,850	16,275	14,875	70%
Link Total		**46,800**	**38,250**	**32,550**	**31,150**	**70%**
Grand Total		**66,630**	**37,840**	**40,654**	**30,901**	**61%**

4.5 VEHICLES

4.5.1 Performance Measures

Six measures of effectiveness were analyzed to evaluate the impact of the campus growth on the surrounding transportation network:

- Intersection operational level of service for intersection located in the primary and secondary impact area
- Arterial Corridor Operations
- Screenline Volumes
- Cordon Volumes
- Caps are set as 1990 trip levels to the University District and University (MIO)
- Freight Corridor Impact

4.5.2 Traffic Volumes

Primary & Secondary Impact Zone

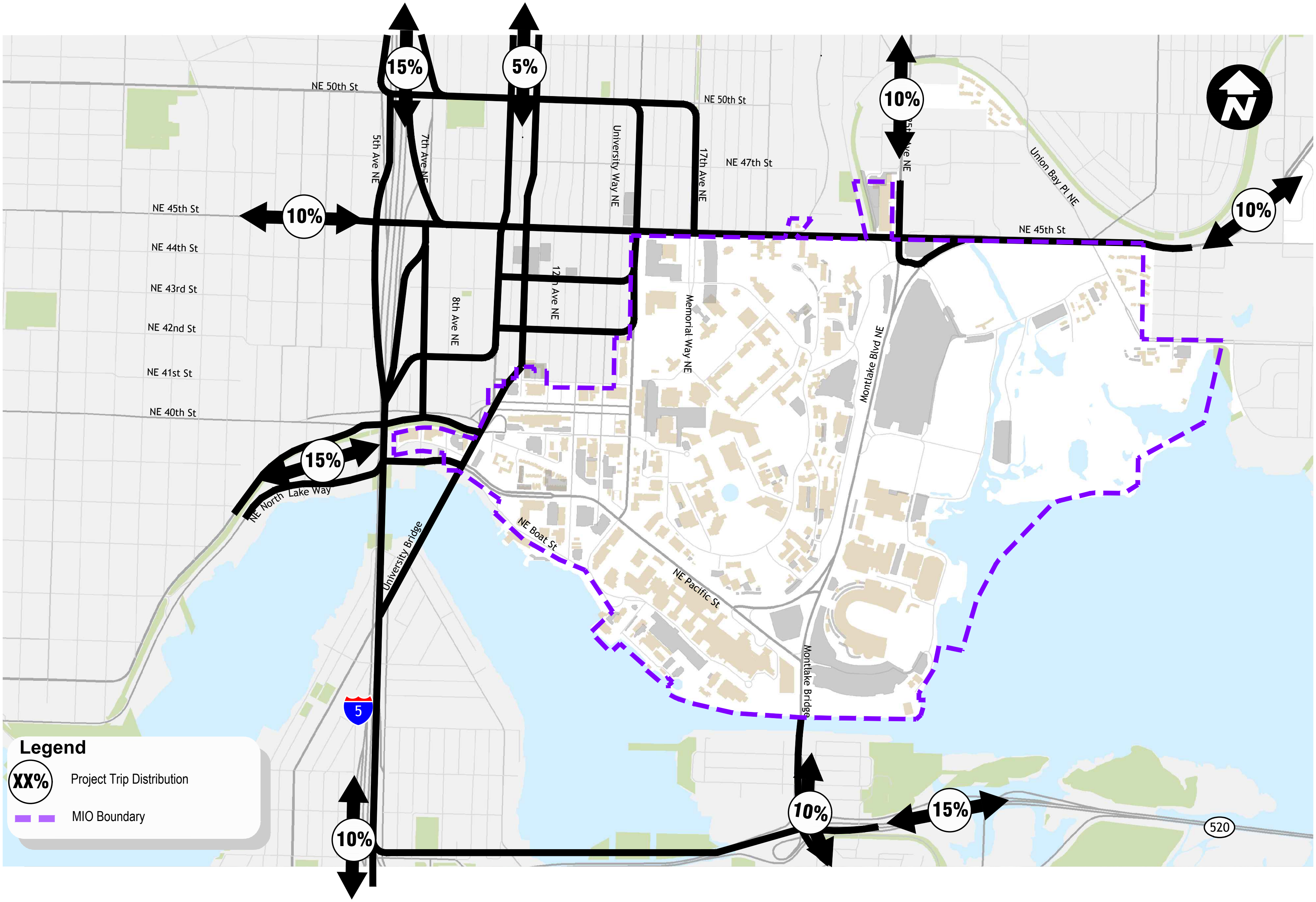
Traffic volumes for the No Action Alternative were forecast based on the approved U District Urban Design Environmental Impact Statement (EIS) and U District Rezone, which forecasts volumes to 2035. To establish 2028 horizon year volumes, a straight-line interpolation between existing 2015 counts and 2035 volumes was completed.

Trip Distribution and Assignment

Trip distribution patterns to and from the existing campus garages were based on existing vehicle travel patterns, previous studies in the project vicinity, and U.S. Census Bureau's *OnTheMap* tool. *OnTheMap* is a web-based mapping and reporting application that shows where workers are employed and where they live based on census data. Surrounding ZIP codes were evaluated to determine if a person would be more likely to travel from the ZIP code via vehicle or by other means. Individuals making trips to ZIP codes closer to the proposed project sites or in more transit-oriented locations are more likely to use transit, walk, bicycle, or other drive alone modes. Individuals coming from ZIP codes outside the Seattle City limits and/or farther from the University of Washington are more likely to drive. The general trip distribution to/from the University is shown on Figure 4.11.

No Action Alternative project trips were assigned to existing West Campus garages following the above-described trip distribution. The resulting 2028 No Action volumes are shown on Figure 4.12 and Figure 4.13.

For purposes of the secondary impact zone analysis it was assumed that 5 percent of project trips would dissipate into neighborhoods or take alternate routes before reaching the secondary impact zone study intersections. The resulting future (2028) No Action Alternative volumes are shown in Figure 4.14.



The distribution considers the primary travel routes in the gridded study area where potential impacts would be the greatest. It is recognized that other routes within the gridded network may be used; however, project impacts are anticipated to be relatively minimal compared to those analyzed.

Vehicle Trip Distribution

University of Washington 2018 Campus Master Plan

FIGURE
4.11

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WHAT TRANSPORTATION CAN BE.

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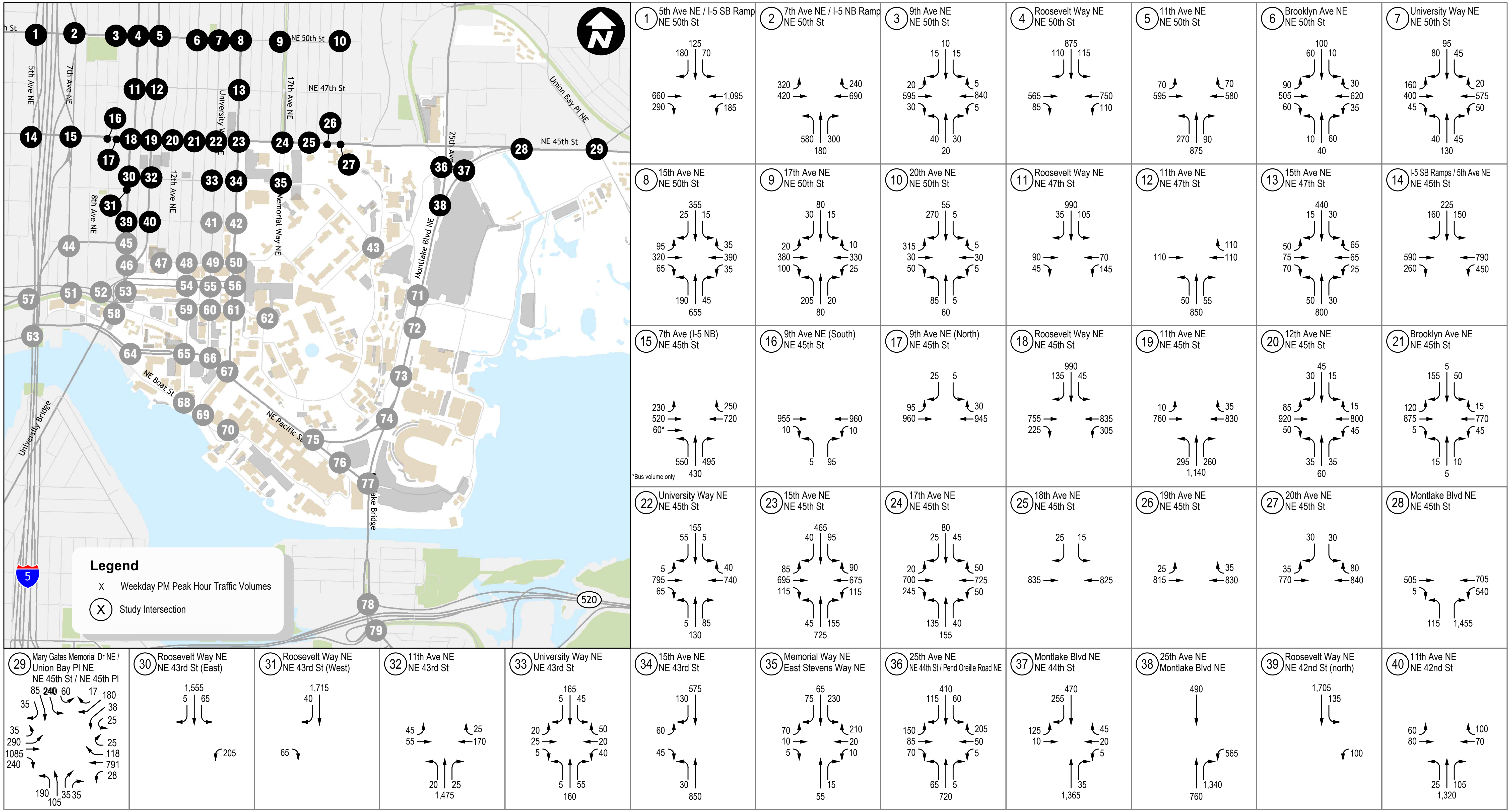
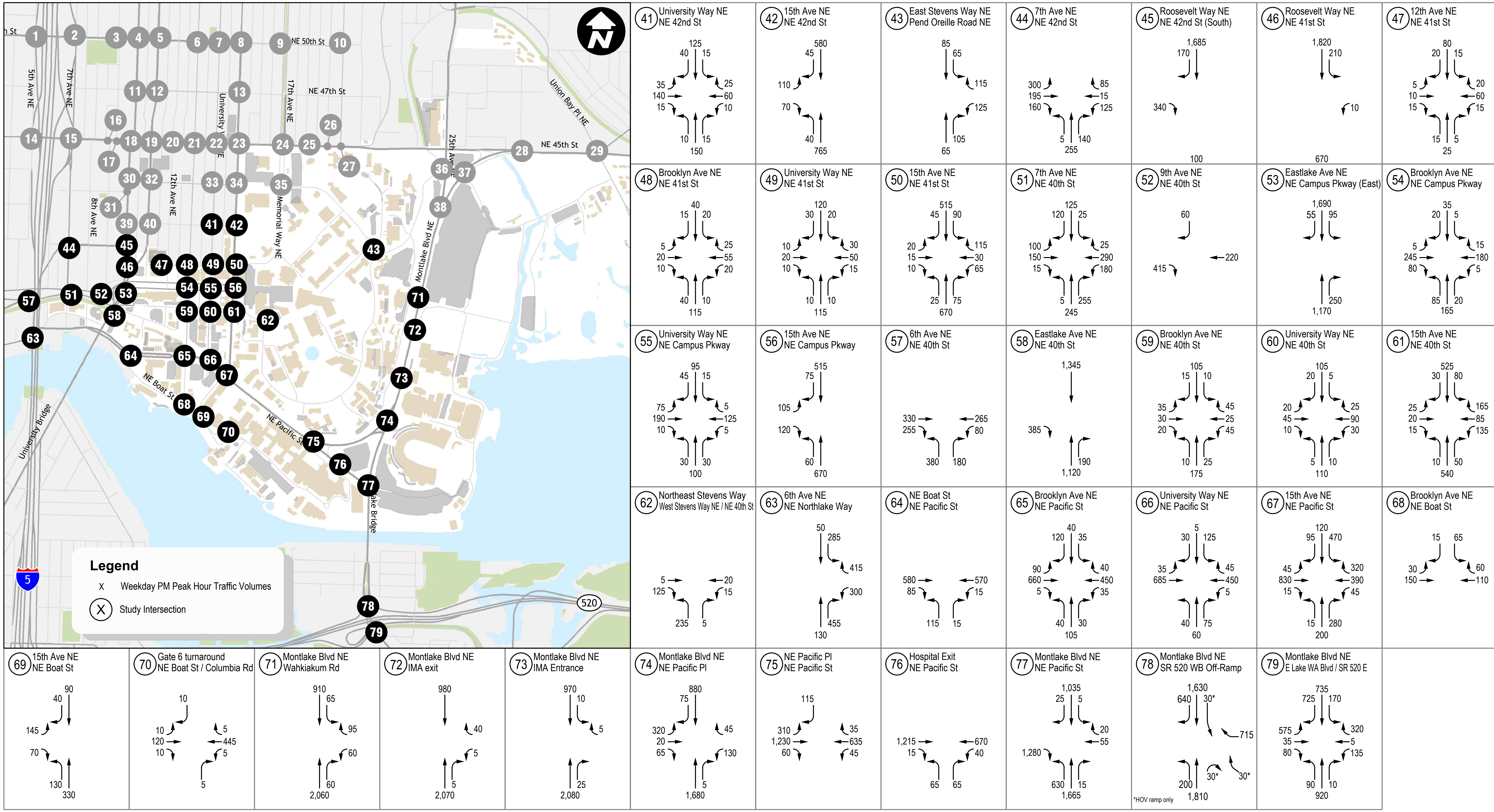


Future (2028) No Action (Intersections 1-40) Weekday PM Peak Hour Traffic Volumes

University of Washington 2018 Campus Master Plan

FIGURE 4.12



Future (2028) No Action (Intersections 41-79) Weekday PM Peak Hour Traffic Volumes

University of Washington 2018 Campus Master Plan

FIGURE **4.13**

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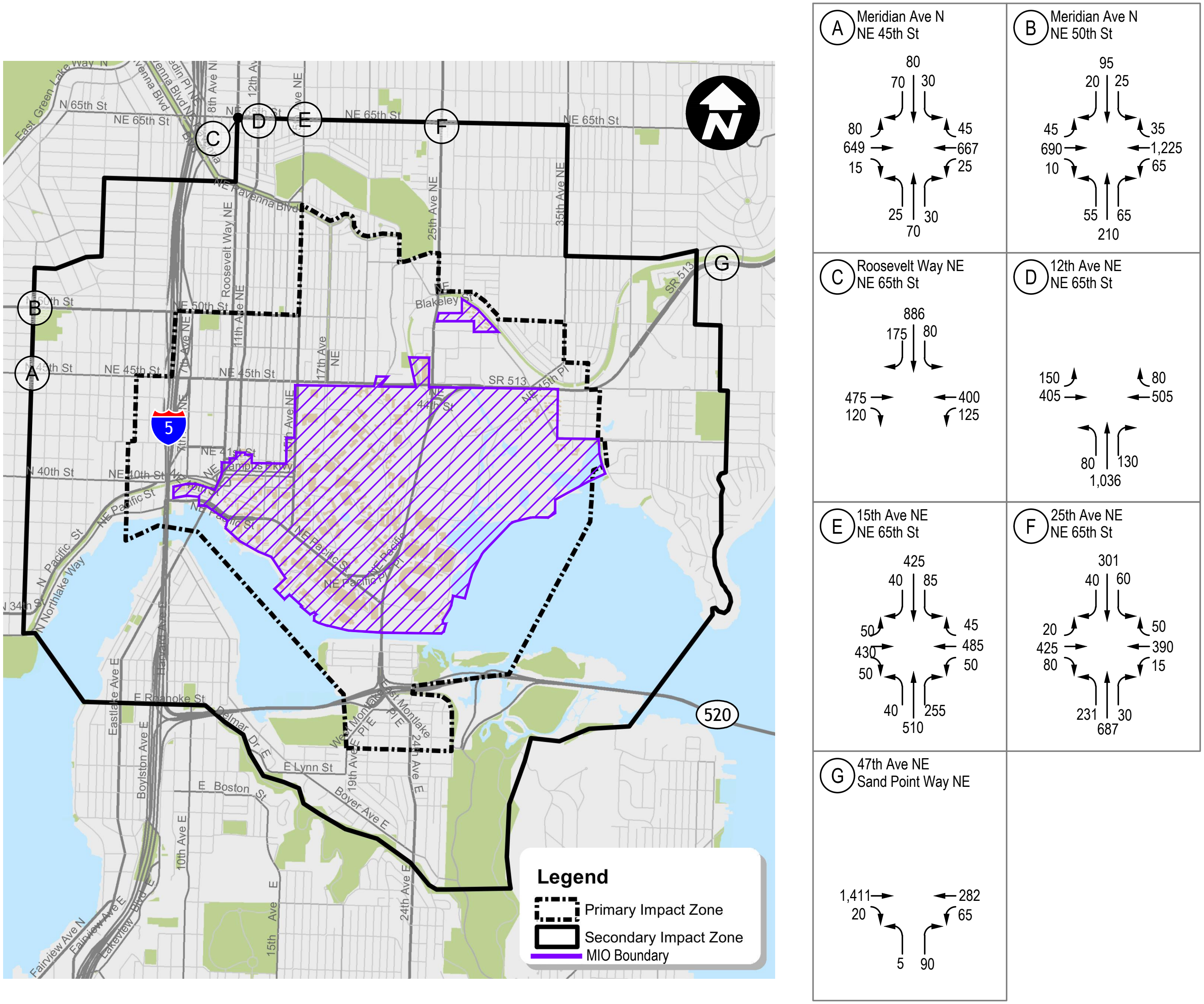

Future (2028) No Action Alternative Secondary Impact Zone Weekday PM Peak Hour Traffic Volumes

FIGURE

4.14

University of Washington 2018 Campus Master Plan

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WHAT TRANSPORTATION CAN BE.

4.5.3 Traffic Operations Performance

Methodology

The traffic operations evaluation within the study area included an analysis of intersection LOS and arterial travel speeds and associated LOS. The methodologies used are consistent with those described in Chapter 3, Affected Environment. A detailed description of methodology can be found in Appendix B.

Planned/funded improvements within the study area have been reflected in the analysis. The list of these projects are included in Appendix C.

Intersection Operations – Primary Impact Zone

Weekday PM peak hour intersection traffic operations under the 2028 No Action Alternative conditions are shown in Figure 4.15 and Figure 4.16. The 2028 geometry for all of the study area intersections were assumed to remain the same as existing conditions, with the exception of the Montlake Boulevard E/SR 520 westbound off-ramp intersection. Signal timing splits were optimized under 2028 No Action Alternative conditions. Complete intersection LOS summaries are provided in Appendix C.

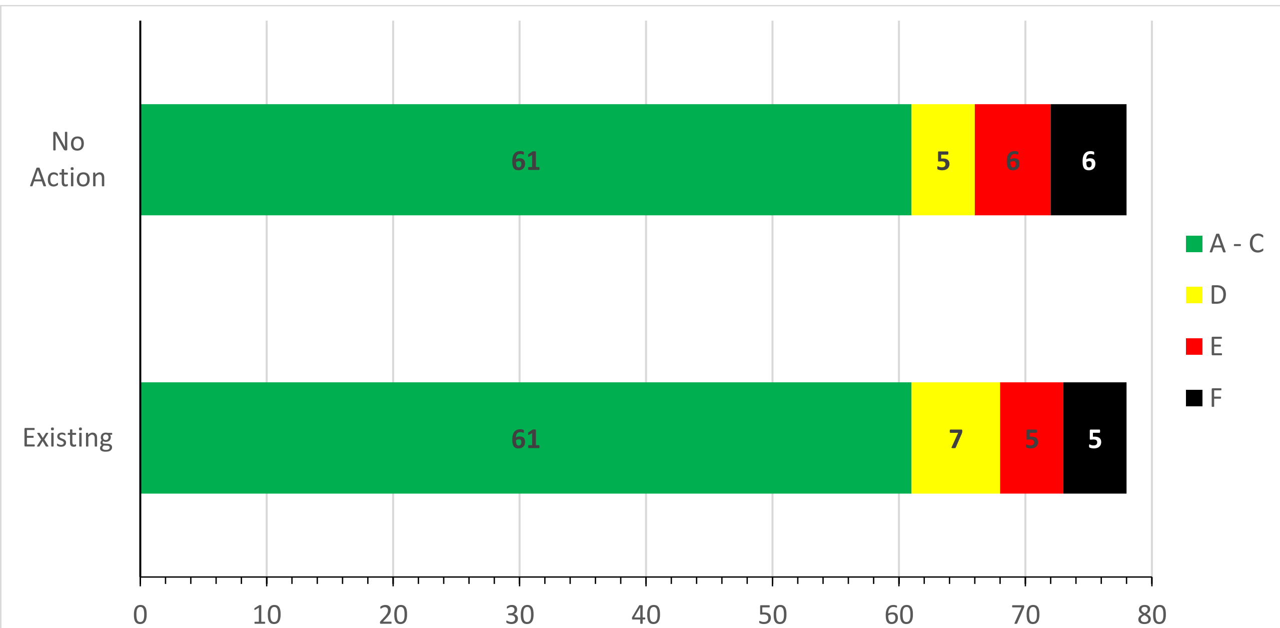


Figure 4.15 Weekday 2028 PM Peak Hour Intersection Level of Service Summary

Table 4.18 presents the intersections that are anticipated to be impacted under the No Action Alternative as compared to existing conditions.

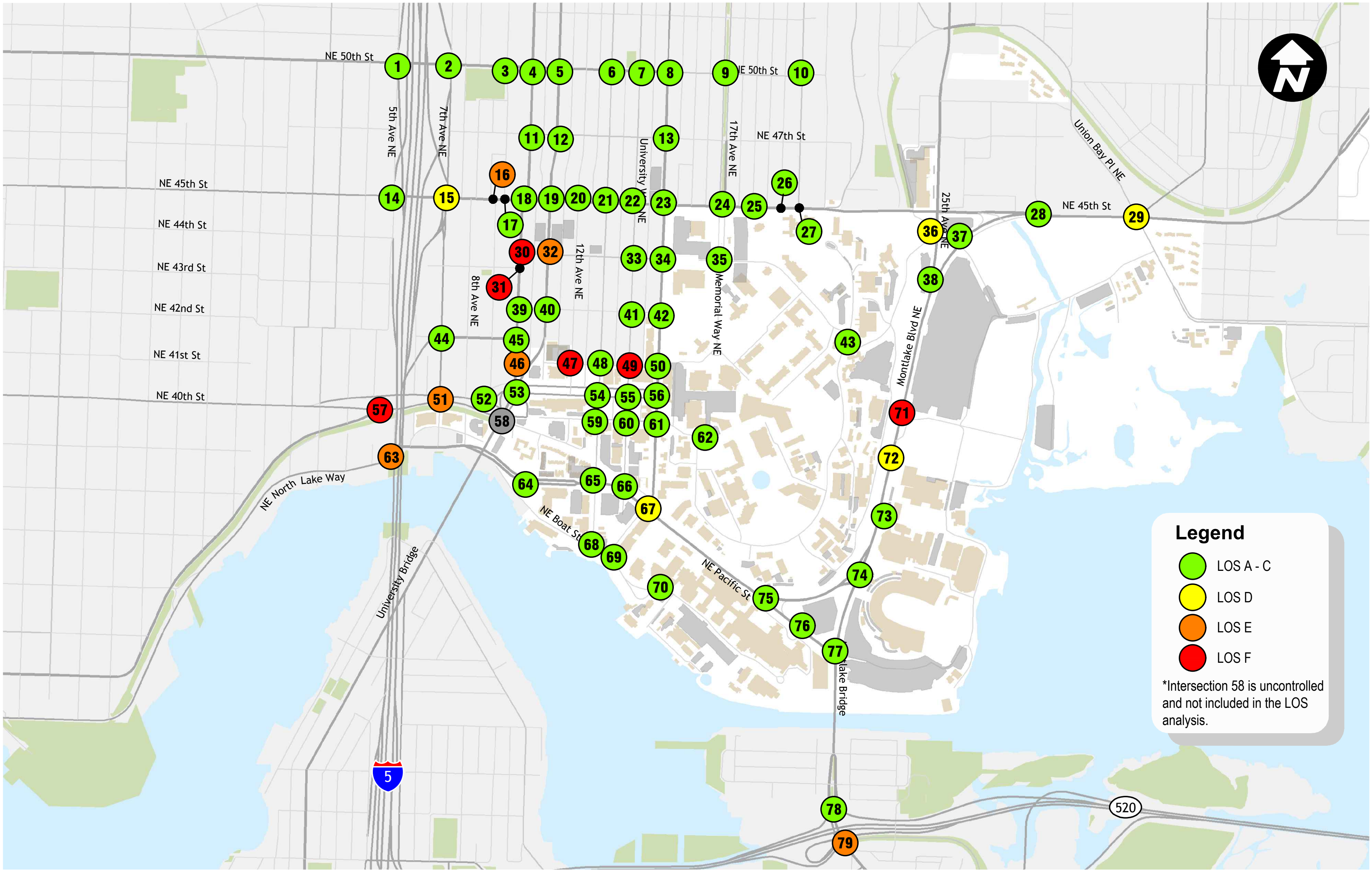
Table 4.18
INTERSECTION LEVEL OF SERVICE IMPACT SUMMARY – PRIMARY IMPACT ZONE

Intersection	Existing		No Action		Change in Delay (sec)
	LOS[1]	Delay[2]	LOS[1]	Delay[2]	
30. Roosevelt Way NE / NE 43rd St (East)	D	28	F	793	765
31. Roosevelt Way NE / NE 43rd St (West)	E	36	F	74	38
32. 11th Ave NE / NE 43rd St	B	14	E	72	58
47. 12th Ave NE / NE 41st St	E	41	F	52	11
49. University Way NE / NE 41st St	F	*	F	*	*
51. 7th Ave NE / NE 40th St	E	37	E	44	7
57. 6th Ave NE / NE 40th St	F	60	F	107	47
63. 6th Ave NE / NE Northlake Way	C	25	E	38	13
71. Montlake Blvd NE / Wahkiakum Rd	F	295	F	343	48

Note: Intersection numbers refer to figure 4.12 and 4.13
*Volume exceeds capacity and Synchro could not calculate the delay.
1. Level of service.
2. Average delay per vehicle in seconds rounded to the whole second.

Typically, the City does not consider an impact at intersections operating at LOS E or F, or if an intersection degrades beyond LOS D, significant if it is a less than 5 second increase in delay. The intersections listed in Table 4.18 are either anticipated to degrade from LOS D or better under existing conditions to LOS E or F, or if currently operating at LOS E or F are anticipated to experience more than a 5 second increase in delay. During the weekday PM peak hour, three additional intersection are anticipated to operate at LOS F under No Action Alternative conditions compared to existing conditions. Overall, 17 intersections are anticipated to operate at LOS D or worse during the weekday PM peak hour during No Action Alternative conditions compared with existing conditions.

With the reconfiguration of the Montlake Boulevard NE/SR 520 westbound ramps and implementation of a traffic signal, the Montlake Boulevard E/SR 520 westbound off-ramp intersection is anticipated to improve from LOS F to LOS C under baseline conditions. Additionally, modifications to the Montlake Boulevard NE/SR 520 eastbound ramps were included, and as a result the intersection is anticipated to improve from existing LOS F to LOS E under the No Action Alternative.



Future (2028) No Action Weekday PM Peak Hour Traffic Operations

University of Washington 2018 Campus Master Plan

FIGURE **4.16**

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Intersection Operations – Secondary Impact Zone

The weekday PM peak hour intersection traffic operations under the 2028 No Action Alternative conditions for the secondary impact zone are shown in Table 4.19. The 2028 geometry for all of the study area intersections were assumed to remain the same as existing conditions. Signal timing splits were optimized under 2028 No Action Alternative conditions. Complete intersection LOS summaries are provided in Appendix C.

Table 4.19
INTERSECTION LEVEL OF SERVICE SUMMARY – SECONDARY IMPACT ZONE

Intersection	Existing		No Action		Change in Delay (sec)
	LOS[1]	Delay[2]	LOS[1]	Delay[2]	
A. Meridian Avenue N/N 45th Street	B	11	B	12	1
B. Meridian Avenue N/N 50th Street	B	13	B	17	4
C. Roosevelt Way NE/NE 65th Street	D	41	E	73	32
D. 12th Avenue NE/NE 65th Street	C	23	C	23	0
E. 15th Avenue NE/NE 65th Street	F	133	F	161	28
F. 25th Avenue NE/NE 65th Street	E	78	E	80	2
G. 47th Avenue NE/Sand Point Way NE	C	19	D	30	11

1. Level of service.
2. Average delay per vehicle in seconds rounded to the whole second.

As shown in Table 4.19 the secondary impact zone intersections are anticipated to operate at the same LOS under the No Action Alternative as they do under existing conditions with the exception of one intersection. The Roosevelt Way NE/NE 65th Street intersection is anticipated to degrade from LOS D to LOS E with approximately a 32 second increase in delay.

4.5.4 Arterial Operations

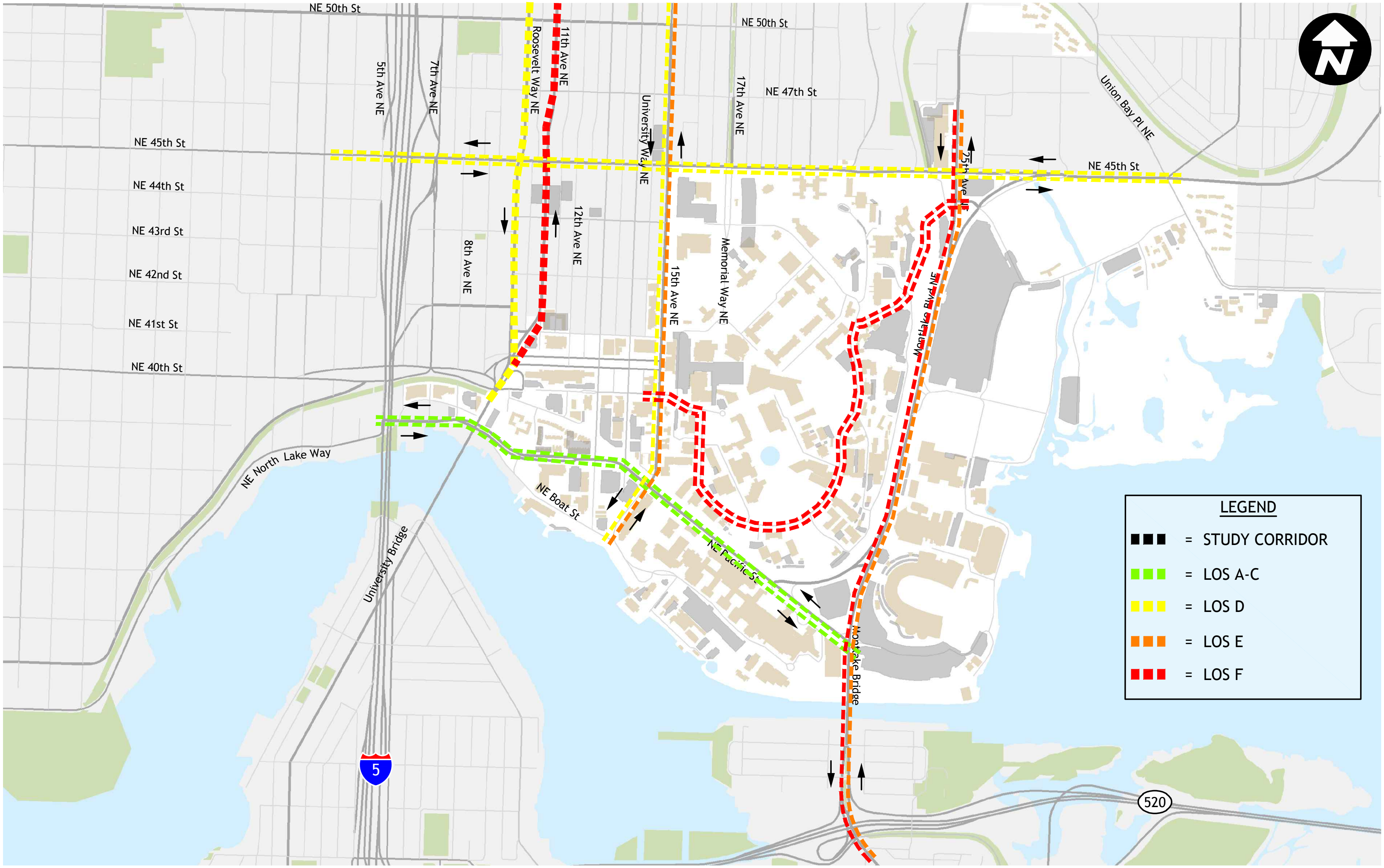
Arterial travel times and speeds shown in Table 4.20 along NE 45th Street, NE Pacific Street, 11th Avenue NE, Roosevelt Way NE, 15th Avenue NE, Montlake Boulevard NE, and Stevens Way NE were evaluated using the Synchro 9 network that was used for the intersection operations analysis. The No Action Alternative results reflect the adjustment factors described in Chapter 3, Affected Environment.

Table 4.20
WEEKDAY PM PEAK HOUR ARTERIAL LOS SUMMARY

Corridor	Existing		No Action	
	LOS[1]	Speed[2]	LOS[1]	Speed[2]
11th Avenue NE between NE Campus Parkway and NE 50th Street				
Northbound	E	8.5	F	5.0
15th Avenue NE between NE Boat Street and NE 50th Street				
Northbound	E	8.2	E	8.0
Southbound	D	9.4	D	9.2
Montlake Boulevard NE between E Lake Washington Boulevard and NE 45th Street				
Northbound	E	14.0	E	11.5
Southbound	F	8.0	F	8.5
NE 45th Street between 5th Avenue NE and Union Bay Place NE				
Eastbound	D	11.7	D	12.0
Westbound	D	12.0	D	11.6
NE Pacific Street (NE Northlake Way) between 6th Avenue NE and Montlake Boulevard E				
Eastbound	D	15.9	C	18.3
Westbound	C	20.6	C	21.9
Roosevelt Way NE between NE Campus Parkway and NE 50th Street				
Southbound	C	14.4	D	10.4
Stevens Way NE between 15th Avenue NE and 25th Avenue NE				
Eastbound	F	3.2	F	3.6
Westbound	F	2.7	F	3.1

1. Level of service
2. Average speed in miles per hour

As shown in Table 4.20 and on Figure 4.17, during the future No Action weekday PM peak hour conditions, most corridors are anticipated to operate at the same LOS as under existing conditions. Exceptions to this would be northbound 11th Avenue NE, eastbound NE Pacific Street, and southbound Roosevelt Way NE. The 11th Avenue NE northbound is anticipated to degrade from LOS E to LOS F; NE Pacific Street eastbound is anticipated to change from LOS D to LOS C; and southbound Roosevelt Way NE is anticipated to degrade from LOS C to LOS D. Improvements in speed between existing and No Action Alternative conditions could be attributed to capital intersection improvements like those at Montlake Boulevard NE, optimized signal timing, ITS improvements, and opportunity for adaptive signal controls in the future. Detailed corridor operations worksheets are provided in Appendix C.



Future (2028) No Action Weekday PM Peak Hour Corridor Traffic Operations

University of Washington 2018 Campus Master Plan

FIGURE **4.17**

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4.5.5 Screenline Analysis: Primary Impact Zone

This section describes the screenline analysis completed for two City-designated screenlines within the study area. In this study, screenlines were selected to count vehicle traffic entering and exiting the University of Washington primary and secondary impact zones. As part of the Mayor's Seattle 2035 Comprehensive Plan (City of Seattle, 2016), two screenlines were identified within the University of Washington vicinity, as shown in Figure 4.18. Screenline 5.16 is an east-west screenline that measures north-south travel and extends along the Lake Washington Ship Canal to include the University and Montlake bridges. Screenline 13.13 is a north-south screenline that measures east-west travel and extends east of I-5 between NE Pacific Street and NE Ravenna Boulevard.

Screenline: An imaginary line across which the number of passing vehicles is counted.

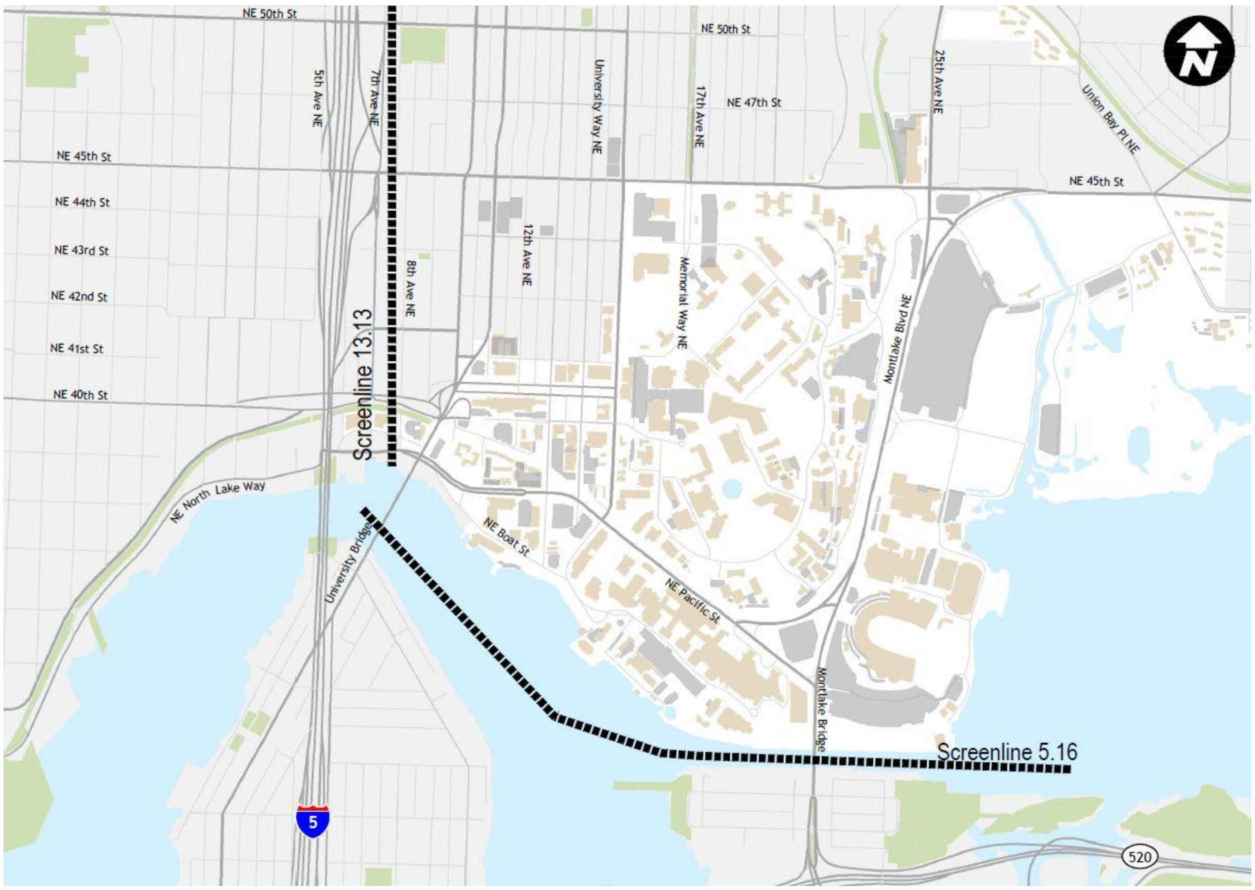


Figure 4.18 Study Area Screenlines

The screenline analysis includes volume-to-capacity (V/C) calculations for the vehicles traversing the screenlines using No Action Alternative traffic volumes and interpolated roadway capacity estimates. Roadway capacity for the 2028 horizon year was interpolated using 2016 capacity estimates described in Chapter 3, Affected Environment, and 2035 capacity estimates referenced in the May 2016 Seattle Comprehensive Plan Update Final EIS. The 2028 No Action roadway capacity estimates are shown in Table 4.21. Detailed screenline volumes and V/C calculations are included in Appendix C.

Table 4.21
ROADWAY CAPACITY AT STUDY AREA SCREENLINES

Screenline	2028 No Action Capacity
5.16 – Ship Canal, University and Montlake Bridges	
Northbound	4,210
Southbound	4,210
13.13 – East of I-5, NE Pacific Street to NE Ravenna Boulevard	
Eastbound	6,119
Westbound	6,119

LOS standards for the screenline analysis are based on the V/C ratio of a screenline. As described in the Seattle Comprehensive Plan Update Final EIS, the LOS standard V/C ratio for Screenlines 5.16 and 13.13 are 1.20 and 1.00, respectively (City of Seattle, 2016). For this study, screenline V/C ratios that do not exceed the LOS standard are acceptable. The No Action Alternative screenline analysis is included in Table 4.22. Detailed screenline analysis calculations are included in Appendix C.

Table 4.22
NO ACTION ALTERNATIVE SCREENLINE ANALYSIS

Screenline	Screenline Volume	Capacity	V/C	LOS Standard V/C
5.16 – Ship Canal, University and Montlake Bridges				
Northbound	3,835	4,210	0.91	1.20
Southbound	4,000	4,210	0.95	1.20
13.13 – East of I-5, NE Pacific Street to NE Ravenna Boulevard				
Eastbound	3,240	6,119	0.53	1.00
Westbound	3,335	6,119	0.55	1.00

Source: NACTO, Seattle Comprehensive Plan Update EIS, and Transpo Group, 2016

As shown in Table 4.22, all No Action Alternative screenline V/C ratios would meet the acceptable LOS standard.

4.5.6 Service/Freight Routes

With the addition of 211,000 gsf of net new development under the No Action Alternative, overall campus service volumes would increase. The percentage increase in freight/service-related traffic would be insignificant given the overall campus volumes, background traffic volumes, and service-related volumes specific to this CMP. Permitting of future campus development projects would require further analysis for the access needs and location, based on the final location, design elements, and programs to be accommodated for each structure.

4.5.7 Parking

This section identifies the No Action Alternative parking impacts. Appendix B Methods and Assumptions describes the methodology for forecasting future parking conditions.

The parking impacts evaluation considered the following:

- Adherence to the City-University Agreement (CUA) parking cap (12,300 spaces)
- Supply and demand forecast for the overall campus as well as within each campus sector
- The potential to exacerbate offsite parking beyond the campus boundaries
- Potential measures to mitigate the potential impacts identified

Parking Supply

As described in Chapter 3, Affected Environment, the current parking supply cap provided on-campus is 10,667 spaces. This analysis assumed future parking supply increases to accommodate additional demands associated with the No Action Alternative's anticipated growth in parking demand. This would result in a slight increase in parking demand but a peak parking utilization (the demand compared to parking supply) of 85 percent for the sector. Development associated with the No Action Alternative is anticipated to occur in the South Campus or West Campus sectors. Therefore, it was assumed that parking supply would increase by 236 spaces because parking utilization for the South Campus sector would be 85 percent. This would result in a future parking supply cap of 10,903 spaces and will not exceed the parking cap of 12,300 spaces.

Parking Demand

Under the No Action Alternative, campus parking demand would increase as a result of the additional 211,000 gsf of development. No Action Alternative parking demand was forecasted based on the increase in campus population consistent with the increase in gsf of development. Table 4.23 summarizes the No Action parking demand compared to existing conditions.

Table 4.23
PEAK PARKING DEMAND COMPARISON

	Vehicles Parked							
	Students[1]		Faculty[1]		Staff[1]		Total	
	Existing[2]	No Action[3]	Existing[2]	No Action[3]	Existing[2]	No Action[3]	Existing[2]	No Action[3]
On-Campus	1,844	1,857	1,090	1,097	3,786	3,814	6,720	6,768
On-Street	134	134	49	49	93	94	276	277
Total	**1,978**	**1,991**	**1,139**	**1,146**	**3,879**	**3,908**	**6,996**	**7,045**

Source: Transpo Group, 2016

1. Demand by population and parking destinations based on 3-year average of University of Washington 2012–2014 Transportation Surveys consistent with information presented in Chapter 3, Affected Environment.
2. Existing parking demand based on University of Washington 2015 parking counts.
3. No Action forecasts based on projected increase in population.

As shown in Table 4.23 a parking demand of less than 50 additional vehicles is expected from the No Action 211,000 gsf development under the 2003 Campus Master Plan. With an increase in parking supply, the No Action Alternative overall campus parking utilization would be slightly less than existing conditions and would not result in a significant adverse impact.

The No Action Alternative on-campus parking demand and utilization was also reviewed by campus sector to provide context on where parking demand would occur. Allocation of No Action Alternative parking demand by sector was based on projected growth by sector. It was assumed that under the No Action Alternative, on-street parking would continue.

Table 4.24
ON-CAMPUS PEAK PARKING DEMAND BY SECTOR

Sector	Future Cap Parking Supply	Parking Demand			% Utilization
		Existing[1]	No Action Growth[2]	No Action Total	
West	1,524	1,428	+48	1,476	96%
South	1,400	1,139	+0	1,139	81%
Central	3,129	2,689	+0	2,689	86%
East	4,853	1,464	+0	1,464	30%
Total	**10,903**	**6,720**	**+48**	**6,768**	**62%**

Source: Transpo Group, 2016

1. Existing parking demand based on University of Washington 2015 parking counts.
2. On-campus parking demand for the No Action Alternative based on projected increase in population. This does not include on-street parking demand increases noted in the Table 4.23 since these would not be parking within the sector lot.

As indicated in Table 4.24, the added parking demand with new South Campus development under the No Action Alternative would result in a 62 percent parking utilization. The West Campus would increase from 94 percent parking utilization under existing conditions to 96 percent. However, given the parking utilization in other campus sectors, portions of this demand could be accommodated elsewhere on campus if it were to become difficult to find parking in West Campus.

With the No Action Alternative, the campus as a whole would still be able to accommodate the total future parking demand within the existing parking supply. Parking could be managed within the established parking cap constraints.

Secondary Parking Impacts

Parking outside the primary impact zone surrounding the campus would likely continue with the No Action Alternative. This would involve students, faculty, and staff parking their vehicles within transit-served areas with unrestricted parking and then using transit and the U-PASS to travel to campus. Given the minimal growth under the No Action Alternative, parking levels would likely be similar to existing conditions.

4.6 TRIP AND PARKING CAPS

4.6.1 Vehicle Trip Caps

As described in Chapter 3, Affected Environment, the University of Washington overall travel demand is subject to maintaining compliance with the trip caps consistent with 1990 University vehicle demand levels. Table 4.25 summarizes the trip cap for the No Action Alternative. No Action assumes that campus population growth would be limited to that associated with completion of the 211,000 gsf building in West Campus, which would reflect a very minor increase in campus-generated traffic above existing levels. As shown, the trip cap would continue to be met, assuming current (2015) mode splits are maintained.

Table 4.25
VEHICLE TRIP CAP SUMMARY

Location/Peak Period	Trip Cap (vph)	No Action
University of Washington Campus		
AM Peak Period Inbound (7:00-9:00)	7,900	7,005
PM Peak Period Outbound (3:00-6:00)	8,500	7,005
U District		
AM Peak Period Inbound (7:00-9:00)	10,100	8,750
PM Peak Period Outbound (3:00-6:00)	10,500	8,750

Note: vph is Vehicles per hour

4.6.2 Parking Caps

With the No Action Alternative, new parking would be provided only to replace parking removed for new buildings.

5 IMPACTS OF ALTERNATIVE 1

This chapter summarizes the results of the analysis conducted for Alternative 1. This evaluation examines the impacts to the key transportation elements and transportation modes identified in Chapter 3, Affected Environment.

The No Action Alternative, used to compare existing conditions to Alternative 1, assumes a proportion of the development to be 211,000 gross square footage (gsf), as included in the development proposed as part of the 2003 Campus Master Plan.

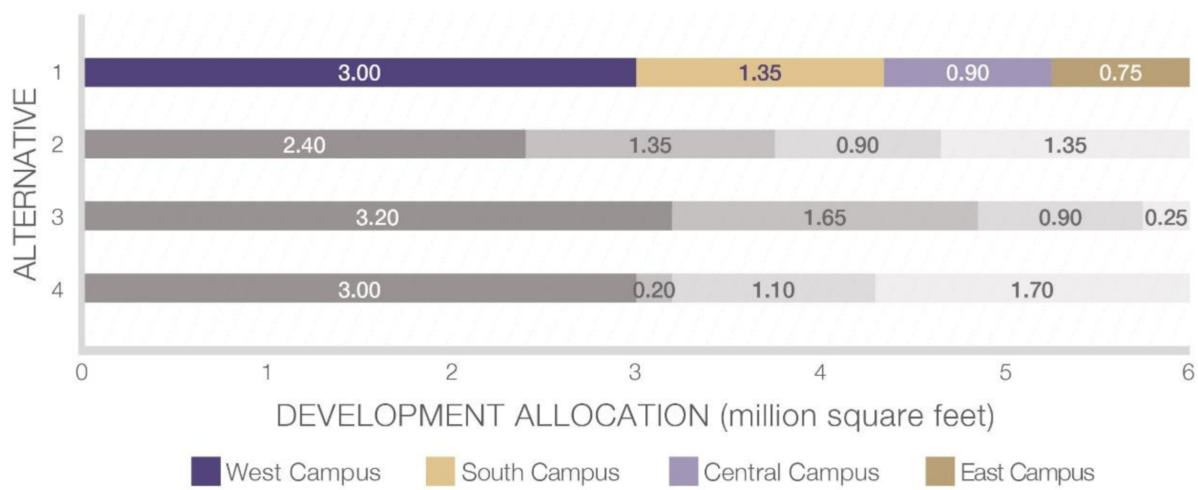
This chapter evaluates all modes of travel and compares **Alternative 1** to the No Action Alternative. Alternative 1 would encompass operations in the horizon year of 2028 with approximately 6 million gross square footage of new development. The focus of those improvements would be primarily in the West and South campus sectors with more limited development in the Central and East campus sectors.

5.1 CHANGING CAMPUS CHARACTERISTICS

5.1.1 Description of the Alternative

The proposed University of Washington development in Alternative 1 is anticipated to be primarily located in the West and South campus sectors. The technical analysis of Alternative 1 focused on the weekday PM peak period and addresses all transportation modes. Alternative 1 represents the University's preferred alternative.

Alternative 1 would include the development of 6 million net new gsf throughout the campus with a focus in the West and South campus sectors. Of this total, approximately 3 million gsf would be located in West Campus and 1.35 million gsf in South Campus. More limited development is planned for the Central and East campus sectors, approximately 900,000 gsf and 750,000 gsf, respectively, as shown in Figure 5.1.



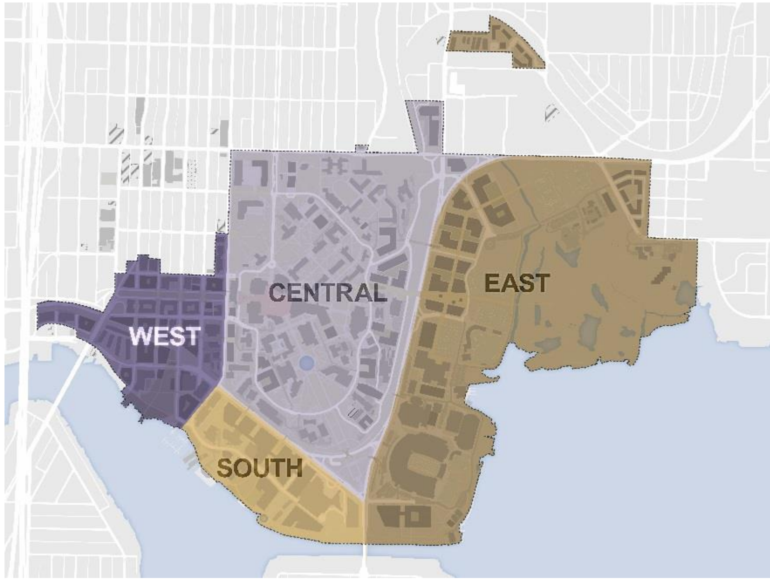


Figure 5.1 Alternative 1 Development Allocation

5.1.2 Trip Generation by Mode

This section provides a summary of the anticipated trip generation for pedestrian, bicycle, transit, and vehicle modes to campus. The trip generation methodology used for assessing the increase in trips under Alternative 1 is consistent with that previously described in Chapter 4, Impacts of No Action. The increase in trips anticipated with Alternative 1 was compared against the No Action forecasts to determine the net increase associated with population growth.

Weekday daily, AM, and PM peak hour vehicular trip generation, comprising both drive alone vehicles and carpools, is summarized in Table 5.1.

Table 5.1
ESTIMATED VEHICLE TRIPS (WEEKDAY)

Trip Type	Daily Trips	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
No Action Alternative							
Student	8,710	1,485	635	2,120	670	955	1,625
Faculty	6,880	1,465	630	2,095	1,035	1,470	2,505
Staff	12,260	3,190	1,370	4,560	1,885	2,685	4,570
Total No Action	**27,850**	**6,140**	**2,635**	**8,775**	**3,590**	**5,110**	**8,700**
Alternative 1							
Student	10,390	1,775	760	2,535	800	1,140	1,940
Faculty	8,230	1,750	750	2,500	1,240	1,765	3,005
Staff	14,860	3,860	1,660	5,520	2,280	3,250	5,530
Total Alternative 1	**33,480**	**7,385**	**3,170**	**10,555**	**4,320**	**6,155**	**10,475**
Net New Trips							
Student	1,680	290	125	415	130	185	315
Faculty	1,350	285	120	405	205	295	500
Staff	2,600	670	290	960	395	565	960
Total Net New Trips	**5,630**	**1,245**	**535**	**1,780**	**730**	**1,045**	**1,775**

Source: Transpo Group, 2016

The table shows that the University-associated development is anticipated to generate 5,630 net new daily trips with approximately 1,780 occurring during the AM peak hour and 1,775 during the PM peak hour. Weekday daily, AM, and PM peak hour vehicular trip generation accounting for visitors is summarized in Table 5.2.

Table 5.2
ESTIMATED NET NEW VEHICLE TRIPS

Trip Type	Daily Trips	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Net New Trips							
Student	1,680	290	125	415	130	185	315
Faculty	1,350	285	120	405	205	295	500
Staff	2,600	670	290	960	395	565	960
Total Net New Trips	**5,630**	**1,245**	**535**	**1,780**	**730**	**1,045**	**1,775**
Visitors (10%)	565	125	55	180	75	105	180
Total UW Trips	**6,195**	**1,370**	**590**	**1,960**	**805**	**1,150**	**1,955**

Source: Transpo Group, 2016

Table 5.3 summarizes trip generation by mode, including transit, walk, bicycle, and other trips with Alternative 1.

Table 5.3
ESTIMATED DAILY TRIPS BY MODE

Trip Type	Transit	Walk	Bicycle	Other
No Action Alternative				
Student	34,550	28,270	5,500	470
Faculty	2,990	840	1,680	260
Staff	11,790	1,120	2,110	670
Total No Action	**49,330**	**30,230**	**9,290**	**1,400**
Alternative 1				
Student	40,480	33,120	6,440	550
Faculty	3,450	960	1,930	300
Staff	15,460	1,470	2,760	870
Total Alternative 1	**59,390**	**35,550**	**11,130**	**1,720**
Net New Trips				
Student	5,930	4,850	940	80
Faculty	460	120	250	40
Staff	3,670	350	650	200
Total Net New Trips	**10,060**	**5,320**	**1,840**	**320**

Source: Transpo Group, 2016

As shown in the table, the proposed development is anticipated to generate 10,060 net new daily transit trips, 5,320 walking trips, 1,840 bicycle trips, and 320 other trips.

5.2 PEDESTRIANS

5.2.1 Performance Measures

The following pedestrian-related performance measures have been identified to assess and compare alternatives:

- Proportion of development within 1/4 mile of multifamily Housing
- Proportion of development within 1/4 mile of University of Washington Residence Halls
- Quality of pedestrian environment
- Pedestrian Screenline Demand and Capacity
- Pedestrian Transit Station/Stop Area LOS

These measures reflect the effectiveness of the pedestrian network in providing safe and easy access to pedestrian destinations, specifically housing, thereby maintaining a high walk mode choice on-campus. A comparisons between Alternative 1 relative to the No Action Alternative is provided for each measure below.

Proportion of Development Within 1/4 Mile of Multifamily Housing

Walking makes up nearly one-quarter of all existing trips to and from campus. Proximity of campus development to housing is therefore one important measure to assessing the propensity of people to walk. This measure assesses the proximity of the current campus buildings and development to nearby multifamily housing. As shown in oximity to multifamily housing.

Table 5.4, 60 percent of Alternative 1 development would be within a 1/4 mile proximity to multifamily housing.

Table 5.4
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF MULTIFAMILY HOUSING

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)
West	211,000	3,000,000
South	NA	0
Central	NA	589,985
East	NA	0
Total	**NA**	**3,589,985**
Percent	***100%***	***60%***

Proportion of Development Within 1/4 Mile of University of Washington Residence Halls

This performance measure assesses the proximity of campus development within walking distance of residence halls. For this analysis, University of Washington residence halls were identified and then buffered by 1/4 mile. As shown in Table 5.5, 80 percent of the new development would be within a 1/4 mile proximity to residence halls.

Table 5.5
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF RESIDENCE HALLS

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)
West	211,000	3,000,000
South	NA	249,344
Central	NA	798,357
East	NA	750,000
Total	**211,000**	**4,797,701**
Percent	***100%***	***80%***

Quality of Pedestrian Environment (Primary and Secondary Impact Zones)

Alternative 1 would provide a number of quality enhancements to pedestrian travel within the Major Institution Overlay (MIO) where development would occur. This alternative includes new waterfront open space in West Campus and South Campus with several new pedestrian facilities in and surrounding this green. The Campus Master Plan (CMP) identifies a new Americans with Disabilities Act (ADA) accessible east-west connection between the new green to Central Campus, thereby improving accessibility and providing an alternative route to the currently heavily used NE 40th Street/Grant Lane route. Pedestrian demand in and around West Campus would increase with added uses.

The CMP also identifies a number of new pedestrian connections in South Campus. These improvements would better connect Portage Bay with Central Campus. Compared to the No Action Alternative, Alternative 1 would greatly improve pedestrian circulation.

In addition to these upgrades, the City of Seattle's Pedestrian Master Plan highlights new Neighborhood Greenways within the primary and secondary impact zones.

Within the primary impact zone, several greenways are planned in the following locations:

- A southern extension of the existing 12th Avenue NE Neighborhood Greenway
- Walla Walla Road
- NE Boat Street from NE Pacific Street to 15th Avenue NE, which would improve pedestrian connectivity from the Cheshiahud Lake Union Loop to the University of Washington campus.
- 20th Avenue NE north of 45th Street and NE 47th Street west of 20th Ave NE, which would increase pedestrian connectivity to the secondary impact zone, and connect to other planned greenways including 11th Avenue NE, NE 55th Street, and NE 62nd Street.
- NE Clark Road

Within the secondary impact zone, greenways in the east section are planned in the following locations:

- 5th Avenue NE
- NE 46th Street
- Keystone Place N

And in the west section:

- NE Surber Drive
- NE 50th Street

Pedestrian Screenline Capacity

The pedestrian screenline capacity analysis evaluates the peak hour demand, capacity, and level of service (LOS) at all at-grade and above-grade crossing locations along Montlake Boulevard NE, NE Pacific Street, 15th Avenue NE, and NE 45th Street. The following section summarizes pedestrian screenline volumes in Alternative 1.

Pedestrian Growth From Transit Ridership

Pedestrian growth from increased transit ridership was added to transit stop pedestrian volumes aggregated by screenline. This growth accounts for all new pedestrians in the University of Washington study area that would be generated by the 10,310 net new transit trips to and from campus under Alternative 1, as noted in Table 5.3 above. During evaluation, a percentage of these trips was allocated to each campus sector (West, South, Central, and East) based on anticipated future transit service from King County METRO CONNECTS and Sound Transit Link light rail extensions, and applied to aggregate screenline pedestrian volumes. Peak hour pedestrian growth from transit ridership is summarized in Table 5.6.

Table 5.6
PEAK HOUR PEDESTRIAN GROWTH FROM TRANSIT RIDERSHIP

Screenline	Pedestrian Volume from Transit Riders (People/hour)
Montlake Boulevard NE	754
NE Pacific Street	168
15th Avenue NE	1,675
NE 45th Street	0

Source: Transpo Group, 2017

As shown in Table 5.6, the 15th Avenue NE screenline would experience the greatest increase of pedestrian crossings from transit. This is due to the implementation of the University District (U District) Station (Link light rail). All transit riders from this station would cross 15th Avenue NE to reach campus. The NE 45th Street screenline would not experience pedestrian growth from transit ridership because no transit stops would be located on NE 45th Street in the area analyzed (between 15th Avenue NE and 20th Avenue NE). Therefore, the crossings analyzed—at 15th Avenue NE, 17th Avenue NE, 18th Avenue NE, 19th Avenue NE, and 20th Avenue NE—are not assumed to be impacted by increased transit riders.

Pedestrian Growth From Alternative 1 Development

Pedestrian growth anticipated with Alternative 1 was assumed to be relative to the No Action Alternative. This growth is based on the proportion of development from Alternative 1 in each campus sector (West, South, Central, and East), therefore, each transit stop location was grouped by campus sector to calculate its proportional increase. Table 5.7 summarizes peak hour pedestrian screenline volume and LOS.

Table 5.7
PEAK HOUR PEDESTRIAN SCREENLINE VOLUME AND LEVEL OF SERVICE

Screenline	No Action Alternative		Alternative 1	
	Peak Hour Pedestrian Volume (People/hour)	Level of Service (LOS)	Peak Hour Pedestrian Volume (People/hour)	Level of Service (LOS)
Montlake Boulevard NE	14,770	A	17,008	A
NE Pacific Street	3,744	A	4,918	A
15th Avenue NE	12,078	A	16,629	A
NE 45th Street	2,272	A	2,614	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition.

As shown in Table 5.7, Alternative 1 peak hour aggregate pedestrian volumes for all screenlines would be at LOS A.

Pedestrian Transit Stop Space Analysis

This measure evaluates the peak hour demand, capacity, and LOS at key transit stops along Montlake Boulevard NE, NE Pacific Street, and 15th Avenue NE. The following sections summarize the pedestrian space per person and LOS at these locations with Alternative 1 development.

Pedestrian Growth From Transit Ridership

Conservative estimates of growth from increased transit ridership were added to transit stop pedestrian volumes aggregated by campus sector. This growth accounts for all new pedestrians in the University of Washington study area that would be generated from the 10,310 net new transit trips to and from campus under Alternative 1, as noted in Table 5.3 above. During evaluation, a percentage of these trips was allocated to each campus sector (West, South, Central, and East) based on anticipated future transit service from King County METRO CONNECTS and Sound Transit Link light rail extensions. Approximately 15 percent of the aggregated campus sector growth was applied to each transit stop. Peak hour pedestrian growth from transit ridership is summarized in Table 5.8.

Table 5.8
PEAK HOUR PEDESTRIAN GROWTH FROM TRANSIT RIDERSHIP

Stop Location	Stop ID Number	King County Metro Stop Number	Campus Sector	Pedestrian Volume from Transit Riders (People/hour)
NE Pacific Street Bay 1	1	29247	South	126
NE Pacific Street Bay 2	2	29405	South	126
NE Pacific Street at 15th Avenue NE	3	29240	South	126
15th Avenue NE at Campus Parkway	4	29440	West	251
15th Avenue NE at NE 42nd Street	5	11352	West	251
15th Avenue NE at NE 43rd Street	6	10912	West	251
Montlake Boulevard Bay 4	7	25240	East	13
Montlake Boulevard Bay 3	8	25765	East	13
Stevens Way at Pend Oreille Road	9	75410	East	13
Stevens Way at Benton Lane	10	75403	East	13

As shown in Table 5.8, West Campus would experience the greatest increase of pedestrian activity from transit. This is due to the implementation of the U District Station. All transit stop locations in this evaluation were assumed to be impacted primarily by West, South, and East Campus development; therefore, Central Campus was not analyzed.

Pedestrian Growth from Alternative 1 Development

Pedestrian space anticipated for Alternative 1 was assumed to be relative to the No Action Alternative. This growth is based on the proportion of development from Alternative 1 in each campus sector (West, South, Central, and East), therefore, each transit stop location was grouped by campus sector to calculate its proportional increase. Table 5.9 summarizes Alternative 1 peak hour pedestrian space and LOS.

Table 5.9
PEAK HOUR TRANSIT STOP PEDESTRIAN SPACE AND LEVEL OF SERVICE

Stop Location	Stop ID Number	No Action Alternative		Alternative 1	
		Pedestrian Space (ft^2/person)	Level of Service (LOS)	Pedestrian Space (ft^2/person)	Level of Service (LOS)
NE Pacific Street Bay 1	1	45.0	A	10.9	B
NE Pacific Street Bay 2	2	39.0	A	10.4	B
NE Pacific Street at 15th Avenue NE	3	7.5	C	1.7	F
15th Avenue NE at Campus Parkway	4	62.4	A	8.3	C
15th Avenue NE at NE 42nd Street	5	50.5	A	6.5	D
15th Avenue NE at NE 43rd Street	6	27.8	A	7.1	C
Montlake Boulevard Bay 4	7	39.0	A	24.3	A
Montlake Boulevard Bay 3	8	108.7	A	67.9	A
Stevens Way at Pend Oreille Road	9	19.0	A	12.2	B
Stevens Way at Benton Lane	10	36.4	A	23.7	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition.

As shown in Table 5.9, Alternative 1 peak hour pedestrian space for all transit stops, with the exception of locations 3 and 5, would be at LOS C or better. Location 3 (mid-block near the 15th Avenue NE/ NE Pacific Street intersection) and location 5 (at the 15th Avenue NE/ NE 42nd Street intersection) would be at LOS F and LOS D, respectively.

5.3 BICYCLES

5.3.1 Performance Measures

The following bicycle-related performance measures have been identified to assess and compare alternatives:

- Burke-Gilman Trail Capacity
- Bicycle Parking and Utilization
- Quality of Bicycle Environment

Burke-Gilman Trail Capacity

The Burke-Gilman Trail is anticipated to experience increased demand throughout all sectors of campus, but particularly in West and South Campus. The focus on development in West Campus with Alternative 1 could result in trail facility improvements, similar to those in the Mercer Court area. Increased cross traffic and travel along the newly updated trail segment is anticipated in South Campus with Alternative 1 development. As noted in Chapter 4, planned expansion of the Burke-Gilman Trail to separate pedestrian and bicycle uses would provide adequate capacity to meet future CMP demands. A portion of the trail from West of the University Bridge to Rainier Vista was improved in 2016 according to the plan; however, the section from Rainier Vista to North of Pend Oreille Road remains unfunded.

Cross traffic and travel along the older segment of the trail would increase in East Campus. Existing travel patterns from the Pronto Cycle Share program (discontinued as of March 31, 2017) suggest that East Campus bicycle travel may increase in the future, as the Burke-Gilman Trail provides a flat and direct route from East Campus to the South and West campus sectors.

As described previously, Burke-Gilman Trail level of service was evaluated with methods used in the 2011 and 2012 studies, including the use of the Federal Highway Administration's Shared-Use Path Level of Service Calculator (SUPLOS). SUPLOS evaluates trail segments using factors including trail width, directional bicycle and pedestrian volumes, and the presence of a striped centerline. (University of Washington Burke-Gilman Trail Corridor Study, July 2011). Future Alternative 1 level of service includes 2028 projected weekday PM peak hour pedestrian and bicycle counts in the operational analysis. In addition, a 20 percent increase over the existing (2010) volumes provided in the July 2011 study was included to account for development growth. The Future Alternative 1 weekday PM peak hour level of service along trail segments is summarized below. Additional detail on the operational analysis can be found in the Methods & Assumptions Appendix.

Table 5.10

FUTURE (2028) ALTERNATIVE 1 BURKE-GILMAN TRAIL WEEKDAY PM PEAK HOUR LEVEL OF SERVICE

			Combined Trail		Separated Trail	
Location	**2028 Alt 1 Projected Pedestrian Volume**	**2028 Alt 1 Projected Bicycle Volume**	**Level of Service (LOS) Score**	**Level of Service (LOS) Grade**	**Level of Service (LOS) Score**	**Level of Service (LOS) Grade**
West of University Bridge	286	1,311	NA	NA	4.13	A
West of 15th Avenue NE	391	1,537	NA	NA	4.11	A
Hitchcock Bridge	682	1,549	NA	NA	4.07	A
T-Wing Overpass	835	1,549	NA	NA	4.22	A
Rainier Vista West	417	1,510	1.37	F	3.82	B
Hec Edmundson Bridge	462	1,525	1.18	F	3.72	B

Location	2028 Alt 1 Projected Pedestrian Volume	2028 Alt 1 Projected Bicycle Volume	Combined Trail		Separated Trail	
			Level of Service (LOS) Score	Level of Service (LOS) Grade	Level of Service (LOS) Score	Level of Service (LOS) Grade
Wahkiakum Lane	309	1,375	0.72	F	3.43	C
South of Pend Oreille Road NE	276	1,418	0.73	F	3.40	C
North of Pend Oreille Road NE	334	1,408	0.58	F	3.39	C

As indicated in the July 2011 corridor study, a combined trail for both pedestrian and bicycle modes results in a much lower level of service than a separated trail. Level of service along the Burke-Gilman Trail can be improved as the plan is implemented to separate the trail.

Bicycle Parking and Utilization

As described in the Affected Environment chapter, the University has effectively managed bicycle parking demand. As new buildings are constructed, bicycle parking will be provided. For these reasons, additional bicycle parking analysis was not conducted for any of the growth alternatives (Alternatives 1-4).

Quality of Bicycle Environment (Primary and Secondary Impact Zones)

The quality of bicycle travel associated with Alternative 1 generally would improve in areas with development. This primarily would include new or improved dedicated bicycle facilities in West and South Campus, or in the case of East Campus, improved access to the Burke-Gilman Trail. South Campus could see the largest improvement in internal circulation and improved access to Portage Bay.

In addition to those mentioned above, the Seattle Bicycle Master Plan includes several proposed improvements within the primary and secondary impact zones.

Within the primary impact zone, planned improvements include:

- A protected bike lane running north-south along Roosevelt Way NE highlights bicycle connectivity improvements (recently installed)
- Protected bike lanes along 11th Avenue NE and 12th Avenue NE
- Protected bike lanes along NE 40th Street, west of Brooklyn Avenue NE that would connect with the existing cycling infrastructure on NE 40th Street, thereby improving connectivity to campus

Within the secondary impact zone, planned improvements include:

- A new protected bike lane along Ravenna Place NE that would provide a direct connection between the Burke-Gillman Trail and Ravenna Park
- A protected bike lane along 36th Avenue NE that would increase bicycle connectivity in the north/south directions

- A planned Neighborhood Greenway along Fairview Avenue E that would increase the cycle connection to campus from the south

In general, bicycle travel demand would increase throughout these areas as well as on regional bicycle facilities to/from them; however, capacity constraints are not anticipated overall but select locations of the Burke-Gilman Trail may be constrained. Bicycle travel on Central Campus would grow but by a relatively small amount compared to existing travel demand. Also, limited improvements in dedicated bicycle facilities in Central Campus would be expected.

5.4 TRANSIT

5.4.1 Performance Measures

The following transit-related performance measures have been identified to assess and compare alternatives:

- Proportion of Development Within 1/4 Mile of RapidRide
- Proportion of Development Within 1/2 Mile of Light Rail
- Transit Stop Capacity
- Transit Travel Times and Delay
- Transit Loads at Screenlines

Proportion of Development Within 1/4 Mile of RapidRide

This measure calculates the proportion of development within 1/4 mile of RapidRide service to the University of Washington. As shown in Table 5.11 below, 100 percent of the new development in Alternative 1 would be within 1/4 mile proximity of RapidRide.

Table 5.11
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF RAPIDRIDE

Sector	No Action Gross Square Footage (gsf)	Alternative 1 Gross Square Footage (gsf)
West	211,000	3,000,000
South	NA	1,350,000
Central	NA	900,000
East	NA	750,000
Total	**211,000**	**6,000,000**
Percent	***100%***	***100%***

Proportion of Development Within 1/2 Mile of Light Rail

This measure evaluates the proportion of development within a 1/2 mile walkshed of light rail stations. This action includes the U District Station at Brooklyn Street between NE 45th and NE 43rd streets, assumed to be completed in 2021. Table 5.12 summarizes the square footage of development within a 1/2 mile walkshed of light rail. Due to the majority of development in Alternative 1 occurring in the West and South campus sectors, the new development would be 95-percent covered within the 1/2 mile walkshed.

Table 5.12
PROPORTION OF DEVELOPMENT WITHIN 1/2 MILE OF LIGHT RAIL

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)
West	211,000	2,680,232
South	NA	1,350,000
Central	NA	900,000
East	NA	750,000
Total	**211,000**	**5,680,232**
Percent	***100%***	***95%***

Transit Stop Capacity
This measure evaluates the number of buses that a transit stop can process in an hour. This analysis was performed for four pairs of stops on key transit corridors around the University of Washington: 15th Avenue NE, NE 45th Street, Montlake Boulevard and Pacific Street. The transit stop capacity and demand do not change by alternative. Therefore, the summary provided in Chapter 4, Impacts of No Action, reflects the expected operations.

Transit Travel Times and Delay
This measure evaluates the PM peak hour bus transit travel speeds on key corridors around and on the University of Washington campus with the 10,060 net new transit riders assumed for Alternative 1 (see Table 5.3). While each Development Alternative allocates growth to different campus sectors, for this analysis, it was assumed that campus transit patrons would be apportioned to the major transit stops throughout the campus and that transit travel speeds would be effected by an increase in transit patrons and resulting dwell times. For this reason, this transit measure is the same for all development alternatives. Also, it was assumed that, with new light-rail stations opening, many transit patrons would use light rail. Bus transit travel time was evaluated along these corridors:

- NE 45th Street
- Pacific Street
- 11th Avenue NE
- Roosevelt Way NE
- 15th Avenue NE
- Montlake Boulevard NE
- Stevens Way NE

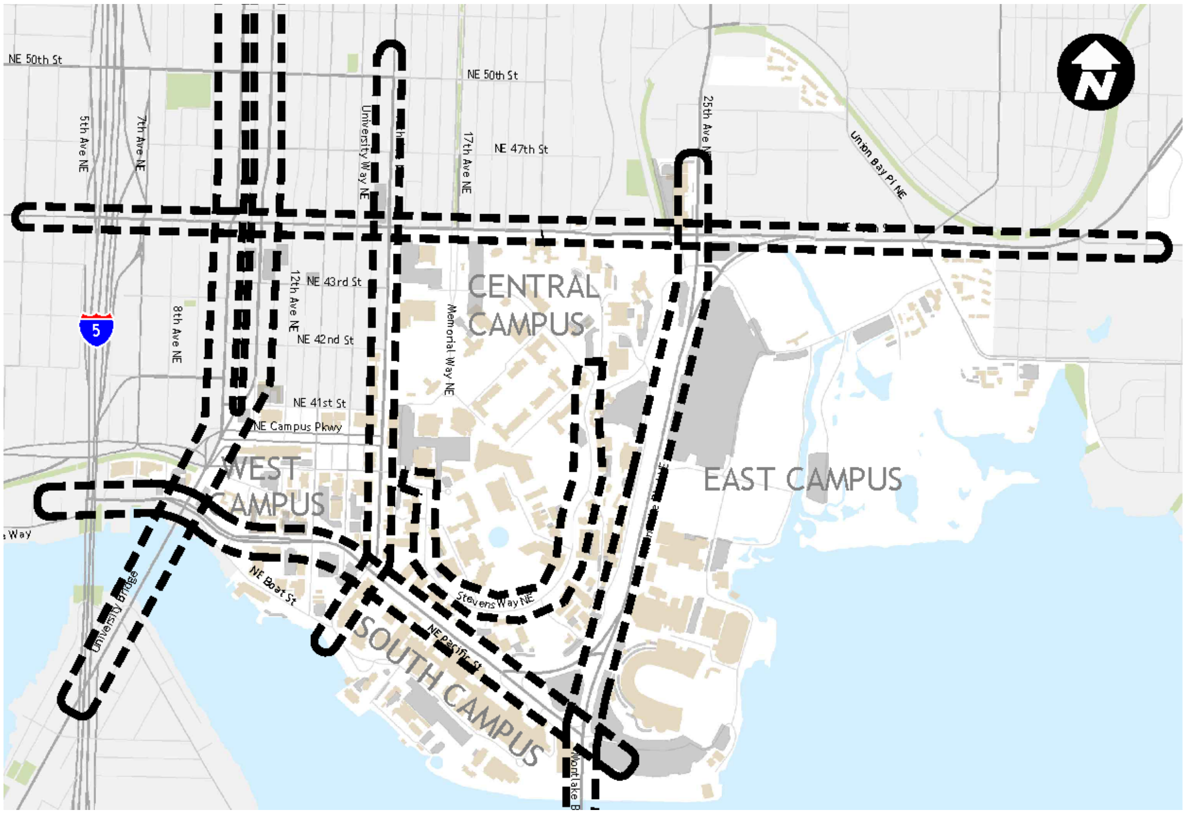


Figure 5.2 Transit Study Corridors

Transit Speed Methodology

To forecast transit speeds, the difference in travel speeds between the No Action Alternative and Alternative 1 (from Synchro traffic models) was added to the No Action transit speeds and new dwell times were calculated based on increased riders from new development. The Alternative 1 average number of passenger boardings and alightings at each stop was calculated from the No Action Alternative. The result was added to the number of forecasted transit trips generated by development. Given the volume of passengers boarding and alighting at each station, a dwell time of 2.75 seconds per boarding and 2.5 seconds per alighting was used to compute the forecast dwell conditions.

In summary, the Campus Master Plan Alternative 1 Transit Speed = No Action Transit Speeds + (Alternative 1 Vehicle Speeds – No Action Vehicle Speeds) + (Alternative 1 Dwell Time – No Action Dwell Time).

Table 5.13 summarizes the Alternative 1 transit travel speeds and compares them to the existing and No Action Alternative transit speeds.

Table 5.13
COMPARISON OF TRANSIT SPEEDS

Corridor	Existing Transit Speed (mph)	No Action Transit Speed (mph)	Alternative 1 Transit Speed (mph)
NE 45th Street Eastbound	5.2	4.8	4.0
NE 45th Street Westbound	5.2	4.0	3.2
NE Pacific Street Eastbound	14.7	12.3	4.6
NE Pacific Street Westbound	7.3	18.3	13.8
11th Avenue NE Northbound	5.9	5.1	4.3
Roosevelt Way NE Southbound	12.6	4.9	4.6
15th Avenue NE Northbound	7.8	14.1	11.3
15th Avenue NE Southbound	5.8	6.8	4.4
Montlake Boulevard NE Northbound	20.0	15.1	11.3
Stevens Way NE Eastbound	6.8	8.8	8.0
Stevens Way NE Westbound	2.7	3.0	3.0

As shown, NE Pacific Street Eastbound results in the largest reduction in travel speed as compared to No Action due to increase dwell times and increased congestion.

Transit Loads at Screenlines

Alternative 1 trips generated by planned University of Washington development were added to the future (2028) baseline demand totals at transit screenlines. These new trips were based on the Pedestrian Screenline Analysis found above in Section 5.4.1, Performance Measures, and used the same pedestrian screenlines. New trips found at pedestrian screenlines were allocated to transit screenlines based on trip distribution assumed in the 2018 CMP and the directionality of routes served on the screenline.

Transit screenline demand-to-capacity (D/C) rates were calculated at both the individual and aggregated level to determine the network's effectiveness at servicing future demand. Consistent with the No Action Alternative, capacity issues are anticipated at the screenlines at 11th Avenue NE south of NE 45th Street, and University Way south of NE 43rd Street. These screenlines would operate at a utilization of over 100 percent, meaning insufficient capacity would exist. These two screenlines are not anticipated to be primary routes for campus-related trips so demand and capacity is expected to be similar to the No Action Alternative. Similar to transit travel times, this transit measure is the same for all development alternatives.

Screenline D/C for Alternative 1 is shown in Table 4.15 below. Looking in the aggregate at all bus service and all demand, bus D/C would be 51 percent, and total Link light rail D/C would be 73 percent, with 67 percent overall D/C across all modes and screenlines. For this 10-year horizon look at bus crowding, the results of this analysis suggest some service would be more crowded and some less crowded but the aggregate demand over all of the screenlines can be accommodated. Transit users at the screenlines that would be over capacity during the PM peak hour could shift to other screenlines as the screenline approached capacity or service can be adjusted.

Table 5.14
TRANSIT SCREENLINE DEMAND AND CAPACITY

Screenline Number	Location	Alt 1 Capacity	Alt 1 Demand	Change from No Action	Alt 1 D/C
1	NE 45th St W/O Mary Gates Drive	2,430	983	328	40%
2	NE 45th & Roosevelt Way	1,040	831	221	80%
3	Roosevelt Way S/O NE 45th St	325	121	-	37%
4	11th Ave NE S/O NE 45th St	325	216	-	67%
5	15th Ave NE S/O NE 43rd St	4,200	1,591	507	38%
6	University Way S/O NE 43rd St	650	516	57	79%
7	Campus Pkwy E/O Brooklyn Ave	1,210	1,159	164	96%
8	Pacific St E/O 15th Ave NE	4,140	1,354	385	33%
9	Stevens Way at Pend Oreille	1,860	1,216	41	65%
10	Montlake Bridge	2,270	1,447	352	64%
11	University Bridge	1,380	757	33	55%
12	Montlake Blvd	730	570	237	78%
Bus Total		**19,830**	**10,245**	**2,088**	**51%**
Link A	U-District Station	23,400	17,305	1,030	74%
Link B	UW/Stadium Station	23,400	16,864	589	72%
Link Total		**46,800**	**34,169**	**1,619**	**73%**
Grand Total		**66,630**	**44,360**	**3,707**	**67%**

5.5 VEHICLE

5.5.1 Performance Measures

Six measures of effectiveness were analyzed to evaluate the impact of the campus growth on the surrounding transportation network:

- Intersection operational level of service for intersection located in the primary and secondary impact area
- Arterial Corridor Operations

- Screenline Volumes
- Cordon Volumes
- Caps are set as 1990 trip levels to the University District and University (MIO)
- Freight Corridor Impact

These measures respond to these questions:

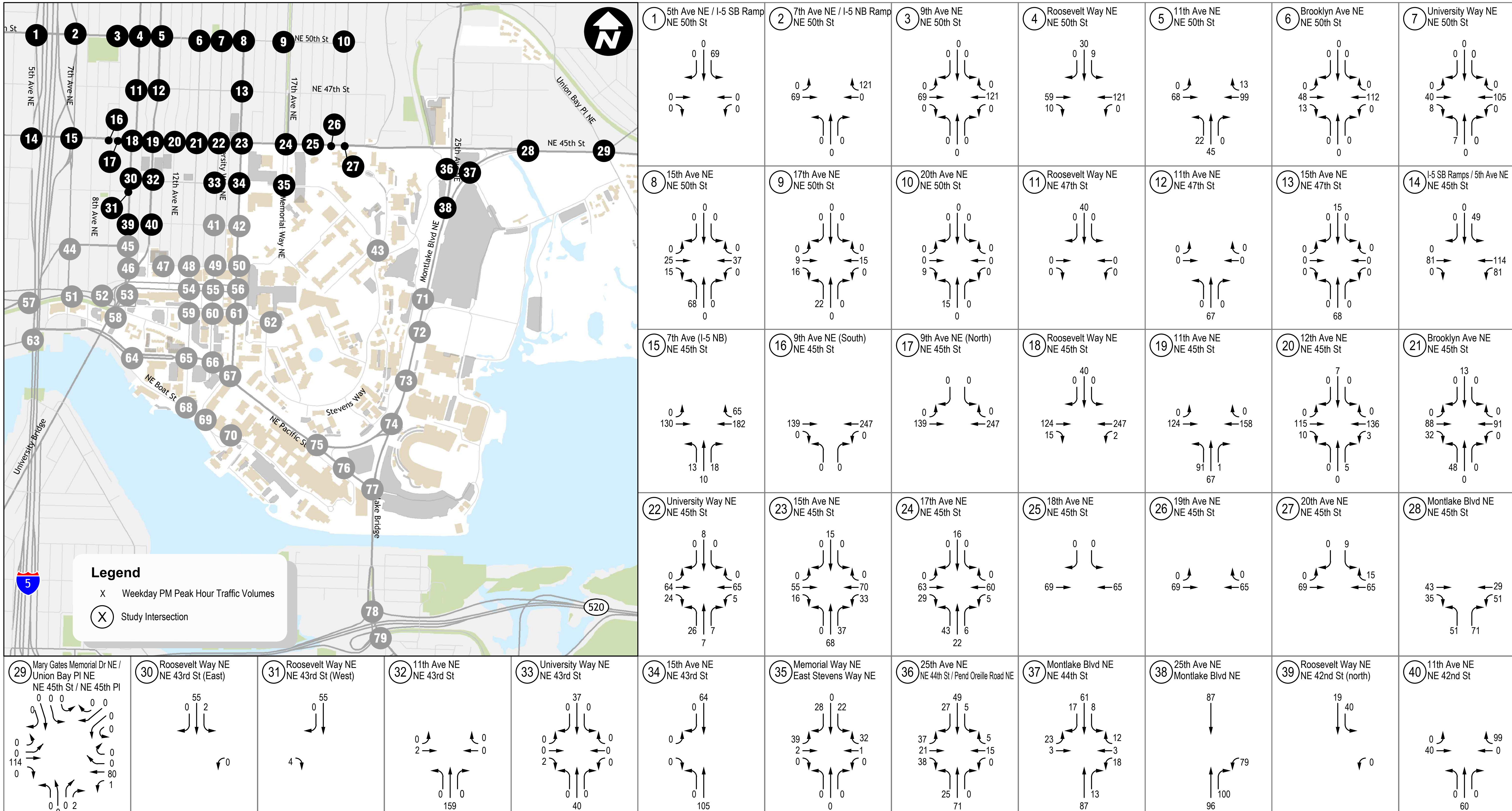
- Will the CMP increase vehicle congestion and will intersections and corridor speeds worsen?
- How will screenlines identified in the comprehensive plan increase?
- How will traffic grow in the overall area?

5.5.2 Traffic Volumes

Increased vehicle traffic associated with Alternative 1 was assigned to potential garage locations based on existing vehicle travel patterns, previous studies in the project vicinity, review of University information, and U.S. Census Bureau's *OnTheMap* tool. *OnTheMap* is a web-based mapping and reporting application that shows where workers are employed and where they live based on census data. The ZIP codes within that data were evaluated to determine if a person would be more likely to travel from the ZIP code via vehicle or by other means. Individuals making trips to ZIP codes closer to the proposed project sites or in more transit-oriented locations are more likely to use transit, walk, bicycle, or use other non-drive alone modes. Individuals making trips to ZIP codes outside the Seattle city limits and/or farther from the site are more likely to drive. The general trip distribution to/from the University of Washington is shown in Chapter 4, Impacts of No Action.

Primary Impact Zone

Project trips for each potential garage location were assigned to the study intersections based on the general trip distribution patterns shown in Chapter 4, Impacts of No Action. Project trips at each study intersection are shown in Figure 5.3 and Figure 5.4 below. The resulting Alternative 1 volumes are shown on Figure 5.5 and Figure 5.6.



Future (2028) Alternative 1 (Intersections 1-40) Project Trips

University of Washington 2018 Campus Master Plan

FIGURE 5.3

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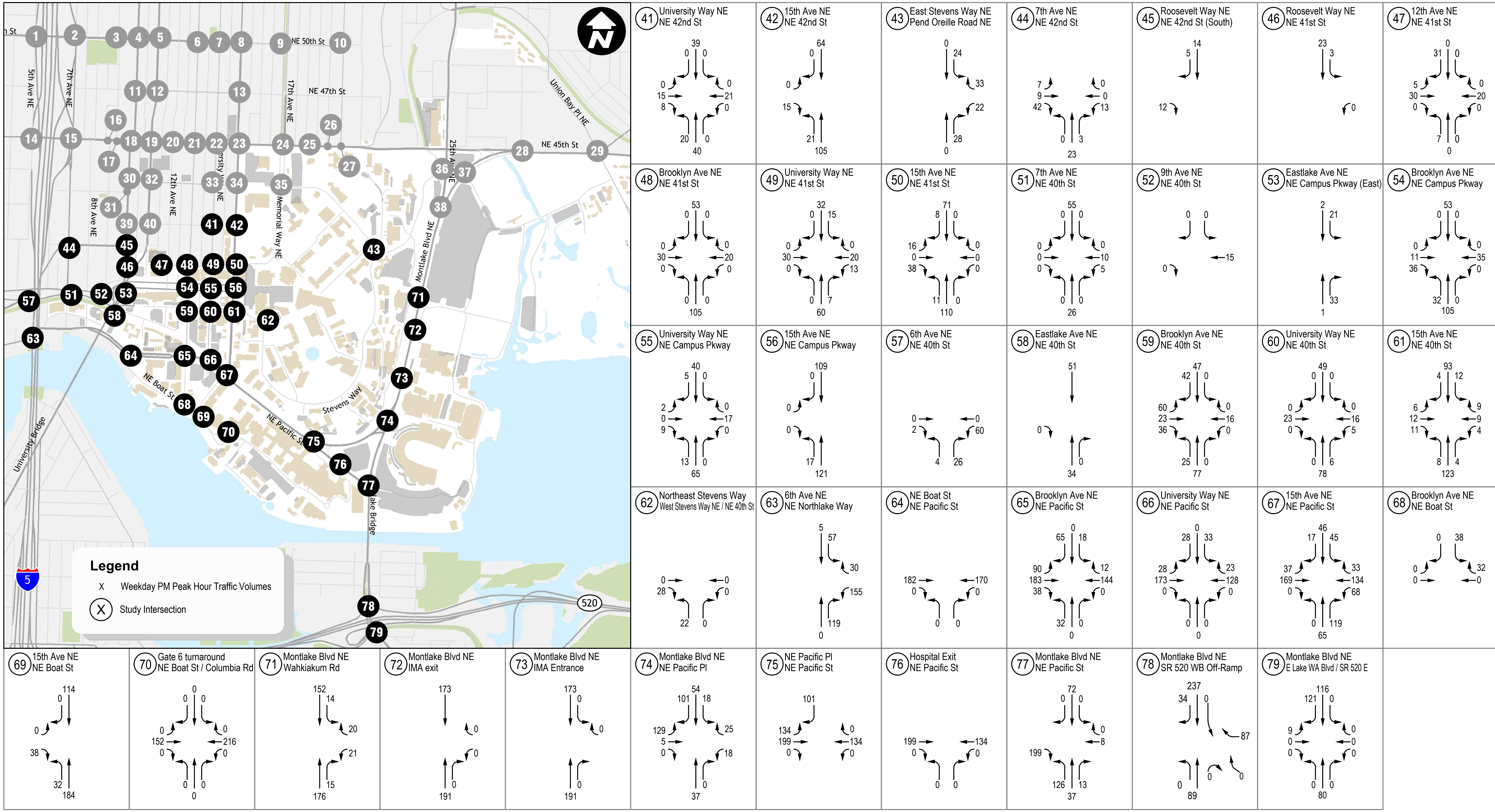

Future (2028) Alternative 1 (Intersections 41-79) Project Trips

University of Washington 2018 Campus Master Plan

FIGURE **5.4**

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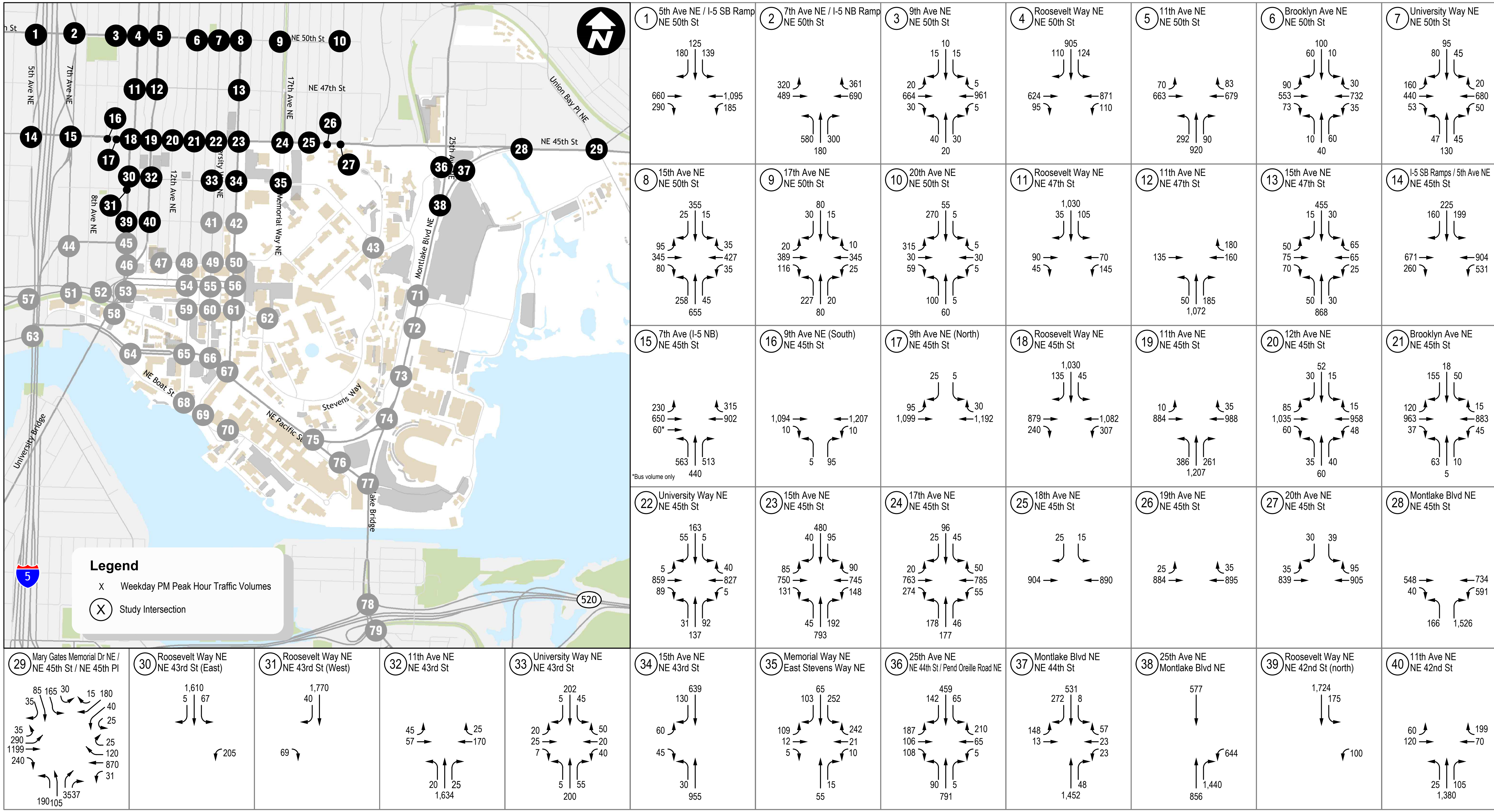

Future (2028) Alternative 1 (Intersections 1-40) Weekday PM Peak Hour Traffic Volumes

University of Washington 2018 Campus Master Plan

FIGURE
5.5

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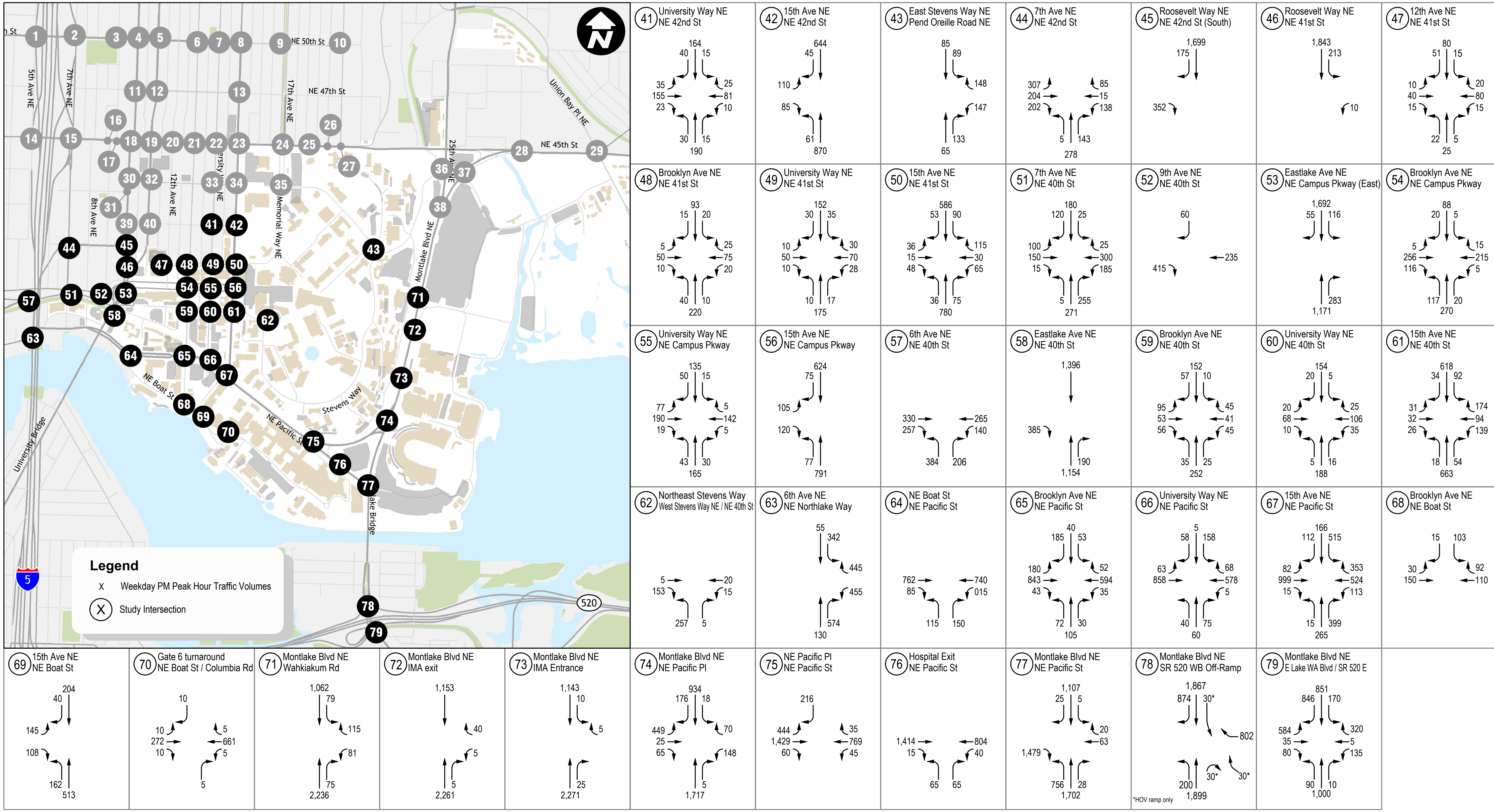

Future (2028) Alternative 1 (Intersections 41-79) Weekday PM Peak Hour Traffic Volumes

FIGURE 5.6

University of Washington 2018 Campus Master Plan

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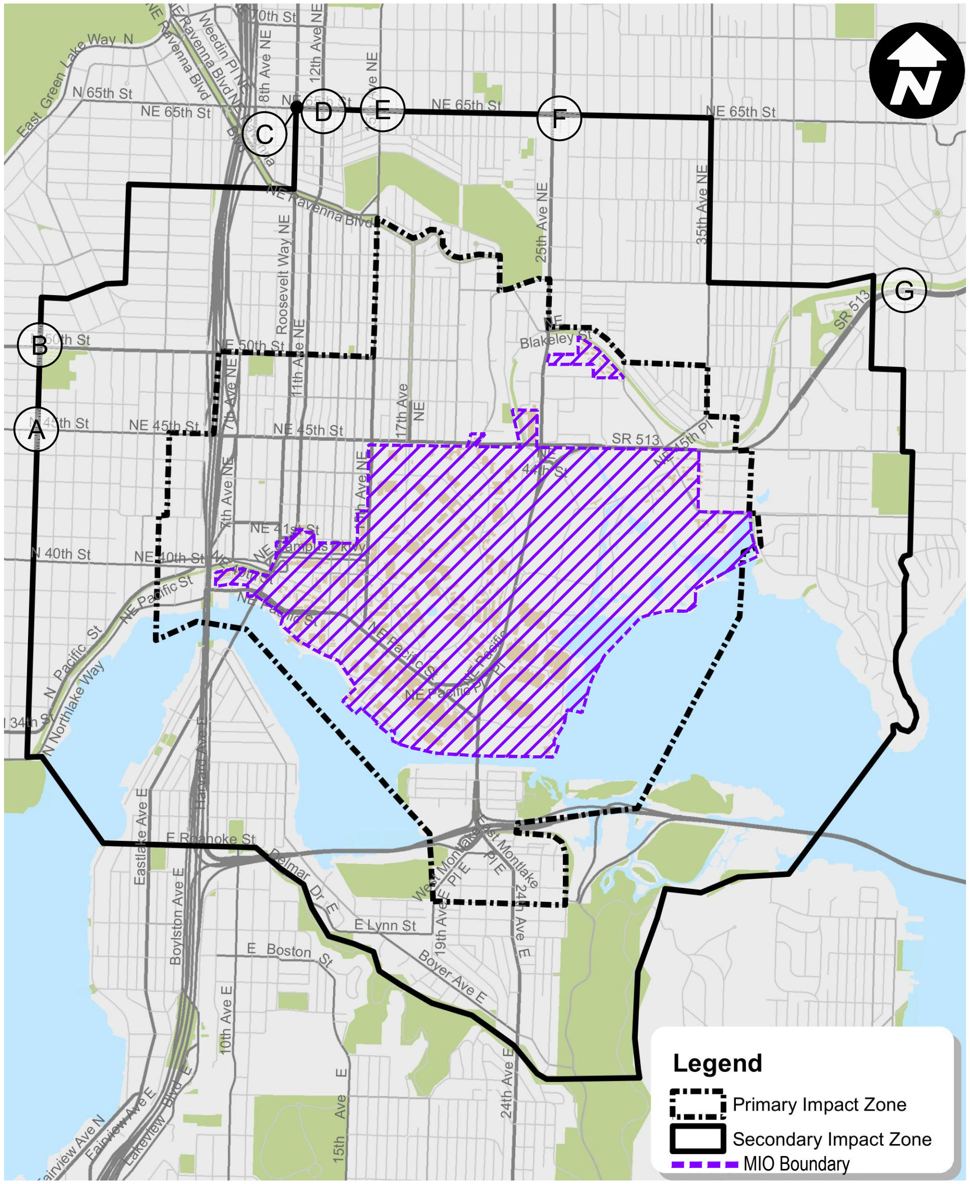
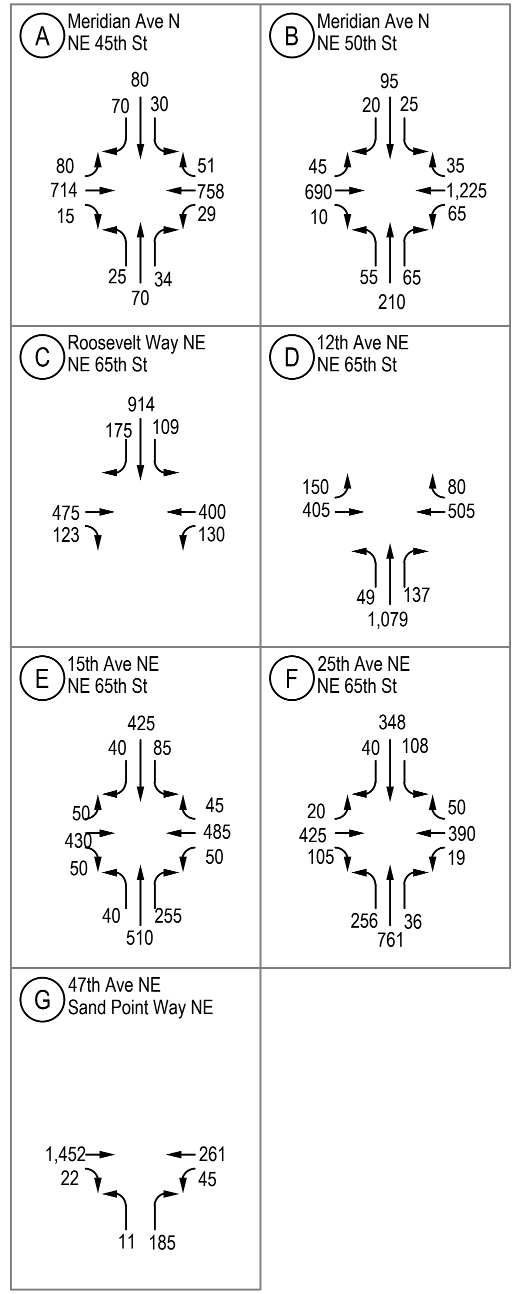
Secondary Impact Zone

Weekday PM peak hour volumes at seven intersections in the secondary impact zone were analyzed by considering future background traffic and volumes associated with the Alternative 1 development. Alternative 1 directional volumes were forecast in the same manner as all primary impact zone study intersections as described above. It was assumed that 5 percent of future volumes would be distributed into the neighborhood roadway network and therefore would not travel through the secondary impact zone study intersections. The resulting secondary impact zone volumes are shown in Figure 5.7.





Alternative 1 Secondary Impact Zone Weekday PM Peak Hour Traffic Volumes

FIGURE

5.7

University of Washington 2018 Campus Master Plan

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WHAT TRANSPORTATION CAN BE.

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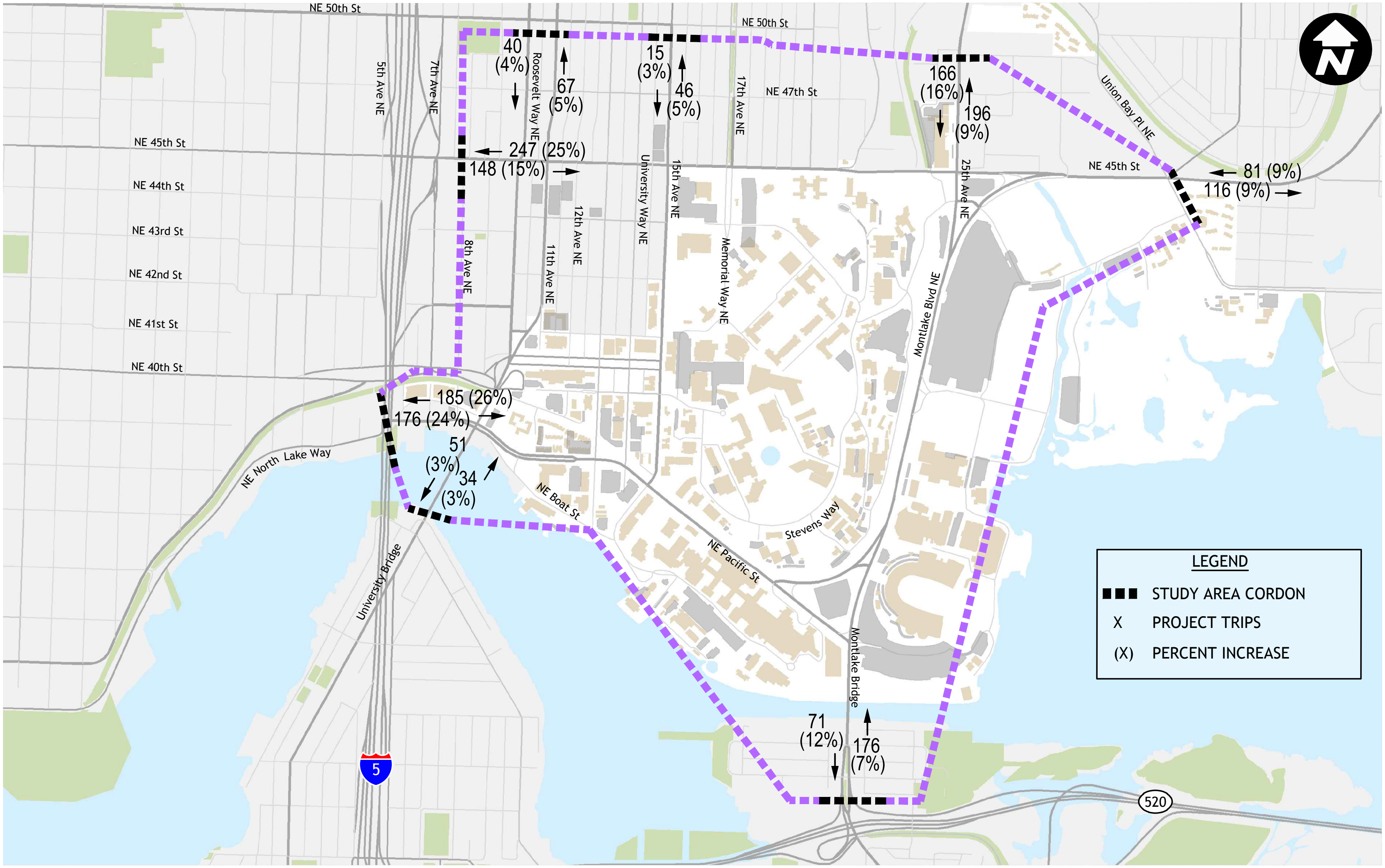
5.5.3 Cordon Volume Analysis

To understand the volumes considered under the different development alternative scenarios, a cordon volume analysis was completed. The cordon volume analysis focused on the major roadways leading to and from the University of Washington and showed the percentage of total trips along the corridor that would be associated with the increased traffic generated by Alternative 1. The cordon volumes and project share associated with Alternative 1 are shown in Figure 5.8. Note that these data reflect the percentage increase associated with continued development on-campus. As shown in the figure, total project-related volumes would be similar to the No Action Alternative even though Alternative 1 would include higher development. This could be due to the limited available capacity on arterials in the area.

Cordon: An imaginary line used to evaluate traffic in and out of the University area and measure the change or increase in traffic associated with the proposed alternatives.



Future (2028) Alternative 1 PM Peak Hour Cordon Volumes and Proportional Increase

FIGURE **5.8**

University of Washington 2018 Campus Master Plan

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5.5.4 Traffic Operations Performance

Methodology

The methodology used in assessing intersection and corridor LOS is consistent with that described in the Affected Environment (Chapter 3) and No Action Alternative (Chapter 4) scenarios. A detailed description of the methodology used can be found in Appendix B, Methods and Assumptions.

Intersection Operations – Primary Impact Zone

Weekday PM peak hour intersection traffic operations during the Alternative 1 conditions are summarized in Figure 5.9 and Figure 5.10**.** The year 2028 geometry for all of the study-area intersections was assumed to remain the same as No Action Alternative conditions. Additionally, all signal timing splits and offsets were optimized for Alternative 1. Complete intersection LOS summaries are provided in Appendix C.

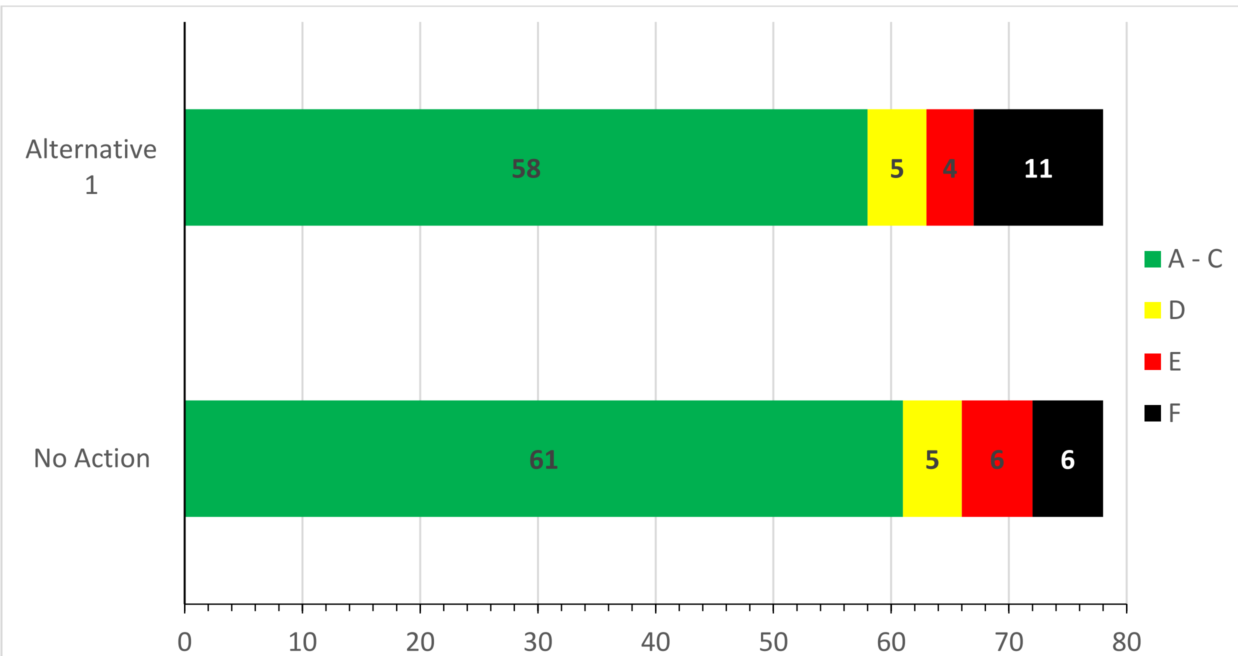


Figure 5.9 Weekday PM Peak Intersection Level of Service Summary

Table 5.15 below illustrates changes in intersection traffic operations at intersections anticipated to operate at LOS E or F during the weekday PM peak hour under future Alternative 1 conditions.

Table 5.15
ALTERNATIVE 1 INTERSECTION LEVEL OF SERVICE SUMMARY

Intersection	No Action		Alternative 1		Change in Delay (sec)	Project Share
	LOS[1]	Delay[2]	LOS[1]	Delay[2]		
16. 9th Ave NE (South) / NE 45th St	E	41	F	67	26	15.9%
29. Montlake Blvd NE / Mary Gates Memorial Dr NE	D	50	E	56	6	5.3%
30. Roosevelt Way NE / NE 43rd St (East)	F	793	F	978	185	3.0%
31. Roosevelt Way NE / NE 43rd St (West)	F	74	F	113	39	3.1%
32. 11th Ave NE / NE 43rd St	E	72	F	110	38	8.1%
46. Roosevelt Way NE / NE 41st St	E	36	E	38	2	1.3%
47. 12th Ave NE / NE 41st St	F	52	F	602	551	24.6%
49. University Way NE / NE 41st St	F	*	F	*	*	28.7%
51. 7th Ave NE / NE 40th St	E	44	F	58	14	5.9%
57. 6th Ave NE / NE 40th St	F	107	F	133	26	5.8%
63. 6th Ave NE / NE Northlake Way	E	38	F	109	71	18.3%
67. 15th Ave NE / NE Pacific St	D	37	E	72	35	20.6%
69. 15th Ave NE / NE Boat St	C	18	F	95	77	31.3%
71. Montlake Blvd NE / Wahkiakum Rd	F	343	F	183	-159	10.9%
72. Montlake Blvd NE / IMA exit	D	34	E	43	9	10.5%

*Volume exceeds capacity and Synchro could not calculate the delay.

1. Level of service.
2. Average delay per vehicle in seconds rounded to the whole second.

During the weekday PM peak hour, five additional intersections are anticipated to operate at LOS F with Alternative 1 compared to No Action Alternative conditions. Overall, 20 intersections are anticipated to operate at LOS D or worse during the weekday PM peak hour with Alternative 1, as compared to 17 under No Action conditions. The City of Seattle does not have an LOS standard, but generally considers LOS E and LOS F at signalized intersections and LOS F at unsignalized intersections to reflect poor operations. Intersections that degrade from LOS D to LOS E or operate at LOS E or LOS F under the "with-project" condition, or increase by 5 or more seconds, could be considered significant by the City.

The following intersections are anticipated to degrade to LOS D or worse under Alternative 1 conditions:

16. 9th Avenue NE (South)/NE 45th Street
17. 9th Avenue NE (North)/NE 45th Street
29. Roosevelt Way NE/NE 43rd Street (West)
32. 11th Avenue NE/NE 43rd Street
51. 7th Avenue NE/NE 40th Street
63. 6th Avenue NE/NE Northlake Way
67. 15th Avenue NE/NE Pacific Street
69. 15th Avenue NE/NE Boat Street
72. Montlake Boulevard NE/IMA Exit
73. Montlake Boulevard NE/IMA Entrance

Intersections where the LOS would be E or F and where the Alternative 1 traffic would increase delay by more than 5 seconds are shown in Table 5.16. As shown in the table, most of the intersections are unsignalized. At the two-way stop controlled (TWSC) intersections, the change in delay is represented for the worst movement.

Table 5.16
ALTERNATIVE 1 POTENTIAL INTERSECTION OPERATIONS IMPACTS SUMMARY

Intersection	Traffic Control	Change in Delay (seconds)	Percent of Total (Project Share)
16. 9th Avenue NE (south)/NE 45th Street	TWSC	26	15.9%
29. Montlake Boulevard NE/Mary Gates Memorial Drive NE	Signalized	6	5.3%
30. Roosevelt Way NE/NE 43rd Street (east)	TWSC	185	3.0%
31. Roosevelt Way NE/NE 43rd Street (west)	TWSC	39	3.1%
32. 11th Avenue NE/NE 43rd Street	Signalized	38	8.1%
47. 12th Avenue NE/NE 41st Street	TWSC	551	24.6%
49. University Way NE/NE 41st Street	TWSC	-[1]	28.7%
51. 7th Avenue NE/NE 40th Street	AWSC	14	5.9%
57. 6th Avenue NE/NE 40th Street	AWSC	26	5.8%
63. 6th Avenue NE/NE Northlake Way	AWSC	71	18.3%
67. 15th Avenue NE/NE Pacific Street	Signalized	35	20.6%
69. 15th Avenue NE/NE Boat Street	AWSC	77	31.3%
72. Montlake Boulevard NE/IMA exit	TWSC	9	10.5%

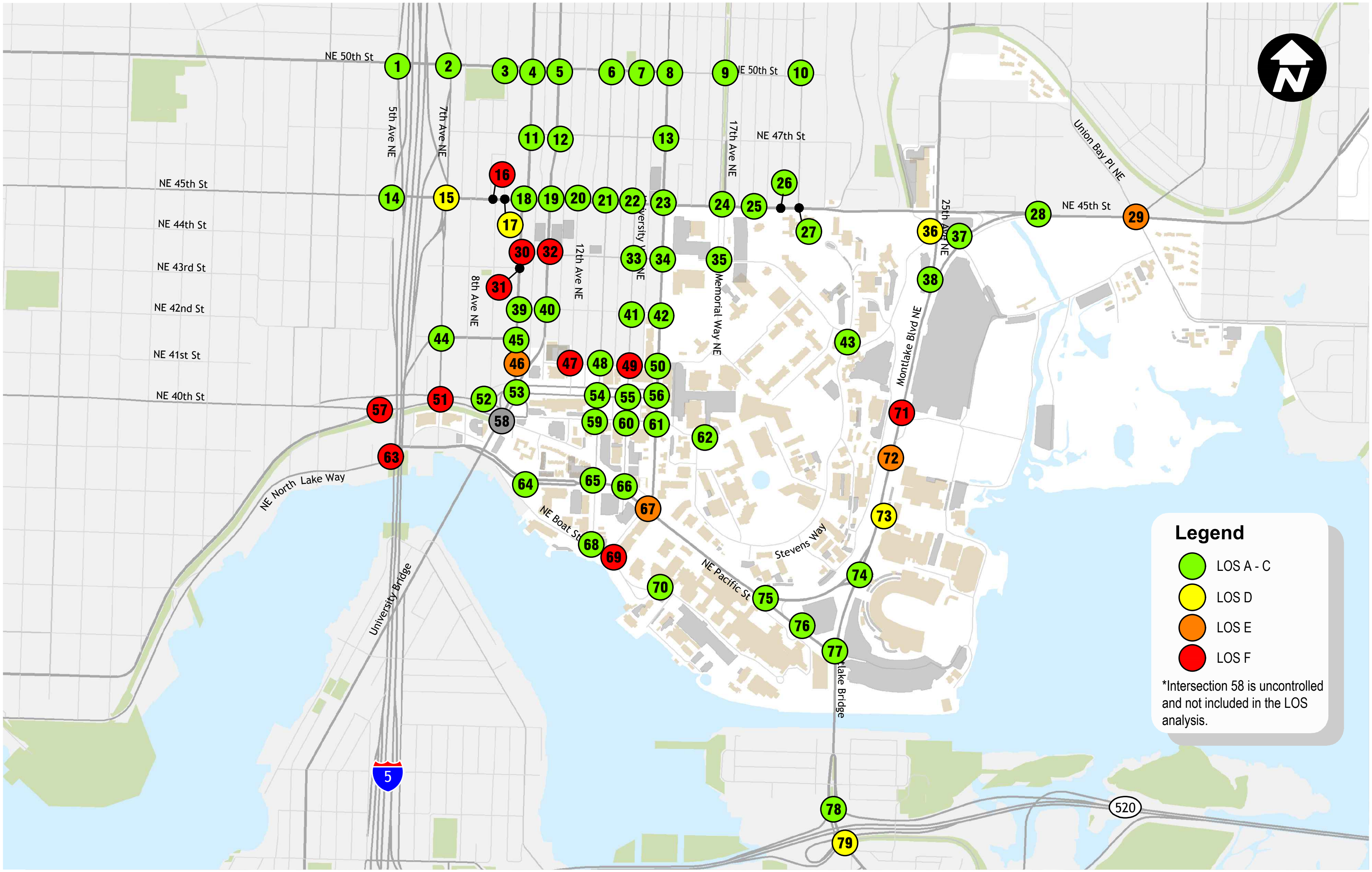
Note: TWSC = two-way stop controlled, AWSC = all-way stop controlled

1. Volume exceeds capacity and Synchro could not calculate the delay.

Of the stop controlled intersections listed in Table 5.16, some of the increased delay could be attributed to higher pedestrian and bicycle volumes. Additionally, the following intersections are located at or near potential garage access locations resulting in a higher share of Alternative 1 project trips:

47. 12th Avenue NE/NE 41st Street
49. University Way NE/NE 41st Street
63. 6th Avenue NE/NE Northlake Way
67. 15th Avenue NE/NE Pacific Street
69. 15th Avenue NE/NE Boat Street
72. Montlake Boulevard NE/IMA exit

Driveways and building access features to be incorporated into planned development can have impacts on the overall trip distribution and individual movements at intersections near these locations. Given the preliminary planning nature of this evaluation, individual traffic impacts should be assessed when final building size and driveway locations are determined. Also, given the grid network, it is anticipated that if drivers experience long delays at unsignalized locations they could alter their trip patterns to reduce delays. It is also recognized that LOS for vehicle traffic, while a consideration, must be increasingly balanced against the assumption that pedestrian, bicycle, and transit travel modes would be encouraged and facilitated. Intersections that are calculated to operate at poor LOS for vehicle traffic are not always considered a high priority for improvement by the City.



Future (2028) Alternative 1 Weekday PM Peak Hour Traffic Operations

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FIGURE **5.10**

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Intersection Operations – Secondary Impact Zone

Weekday PM peak hour intersection traffic operations under the 2028 No Action Alternative and Alternative 1 conditions are shown in Table 5.17. The 2028 geometry for all of the study area intersections were assumed to remain the same as existing conditions. Signal timing splits were optimized under 2028 Alternative 1 conditions. Complete intersection LOS summaries are provided in Appendix C.

Table 5.17
INTERSECTION LEVEL OF SERVICE SUMMARY – SECONDARY IMPACT ZONE

Intersection	No Action		Alternative 1		Change in Delay (sec)
	LOS[1]	Delay[2]	LOS[1]	Delay[2]	
A. Meridian Avenue N/N 45th Street	B	12	B	13	1
B. Meridian Avenue N/N 50th Street	B	17	B	17	0
C. Roosevelt Way NE/NE 65th Street	E	73	E	79	6
D. 12th Avenue NE/NE 65th Street	C	23	C	23	0
E. 15th Avenue NE/NE 65th Street	F	161	F	160	-1
F. 25th Avenue NE/NE 65th Street	E	80	F	132	52
G. 47th Avenue NE/Sand Point Way NE	D	30	F	59	29

1. Level of service.
2. Average delay per vehicle in seconds rounded to the whole second.

As shown in Table 5.17 the secondary impact zone intersections are anticipated to operate at the same LOS under Alternative 1 as they do under the No Action Alternative conditions with the exception of the 25th Avenue NE/ NE 65th Street and 47th Avenue NE/ Sand Point Way NE intersections. The 25th Avenue NE/ NE 65th Street intersection is anticipated to degrade from LOS E to LOS F with approximately a 52 second increase in delay. The 47th Avenue NE/ Sand Point Way NE intersection is anticipated to degrade from LOS D to LOS F with approximately a 29 second increase in delay. Additionally, the 15th Avenue NE/NE 65th Street intersection is anticipated to experience a slight decrease in delay.

5.5.5 Arterial Operations

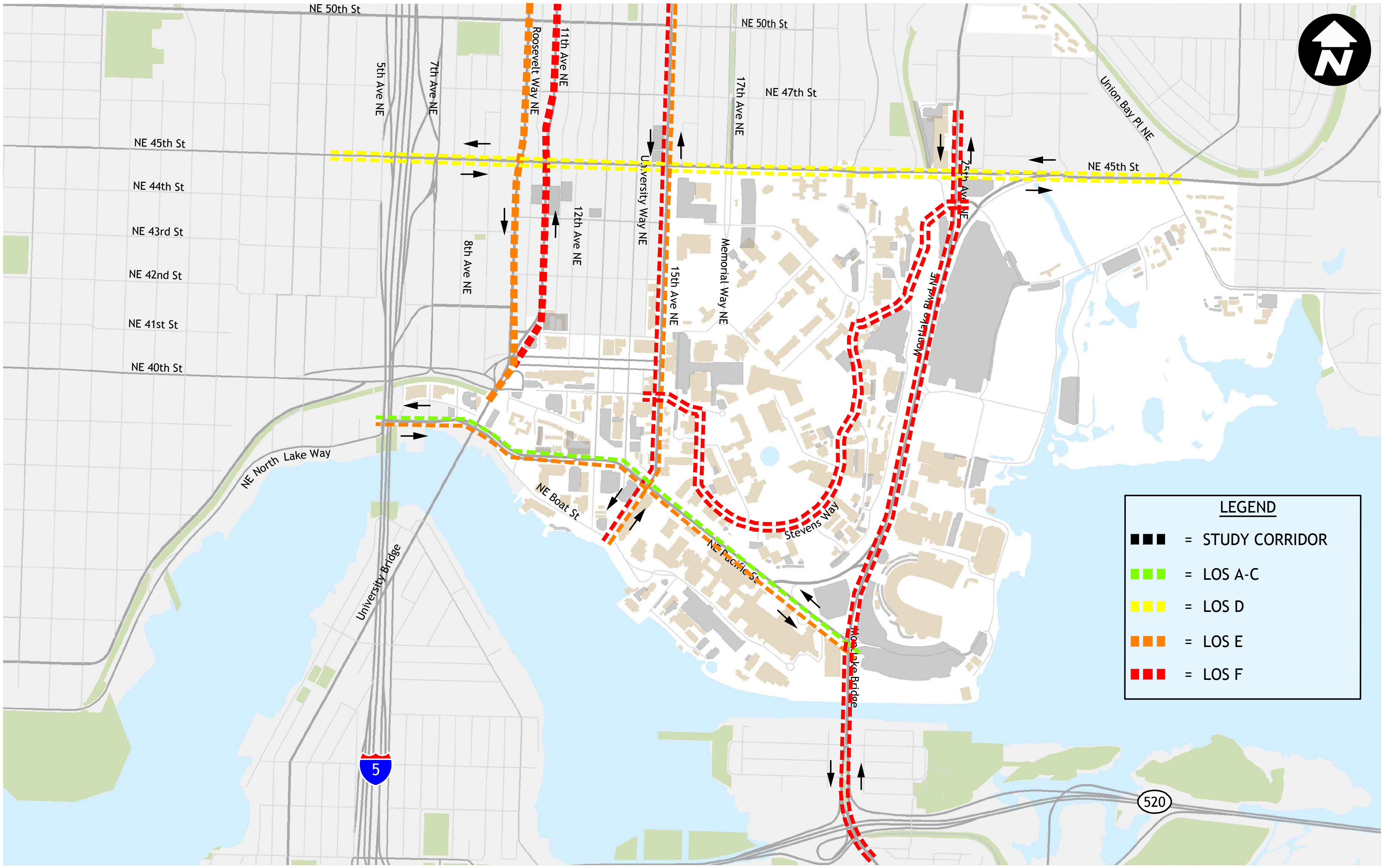
Arterial travel times and speeds were evaluated along NE 45th Street, Pacific Street, 11th Avenue NE, Roosevelt Way NE, 15th Avenue NE, Montlake Boulevard NE, and Stevens Way NE, along with traffic data associated with Alternative 1. These data are consistent with the previously described methodology for both existing and future No Action Alternative conditions. This includes the application of the adjustment factors previously described. Table 5.18 and Figure 5.11 summarize weekday PM peak hour arterial travel times and speeds. Detailed corridor operations worksheets are provided in Appendix C.

Table 5.18
WEEKDAY PM PEAK HOUR ARTERIAL OPERATIONS SUMMARY

Corridor	No Action Alternative		Alternative 1	
	LOS[1]	Speed[2]	LOS[1]	Speed[2]
11th Avenue NE between NE Campus Parkway and NE 50th Street				
Northbound	F	5.0	F	3.9
15th Avenue NE between NE Boat Street and NE 50th Street				
Northbound	E	8.0	E	7.2
Southbound	D	9.2	F	7.0
Montlake Boulevard NE between E Lake Washington Boulevard and NE 45th Street				
Northbound	E	11.5	F	9.9
Southbound	F	8.5	F	8.5
NE 45th Street between 5th Avenue NE and Union Bay Place NE				
Eastbound	D	12.0	D	12.0
Westbound	D	11.6	D	10.6
NE Pacific Street (NE Northlake Way) between 6th Avenue NE and Montlake Boulevard E				
Eastbound	C	18.3	E	11.6
Westbound	C	21.9	C	20.7
Roosevelt Way NE between NE Campus Parkway and NE 50th Street				
Southbound	D	10.4	E	8.8
Stevens Way NE between 15th Avenue NE and 25th Avenue NE				
Eastbound	F	3.6	F	3.5
Westbound	F	3.1	F	2.3

1. Level of service.
2. Average speed in miles per hour.

As shown in Table 5.18, with Alternative 1, the arterials would experience increases in delay and slower travel speeds. Anticipated LOS is as follows: Southbound 15th Avenue NE (from LOS D to LOS F), northbound Montlake Boulevard NE (from LOS E to LOS F), eastbound NE Pacific Street (from LOS C to LOS E), and southbound Roosevelt Way NE (from LOS D to LOS E).



Future (2028) Alternative 1 Weekday PM Peak Hour Corridor Traffic Operations

FIGURE

5.11

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WHAT TRANSPORTATION CAN BE.

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5.5.6 Screenline Analysis: Primary Impact Zone

Screenline: An imaginary line across which the number of passing vehicles is counted.

This section describes the analysis completed for two designated screenlines within the study area, consistent with City of Seattle Transportation Concurrency system. Screenlines are imaginary lines across which the number of passing vehicles is counted. In this study, screenlines were selected to count vehicle traffic entering and exiting the University of Washington primary and secondary impact zones. As part of the Mayor's Seattle 2035 Comprehensive Plan (City of Seattle, 2016), two screenlines were identified within the vicinity of the University of Washington, as shown in Figure 5.12. Screenline 5.16 is an east-west screenline, measuring north-south travel, and extends along the ship canal to include the University and Montlake bridges. Screenline 13.13 is a north-south screenline, measuring east-west travel, and extends east of Interstate 5 (I-5) between NE Pacific Street and NE Ravenna Boulevard.

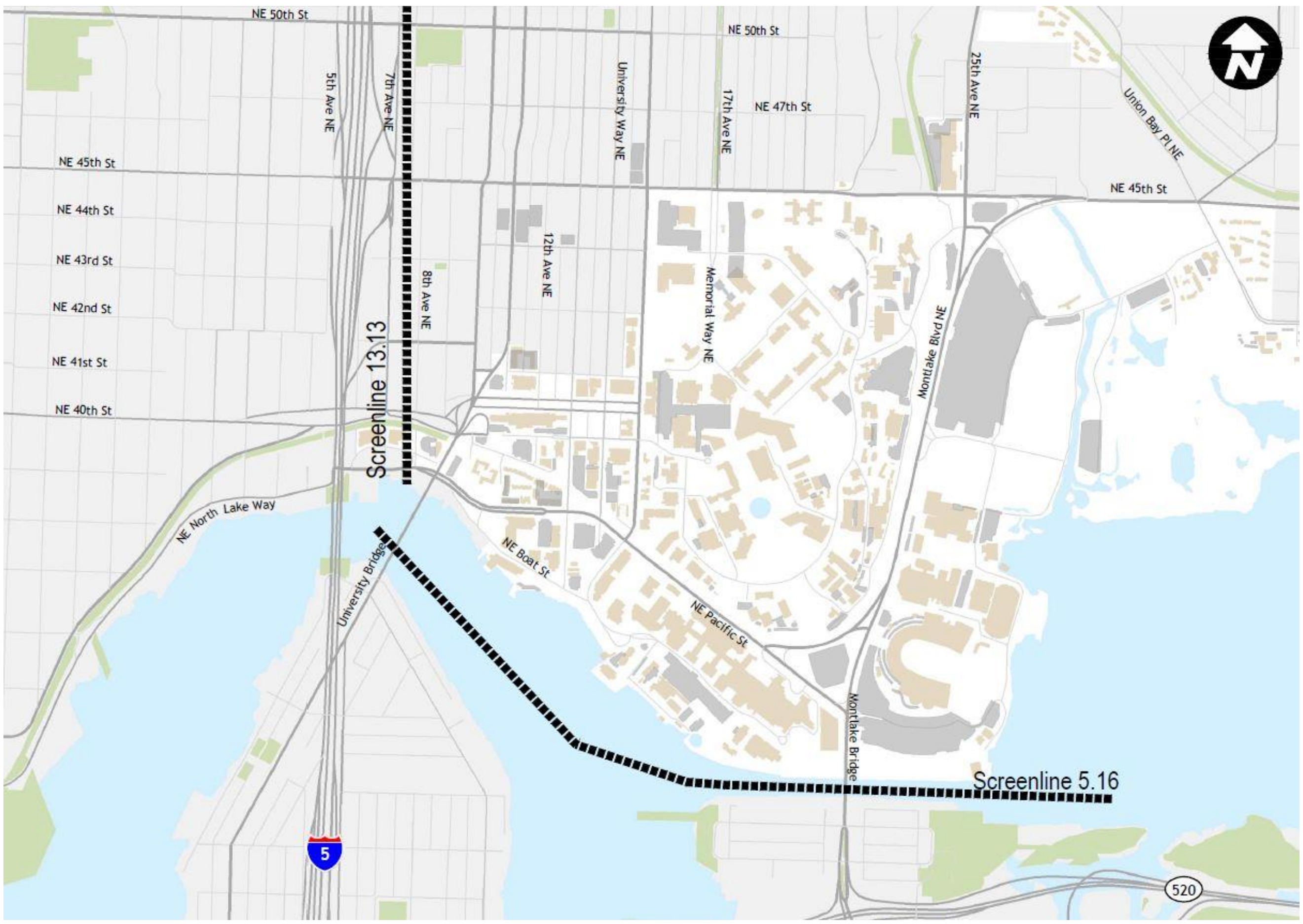


Figure 5.12 Study Area Screenlines

The analysis included volume-to-capacity (V/C) calculations for the vehicles traversing the screenlines using Alternative 1 traffic volumes and interpolated roadway capacity estimates. Roadway capacity for the 2028 horizon year was interpolated using 2016 capacity estimates described in Chapter 3, Affected Environment, and 2035 capacity estimates referenced in the May 2016 Seattle Comprehensive Plan Update Final EIS. Alternative 1 roadway capacity estimates are shown in Table 5.19 below. Detailed screenline volumes and V/C calculations are included in Appendix C.

Table 5.19
ROADWAY CAPACITY AT STUDY AREA SCREENLINES

Screenline	Alternative 1 Capacity
5.16 – Ship Canal, University, and Montlake Bridges	
Northbound	4,210
Southbound	4,210
13.13 – East of I-5, NE Pacific Street to NE Ravenna Boulevard	
Eastbound	6,119
Westbound	6,119

Source: Transpo Group, 2016

LOS standards for the screenline analysis were based on the V/C ratio of a screenline. As described in the Seattle Comprehensive Plan Update EIS, the LOS standard V/C ratios for Screenline 5.16 and Screenline 13.13 were 1.20 and 1.00, respectively. For this study, screenline V/C ratios that did not exceed the LOS standard were considered acceptable. A summary of the Alternative 1 screenline analysis is shown in Table 5.20. Detailed screenline analysis calculations are included in Appendix C.

Table 5.20
SCREENLINE ANALYSIS SUMMARY

Screenline	Screenline Volume	Capacity	V/C	LOS Standard V/C
5.16 – Ship Canal, University, and Montlake Bridges				
Northbound	4,045	4,210	0.96	1.20
Southbound	4,522	4,210	1.07	1.20
13.13 – East of I-5, NE Pacific Street to NE Ravenna Boulevard				
Eastbound	3,645	6,119	0.60	1.00
Westbound	3,916	6,119	0.64	1.00

Source: NACTO, Seattle Comprehensive Plan Update EIS, and Transpo Group, 2016

As shown in Table 5.20, all Alternative 1 screenline V/C ratios would meet the acceptable LOS standard.

5.5.7 Service/Freight Routes

Consistent with existing conditions, freight and delivery access would be provided for each building. The deliveries would largely come directly from the shippers, though a proportion of these may come through the University's interdepartmental delivery system. Because the specific development sites or freight/service needs are not yet known, an analysis at a site-specific level would not be appropriate at this time. The Seattle Municipal Code outlines the desired locations and number of loading berths and zones required for a project. This information would be used as guidance during the permitting of any future site. In general, an increase in delivery/service-related traffic would occur in the areas being developed. Therefore, no significant impact due to added freight traffic associated with Alternative 1 was identified.

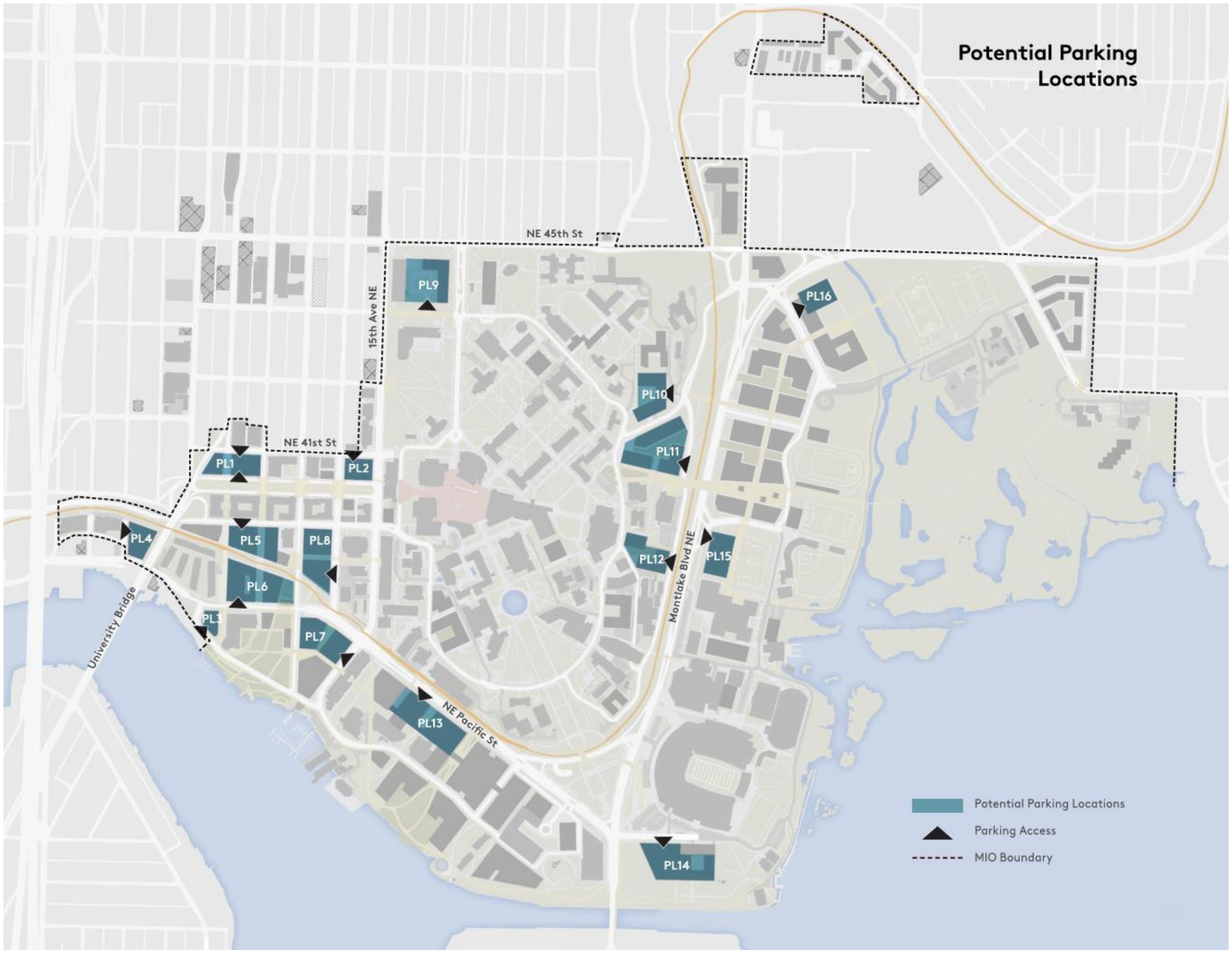
5.5.8 Parking

Parking Supply

Parking impacts were determined by evaluating each of the Development Alternatives assuming that the parking supply would be increased or decreased within each sector to achieve an 85-percent utilization without exceeding the parking cap. An 85- to 90-percent utilization reflects a level at which drivers are typically able to find parking without difficulty and circulation through the parking areas while searching for parking is minimized. With Alternative 1, the parking supply cap would be 10,250 spaces for all sectors combined.

Additional parking would be constructed on one or more of the identified parking sites reflected in Figure 5.13 below. Any increases in parking supply would be phased such that the existing City-University Agreement (CUA) parking cap would be maintained. Strategies to maintain the parking cap could include:

- Factoring in the parking demand and the implications on the parking cap when determining phasing of development
- Removing parking in sectors that are underutilized so that parking can be constructed in more desirable locations consistent with parking demand projections
- Shifting modes to reduce the overall parking needs for the campus to minimize the amount of new parking needed



Source: Sasaki Architects, July 2017 CMP

Figure 5.13 Potential Sites for Campus Parking

Parking Demand

Alternative 1 would develop 6 million gsf on-campus. Table 5.21 provides a comparison of the resulting peak parking demand by population between the No Action Alternative and Alternative 1. The evaluation assumes that, with the changes in campus parking supply, potential on-street parking demand would occur within the campus.

Table 5.21
PEAK PARKING DEMAND ON-CAMPUS / ON-STREET

	Vehicles Parked							
	Students[1]		Faculty[1]		Staff[1]		Total	
	No Action[2]	Alt 1[3]	No Action[2]	Alt 1[3,4]	No Action[2]	Alt 1[3]	No Action[2]	Alt 1[3]
On-Campus	1,857	2,298	1,096	1,358	3,814	4,768	6,768	8,424
Potential On-Street	134	136	49	50	94	96	277	282
Total	1,991	2,435	1,146	1,408	3,908	4,863	7,045	8,706

Source: Transpo Group, 2016

1. Demand by population assumes a SOV at 20 percent for the campus.
2. No Action forecasts are based on projected increases in population.
3. Approximately 3 percent of the total parking demand is anticipated to be generated by the proposed partner development (500,000 gsf in West Campus).

As shown in the table, compared to the No Action Alternative, Alternative 1 would add a parking demand of approximately 1,660 vehicles, assuming a 20-percent SOV for the campus. For the campus as a whole, the Alternative 1 parking demand would continue to be accommodated within the existing parking supply and would not impact the CUA parking cap.

Similar to the No Action Alternative, Alternative 1 on-campus parking demand and utilization were reviewed by sector to provide context (see Table 5.22 below). Allocation of Alternative 1 parking demand by sector was based on projected development as documented in Appendix B: Methods and Assumptions. This evaluation assumed that on-street parking would be allocated to on-campus facilities, given the increases and reallocation of parking supply to achieve an 85-percent utilization.

Table 5.22
PEAK PARKING DEMAND BY SECTOR

Sector	Parking Supply Cap	Parking Demand			% Utilization
		No Action[1]	Alternative 1		
			Growth[2]	Total	
West	2,820	1,428	969	2,397	85%
South	1,910	1,187	436	1,623	85%
Central	3,510	2,689	291	2,980	85%
East	2,010	1,464	242	1,706	85%
Total	10,250	6,768	1,938	8,706	85%

Source: Transpo Group, 2016

1. On-campus parking demand for the No Action Alternative is based on the projected increase in population. The analysis does not include on-street parking demand increases noted in the previous table since these would not be parking within the sectors.
2. Growth in parking demand for Alternative 1 is based on the projected increase in population.

As Table 5.22 reflects, reallocation of parking would result in a parking supply under the existing cap and an 85-percent utilization by campus sector and for the campus as a whole. The additional parking and reallocation of parking supply would provide a better relationship between localized supply and demand and thus reduce the likelihood of parking beyond University of Washington facilities (i.e., within the neighborhoods).

Secondary Parking Impacts

Parking outside the primary impact zone would likely continue with Alternative 1 similar to the No Action Alternative. This could include people parking their vehicles in unrestricted spaces within areas served by transit and then using transit to travel to campus. With future campus growth, this could occur at higher levels compared to the No Action Alternative.

5.6 AERIAL/STREET VACATIONS

The City of Seattle has established policies related to the review and consideration of alley and street vacations. The City's Street Vacation Policies (Clerk File 310078) are intended to guide City Council decisions regarding the vacation of public rights-of-way. Policy 1, which is related to Circulation and Access, states:

"Vacations may be approved only if they do not result in negative effects on both the current and future needs for the City's vehicular, bicycle, or pedestrian circulation systems or an access to private property, unless the negative effects can be mitigated."

Alternative 1 proposes a street vacation along NE Northlake Place east of 8th Avenue NE. Potential impacts would be concentrated within the immediate vicinity of NE Northlake Place with no impacts anticipated outside this area. Potential pedestrian, bicycle, transit, and vehicle impacts for each of the street vacations under Alternative 1 are outlined below.

NE Northlake Place

- **Pedestrians and Bicycles.** The vacation of Northlake Place would allow for a larger parcel to accommodate a new building. Pedestrian and bicycle use of this street is currently limited and generally associated with uses that have access along Northlake Place. With the vacation, these uses would be redeveloped. Pedestrian and bicycle facilities would be developed in the vicinity of the new building including the proposed green south of the Northlake Place parcels.
- **Transit.** No buses currently use Northlake Place. Primary bus service is located along NE Pacific Street, north of Boat Street NE. Given the relatively low traffic volumes of Northlake Place (approximately 30 vehicles during the weekday AM and PM peak hours), it is not anticipated that shifts in traffic would have a noticeable impact on transit.
- **Vehicle.** The section of NE Northlake Place proposed for street vacation accommodates two-way east/westbound lanes and one travel lane in each direction. NE Northlake Place dead ends approximately 170 feet east of 8th Avenue NE. The street is classified as an access street by the City of Seattle.
    - **Traffic Volumes –** Traffic volumes are relatively low along Northlake Place with approximately 30 vehicles during both the AM and PM peak hours.
    - **Traffic Operations –** No operational impacts are anticipated as a result of shifts in traffic volumes with the vacation.
    - **Service/Freight Routes –** No impacts are anticipated to service and freight routes as a result of the vacation.
    - **Parking –** Approximately 10 to 15 stalls would be displaced with the vacation. The Alternative 1 parking analysis shows that there would be sufficient campus parking to accommodate this displacement.

Further analysis would be provided to the City consistent with the policy requirements at such time an application for a street vacation is made. The EIS alternatives and supporting analysis reflect the vacation as proposed.

5.7 VEHICLE TRIP CAPS

Vehicle Trip Caps. Table 5.23 summarizes the potential vehicle trip cap compliance assuming an SOV rate of 20 percent. Historic SOV mode splits are between 18 and 20 percent (2014–2015) and 17 percent at 2016. Recent opening of the University of Washington Station (Link light rail) and anticipated expansion to a U District Station in 2021 suggests that the 20-percent projection for SOV modes used in this analysis is conservative and could be lower. As shown in the table, the vehicle trip cap is forecast to be maintained; however, the percentage of vehicle trips under the cap would decline with forecast growth levels. This suggests that the University of Washington would need to find ways through the Transportation Management Plan (TMP) demand management strategies to further reduce the amount of SOVs that are generated during the critical peak periods subject to the trip caps. The 2018 Seattle CMP goal is 15% SOV by 2028.

Table 5.23
VEHICLE TRIP CAP SUMMARY

Location/Peak Period	Trip Cap (vehicles/ hour)	Alternative 1
University of Washington Campus		
AM Peak Period Inbound (7–9 am)	**7,900**	**8,230**
PM Peak Period Outbound (3–6 pm)	8,500	8,230
U District		
AM Peak Period Inbound (7–9 am)	**10,100**	**10,275**
PM Peak Period Outbound (3–6 pm)	10,500	10,275

As described in Chapter 3, Affected Environment, projected trip cap outcomes are forecasts. Changes or shifts in travel behavior that would result in lower drive alone modes would reduce these estimates of AM entering trips. The University will continue monitoring as part of the TMP. Reductions in proportions of students, faculty, and staff driving alone, even by 1 percent, would result in the AM inbound traffic volumes adhering to the cap. The analysis assumes no change in mode split from 2015 levels (i.e. 20 percent), and thus may be considered conservative given that the current 2016 mode split is 17 percent, and worst-case assumptions given the planned light rail expansions from the University of Washington to Northgate by 2021 and Lynnwood by 2023. When completed, these rail expansions will greatly enhance access for students, faculty, and staff to reach the University by convenient transit and could reduce the overall proportion of drive alone travel to the campus. While this approach is conservative and does not factor in the potential benefits of increased future light rail access, the University would continue to maintain compliance with the trip caps as part of their overall management effort, consistent with the institution's history, and implemented through the TMP, assuming the more conservative 20 percent mode split would result in exceeding the U District cap in about 2025. A sensitivity analysis with lower drive alone mode split is included in Appendix B. As noted previously, growing trends in transit use for campus populations indicate this 20 percent drive alone mode split may be conservative. As the University commits to a lower mode split percentage, these caps would not be exceeded.

Transportation Management Plan (TMP): A transportation management plan provides strategies for limiting traffic impacts and promoting active communities by managing vehicle trips and parking, as well as accommodating transit and non-motorized travel modes.

Parking Caps. Depending on the amount of new parking constructed to replace displaced facilities and to provide additional parking more proximate to new campus buildings, the on-campus parking supply will be managed to assure maintenance of the 12,300 total parking supply cap. This could require temporary or permanent elimination of some parking spaces, or repurposing the spaces during weekday conditions while maintaining their availability for use during major sporting events at Husky Stadium.

6 IMPACTS OF ALTERNATIVE 2

This chapter evaluates all modes of travel and compares **Alternative 2** to the No Action Alternative. Alternative 2 would encompass operations in the horizon year of 2028 with approximately 6 million gross square footage of new development. The focus of those improvements would be primarily in the West and South campus sectors with more limited development in the Central and East campus sectors.

This chapter summarizes the results of the analysis conducted for Alternative 2: CMP Proposed Allocation with Existing Height Limits. As in the previous chapters, this evaluation examines the impacts to the key transportation elements and transportation modes.

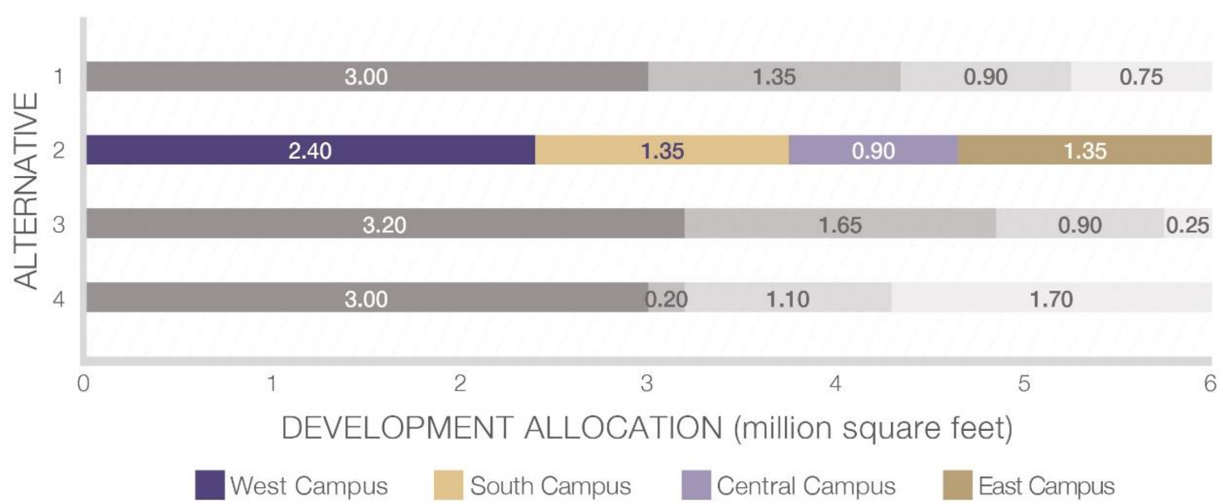
The No Action Alternative, used to compare existing conditions to Alternative 2, assumes a proportion of the development to be 211,000 gross square footage (gsf), as outlined in the City of Seattle adopted 2035 Comprehensive Plan and the adopted U District Rezone.

6.1 CHANGING CAMPUS CHARACTERISTICS

6.1.1 Description of the Alternative

This section summarizes the evaluation of Alternative 2 with respect to the transportation elements identified in Chapter 3, Affected Environment. The proposed University of Washington development in Alternative 2 is anticipated to be primarily located in the West and East campus sectors. The technical analysis of Alternative 2 focused on the weekday PM peak period.

Alternative 2 would include the development of 6 million net new gsf throughout the campus. Of this total area, approximately 2.4 million gsf would be located in West Campus, 1.35 million gsf in South Campus, 900,000 gsf in Central Campus, and 1.35 million in East Campus, as shown in Figure 6.1.



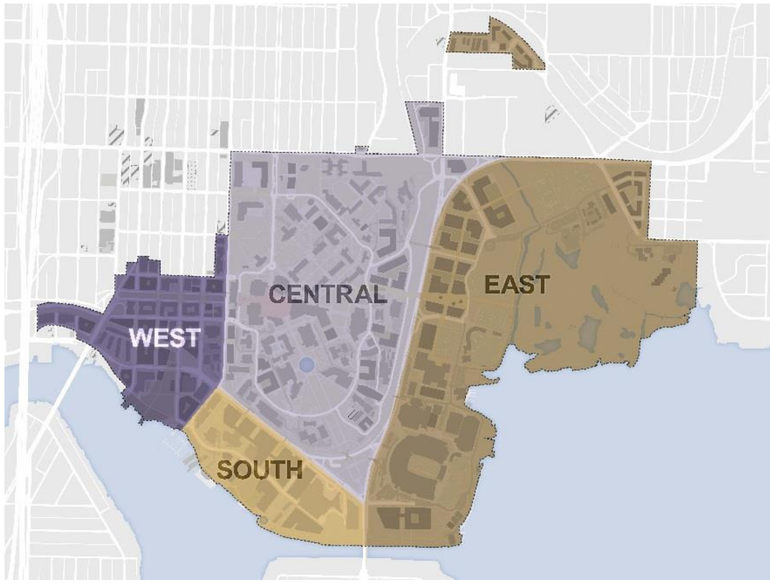


Figure 6.1 Alternative 2 Development Allocation

6.1.2 Trip Generation by Mode

This section provides a summary of the anticipated trip generation for pedestrian, bicycle, transit, and vehicle modes to campus. The trip generation methodology used for assessing the increase in trips under Alternative 2 is consistent with that previously described in Chapter 4, No Action Alternative.

6.2 PEDESTRIANS

6.2.1 Performance Measures

The following pedestrian-related performance measures have been identified to assess and compare alternatives:

- Proportion of Development within 1/4 Mile of Multi-Family Housing
- Proportion of Development within 1/4 Mile of University of Washington Residence Halls
- Quality of Pedestrian Environment
- Pedestrian Screenline Demand and Capacity
- Pedestrian Transit Station/Stop Area LOS

These measures reflect the effectiveness of the pedestrian network in providing safe and easy access to pedestrian destinations, specifically housing, thereby maintaining a high walk mode choice on campus. A comparisons between Alternative 2 relative to the No Action Alternative and Alternative 1 is provided for each measure below.

Proportion of Development within 1/4 Mile of Multifamily Housing

Walking makes up nearly 30 percent of all existing trips to and from campus. Proximity of campus development to housing is therefore one important measure to assessing the propensity of people to walk. This measure assesses the proximity of the current campus buildings and development to nearby multifamily housing. As shown in Table 6.1, 67 percent of Alternative 2 development would be within a 1/4-mile proximity to multifamily housing.

Table 6.1
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF MULTIFAMILY HOUSING

Sector	No Action Gross square feet (gsf)	Alternative 1 Gross square feet (gsf)	Alternative 2 Gross square feet (gsf)
West	211,000	3,000,000	3,000,000
South	NA	0	0
Central	NA	589,985	723,460
East	NA	0	897,964
Total	**211,000**	**3,589,985**	**4,021,424**
Percent	***100%***	***60%***	***67%***

Proportion of Development within 1/4 Mile of University of Washington Residence Halls
This performance measure assesses the proximity of campus development within walking distance of residence halls. For this analysis, University of Washington residence halls were identified and then buffered by a 1/4 mile. As shown in Table 6.2, 79 percent of the new development in Alternative 2 would be within a 1/4-mile proximity to residence halls.

Table 6.2
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF RESIDENCE HALLS

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)	Alternative 2 Gross Square Feet (gsf)
West	211,000	3,000,000	3,000,000
South	NA	249,344	249,344
Central	NA	798,357	723,460
East	NA	750,000	1,350,000
Total	**211,000**	**4,797,701**	**4,722,804**
Percent	***100%***	***80%***	***79%***

Quality of Pedestrian Environment (Primary and Secondary Impact Zones)
Alternative 2 would provide several enhancements to pedestrian travel within the Major Institution Overlay (MIO) where development would occur. Improvements in West Campus would primarily include improvements to sidewalks and a new Americans with Disabilities Act (ADA) accessible pedestrian connection between West and Central Campus. Pedestrian demand in and around West Campus would increase with added uses.

The new pedestrian connections in South Campus, would improve access to Portage Bay; however, improved access and connectivity could be less than Alternative 1. South Campus would see an increase in pedestrian travel, although not on the same scale as West or East Campus.

In addition to these upgrades, the City of Seattle's Pedestrian Master Plan highlights new Neighborhood Greenways within the primary and secondary impact zones.

Within the primary impact zone, several greenways are planned in the following locations:

- A southern extension of the existing 12th Avenue NE Neighborhood Greenway
- Walla Walla Road
- NE Boat Street from NE Pacific Street to 15th Avenue NE, which would improve pedestrian connectivity from the Cheshiahud Lake Union Loop to the University of Washington campus
- 20th Avenue NE north of 45th Street and NE 47th Street west of 20th Ave NE, which would increase pedestrian connectivity to the secondary impact zone, and would connect to other planned greenways including 11th Avenue NE, NE 55th Street, and NE 62nd Street
- NE Clark Road

Within the secondary impact zone, greenways in the east section are planned in the following locations:

- 5th Avenue NE
- NE 46th Street
- Keystone Place N

And in the west section:

- NE Surber Drive
- NE 50th Street

Pedestrian Screenline Demand and Capacity

The pedestrian screenline capacity analysis evaluates the peak hour demand, capacity, and level of service (LOS) at all at-grade and above-grade crossing locations along Montlake Boulevard NE, NE Pacific Street, 15th Avenue NE, and NE 45th Street. The following section summarizes pedestrian screenline volumes in Alternative 2.

Pedestrian Growth from Transit Ridership

Pedestrian growth from increased transit ridership was added to transit stop pedestrian volumes aggregated by screenline, similar to Alternative 1 as described in Chapter 5. This growth accounts for all new pedestrians in the University of Washington study area that would be generated by additional net new transit trips to and from campus.

Pedestrian Growth from Alternative 2 Development

Pedestrian growth anticipated with Alternative 2 was assumed to be relative to the No Action Alternative, and evaluated using the same analysis process as Alternative 1 (see Chapter 5). Table 6.3 summarizes Alternative 2 peak hour pedestrian screenline volumes and LOS.

Table 6.3
PEAK HOUR PEDESTRIAN VOLUME AND LEVEL OF SERVICE

Screenline	No Action Alternative		Alternative 2	
	Peak Hour Pedestrian Volume (People/hour)	Level of Service (LOS)	Peak Hour Pedestrian Volume (People/hour)	Level of Service (LOS)
Montlake Boulevard NE	14,770	A	17,948	A
NE Pacific Street	3,744	A	4,780	A
15th Avenue NE	12,078	A	15,744	A
NE 45th Street	2,272	A	2,614	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition.

As shown in Table 6.3, Alternative 2 peak hour aggregate pedestrian volumes for all screenlines would be at LOS A.

Pedestrian Transit Station/Stop Area LOS

This measure evaluates the peak hour demand, capacity, and LOS at key transit stops along Montlake Boulevard NE, NE Pacific Street, and 15th Avenue NE. The following sections summarize the pedestrian space per person and LOS at these locations with Alternative 2 development.

Pedestrian Growth from Transit Ridership

Additional growth due to increased transit ridership was added to transit stop pedestrian volumes aggregated by campus sector, similar to Alternative 1 as described in Chapter 5. This growth accounts for all new pedestrians in the University of Washington study area that would be generated by additional net new transit trips to and from campus.

Pedestrian Space from Alternative 2 Development

Pedestrian space anticipated with Alternative 2 was assumed to be relative to the No Action Alternative and evaluated using the same method as Alternative 1 (see Chapter 5). Table 6.4 summarizes Alternative 2 peak hour pedestrian space and LOS.

Table 6.4
PEAK HOUR PEDESTRIAN SPACE AND LEVEL OF SERVICE

Stop Location	Stop ID Number	No Action Alternative		Alternative 2	
		Pedestrian Space (ft²/person)	Level of Service (LOS)	Pedestrian Space (ft²/person)	Level of Service (LOS)
NE Pacific Street Bay 1	1	45.0	A	10.9	B
NE Pacific Street Bay 2	2	39.0	A	10.4	B
NE Pacific Street at 15th Avenue NE	3	7.5	C	1.7	F
15th Avenue NE at Campus Parkway	4	62.4	A	8.5	C
15th Avenue NE at NE 42nd Street	5	50.5	A	6.6	D
15th Avenue NE at NE 43rd Street	6	27.8	A	7.1	C
Montlake Boulevard Bay 4	7	39.0	A	23.3	A
Montlake Boulevard Bay 3	8	108.7	A	64.9	A
Stevens Way at Pend Oreille Road	9	19.0	A	12.2	B
Stevens Way at Benton Lane	10	36.4	A	22.3	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition.

As shown in Table 6.4, Alternative 2 peak hour pedestrian space for all transit stops, with the exception of locations 3 and 5, would be at LOS C or better. Location 3 (mid-block near the 15th Avenue NE/ NE Pacific Street intersection) and location 5 (at the 15th Avenue NE/ NE 42nd Street intersection) would be at LOS F and LOS D, respectively.

6.3 BICYCLES

6.3.1 Performance Measures

The following bicycle-related performance measures have been identified to assess and compare alternatives:

- Burke-Gilman Trail Capacity
- Bicycle Parking and Utilization
- Quality of Bicycle Environment

Burke-Gilman Trail Capacity

The Burke-Gilman Trail is anticipated to experience increased demand in the West, South, and East campus sectors, similar to Alternative 1. However, the balance of this growth would be oriented toward East Campus and less toward West Campus compared to Alternative 1. The development in West Campus with Alternative 2 could result in trail facility improvements, like those in the Mercer Court area. Increased cross traffic and travel along the trail segment is anticipated in all areas of campus particularly in East Campus with large redevelopment of E1 from parking to buildings. Planned expansion of the Burke-Gilman Trail by separating pedestrian and bicycle uses would provide adequate capacity to meet CMP demands.

LOS results for segments along the Burke-Gilman Trail were based on the Federal Highway Administration's Shared-Use Path Level of Service Calculator (SUPLOS). These results are anticipated to be similar to those presented in Alternative 1 (Chapter 5).

Bicycle Parking and Utilization

As described in the Affected Environment chapter, the University has effectively managed bicycle parking demand. As new buildings are constructed, bicycle parking will be provided. For these reasons, additional bicycle parking analysis was not conducted for any of the growth alternatives (Alternatives 1-4).

Quality of Bicycle Environment (Primary and Secondary Impact Zones)

Changes to bicycle travel associated with Alternative 2 are similar to Alternative 1; however, added bicycle travel demand would be lower in West Campus and greater in East Campus.

In addition to those mentioned above, the Seattle Bicycle Master Plan includes several proposed improvements within the primary and secondary impact zones.

Within the primary impact zone, planned improvements include:

- A protected bike lane running north/south along Roosevelt Way NE highlights bicycle connectivity improvements (recently installed)
- Protected bike lanes along 11th Avenue NE and 12th Avenue NE
- Protected bike lanes along NE 40th Street, west of Brooklyn Avenue NE that would connect with the existing cycling infrastructure on NE 40th Street, thereby improving connectivity to campus

Within the secondary impact zone, planned improvements include:

- A new protected bike lane along Ravenna Place NE that would provide a direct connection between the Burke-Gillman Trail and Ravenna Park
- A protected bike lane along 36th Avenue NE that would increase bicycle connectivity in the north/south directions
- A planned Neighborhood Greenway along Fairview Avenue E that would increase the cycle connection to campus from the south

6.4 TRANSIT

6.4.1 Performance Measures

The following transit-related performance measures have been identified to assess and compare alternatives:

- Proportion of Development within 1/4 Mile of RapidRide
- Proportion of Development within 1/2 Mile of Light Rail
- Transit Stop Capacity
- Transit Travel Times and Delay
- Transit Loads at Screenlines

Proportion of Development within 1/4 Mile of RapidRide

This measure calculates the proportion of development within 1/4 mile of RapidRide service to the University of Washington. As shown in Table 6.5 below, 100 percent of the new development in the No Action Alternative, Alternative 1, and Alternative 2 would be within a 1/4-mile proximity of RapidRide.

Table 6.5
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF RAPIDRIDE

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)	Alternative 2 Gross Square Feet (gsf)
West	211,000	3,000,000	2,400,000
South	NA	1,350,000	1,350,000
Central	NA	900,000	900,000
East	NA	750,000	1,350,000
Total	**211,000**	**6,000,000**	**6,000,000**
Percent	***100%***	***100%***	***100%***

Proportion of Development within 1/2 Mile of Light Rail

This measure calculates the proportion of development within a 1/2-mile walkshed of light rail stations. This action includes the U District Station at Brooklyn Street between NE 45th and NE 43rd streets, assumed to be completed in 2021. Table 6.6 summarizes the square footage of development within a 1/2-mile walkshed of light rail in No Action, Alternative 1, and Alternative 2. Compared to Alternative 1, Alternative 2 development would be more significant in East Campus. However, much more of this East Campus development would fall outside the 1/2-mile walkshed of light rail stations, resulting in a lower overall coverage.

Table 6.6
PROPORTION OF DEVELOPMENT WITHIN 1/2 MILE OF LIGHT RAIL

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)	Alternative 2 Gross Square Feet (gsf)
West	211,000	2,680,232	2,160,729
South	NA	1,350,000	1,350,000
Central	NA	900,000	900,000
East	NA	750,000	452,036
Total	**211,000**	**5,680,232**	**4,862,766**
Percent	***100%***	***89%***	***90%***

Transit Stop Capacity

This measure evaluates the number of buses that a transit stop can process in an hour. This analysis was performed for four pairs of stops on key transit corridors around the University of Washington: 15th Avenue NE, NE 45th Street, Montlake Boulevard and NE Pacific Street. The transit stop capacity and demand do not change by alternative. Therefore, the summary provided in Chapter 4, No Action Alternative, reflects the expected operations.

Transit Travel Times and Delay

Transit travel speeds do not vary between Development Alternatives. Transit origins around the campus are anticipated to attract similar numbers of patrons regardless of development. Therefore, the transit corridor speeds are the same as Alternative 1 (Chapter 5).

Transit Loads at Screenlines

See Chapter 5, Alternative 1.

6.5 VEHICLE

6.5.1 Performance Measures

Six measures of effectiveness were analyzed to evaluate the impact of the campus growth on the surrounding transportation network:

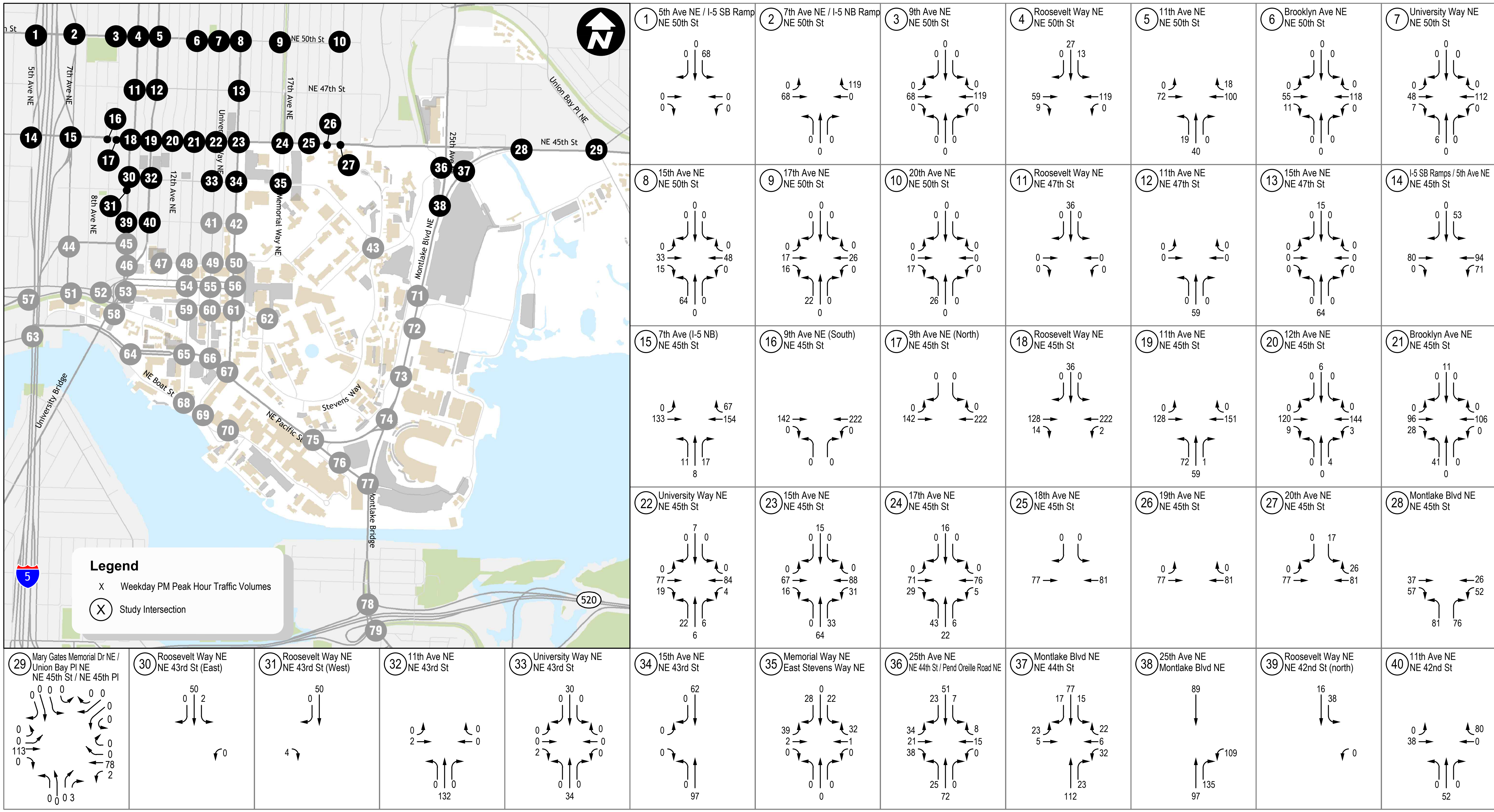
- Intersection operational level of service for intersection located in the primary and secondary impact area
- Arterial Corridor Operations
- Screenline Volumes
- Cordon Volumes
- Caps are set as 1990 trip levels to the University District and University (MIO)
- Freight Corridor Impact

6.5.2 Traffic Volumes

Increased vehicle traffic associated with Alternative 2 was assigned to potential garage locations based on existing vehicle travel patterns, previous studies in the project vicinity, review of University information, and U.S. Census Bureau's *OnTheMap* tool. *OnTheMap* is a web-based mapping and reporting application that shows where workers are employed and where they live based on census data. The ZIP codes within that data were evaluated to determine if a person would be more likely to travel from the ZIP code via vehicle or by other means. Individuals making trips to ZIP codes closer to the proposed project sites or in more transit-oriented locations are more likely to use transit, walk, bicycle, or other non-drive alone modes. Individuals making trips to ZIP codes outside the Seattle city limits and/or farther from the site are more likely to drive. The general trip distribution to/from the University of Washington is shown in Chapter 4, Impacts of No Action.

Primary Impact Zone

Project trips for each potential garage location were assigned to the study intersections based on the general trip distribution patterns shown in Chapter 4. Project trips at each study intersection are shown in Figure 6.2 and Figure 6.3 below. The resulting Alternative 2 volumes are shown in Figure 6.4 and Figure 6.5.



Future (2028) Alternative 2 (Intersections 1-40) Project Trips

University of Washington 2018 Campus Master Plan

FIGURE
6.2

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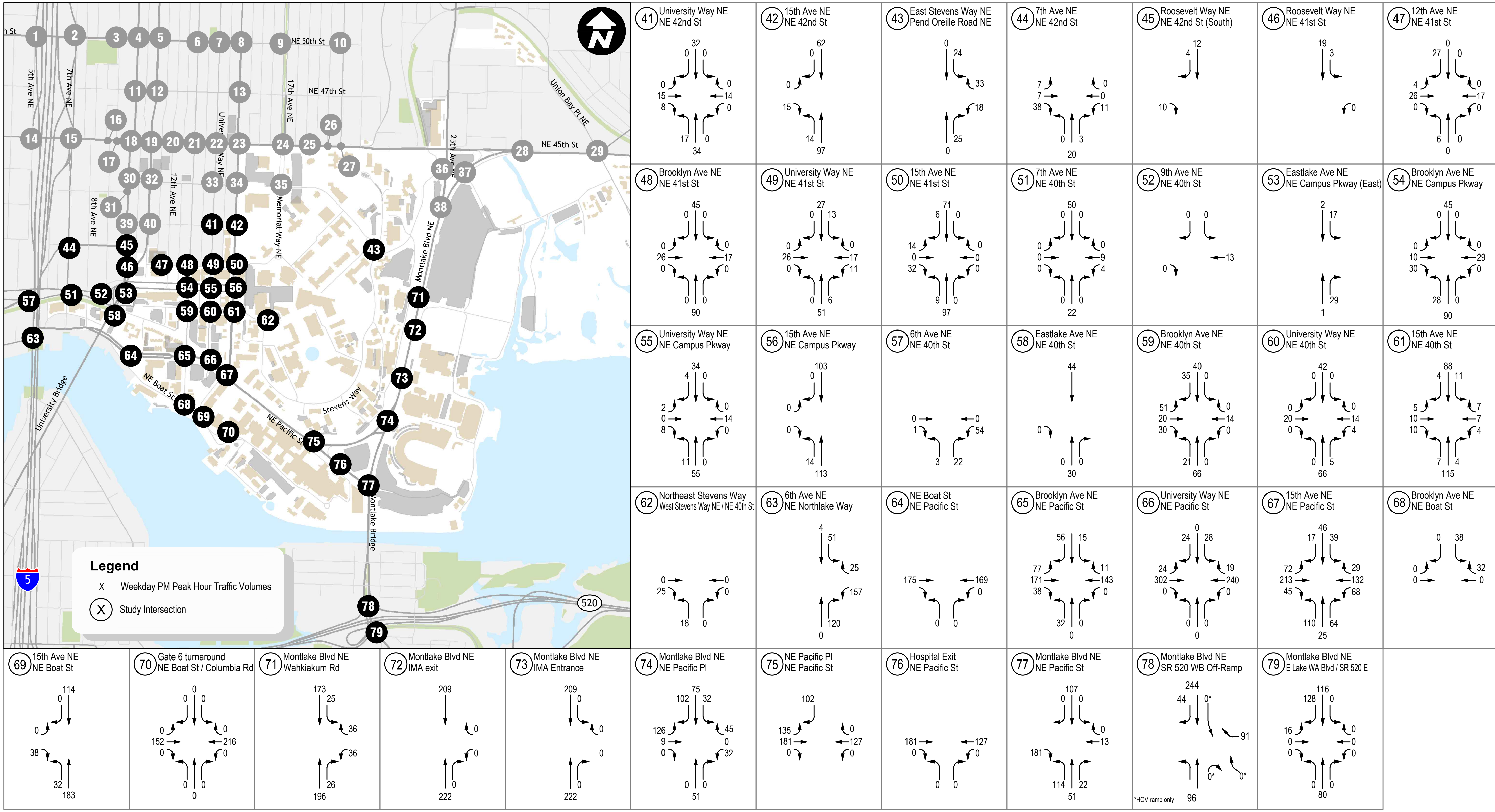

Future (2028) Alternative 2 (Intersections 41-79) Project Trips

University of Washington 2018 Campus Master Plan

FIGURE **6.3**

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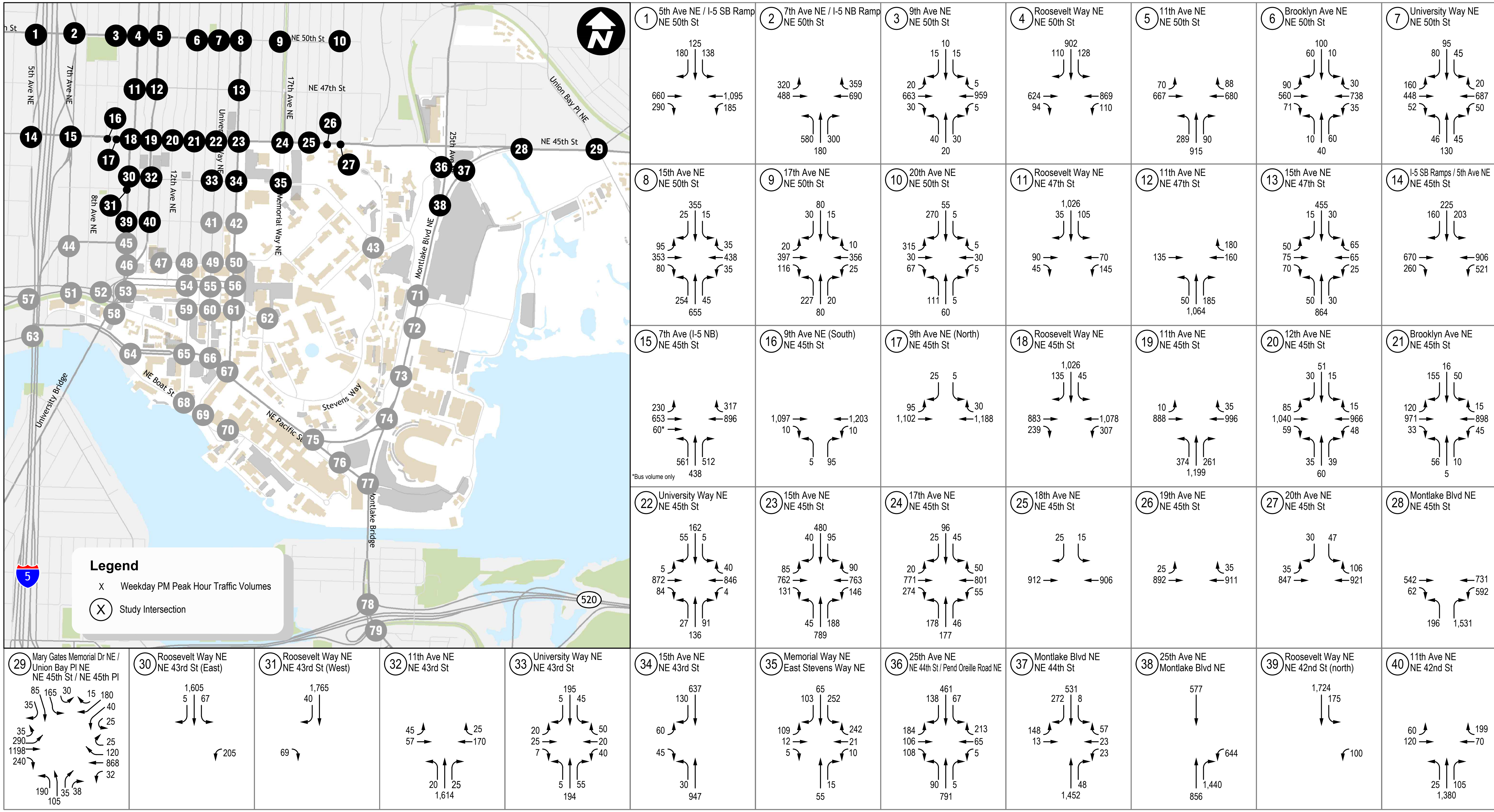

Future (2028) Alternative 2 (Intersections 1-40) Weekday PM Peak Hour Traffic Volumes

University of Washington 2018 Campus Master Plan

FIGURE
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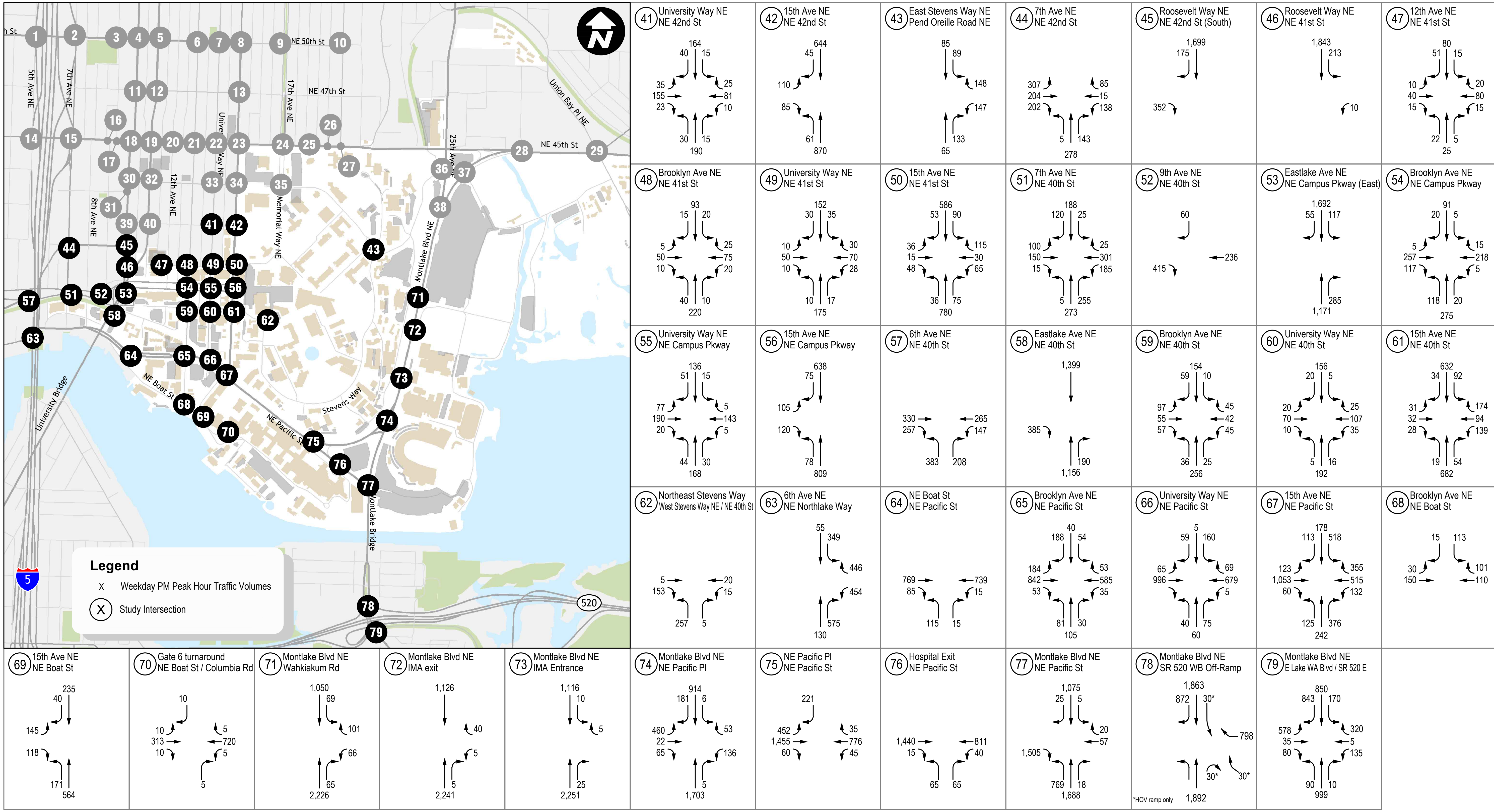

Future (2028) Alternative 2 (Intersections 41-79) Weekday PM Peak Hour Traffic Volumes

University of Washington 2018 Campus Master Plan

FIGURE **6.5**

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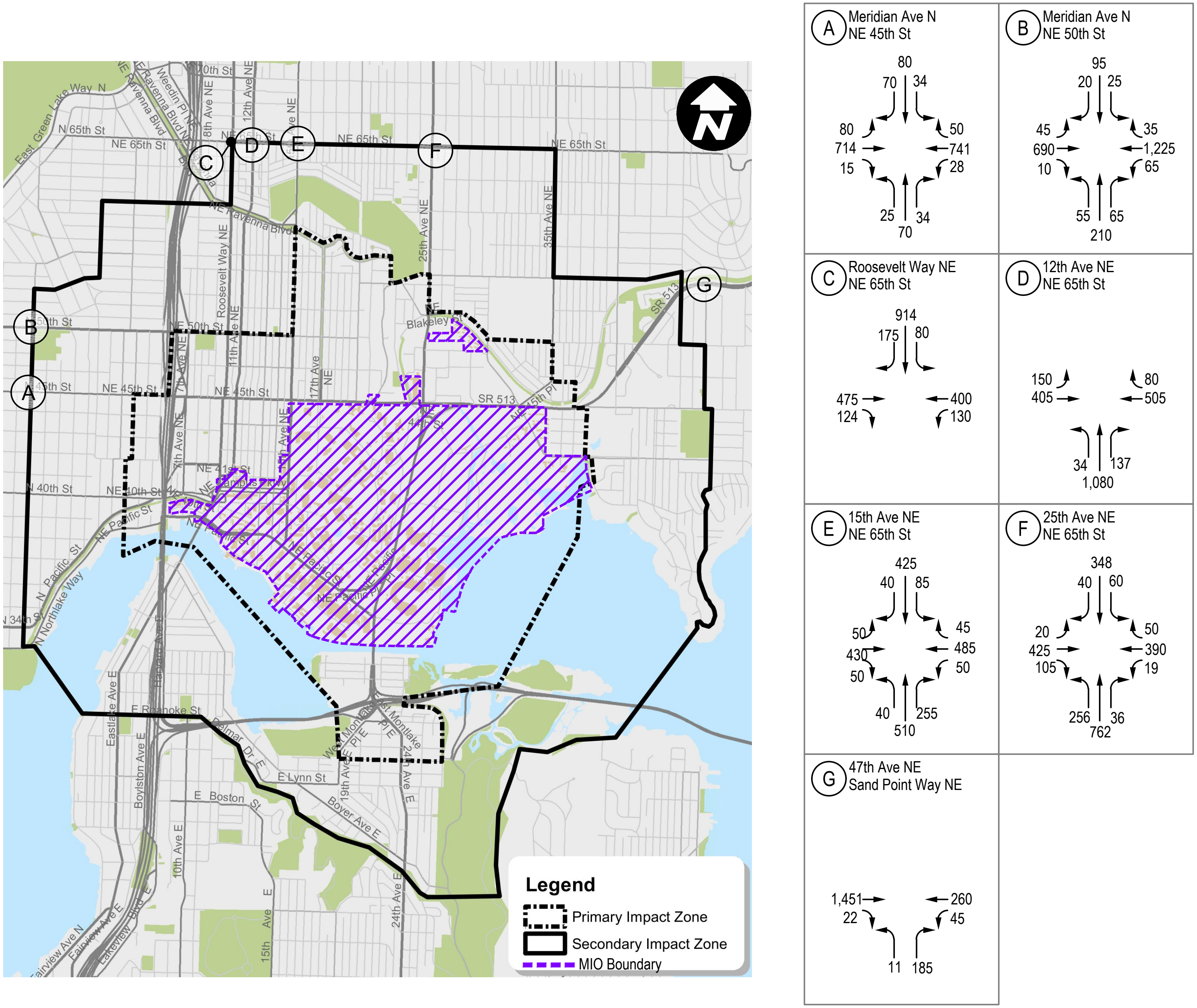
Secondary Impact Zone

Weekday PM peak hour volumes at seven intersections in the secondary impact zone were analyzed by considering future background traffic and volumes associated with the Alternative 2 development. Alternative 2 directional volumes were forecast in the same manner as all primary impact zone study intersections as described above. It was assumed that 5 percent of future volumes would be distributed into the neighborhood roadway network and therefore would not travel through the secondary impact zone study intersections. The resulting secondary impact zone volumes are shown in Figure 6.6.



Alternative 2 Secondary Impact Zone Weekday PM Peak Hour Traffic Volumes

FIGURE 6.6

University of Washington 2018 Campus Master Plan

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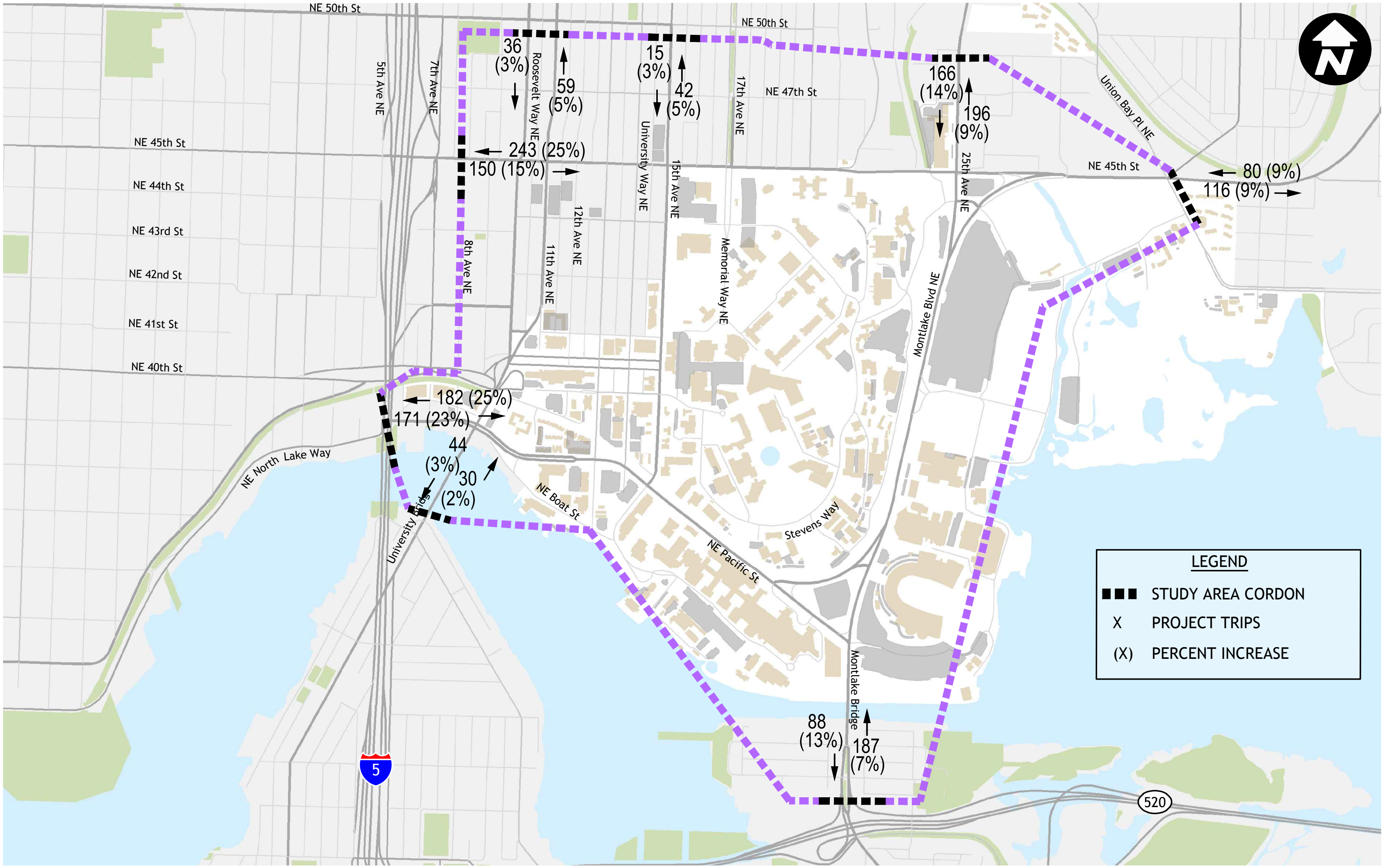
6.5.3 Cordon Volume Analysis

Cordon: An imaginary line used to evaluate traffic in and out of the University area and measure the change or increase in traffic associated with the proposed alternatives.

To understand the volumes considered under the different development alternative scenarios, a cordon volume analysis was completed. The cordon volume analysis focused on the major roadways leading to and from the University. The cordon volume analysis also showed the percent of total trips along the corridor that were associated with the increased traffic generated by Alternative 2. The cordon volume and project share associated with Alternative 2 are shown in Figure 6.7. Note that these data reflect the percentage increase associated with continued development on-campus. As shown in the figure, total project-related volumes would increase cordon volumes by 10–11 percent. Similar to Alternative 1, this increase could be constrained by the available arterial street capacity.



Future (2028) Alternative 2 PM Peak Hour Cordon Volumes and Proportional Increase

FIGURE

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6.5.4 Traffic Operations Performance

Methodology

The methodology used in assessing intersection and corridor LOS is consistent with that described for the Affected Environment (Chapter 3) and No Action Alternative (Chapter 4) scenarios. A detailed description of the methodology used can be found in Appendix B: Methods and Assumptions.

Intersection Operations – Primary Impact Zone

Weekday PM peak hour intersection traffic operations during the Alternative 2 conditions are summarized in Figure 6.8 and Figure 6.9. The year 2028 geometry for all of the study-area intersections was assumed to remain the same as No Action Alternative conditions. Additionally, signal timing splits and offsets were optimized under Alternative 2. Complete intersection LOS summaries are provided in Appendix C.

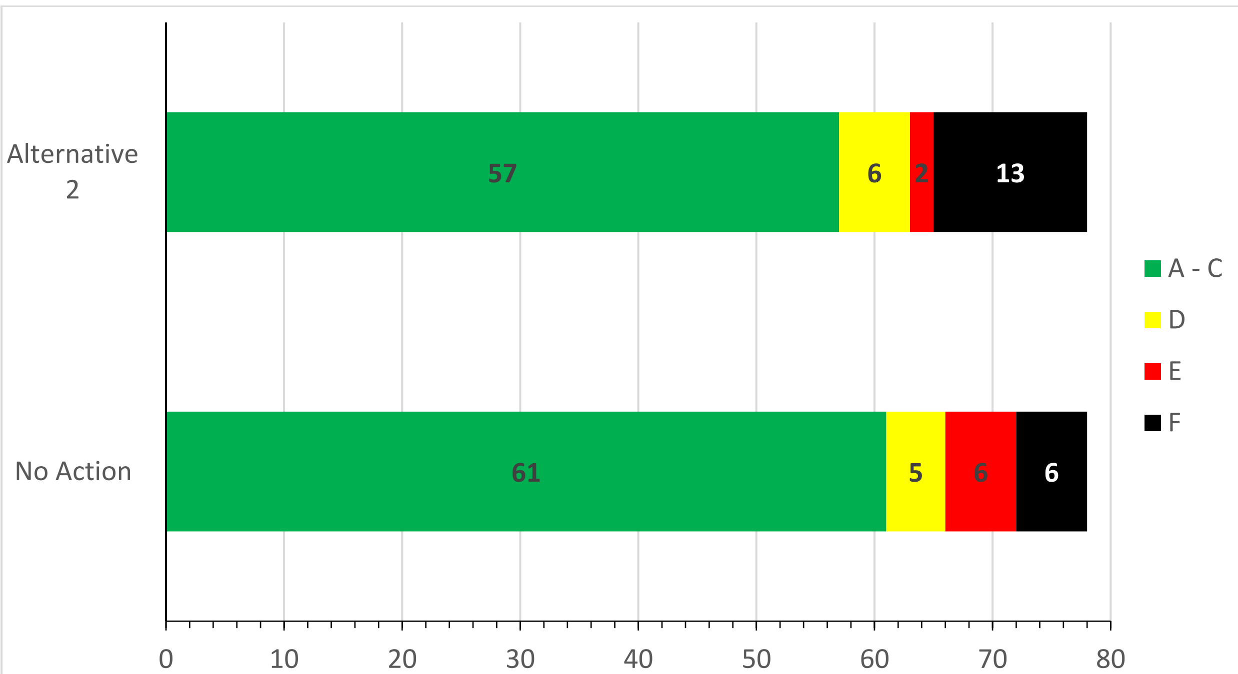


Figure 6.8 Weekday PM Intersection Level of Service Summary

The following table illustrates changes in intersection traffic operations at locations anticipated to operate at LOS E or F during the weekday PM peak hour under future Alternative 2 conditions.

Table 6.7
INTERSECTION LEVEL OF SERVICE SUMMARY

Intersection	No Action		Alternative 2		Change in Delay (sec)	Project Share
	LOS[1]	Delay [2]	LOS[1]	Delay [2]		
16. 9th Ave NE (south) / NE 45th St	E	41	F	67	26	15.9%
29. Montlake Blvd NE / Mary Gates Memorial Dr NE	D	50	E	58	8	5.2%
30. Roosevelt Way NE / NE 43rd St (east)	F	793	F	966	173	2.8%
31. Roosevelt Way NE / NE 43rd St (west)	F	74	F	113	39	2.9%
32. 11th Ave NE/NE 43rd St	E	72	F	105	33	7.2%
46. Roosevelt Way NE / NE 41st St	E	36	E	36	2	1.3%
47. 12th Ave NE / NE 41st St	F	52	F	426	374	24.6%
49. University Way NE / NE 41st St	F	*	F	*	*	28.7%
51. 7th Ave NE / NE 40th St	E	44	F	56	12	5.2%
57. 6th Ave NE / NE 40th St	F	107	F	128	21	5.1%
63. 6th Ave NE / NE Northlake Way	E	38	F	108	70	17.9%
67. 15th Ave NE / NE Pacific St	D	37	F	87	49	23.3%
69. 15th Ave NE / NE Boat St	C	18	F	96	78	31.4%
71. Montlake Blvd NE / Wahkiakum Rd	F	343	F	272	-71	13.1%
72. Montlake Blvd NE / IMA exit	D	34	F	57	23	12.2%

*Volume exceeds capacity and Synchro could not calculate the delay.

1. Level of service. 2. Average delay per vehicle in seconds rounded to the whole second.

During the weekday PM peak hour, eight additional intersections are anticipated to operate at LOS F under Alternative 2 traffic conditions compared to No Action conditions. Overall, 21 intersections are anticipated to operate at LOS D or worse during the weekday PM peak hour with Alternative 2, as compared to 17 under No Action conditions. The City of Seattle does not have an LOS standard, but generally considers LOS E and LOS F at signalized intersections and LOS F at unsignalized intersections to reflect poor operations. Intersections that degrade from LOS D to E or operate at LOS E or LOS F under the "with-project" condition, or increase by more than 5 or more seconds, could be considered significant by the City.

The following intersections are anticipated to degrade to LOS D or worse under Alternative 2 conditions:

16. 9th Avenue NE (South)/NE 45th Street
17. 9th Avenue NE (North)/NE 45th Street
29. Montlake Boulevard NE/Mary Gates Memorial Drive NE
32. 11th Avenue NE/ NE 43rd Street
51. 7th Avenue NE/ NE 40th Street
63. 6th Avenue NE/NE Northlake Way
67. 15th Avenue NE/NE Pacific Street
69. 15th Avenue NE/NE Boat Street
72. Montlake Boulevard NE/IMA Exit
73. Montlake Boulevard NE/IMA Entrance
77. Montlake Boulevard NE/NE Pacific Street

Intersections where the LOS would be E or F and where the Alternative 2 traffic would increase delay by more than 5 seconds are shown in Table 6.8. As shown in the table, a majority of the intersections is unsignalized. At the two-way stop controlled (TWSC) intersections, the change in delay is represented for the worst movement.

Table 6.8
POTENTIAL INTERSECTION OPERATIONS IMPACTS SUMMARY

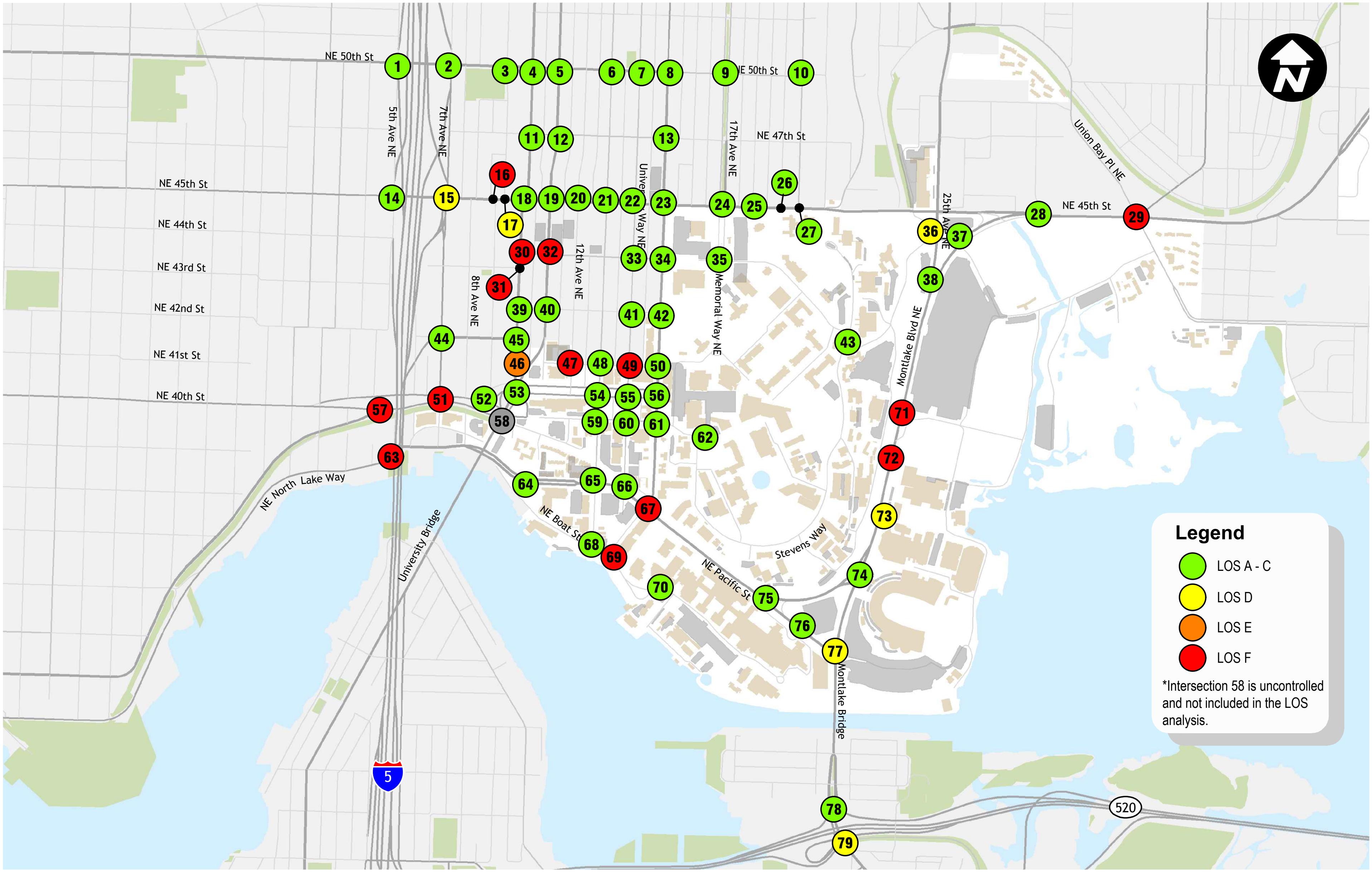
Intersection	Traffic Control	Change in Delay (Seconds)[1]	Percent of Total (Project Share)
16. 9th Avenue NE (south)/NE 45th Street	TWSC	26	15.9%
29. Montlake Boulevard NE/Mary Gates Memorial Drive NE	Signalized	73	5.2%
30. Roosevelt Way NE/NE 43rd Street (east)	TWSC	173	2.8%
31. Roosevelt Way NE/NE 43rd Street (west)	TWSC	39	2.9%
32. 11th Avenue NE/ NE 43rd Street	Signalized	33	7.2%
47. 12th Avenue NE/NE 41st Street	TWSC	374	24.6%
49. University Way NE/NE 41st Street	TWSC	-[2]	28.7%
51. 7th Avenue NE / NE 40th Street	AWSC	12	5.2%
57. 6th Avenue NE / NE 40th Street	AWSC	21	5.1%
63. 6th Avenue NE / NE Northlake Way	AWSC	70	17.9%
67. 15th Avenue NE / NE Pacific Street	Signalized	49	23.3%
69. 15th Avenue NE / NE Boat Street	AWSC	78	31.4%
72. Montlake Boulevard NE / IMA exit	TWSC	23	12.2%

1. Change in worst movement delay for two-way stop controlled (TWSC) intersections.
2. Volume exceeds capacity and Synchro could not calculate the delay.

Of the stop controlled intersections listed in Table 6.8, some of the increased delay could be attributed to higher pedestrian and bicycle volumes. Additionally, the following intersections are located at or near potential garage access locations resulting in a higher share of alternative percentages:

47. 12th Avenue NE/NE 41st Street
49. University Way NE/NE 41st Street
63. 6th Avenue NE/NE Northlake Way
67. 15th Avenue NE/NE Pacific Street
69. 15th Avenue NE/NE Boat Street
71. Montlake Boulevard NE / Wahkiakum Road
72. Montlake Boulevard NE/IMA exit

Driveways and building access features to be incorporated into planned development can have impacts on the overall trip distribution and individual movements at intersections near these locations. Given the preliminary planning nature of this evaluation, individual traffic impacts should be assessed when final building size and driveway locations are determined. Also, given the grid network, it is anticipated that if drivers experience long delays at unsignalized locations they could alter their trip patterns to reduce delays. Similar to Alternative 1, the LOS for vehicle traffic, while a consideration, must be increasingly balanced against the assumption that pedestrian, bicycle, and transit travel modes would be encouraged and facilitated. Intersections that are calculated to operate at poor LOS for vehicle traffic are not always considered a high priority for improvements by the City.



Future (2028) Alternative 2 Weekday PM Peak Hour Traffic Operations

FIGURE

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Intersection Operations – Secondary Impact Zone

Weekday PM peak hour intersection traffic operations under the 2028 No Action Alternative and Alternative 2 conditions are shown in Table 6.9. The 2028 geometry for all of the study area intersections were assumed to remain the same as existing conditions. Signal timing splits were optimized under 2028 Alternative 2 conditions. Complete intersection LOS summaries are provided in Appendix C.

Table 6.9
INTERSECTION LEVEL OF SERVICE SUMMARY – SECONDARY IMPACT ZONE

Intersection	No Action		Alternative 2		Change in Delay (sec)
	LOS[1]	Delay[2]	LOS[1]	Delay[2]	
A. Meridian Avenue N/N 45th Street	B	12	B	13	1
B. Meridian Avenue N/N 50th Street	B	17	B	17	0
C. Roosevelt Way NE/NE 65th Street	E	73	F	80	7
D. 12th Avenue NE/NE 65th Street	C	23	C	22	-1
E. 15th Avenue NE/NE 65th Street	F	161	F	160	-1
F. 25th Avenue NE/NE 65th Street	E	80	F	112	32
G. 47th Avenue NE/Sand Point Way NE	D	30	F	59	29

1. Level of service.
2. Average delay per vehicle in seconds rounded to the whole second.

As shown in Table 6.9 the secondary impact zone intersections are anticipated to operate at the same LOS under Alternative 2 as they do under the No Action Alternative conditions with the exception of the 25th Avenue NE/ NE 65th Street, 47th Avenue NE/ Sand Point Way NE, and Roosevelt Way NE/ NE 65th Street intersections. The 25th Avenue NE/ NE 65th Street intersection is anticipated to degrade from LOS E to LOS F with approximately a 32 second increase in delay. The 47th Avenue NE/ Sand Point Way NE intersection is anticipated to degrade from LOS D to LOS F with approximately a 29 second increase in delay. The Roosevelt Way NE/ NE 65th Street intersection is anticipated to degrade from LOS E to LOS F with approximately a 7 second increase in delay. Additionally, the 15th Avenue NE/NE 65th Street and 12th Avenue NE/ NE 65th Street intersections are anticipated to experience a slight decrease in delay.

6.5.5 Arterial Operations

Arterial travel times and speeds were evaluated along NE 45th Street, Pacific Street, 11th Avenue NE, Roosevelt Way NE, 15th Avenue NE, Montlake Boulevard NE, and Stevens Way NE, along with traffic data associated with Alternative 1. These data are consistent with the previously described methodology for both existing and future No Action conditions. This includes the application of the adjustment factors previously described.

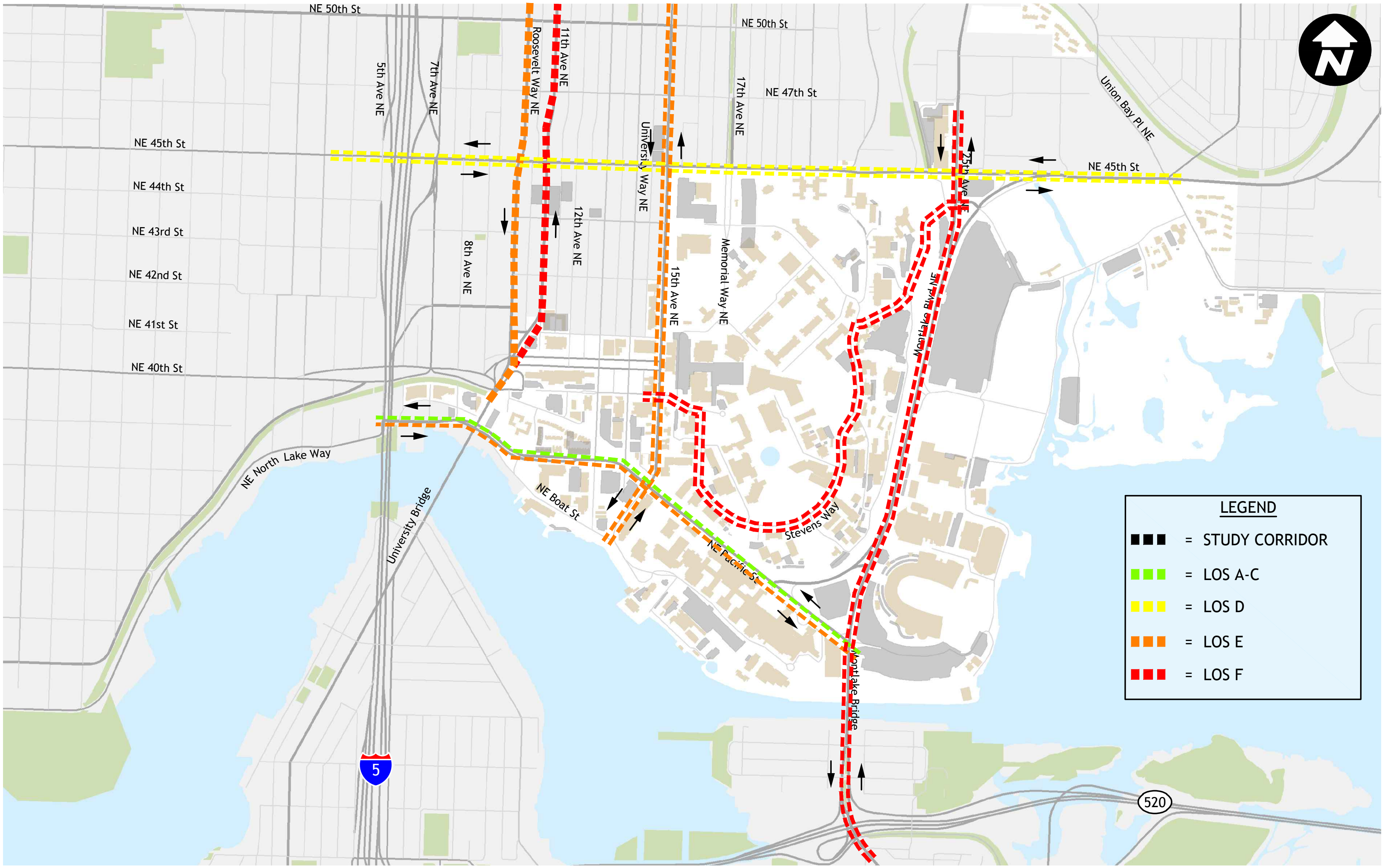
Table 6.10 and Figure 6.10 summarize weekday PM peak hour arterial travel times and speeds. Detailed arterial operations worksheets are provided in Appendix C.

Table 6.10
WEEKDAY PM PEAK HOUR ARTERIAL LEVEL OF SERVICE SUMMARY

Corridor	No Action		Alternative 2	
	LOS[1]	Speed[2]	LOS[1]	Speed[2]
11th Avenue NE between NE Campus Parkway and NE 50th Street				
Northbound	F	5.0	F	4.0
15th Avenue NE between NE Boat Street and NE 50th Street				
Northbound	E	8.0	E	7.3
Southbound	D	9.2	E	7.1
Montlake Boulevard NE between E Lake Washington Boulevard and NE 45th Street				
Northbound	E	11.5	F	9.7
Southbound	F	8.5	F	8.4
NE 45th Street between 5th Avenue NE and Union Bay Place NE				
Eastbound	D	12.0	D	11.9
Westbound	D	11.6	D	10.6
NE Pacific Street (NE Northlake Way) between 6th Avenue NE and Montlake Boulevard E				
Eastbound	C	18.3	E	11.1
Westbound	C	21.9	C	20.6
Roosevelt Way NE between NE Campus Parkway and NE 50th Street				
Southbound	D	10.4	E	8.9
Stevens Way NE between 15th Avenue NE and 25th Avenue NE				
Eastbound	F	3.6	F	3.5
Westbound	F	3.1	F	2.3

1. Level of service.
2. Average speed in miles per hour

As shown in Table 6.10, with Alternative 2 the arterials would experience increases in delay and slower travel speeds. Anticipated LOS expected is as follows: Southbound 15th Avenue NE (from LOS D to LOS E), northbound Montlake Boulevard NE (from LOS E to LOS F), eastbound NE Pacific Street (from LOS C to LOS E), and southbound Roosevelt Way NE (from LOS D to LOS E).



Future (2028) Alternative 2 Weekday PM Peak Hour Corridor Traffic Operations

FIGURE 6.10

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6.5.6 Screenline Analysis: Primary Impact Zone

Screenline: An imaginary line across which the number of passing vehicles is counted.

This section describes the analysis completed for two designated screenlines within the study area, consistent with City of Seattle Transportation Concurrency system. Screenlines are imaginary lines across which the number of passing vehicles is counted. In this study, screenlines were selected to count vehicle traffic entering and exiting the University of Washington primary and secondary impact zones. As part of the Mayor's Seattle 2035 Comprehensive Plan (City of Seattle, 2016), two screenlines were identified within the vicinity of the University of Washington, as shown in Figure 6.11. Screenline 5.16 is an east-west screenline, measuring north-south travel, and extending along the ship canal to include the University and Montlake bridges. Screenline 13.13 is a north-south screenline, measuring east-west travel, and extending east of Interstate 5 (I-5) between NE Pacific Street and NE Ravenna Boulevard.

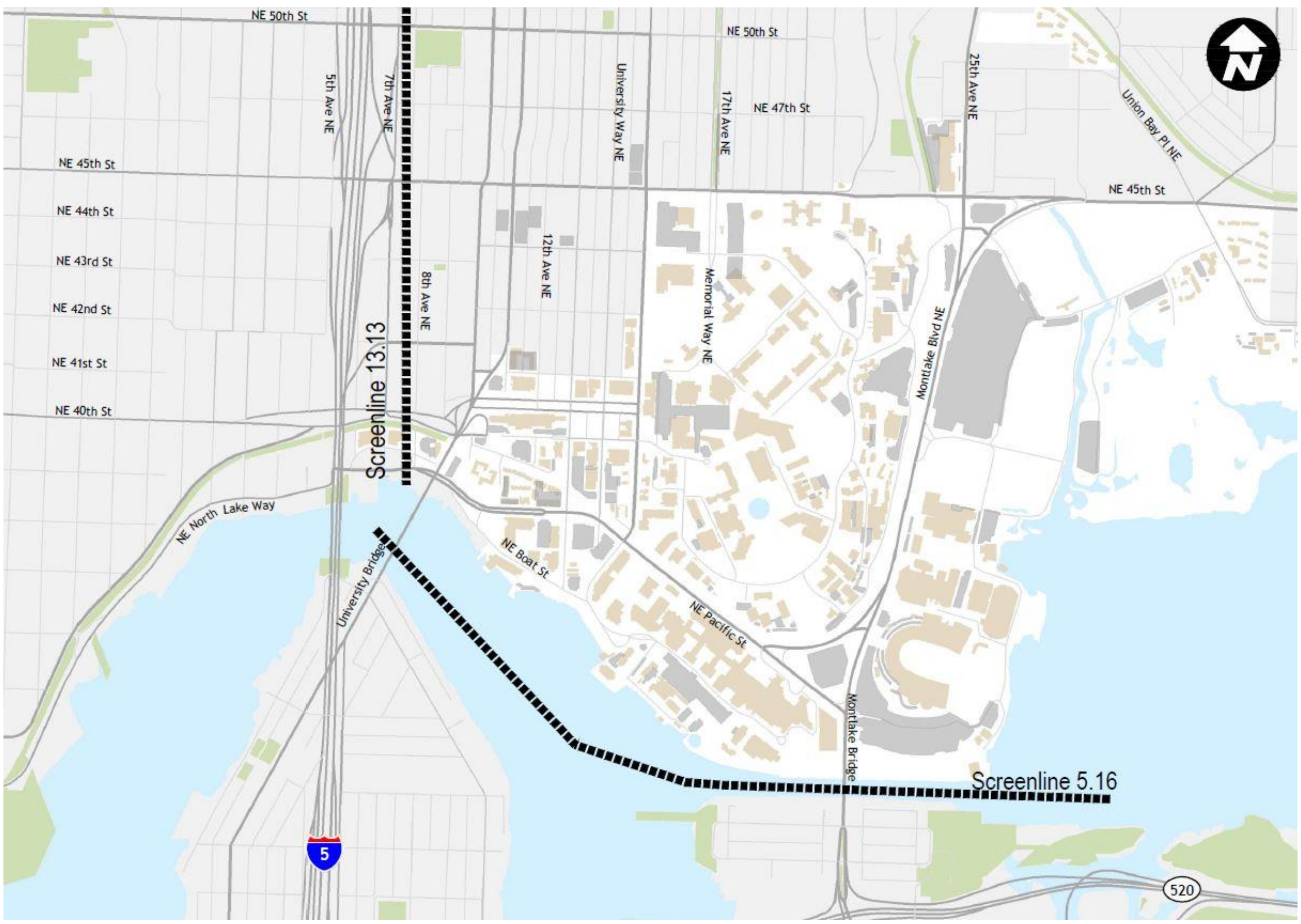


Figure 6.11 Study Area Screenlines

The screenline analysis included volume-to-capacity (V/C) calculations for the vehicles traversing the screenlines using Alternative 2 traffic volumes and interpolated roadway capacity estimates. Roadway capacity for the 2028 future horizon year was interpolated using 2016 capacity estimates described in Chapter 3, Affected Environment, and 2035 capacity estimates referenced in the May 2016 Seattle Comprehensive Plan Update Final EIS. Alternative 2 roadway capacity estimates are shown in Table 6.11 below. Detailed screenline volumes and V/C calculations are included in Appendix C.

Table 6.11
ROADWAY CAPACITY AT STUDY AREA SCREENLINES

Screenline	Alternative 2 Capacity
5.16 – Ship Canal, University and Montlake Bridges	
Northbound	4,210
Southbound	4,210
13.13 – East of I-5, NE Pacific Street to NE Ravenna Boulevard	
Eastbound	6,119
Westbound	6,119

Source: Transpo Group, 2016

LOS standards for the screenline analysis were based on the V/C ratio of a screenline. As described in the Seattle Comprehensive Plan Update EIS, the LOS standard V/C ratio for Screenline 5.16 and Screenline 13.13 were 1.20 and 1.00, respectively. For this study, screenline V/C ratios that did not exceed the LOS standard were considered acceptable. A summary of the Alternative 2 screenline analysis is shown in Table 6.12. Detailed screenline analysis calculations are included in Appendix C.

Table 6.12
SCREENLINE ANALYSIS SUMMARY

Screenline	Screenline Volume	Capacity	V/C	LOS Standard V/C
5.16 – Ship Canal, University and Montlake Bridges				
Northbound	4,052	4,210	0.96	1.20
Southbound	4,532	4,210	1.08	1.20
13.13 – East of I-5, NE Pacific Street to NE Ravenna Boulevard				
Eastbound	3,641	6,119	0.60	1.00
Westbound	3,905	6,119	0.64	1.00

Source: NACTO, Seattle Comprehensive Plan Update EIS, and Transpo Group, 2016

As shown in Table 6.12, all Alternative 2 screenline V/C ratios would meet the acceptable LOS standard.

6.5.7 Service/Freight Routes

Campus-wide, the overall freight/service-related activities with Alternative 2 are anticipated to be similar to that planned for Alternative 1 as the total development area for each is the same. Increase in volume would shift based on the allocation of development area. With Alternative 2, comparative increases in campus development-related freight and service activity would occur mostly in the East campus sector, accessed off Montlake Boulevard. Therefore, no significant impact due to added freight traffic associated with Alternative 2 was identified.

6.5.8 Parking

Parking Supply

Similar to Alternative 1, it was assumed that parking supply would be increased or decreased within each campus sector to achieve an 85-percent utilization without exceeding the Alternative 2 parking cap of 10,250 spaces. The location of parking and strategies used to maintain the existing City University Agreement (CUA) parking cap would be consistent with those outlined for Alternative 1.

Parking Demand

Overall parking demand for Alternative 2 would be the same as Alternative 1. Alternative 2 on-campus parking demand and utilization was reviewed by campus sector to provide context on where parking demand would occur (see Table 6.13). Allocation of Alternative 2 parking demand by sector was based on projected development as documented in Appendix B, Methods and Assumptions. This evaluation assumed that on-street parking would be allocated to on-campus facilities given the increases and reallocation of parking supply to achieve an 85-percent utilization.

Table 6.13
PEAK PARKING DEMAND BY SECTOR

Sector	Future Cap Parking Supply	Parking Demand			% Utilization
			Alternative 2		
		No Action[1]	Growth[2]	Total	
West	2,590	1,428	775	2,203	85%
South	1,910	1,187	436	1,623	85%
Central	3,510	2,689	291	2,980	85%
East	2,240	1,464	436	1,900	85%
Total	**10,250**	**6,768**	**+1,938**	**8,706**	**85%**

Source: Transpo Group, 2016

1. On-campus parking demand for No Action based on projected increase in population. This does not include on-street parking demand increases noted in the previous table since these would not be parking within the Sectors.
2. Growth in parking demand based on projected increase in population for Alternative 2. The analysis assumes with the street vacation and reallocation of parking supply in Alternative 2, on-street parking demand would shift to on-campus parking.

As the table above reflects, reallocation of parking would result in a parking supply under the existing cap and an 85-percent utilization by campus sector and for the campus as a whole. The additional parking and reallocation of parking supply would provide a better relationship between localized supply and demand and thus reduce the likelihood of parking beyond University of Washington facilities (i.e., within the neighborhoods).

Secondary Parking Impacts

Parking outside the Primary Impact Zone would likely continue with Alternative 2 similar to the No Action Alternative. This could include people parking their vehicles in unrestricted spaces within areas served by transit and then using transit to travel to campus. With future campus growth, this could occur at higher levels compared to the No Action Alternative.

6.6 AERIAL/STREET VACATIONS

Alternative 2 impacts for the street vacation would be consistent with those described for Alternative 1 (Chapter 5). As noted in the Alternative 1 analysis, the City of Seattle has defined policies related to the assessing and approving the vacation of public rights-of-way. Further analysis would be provided to the City consistent with the policy requirements at such time an application for a street vacation is made. The EIS alternatives and supporting analysis reflect the vacation as proposed.

6.7 VEHICLE TRIP CAPS

CUA vehicle trip caps are considered campus-wide and would not materially change between the Development Alternatives. See discussion in Chapter 5, Alternative 1.

7 IMPACTS OF ALTERNATIVE 3

This chapter evaluates all modes of travel and compares **Alternative 3** to the No Action Alternative. Alternative 3 would encompass operations in the horizon year of 2028 with 6 million gross square footage of new development. The focus of those improvements would be primarily in the West and South campus sectors, with more limited development in the Central and East campus sectors.

This chapter summarizes the results of the analysis conducted for Alternative 3: Campus Development Reflecting increased West and South Campus Development. As in the previous chapters, the analysis examines the impacts to key transportation elements and transportation modes identified in Chapter 3, Affected Environment.

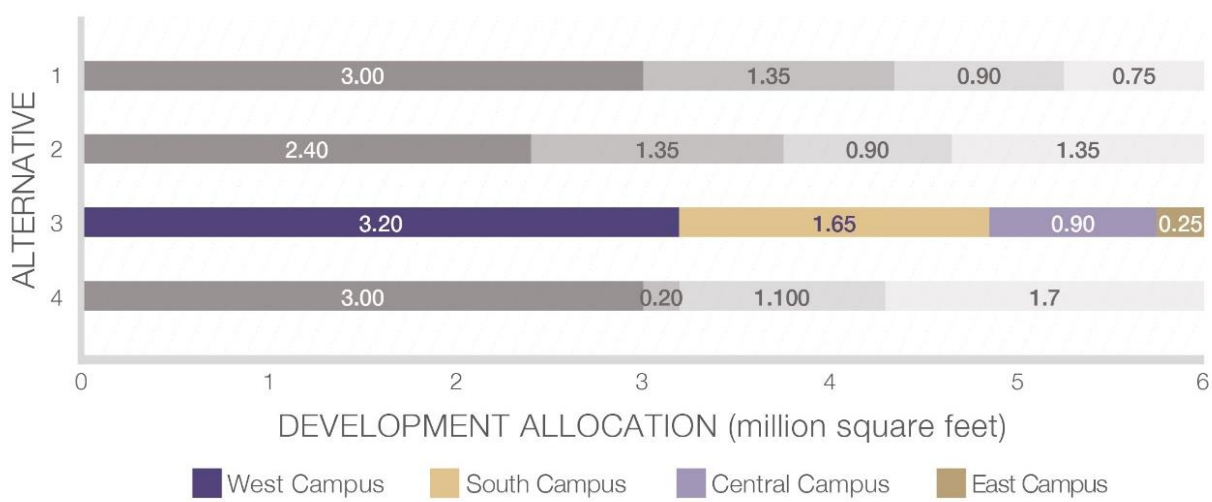
The No Action Alternative, used to compare existing conditions to Alternative 3, assumes a proportion of the development to be 211,000 gross square footage (gsf), as outlined in the City of Seattle adopted 2035 Comprehensive Plan and the adopted U District Rezone.

7.1 CHANGING CAMPUS CHARACTERISTICS

7.1.1 Description of the Alternative

The proposed University of Washington development under Alternative 3 is anticipated to be primarily located in the West and South campus sectors. The technical analysis of Alternative 3 focused on the weekday PM peak period.

Alternative 3 would include the development total of 6 million gsf throughout the campus, with a focus in the West and South Campus sectors and more limited development in the Central and East Campus sectors. Approximately 3.2 million gsf of development is proposed in West Campus and 1.65 million gsf would be developed in South Campus. The remaining development would be located in Central and East campus—approximately 900,000 gsf and 250,000 gsf, respectively. Figure 7.1 summarizes the Alternative 3 development allocation compared to the other development alternatives.



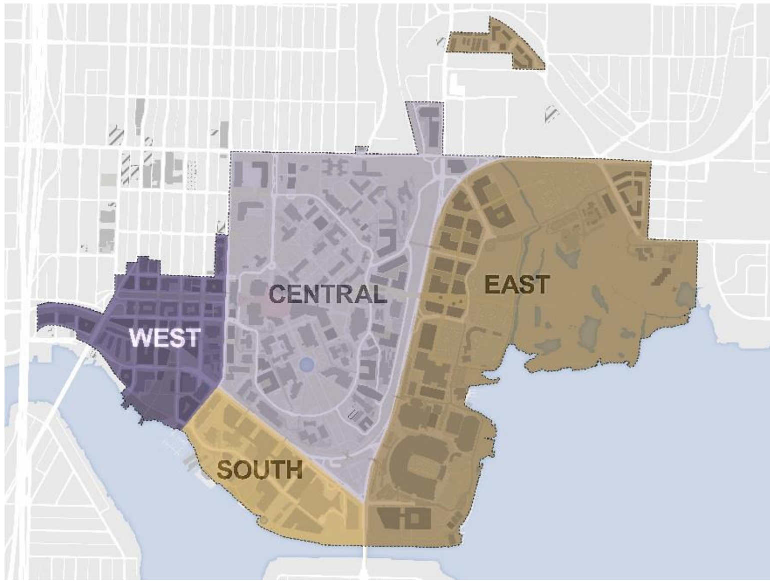


Figure 7.1 Alternative 3 Development Allocation

7.1.2 Trip Generation by Mode

This section summarizes the anticipated Alternative 3 trip generation for pedestrian, bicycle, transit, and vehicle trips to campus.

The trip generation methodology used for assessing the increase in trips under Alternative 3 is consistent with that previously described in Chapter 4, Impacts of No Action, and is consistent with Alternatives 1 and 2.

7.2 PEDESTRIANS

7.2.1 Performance Measures

The following pedestrian-related performance measures have been identified to assess and compare alternatives:

- Proportion of Development Within 1/4 mile of Multifamily Housing
- Proportion of Development Within 1/4 mile of University of Washington Residence Halls
- Quality of Pedestrian Environments
- Pedestrian Screenline Demand and Capacity
- Pedestrian Transit Station/Stop Area LOS

These measures reflect the effectiveness of the pedestrian network in providing safe and easy access to pedestrian destinations—specifically housing—and thereby maintaining a high walk mode choice on campus. Comparisons of Alternative 3 to the No Action Alternative is provided for each measure below.

Proportion of Development within 1/4 Mile of Multifamily Housing

Walking makes up nearly one-third of all existing campus-related trips to and from campus. Proximity of campus development to housing is therefore one important measure for assessing the propensity of people to walk. This measure assesses the proximity of the current campus buildings and development to nearby multifamily housing in the University District. As shown in Table 7.1, 64 percent of Alternative 3 development would be within 1/4 quarter mile of multifamily housing.

Table 7.1
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF MULTIFAMILY HOUSING

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)	Alternative 2 Gross Square Feet (gsf)	Alternative 3 Gross Square Feet (gsf)
West	211,000	3,000,000	3,000,000	3,200,000
South	NA	0	0	0
Central	NA	589,985	723,460	645,884
East	NA	0	897,964	0
Total	**211,000**	**3,589,985**	**4,021,424**	**3,845,884**
Percent	***100%***	***60%***	***67%***	***64%***

Proportion of Development within 1/4 mile of University of Washington Residence Halls

This performance measure assesses the proportion of new development within walking distance of campus residence halls. For this analysis, University of Washington residence halls were identified and then buffered by 1/4 mile. As shown in Table 7.2, 76 percent of the new development in Alternative 3 would be within 1/4 mile of University of Washington residence halls.

Table 7.2
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF RESIDENCE HALLS

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)	Alternative 2 Gross Square Feet (gsf)	Alternative 3 Gross Square Feet (gsf)
West	211,000	3,000,000	3,000,000	3,200,000
South	NA	249,344	249,344	332,215
Central	NA	798,357	723,460	788,727
East	NA	750,000	1,350,000	206,691
Total	**211,000**	**4,797,701**	**4,722,804**	**4,527,632**
Percent	***100%***	***80%***	***79%***	***76%***

Quality of Pedestrian Environment (Primary and Secondary Impact Zones)

Alternative 3 impacts would be similar to Alternative 1 impacts. The primary difference would be less development in East Campus, which would result in fewer connections and a less developed pedestrian network.

In addition to the referenced upgrades, the City of Seattle's Pedestrian Master Plan highlights new Neighborhood Greenways that have been planned within the primary and secondary impact zones. In addition to the existing 12th Avenue NE Neighborhood Greenway, within the primary impact zone several new Neighborhood Greenways are planned:

- A southern extension of the existing 12th Avenue NE Neighborhood Greenway
- Walla Walla Road
- NE Boat Street from NE Pacific Street to 15th Avenue NE
- 20th Avenue NE north of 45th Street
- NE 47th Street west of 20th Ave NE
- NE Clark Road

The NE Boat Street Neighborhood Greenway will improve pedestrian connectivity from the Cheshiahud Lake Union Loop to the University of Washington campus. The 20th Avenue NE and NE 47th Street greenways will increase pedestrian connectivity to the secondary impact zone and connect to planned greenways, including 11th Avenue NE, NE 55th Street, and NE 62nd Street.

In the east section of the of the secondary impact zone, new Neighborhood Greenways are planned along 5th Avenue NE, NE 46th Street, and Keystone Place North. Planned improvements on the west side of the secondary impact zone include improvements to NE Surber Drive and NE 50th Street.

Pedestrian Screenline Capacity

The pedestrian screenline capacity analysis evaluates the peak hour demand, capacity, and level of service (LOS) at all at- and above-grade crossing locations along Montlake Boulevard NE, NE Pacific Street, 15th Avenue NE, and NE 45th Street. The following section summarizes pedestrian screenline volumes under Alternative 3.

Pedestrian Growth from Transit Ridership

Additional growth resulting from increased transit ridership was added to transit stop pedestrian volumes aggregated by screenline, similar to that described for Alternative 1 in Chapter 5. This growth would account for all new pedestrians in the University of Washington study area that would be generated specifically by additional net new transit trips to and from campus.

Pedestrian Growth From Alternative 3 Development

Pedestrian growth resulting from Alternative 3 was assumed to be relative to the No Action Alternative and evaluated using the same analysis process as for Alternative 1. Table 7.3 summarizes Alternative 3 peak hour pedestrian screenline volumes and LOS.

Table 7.3
PEAK HOUR PEDESTRIAN SCREENLINE VOLUME AND LEVEL OF SERVICE

	No Action Alternative		Alternative 3	
Screenline	Peak Hour Pedestrian Volume (People/hour)	Level of Service	Peak Hour Pedestrian Volume (People/hour)	Level of Service
Montlake Boulevard NE	14,770	A	16,437	A
NE Pacific Street	3,744	A	5,092	A
15th Avenue NE	12,078	A	16,882	A
NE 45th Street	2,272	A	2,614	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition.

As shown in Table 7.3, all Alternative 3 peak hour aggregate pedestrian volumes for all screenlines would be at LOS A.

Pedestrian Transit Stop Space Analysis

This measure evaluates the peak hour demand, capacity, and LOS at key transit stops along Montlake Boulevard NE, NE Pacific Street, and 15th Avenue NE. The following sections summarize the pedestrian space per person and LOS at these locations with Alternative 3 development.

Pedestrian Growth From Transit Ridership

Additional growth from increased transit ridership was added to transit stop pedestrian volumes aggregated by campus sector, similar to that described for Alternative 1 in Chapter 5. This growth would account for all new pedestrians in the University of Washington study area, generated specifically by additional net new transit trips to and from campus.

Pedestrian Growth From Alternative 3 Development

Pedestrian growth from Alternative 3 was assumed relative to the No Action Alternative and evaluated using the same analysis process as described for Alternative 1 in Chapter 5. Table 7.4 summarizes Alternative 3 peak hour pedestrian space and LOS at transit stops in the study area.

Table 7.4
PEAK HOUR TRANSIT STOP PEDESTRIAN SPACE AND LEVEL OF SERVICE

Stop Location	Stop ID Number	No Action Alternative		Alternative 3	
		Pedestrian Space (ft^2/person)	Level of Service	Pedestrian Space (ft^2/person)	Level of Service
NE Pacific Street Bay 1	1	45.0	A	10.7	B
NE Pacific Street Bay 2	2	39.0	A	10.2	B
NE Pacific Street at 15th Ave NE	3	7.5	C	1.7	F
15th Avenue NE at Campus Pkwy	4	62.4	A	8.3	C
15th Avenue NE at NE 42nd Street	5	50.5	A	6.5	D
15th Avenue NE at NE 43rd Street	6	27.8	A	7.1	C
Montlake Boulevard Bay 4	7	39.0	A	26.1	A
Montlake Boulevard Bay 3	8	108.7	A	72.8	A
Stevens Way at Pend Oreille Road	9	19.0	A	12.2	B
Stevens Way at Benton Lane	10	36.4	A	25.3	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition.

As shown in Table 7.4, Alternative 3 peak hour pedestrian space for all transit stops, with the exception of locations 3 and 5, would be LOS C or better. Location 3 (mid-block near the 15th Avenue NE/ NE Pacific Street intersection) and location 5 (at the 15th Avenue NE/ NE 42nd Street intersection) would be LOS F and LOS D, respectively.

7.3 BICYCLES

7.3.1 Performance Measures

The following bicycle-related performance measures have been identified to assess and compare alternatives:

- Burke-Gilman Trail Capacity
- Bicycle Parking and Utilization
- Quality of Bicycle Environment

Burke-Gilman Trail Capacity

Alternative 3 would generally have the same impact on the Burke-Gilman Trail pedestrian and bicycle demand as Alternative 1. However, due to the larger concentration of growth in West and South campus, high travel demand would be anticipated in these areas along and crossing the Burke-Gilman Trail. The East Campus would likely see the least growth in demand. Planned expansion of the Burke-Gilman Trail separating pedestrian and bicycle uses will provide adequate capacity to meet CMP demands.

Level of service results for segments along the Burke-Gilman Trail was based on the Federal Highway Administration's Shared-Use Path Level of Service Calculator (SUPLOS). These results are anticipated to be similar to those presented for Alternative 1 in Chapter 5.

Bicycle Parking and Utilization

As described in the Affected Environment chapter, the University has effectively managed bicycle parking demand. As new buildings are constructed, bicycle parking will be provided. For these reasons, additional bicycle parking analysis was not conducted for any of the growth alternatives (Alternatives 1-4).

Quality of Bicycle Environment (Primary and Secondary Impact Zones)

Alternative 3 would include the same general improvements to bicycle travel on campus as with Alternative 1, but with a greater concentration of added bicycle travel in the West and South campus sectors and less bicycle travel in East Campus.

The Burke-Gilman Trail would likely experience increased demand in the West and South campus sectors. The Alternative 3 focus on development in West Campus could result in trail facility improvements similar to those in the Mercer Court area. Increased cross-traffic and travel along the newly updated trail segment is anticipated in South Campus with Alternative 3. The Burke-Gilman Trail would provide better bicycle circulation from the southwest to the northeast areas of campus. Cross-traffic and travel along the older segment of the trail would increase in East Campus. Existing Pronto travel patterns indicate that East Campus bicycle travel may increase because the Burke-Gilman Trail provides a flat and direct route from East Campus to the South and West campus sectors.

In addition to the above-mentioned improvements, the Seattle Bicycle Master Plan includes several proposed improvements within the primary and secondary impact zones. These improvements include:

- Additional Neighborhood Greenways within the study area. These greenways would improve connectivity between bicycle environments throughout the study area, especially between the primary and secondary impact zones.
- The (recently installed) protected bike lane running north-south along Roosevelt Way NE highlights bicycle connectivity improvements within the primary impact zone.
- Protected bike lanes planned along 11th Avenue NE and 12th Avenue NE.
- Protected bike lanes planned along NE 40th Street, west of Brooklyn Avenue NE. This would connect with the existing bicycling infrastructure on NE 40th Street and improve connectivity to campus.

The following bicycle lane improvements are also planned within the secondary impact zone.

- A new protected bike lane along Ravenna Place NE, which would provide a direct connection between the Burke-Gillman Trail and Ravenna Park.
- A protected bike lane along 36th Avenue NE, which would increase bicycle connectivity in the north-south directions to the secondary impact zone.

- A planned Neighborhood Greenway along Fairview Avenue E, which would increase the bicycle connection to campus from the south.

7.4 TRANSIT

7.4.1 Performance Measures

Impacts of the No Action Alternative, Alternative 1, 2, and 3 on transit as compared to existing conditions is provided in this section. The following transit-related performance measures have been identified to assess and compare alternatives:

- Proportion of Development Within 1/4 mile of RapidRide
- Proportion of Development Within 1/2 mile of Light Rail
- Transit Stop Capacity
- Transit Travel Times and Delay
- Transit Loads at Screenlines

Proportion of Development within 1/4 Mile of RapidRide

This measure calculates the proportion of development that occurs within 1/4 mile of RapidRide service to the University of Washington. As shown in Table 7.5, 100 percent of the new development with Alternative 3 would be within a 1/4 mile of RapidRide routes.

Table 7.5
PROPORTION OF DEVELOPMENT WITHIN 1/2 MILE OF RAPIDRIDE

Sector	No Action Alternative Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)	Alternative 2 Gross Square Feet (gsf)	Alternative 3 Gross Square Feet (gsf)
West	211,000	3,000,000	2,400,000	3,200,000
South	NA	1,350,000	1,350,000	1,650,000
Central	NA	900,000	900,000	900,000
East	NA	750,000	1,350,000	250,000
Total	**211,000**	**6,000,000**	**6,000,000**	**6,000,000**
Percent	***100%***	***100%***	***100%***	***100%***

Proportion of Development within 1/2 Mile of Light Rail

This measure evaluates the proportion of development within a 1/2-mile walkshed of Link light rail stations. Alternative 3 includes the U District Station on Brooklyn Avenue NE, assumed to be completed in 2021. .

Table 7.6 summarizes the square footage of development within a 1/2-mile walkshed of Link light rail station. As shown in this table, Alternative 3, like Alternative 1, would concentrate development in West and South Campus. This would result in 90 percent of the development being within the 1/2-mile walkshed to light rail stations.

Table 7.6
PROPORTION OF DEVELOPMENT WITHIN 1/2 MILE OF LIGHT RAIL

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)	Alternative 2 Gross Square Feet (gsf)	Alternative 3 Gross Square Feet (gsf)
West	211,000	2,680,232	2,160,729	2,880,973
South	NA	1,350,000	1,350,000	1,650,000
Central	NA	900,000	900,000	900,000
East	NA	750,000	452,036	250,000
Total	**211,000**	**5,680,232**	**4,862,766**	**5,680,973**
Percent	***100%***	***89%***	***90%***	***90%***

Transit Stop Capacity

Transit stop capacity measures the number of buses that a transit stop can process in an hour. This analysis was performed for four pairs of stops on key transit corridors around the University of Washington: 15th Avenue NE, NE 45th Street, Montlake Boulevard NE, and NE Pacific Street. The transit stop capacity and demand would not change by alternative. Therefore, the summary provided in Chapter 4, Impacts of No Action, reflects the expected operations.

Transit Travel Speeds

Transit travel speeds do not vary between development alternatives. Therefore, the transit corridor speeds under Alternative 3 would be the same as under Alternative 1 (see Chapter 5).

Transit Screenline Load Analysis

The transit screenline load analysis results for Alternative 3 are as described for Alternative 1 in Chapter 5.

7.5 VEHICLE

7.5.1 Performance Measures

Six measures of effectiveness were analyzed to evaluate the impact of the campus growth on the surrounding transportation network:

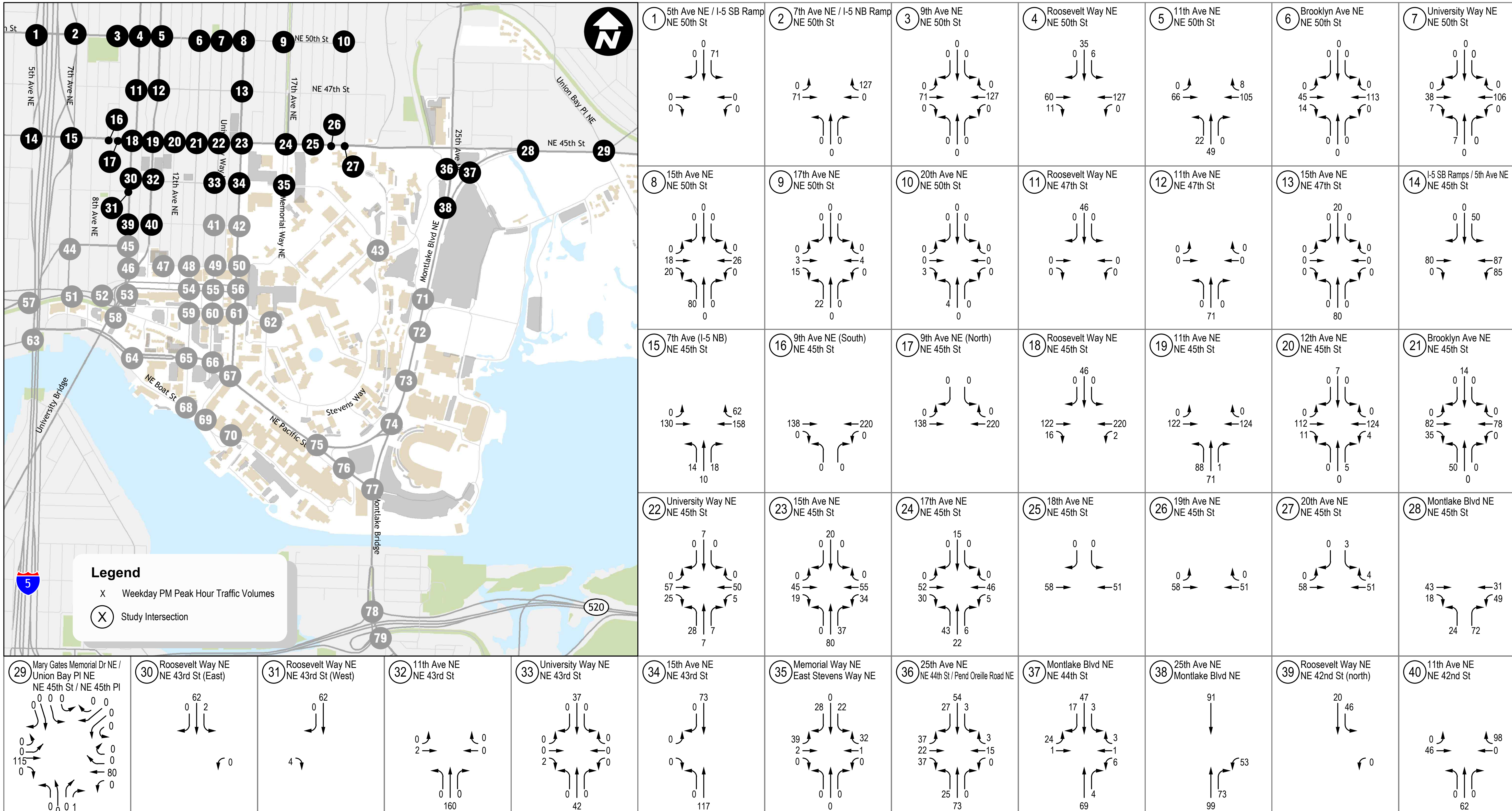
- Intersection operational level of service for intersection located in the primary and secondary impact area
- Arterial Corridor Operations
- Screenline Volumes
- Cordon Volumes
- Caps are set as 1990 trip levels to the University District and University (MIO)
- Freight Corridor Impact

7.5.2 Traffic Volumes

Increased vehicle traffic associated with Alternative 3 were assigned to potential garage locations based on existing vehicle travel patterns, previous studies in the project vicinity, review of University information, and U.S. Census Bureau's *OnTheMap* tool. *OnTheMap* is a web-based mapping and reporting application that shows where workers are employed and where they live, based on census data. The relevant ZIP codes were evaluated to determine if a person would be more likely to travel from the ZIP code via vehicle or by other means. Individuals making trip to ZIP codes closer to the proposed project sites or in more transit-oriented locations are more likely to use transit, walk, bicycle, or other non-drive alone transportation modes. Individuals making trips to ZIP codes outside the Seattle city limits and/or farther from the University of Washington are more likely to drive. The general trip distribution to/from the University is shown in Chapter 4, Impacts of No Action.

Primary Impact Zone

Vehicle trips for each potential Alternative 3 garage location were assigned to the study intersections based on the general trip distribution patterns shown in Chapter 4, Impacts of No Action. Project trips at each study intersection are shown on Figure 7.2 and Figure 7.3. The resulting Alternative 3 volumes are shown on Figure 7.4 and Figure 7.5.



Future (2028) Alternative 3 (Intersections 1-40) Project Trips

University of Washington 2018 Campus Master Plan

FIGURE **7.2**

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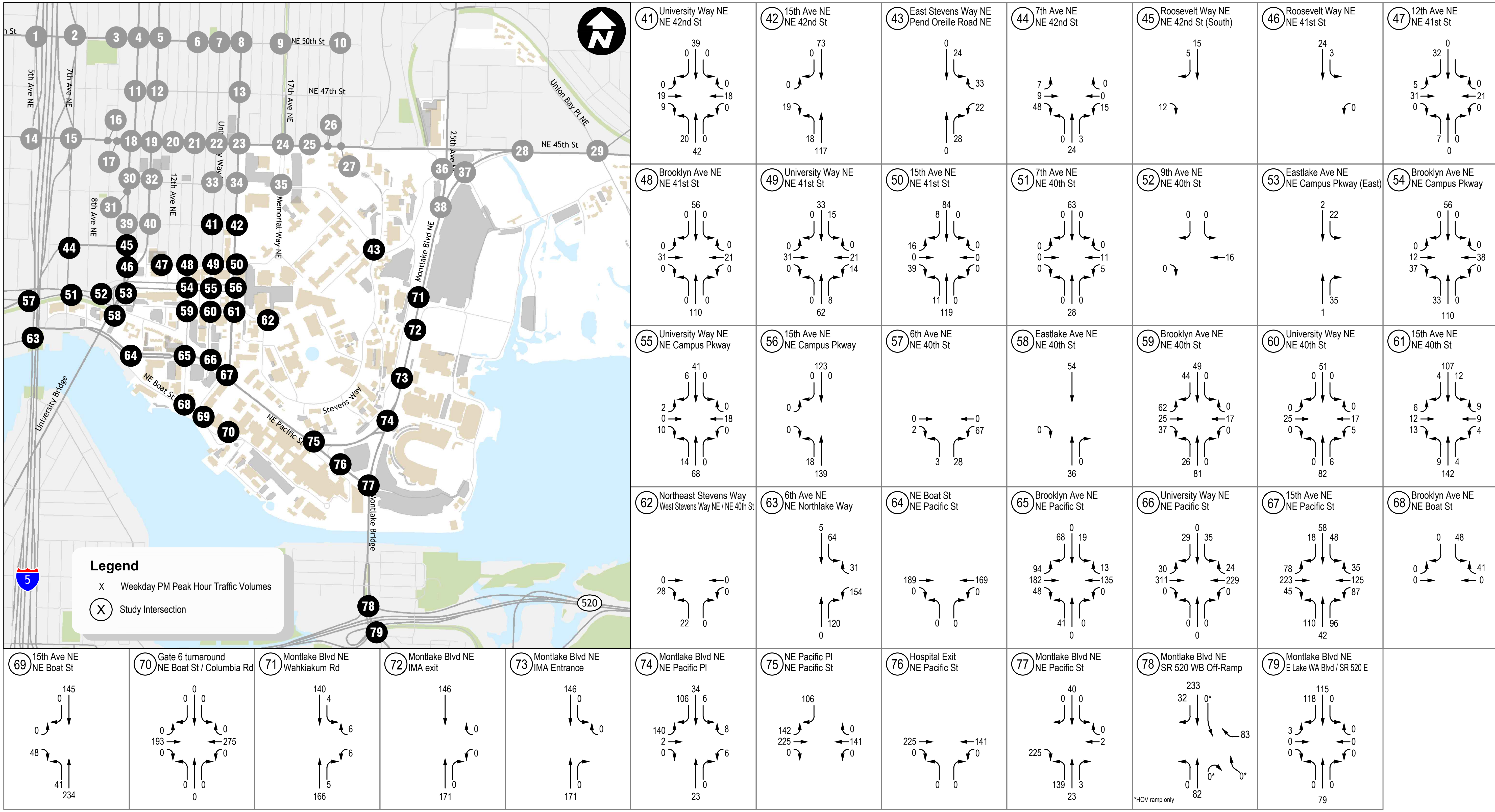

Future (2028) Alternative 3 (Intersections 41-79) Project Trips

University of Washington 2018 Campus Master Plan

FIGURE 7.3

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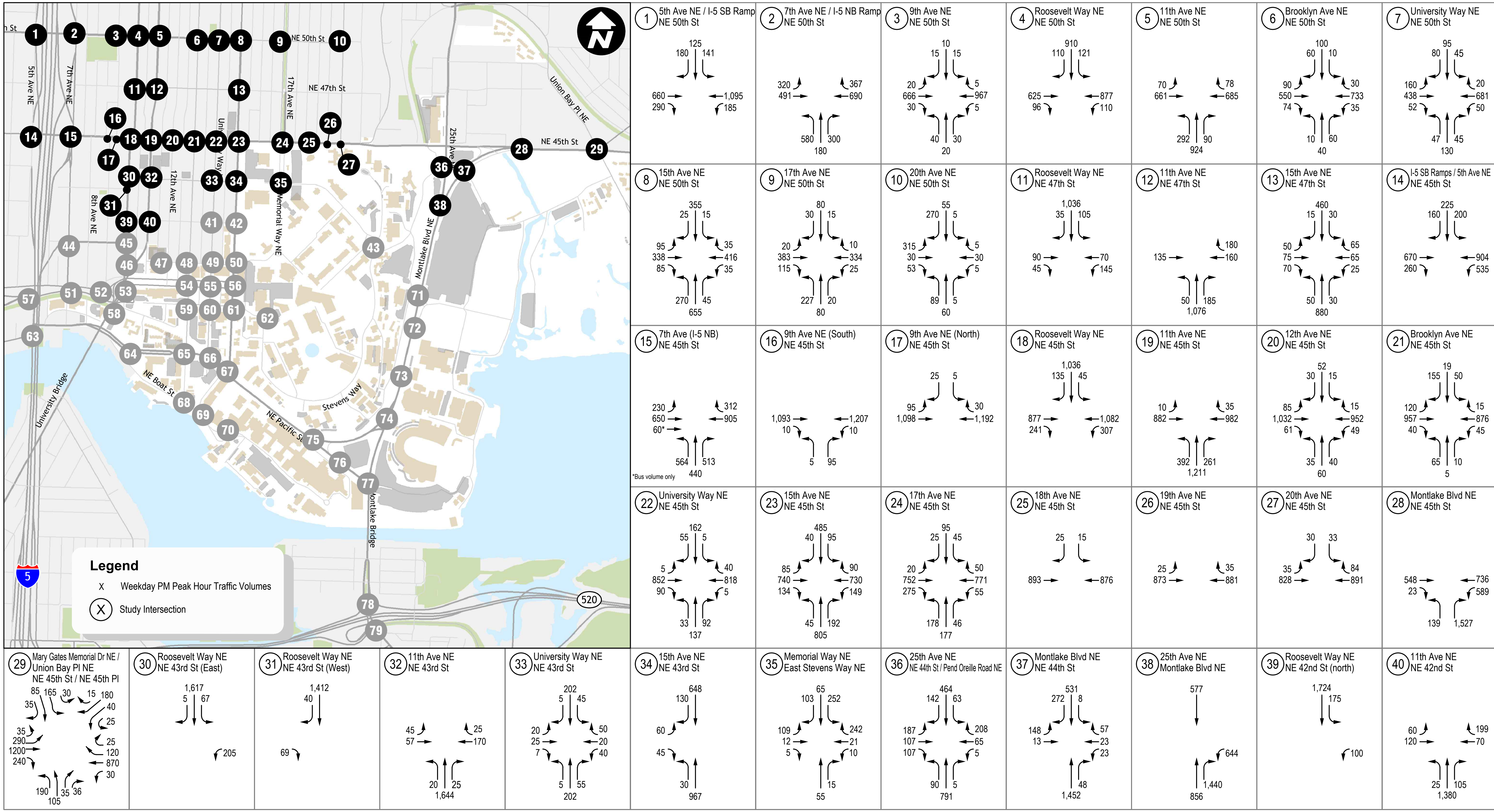

Future (2028) Alternative 3 (Intersections 1-40) Weekday PM Peak Hour Traffic Volumes

University of Washington 2018 Campus Master Plan

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FIGURE **7.4**

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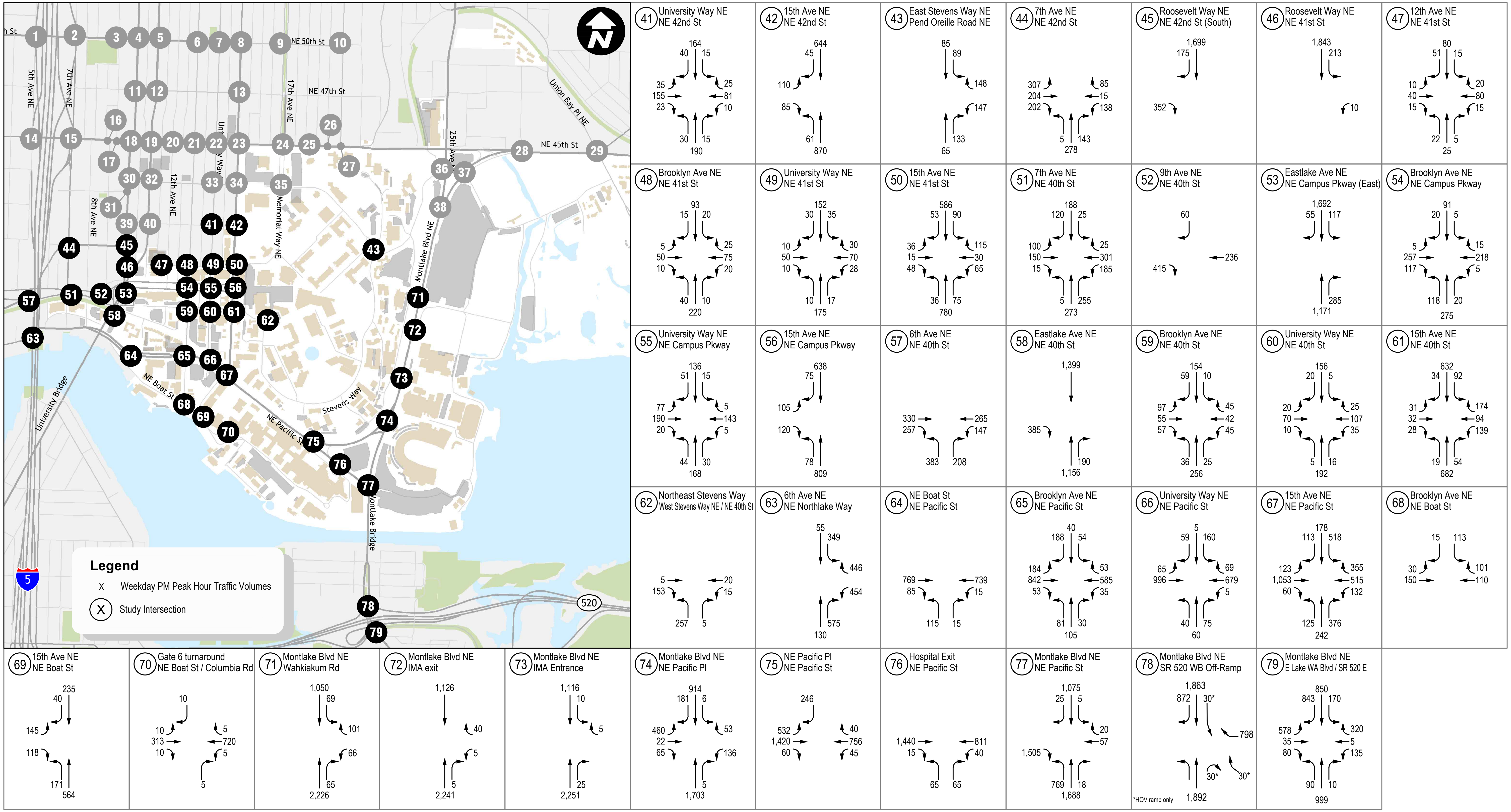

Future (2028) Alternative 3 (Intersections 41-79) Weekday PM Peak Hour Traffic Volumes

University of Washington 2018 Campus Master Plan

FIGURE
7.5

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WHAT TRANSPORTATION CAN BE.

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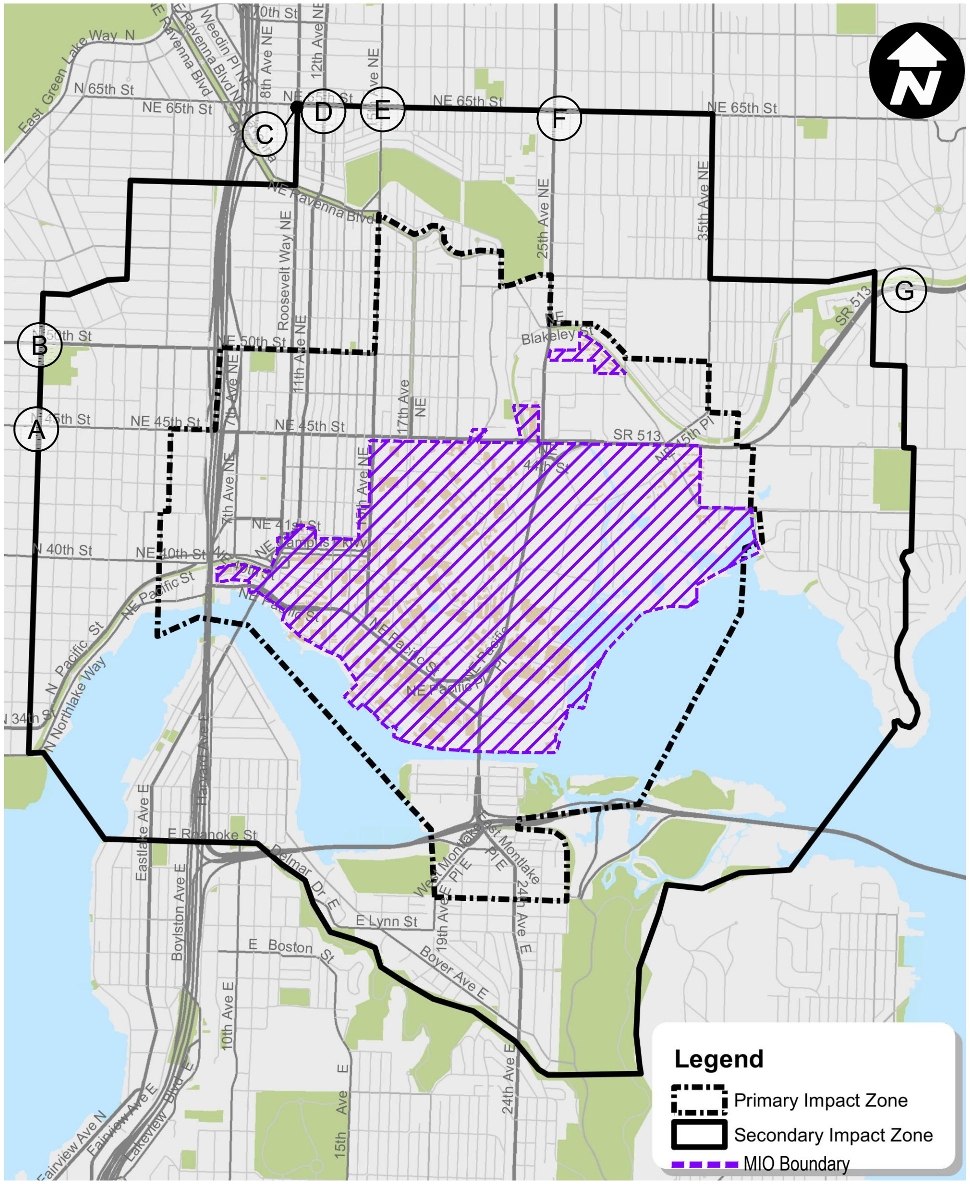
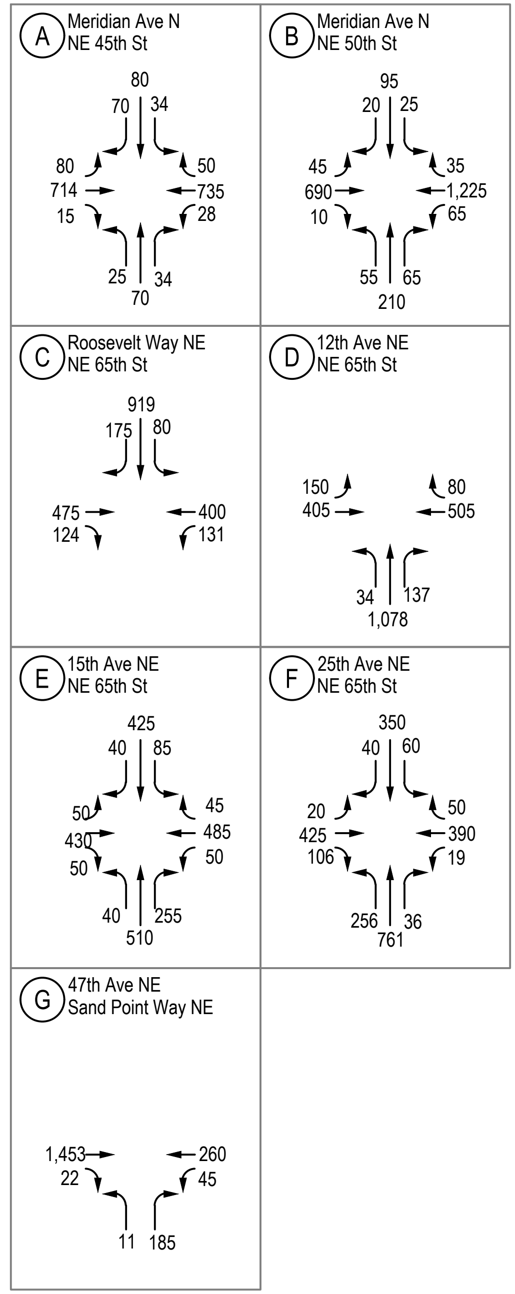
Secondary Impact Zone

Weekday PM peak hour volumes at seven intersections in the secondary impact zone were analyzed by considering future background traffic and volumes associated with the Alternative 3 development. Alternative 3 directional volumes were forecast in the same manner as all primary impact zone study intersections as described above. It was assumed that 5 percent of future volumes would be distributed into the neighborhood roadway network and therefore would not travel through the secondary impact zone study intersections. The resulting secondary impact zone volumes are shown in Figure 7.6.





Alternative 3 Secondary Impact Zone Weekday PM Peak Hour Volumes

University of Washington 2018 Campus Master Plan

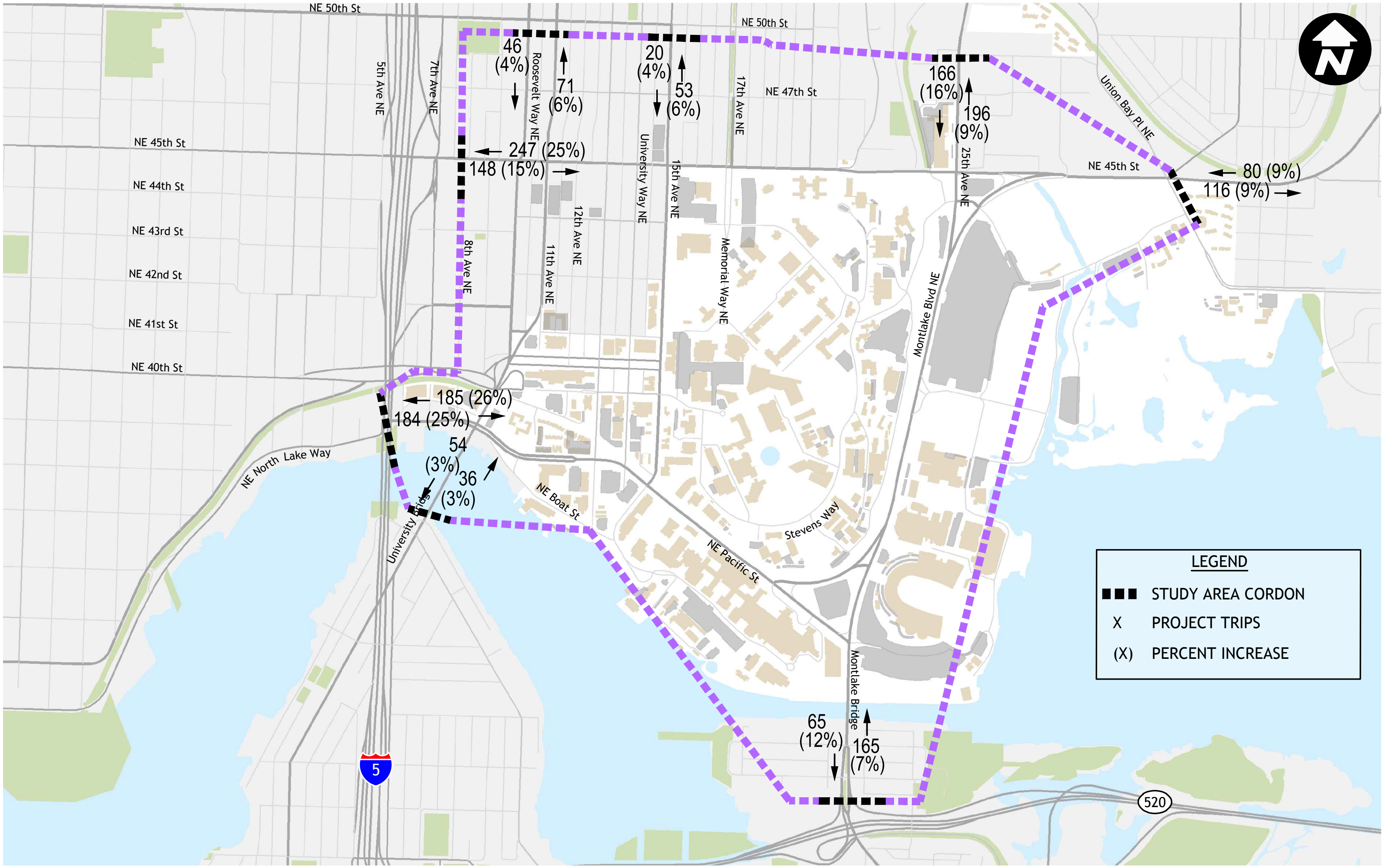
transpogroup WHAT TRANSPORTATION CAN BE.

FIGURE **7.6**

7.5.3 Cordon Volume Analysis

Cordon: An imaginary line used to evaluate traffic in and out of the University area and measure the change or increase in traffic associated with the proposed alternatives.

The proportionate share of traffic along the major roadways surrounding the University of Washington campus under Alternative 3 would be consistent with those previously described for Alternatives 1 and 2. The street vacation would have a minimal impact on the surrounding roadways. The proportionate share of University traffic is shown in Figure 7.7.



Future (2028) Alternative 3 PM Peak Hour Cordon Volumes and Proportional Increase

FIGURE **7.7**

University of Washington 2018 Campus Master Plan

transpogroup WHAT TRANSPORTATION CAN BE.

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7.5.4 Traffic Operations Performance

Methodology

The methodology used in assessing intersection and corridor LOS for Alternative 3 is consistent with that described in Chapter 3, Affected Environment, and Chapter 4, Impacts of No Action Alternative. See Appendix B for a detailed description of methodology used.

Intersection Operations – Primary Impact Zone

Weekday PM peak hour intersection traffic operations under Alternative 3 are summarized in Figure 7.8 and Figure 7.9**.** The year 2028 geometry for all of the study area intersections were assumed to remain the same as No Action Alternative conditions, except when modifications are expected as part of Alternative 3. Additionally, signal timing splits and offsets were optimized under Alternative 3. Complete intersection level of service summaries are provided in Appendix C.

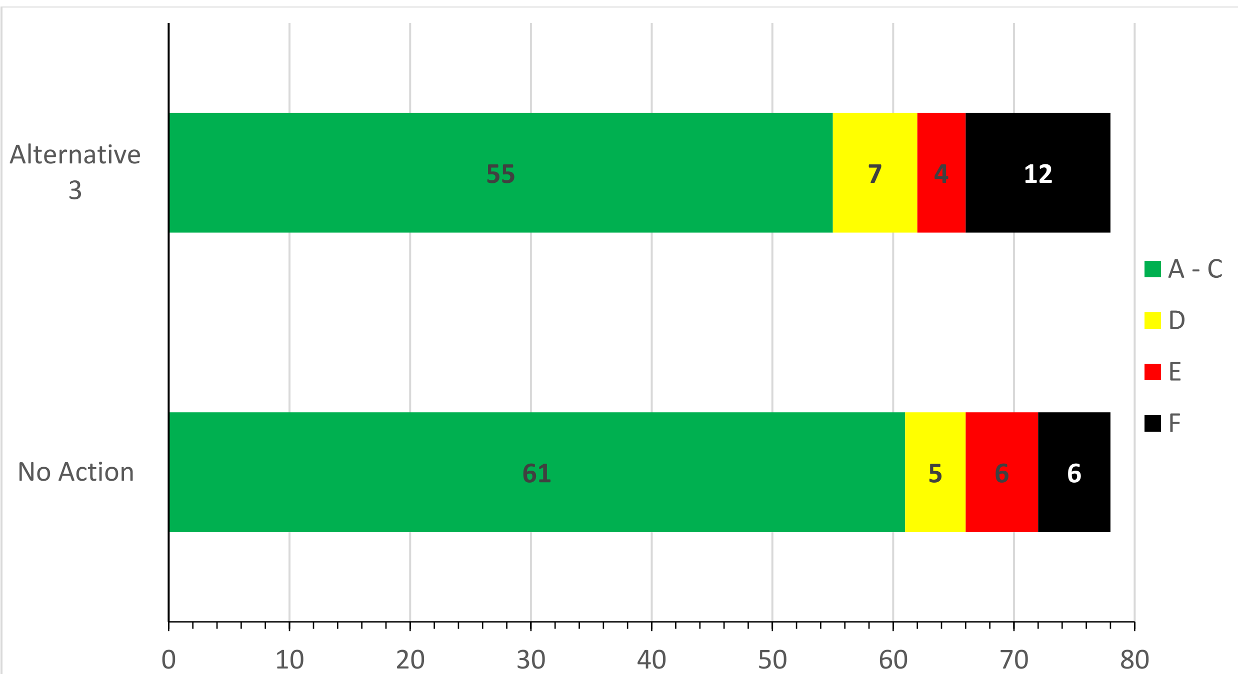


Figure 7.8 No Action/Alternative 3 Weekday 2028 Intersection Level of Service Summary

Table 7.7 illustrates changes in intersection traffic operations at intersections anticipated to operate at LOS E or F during the and Alternative 3 weekday PM peak hour.

Table 7.7
INTERSECTION LEVEL OF SERVICE PM PEAK HOUR SUMMARY

Intersection	No Action		Alternative 3		Change in Delay (sec)	Project Share
	LOS[1]	Delay[2]	LOS[1]	Delay[2]		
16. 9th Ave NE (South) / NE 45th St	E	41	F	67	26	15.9%
17. 9th Ave NE (North) / NE 45th St	C	23	E	36	13	15.7%
29. Montlake Blvd NE / Mary Gates Memorial Dr NE	D	50	E	57	7	5.2%
30. Roosevelt Way NE / NE 43rd St (East)	F	793	F	995	202	3.4%
31. Roosevelt Way NE / NE 43rd St (West)	F	74	F	113	39	3.5%
32. 11th Ave NE / NE 43rd St	E	72	F	111	39	8.6%
46. Roosevelt Way NE / NE 41st St	E	36	E	39	3	1.3%
47. 12th Ave NE / NE 41st St	F	52	F	664	612	24.6%
49. University Way NE / NE 41st St	F	*	F	*	*	28.7%
51. 7th Ave NE / NE 40th St	E	44	F	61	17	6.5%
57. 6th Ave NE / NE 40th St	F	107	F	108	1	6.3%
63. 6th Ave NE / NE Northlake Way	E	38	F	79	41	18.6%
67. 15th Ave NE / NE Pacific St	D	37	E	65	28	25.5%
71. Montlake Blvd NE / Wahkiakum Rd	F	343	F	3022	2679	9.1%
72. Montlake Blvd NE / IMA exit	D	34	E	42	8	9.3%

*Volume exceeds capacity and Synchro could not calculate the delay.

1. Level of service.
2. Average delay per vehicle in seconds rounded to the whole second.

During the weekday PM peak hour, four additional intersections are anticipated to operate at LOS F with Alternative 3 as compared to No Action conditions. Overall, 23 intersections are anticipated to operate at LOS D or worse during the weekday PM peak hour under Alternative 3 conditions, as compared to 17 under No Action conditions. The City of Seattle does not have an LOS standard, but generally considers LOS E and LOS F at signalized intersections and LOS F at unsignalized intersections as poor operations. Intersections that degrade from LOS D to LOS E or operate at LOS E or LOS F under the "with-project" condition, or experience an increase of 5 or more seconds, could be considered a significant impact by the City.

The following intersections are anticipated to degrade to LOS D or degrade from LOS D to LOS E or worse under Alternative 3:

16. 9th Avenue NE (South)/NE 45th Street
17. 9th Avenue NE (North)/NE 45th Street
18. Roosevelt Way NE/NE 45th Street
23. 15th Avenue NE/NE 45th Street
29. Montlake Boulevard NE/Mary Gates Memorial Drive NE
32. 11th Avenue NE/ NE 43rd Street
51. 7th Avenue NE/NE 40th Street
63. 6th Avenue NE/NE Northlake Way
67. 15th Avenue NE/NE Pacific Street
69. 15th Avenue NE/NE Boat Street
72. Montlake Boulevard NE/IMA Exit
73. Montlake Boulevard NE/IMA Entrance

Intersections where the LOS would be E or F and where the Alternative 3 traffic increases would delay by more than 5 seconds are shown in Table 7.8. As shown in Table 7.8, most of the intersections are unsignalized. At the two-way, stop-controlled intersections, the change in delay is represented for the worst movement.

Table 7.8
ALTERNATIVE 3 INTERSECTION OPERATIONS POTENTIAL IMPACTS SUMMARY

Intersection	Traffic Control	Change in Delay (Seconds)	Percent of Total (Project Share)
16. 9th Avenue NE (south)/NE 45th Street	TWSC	26	15.9%
17. 9th Avenue NE (north)/NE 45th Street	TWSC	13	15.7%
29. Montlake Boulevard NE/Mary Gates Memorial Drive NE	Signalized	6	5.2%
30. Roosevelt Way NE/NE 43rd Street (east)	TWSC	201	3.4%
31. Roosevelt Way NE/NE 43rd Street (west)	TWSC	39	3.5%
32. 11th Avenue NE/NE 43rd Street	Signalized	41	8.6%
47. 12th Avenue NE/NE 41st Street	TWSC	612	24.6%
49. University Way NE/NE 41st Street	TWSC	-[1]	28.7%
51. 7th Avenue NE/NE 40th Street	AWSC	17	6.5%
57. 6th Avenue NE/NE 40th Street	AWSC	29	6.3%
63. 6th Avenue NE/NE Northlake Way	AWSC	72	18.6%
67. 15th Avenue NE/NE Pacific Street	Signalized	60	25.5%
71. Montlake Boulevard NE/Wahkiakum Road	TWSC	2,679	9.1%
72. Montlake Boulevard NE/IMA exit	TWSC	8	9.3%

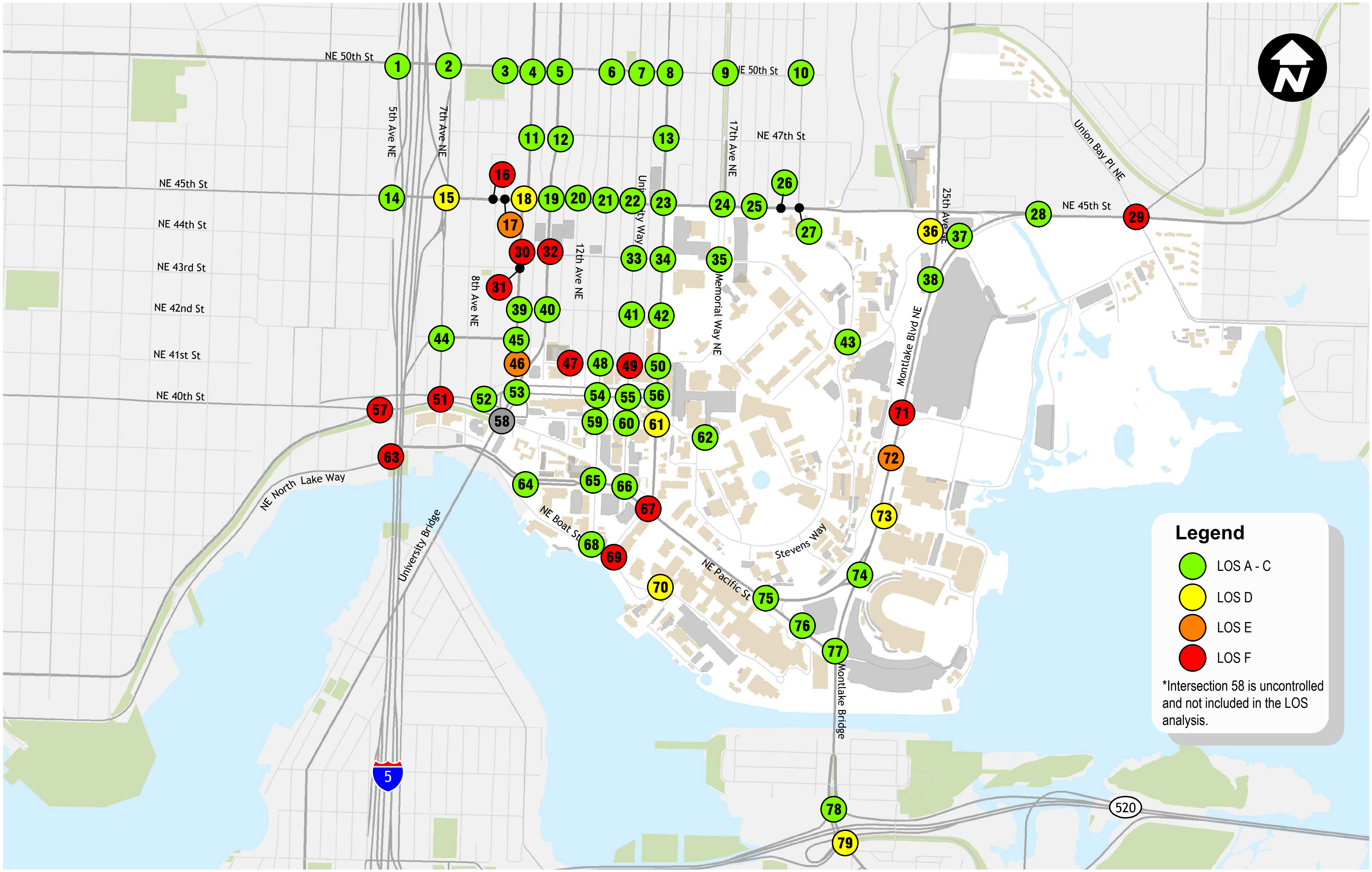
Note: TWSC = Two-way stop-controlled, AWSC = all-way stop-controlled
1. Volume exceeds capacity, and Synchro could not calculate the delay.

Of the stop-controlled intersections listed in Table 7.8, some of the increased delay could be attributed to higher pedestrian and bike volumes with Alternative 3. Additionally, the following intersections are located at or near potential garage access locations, thus resulting in a higher share of alternative percentages:

47. 12th Avenue NE/NE 41st Street
49. University Way NE/NE 41st Street
63. 6th Avenue NE/NE Northlake Way
67. 15th Avenue NE/NE Pacific Street
69. 15th Avenue NE/NE Boat Street
71. Montlake Boulevard NE/Wahkiakum Road
72. Montlake Boulevard NE/IMA exit

The driveway locations would impact the overall trip distribution and individual movements at intersections near these locations. Given the preliminary planning nature of this evaluation, individual traffic impacts should be assessed when final building size and driveway locations are determined. Also, given the gridded network, if drivers were to experience long delays at unsignalized locations, they could alter their trip pattern to reduce delays.

Figure 7.9 shows the weekday PM peak hour traffic operations at study area intersections under Alternative 3. The LOS for vehicle traffic, while a consideration, is increasingly balanced against ensuring that pedestrian, bicycle, and transit travel modes are encouraged and facilitated. Therefore, intersections that are calculated to operate at poor LOS for vehicle traffic are not always considered a high priority for improvements by the City.



Future (2028) Alternative 3 Weekday PM Peak Hour Traffic Operations

FIGURE 7.9

University of Washington 2018 Campus Master Plan

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WHAT TRANSPORTATION CAN BE.

Intersection Operations – Secondary Impact Zone

Weekday PM peak hour intersection traffic operations under the 2028 No Action Alternative and Alternative 3 conditions are shown in Table 7.9**.** The 2028 geometry for all of the study area intersections were assumed to remain the same as existing conditions. Signal timing splits were optimized under 2028 Alternative 3 conditions. Complete intersection LOS summaries are provided in Appendix C.

Table 7.9
INTERSECTION LEVEL OF SERVICE SUMMARY – SECONDARY IMPACT ZONE

Intersection	No Action		Alternative 3		Change in Delay (sec)
	LOS[1]	Delay[2]	LOS[1]	Delay[2]	
A. Meridian Avenue N/N 45th Street	B	12	B	13	1
B. Meridian Avenue N/N 50th Street	B	17	B	17	0
C. Roosevelt Way NE/NE 65th Street	E	73	F	81	8
D. 12th Avenue NE/NE 65th Street	C	23	C	22	-1
E. 15th Avenue NE/NE 65th Street	F	161	F	160	-1
F. 25th Avenue NE/NE 65th Street	E	80	F	112	32
G. 47th Avenue NE/Sand Point Way NE	D	30	F	59	29

1. Level of service.
2. Average delay per vehicle in seconds rounded to the whole second.

As shown in Table 7.9 the secondary impact zone intersections are anticipated to operate at the same LOS under Alternative 3 as they do under the No Action Alternative conditions with the exception of the 25th Avenue NE/ NE 65th Street, 47th Avenue NE/ Sand Point Way NE, and Roosevelt Way NE/ NE 65th Street intersections. The 25th Avenue NE/ NE 65th Street intersection is anticipated to degrade from LOS E to LOS F with approximately a 32 second increase in delay. The 47th Avenue NE/ Sand Point Way NE intersection is anticipated to degrade from LOS D to LOS F with approximately a 29 second increase in delay. The Roosevelt Way NE/ NE 65th Street intersection is anticipated to degrade from LOS E to LOS F with approximately an 8 second increase in delay. Additionally, the 15th Avenue NE/NE 65th Street and 12th Avenue NE/ NE 65th Street intersections are anticipated to experience a slight decrease in delay.

Potential New Access on NE Pacific Street

The impacts of a potential new access along NE Pacific Street, east of 15th Avenue NE at the location of the existing signalized pedestrian crossing, were analyzed for Alternative 3. This potential access, which was analyzed as a signalized intersection, would provide additional access to the approximately 4,000-stall parking garage south of NE Pacific Street that would replace the existing S1 garage. The potential new access point could also be developed to consolidate signals on NE Pacific Street by incorporating the existing pedestrian signal.

For this analysis, vehicle trips to the new parking garage were assumed to be rerouted to allow for the potential new NE Pacific Street access. This access was only analyzed for Alternative 3 because this alternative would include the largest amount of development in South Campus. Table 7.10 shows the differences in intersection operations at locations most affected by the rerouted traffic to the potential new NE Pacific St access.

Table 7.10
INTERSECTION LEVEL OF SERVICE SUMMARY WITH NE PACIFIC STREET ACCESS

Intersection	Alternative 3			Alternative 3 with Potential New Access			Change in Delay (sec)
	LOS[1]	Delay[2]	Project Share	LOS[1]	Delay[2]	Project Share	
67. 15th Avenue NE/NE Pacific Street	F	97	25.5%	E	65	20.5%	-32
69. 15th Avenue NE/NE Boat Street	F	142	36.8%	D	30	19.9%	-112
70. Gate 6 turnaround/ NE Boat Street/NE Columbia Road	D	34	43.4%	C	15	23.5%	-19
80. Possible garage access/NE Pacific Street	-	-	-	B	11	22.1%	11

1. Level of service.
2. Average delay per vehicle in seconds rounded to the whole second.

As shown in Table 7.10, an additional access would alleviate delay at intersections immediately affected by traffic to the garage driveways, especially at the 15th Avenue NE/NE Pacific Street, 15th Avenue NE/NE Boat Street, and Gate 6 turnaround/NE Boat Street/NE Columbia Road intersections. Intersection operations at the possible new access would meet LOS standards.

7.5.5 Arterial Operations

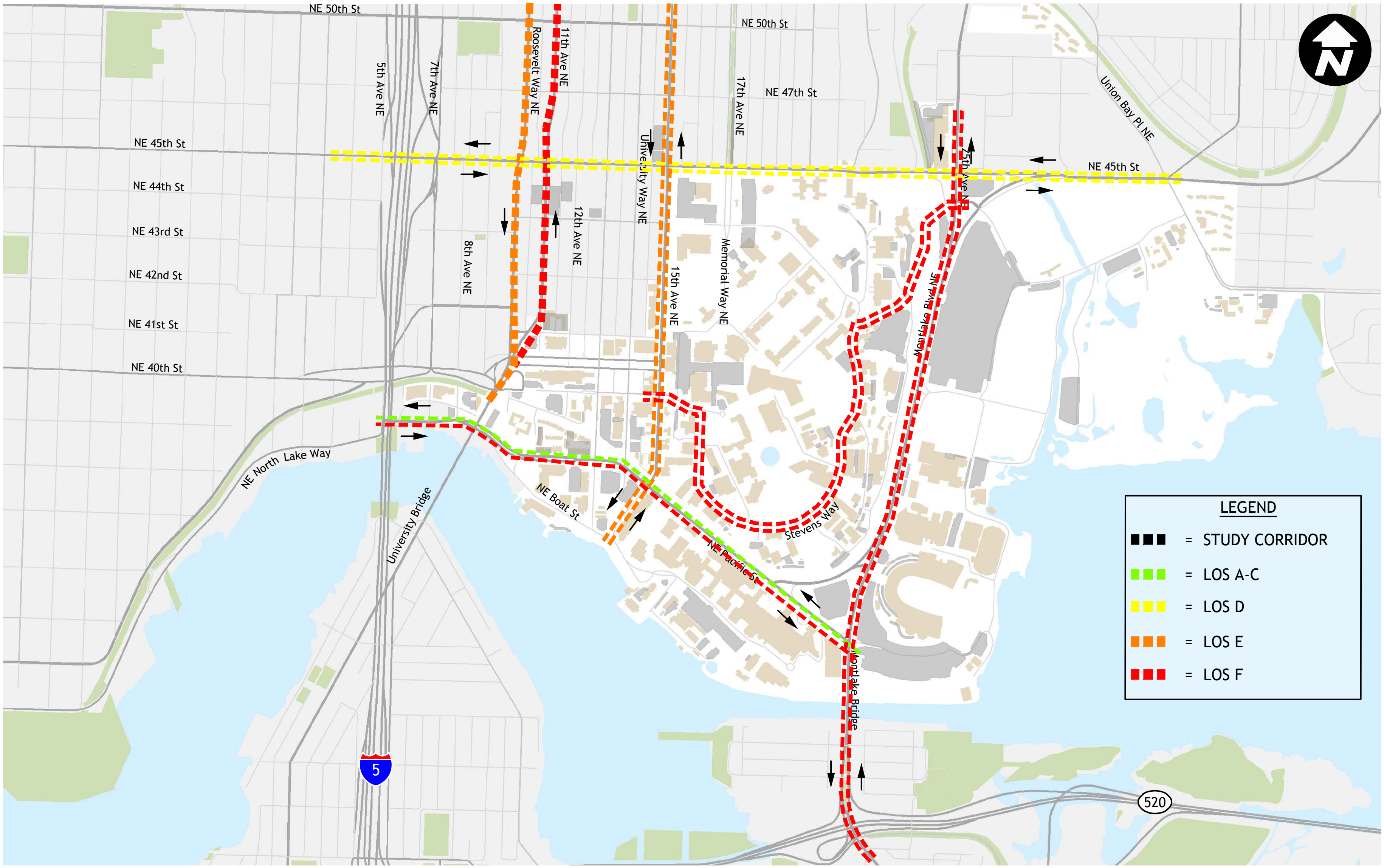
Arterial travel times and speeds were evaluated along NE 45th Street, Pacific Street, 11th Avenue NE, Roosevelt Way NE, 15th Avenue NE, Montlake Boulevard NE, and Stevens Way NE along with traffic data associated with Alternative 3. These data are consistent with the previously described methodology for both existing and future No Action conditions. This includes the application of the adjustment factors previously described. Table 7.11 and Figure 7.10 summarize the weekday PM peak hour No Action and Alternative 3 arterial LOS and travel times and speeds. Detailed arterial operations worksheets are provided in Appendix C.

Table 7.11
WEEKDAY PM PEAK HOUR ARTERIAL LEVEL OF SERVICE AND TRAVEL TIME SUMMARY

Corridor	No Action		Alternative 3	
	LOS[1]	Speed[2]	LOS[1]	Speed[2]
11th Avenue NE between NE Campus Parkway and NE 50th Street				
Northbound	F	5.0	F	3.9
15th Avenue NE between NE Boat Street and NE 50th Street				
Northbound	E	8.0	E	7.1
Southbound	D	9.2	E	7.2
Montlake Boulevard NE between E Lake Washington Boulevard and NE 45th Street				
Northbound	E	11.5	F	10.0
Southbound	F	8.5	F	8.6
NE 45th Street between 5th Avenue NE and Union Bay Place NE				
Eastbound	D	12.0	D	12.0
Westbound	D	11.6	D	10.7
NE Pacific Street (NE Northlake Way) between 6th Avenue NE and Montlake Boulevard E				
Eastbound	C	18.3	F	10.0
Westbound	C	21.9	C	20.6
Roosevelt Way NE between NE Campus Parkway and NE 50th Street				
Southbound	D	10.4	E	8.8
Stevens Way NE between 15th Avenue NE and 25th Avenue NE				
Eastbound	F	3.6	F	3.5
Westbound	F	3.1	F	2.2

1. Level of service.
2. Average speed in miles per hour

As shown in Table 7.11, under Alternative 3, the arterials would generally experience increases in delay and slower travel speeds. LOS is anticipated to degrade as follows: southbound 15th Avenue NE arterial, from LOS D to LOS E; northbound Montlake Boulevard NE, from LOS E to LOS F; eastbound NE Pacific Street, from LOS C to LOS F; and southbound Roosevelt Way NE, from LOS D to LOS E.



Future (2028) Alternative 3 Weekday PM Peak Hour Corridor Traffic Operations

University of Washington 2018 Campus Master Plan

FIGURE **7.10**

transpogroup
WHAT TRANSPORTATION CAN BE.

7.5.6 Screenline Analysis: Primary Impact Zone

> **Screenline:** An imaginary line across which the number of passing vehicles is counted.

This section describes the analysis completed for two designated screenlines within the study area, consistent with City of Seattle Transportation Concurrency system. Screenlines are imaginary lines across which the number of passing vehicles is counted. In this study, screenlines were selected to count vehicle traffic entering and exiting the University of Washington primary and secondary impact zones. As part of the Mayor's Seattle 2035 Comprehensive Plan (City of Seattle, 2016), two screenlines were identified within the vicinity of the University of Washington, as shown in Figure 7.11. Screenline 5.16 is an east-west screenline, measuring north-south travel, and extends along the Lake Washington Ship Canal to include the University and Montlake bridges. Screenline 13.13 is a north-south screenline, measuring east-west travel, and extends east of Interstate 5 (I-5) between NE Pacific Street and NE Ravenna Boulevard.

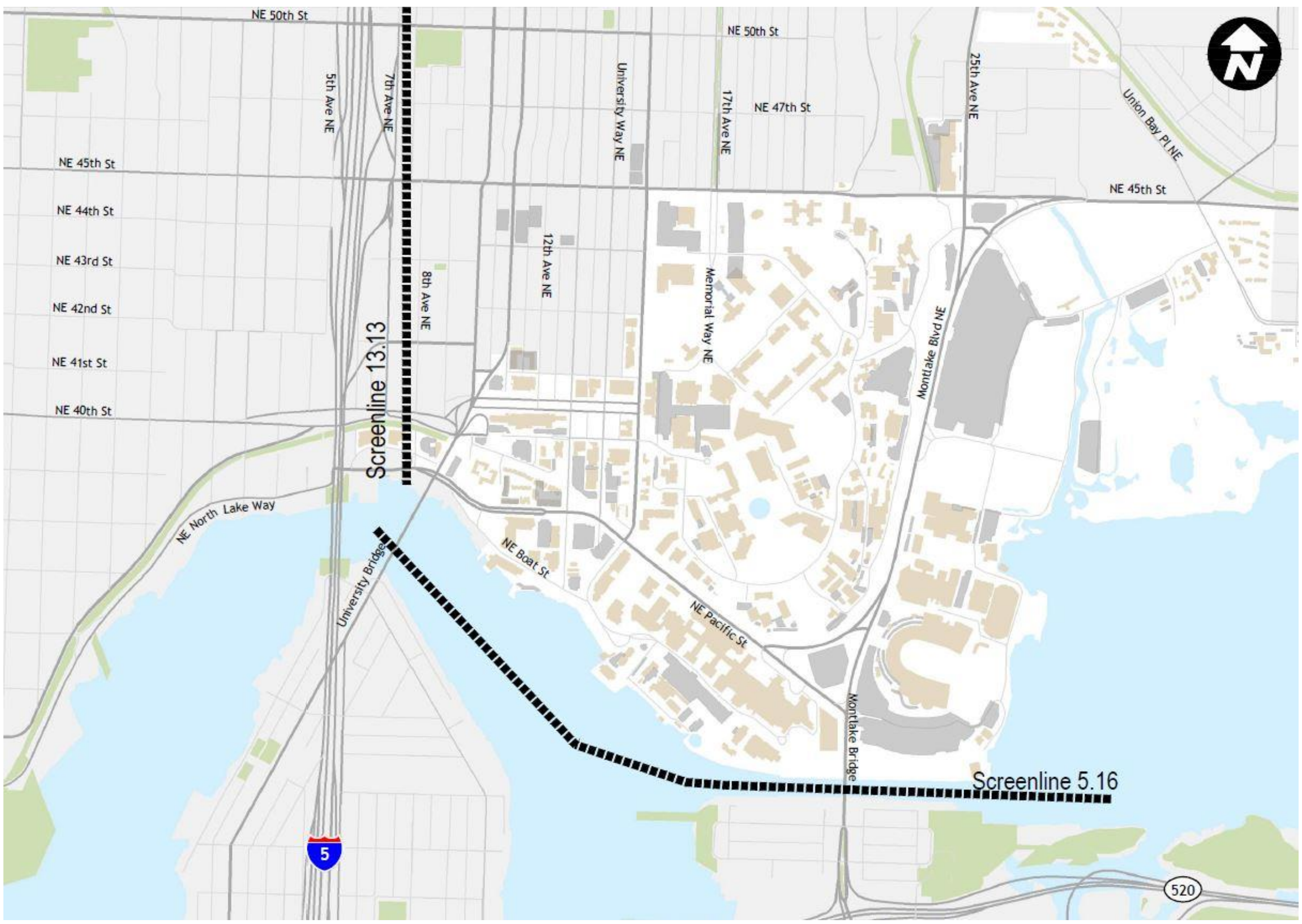


Figure 7.11 Study Area Screenlines

The screenline analysis included volume-to-capacity (V/C) calculations for the vehicles traversing the screenlines using Alternative 3 traffic volumes and interpolated roadway capacity estimates. Roadway capacity for the 2028 horizon year was interpolated using 2016 capacity estimates described in Chapter 3, Affected Environment, and 2035 capacity estimates referenced in the May 2016 Seattle Comprehensive Plan Update Final EIS. Alternative 3 roadway capacity estimates are shown in Table 7.12 below. Detailed screenline volumes and volume to capacity calculations are included in Appendix C.

Table 7.12
ROADWAY CAPACITY AT STUDY AREA SCREENLINES

Screenline	Alternative 3 Capacity
5.16 – Ship Canal, University and Montlake Bridges	
Northbound	4,210
Southbound	4,210
13.13 – East of I-5, NE Pacific Street to NE Ravenna Boulevard	
Eastbound	6,119
Westbound	6,119

Source: Transpo Group, 2016

LOS standards for the screenline analysis were based on the V/C ratio of a screenline. As described in the Seattle Comprehensive Plan Update EIS, the LOS standard V/C ratio for Screenlines 5.16 and 13.13 are 1.20 and 1.00, respectively. For this study, screenline V/C ratios that did not exceed the LOS standard were considered acceptable. A summary of the Alternative 3 screenline analysis is shown in Table 7.13. Detailed screenline analysis calculations are included in Appendix C.

Table 7.13
ALTERNATIVE 3 SCREENLINE ANALYSIS SUMMARY

Screenline	Screenline Volume	Capacity	V/C	LOS Standard V/C
5.16 – Ship Canal, University and Montlake Bridges				
Northbound	4,036	4,210	0.96	1.20
Southbound	4,519	4,210	1.07	1.20
13.13 – East of I-5, NE Pacific Street to NE Ravenna Boulevard				
Eastbound	3,655	6,119	0.60	1.00
Westbound	3,923	6,119	0.64	1.00

Source: NACTO, Seattle Comprehensive Plan Update EIS, and Transpo Group, 2016

As shown in Table 7.13, all Alternative 3 screenline V/C ratios would meet the acceptable LOS standard.

7.5.7 Service/Freight Routes

Impacts would be similar to those identified in Chapter 5 for Alternative 1. No significant impact would result from added freight activity on campus.

7.5.8 Parking

Parking Supply

Similar to the other development alternatives, this analysis assumed that parking supply would be increased or decreased within each campus sector to achieve an 85 percent utilization without exceeding the parking cap for Alternative 3. With Alternative 3, the parking supply cap would be 10,240 spaces for all sectors combined. The location of parking and strategies used to maintain the existing City-University Agreement (CUA) parking cap would be consistent with those outlined for Alternative 1.

Parking Demand

Overall parking demand for Alternative 3 would be the same as with the other development alternatives. Alternative 3 on-campus parking demand and utilization was reviewed by sector to provide context on where parking demand would occur (see Table 7.14). Allocation of Alternative 3 parking demand by sector was based on projected development as documented in Appendix B Methods & Assumptions. The analysis assumes that on-street parking would be allocated to on-campus facilities, given the increases and reallocation of parking supply, to achieve an 85 percent utilization.

Table 7.14
PEAK PARKING DEMAND BY SECTOR

		Parking Demand			
			Alternative 3		
Sector	Parking Supply Cap	No Action[1]	Growth[2]	Total	% Utilization
West	2,900	1,428	1,034	2,462	85%
South	2,020	1,187	533	1,720	85%
East	1,820	1,464	81	1,545	85%
Central	3,500	2,689	290	2,979	85%
Total	**10,240**	**6,768**	**1,938**	**8,706**	**85%**

Source: Transpo Group, 2016

1. On-campus parking demand is based on the projected increase in population. The analysis does not include on-street parking demand increases since these would not be parking within the sectors.
2. The growth in parking demand is based on projected increase in population. The analysis assumed that with the street vacation and reallocation of parking supply in Alternative 3, on-street parking demand would shift to on-campus parking.

As Table 7.14 shows, a reallocation of parking would result in a parking supply under the existing cap and an 85 percent utilization by campus sector as well as the campus as a whole. The additional parking and reallocation of parking supply would provide a better relationship between localized supply and demand and thus reduce the likelihood of parking beyond University of Washington facilities (i.e., within the neighborhoods).

Secondary Parking Impacts

Parking outside the Primary Impact Zone would likely continue with Alternative 3 similar to the No Action Alternative. This would include people parking their vehicles in unrestricted parking within transit-served areas and then using transit to travel to campus. With campus growth, this could occur at higher levels compared to the No Action Alternative.

7.6 AERIAL/STREET VACATIONS

Alternative 3 impacts for the street vacation would be consistent with those described for Alternative 1 in Chapter 5. As noted in Chapter 5, Alternative 1, the City of Seattle has defined polices related to assessing and approving the vacation of public rights-of-way. Further analysis will be provided to the City consistent with the policy requirements when an application for a street vacation is made. The EIS alternatives and supporting analysis reflect the vacation as proposed.

7.7 VEHICLE TRIP CAPS

CUA vehicle trip caps are considered campus-wide and would not materially change between the development alternatives. See the related discussion in Chapter 5, Impacts of Alternative 1.

8 IMPACTS OF ALTERNATIVE 4

This chapter summarizes the results of the analysis conducted for Alternative 4: Campus Development Reflecting Increase West and East Campus Density. As in the previous chapters, the analysis examines the impacts to the key transportation elements and transportation modes identified in Chapter 3, Affected Environment, of this report.

This chapter evaluates all modes of travel and compares **Alternative 4** to the No Action Alternative. Alternative 4 would encompass operations in the horizon year of 2028 with approximately 6 million gross square footage of new development. The focus of those improvements would be primarily in the West and East campus sectors.

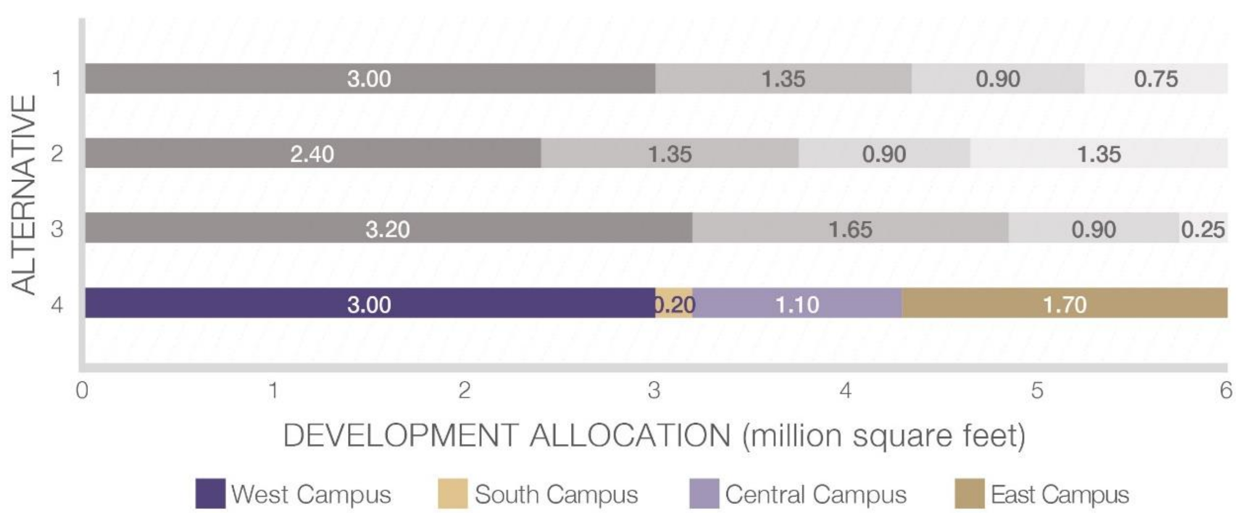
The No Action Alternative, used to compare existing conditions to Alternative 4, assumes a proportion of the development to be 211,000 gross square footage (gsf), as outlined in the City of Seattle adopted 2035 Comprehensive Plan and the adopted U District Rezone.

8.1 CHANGING CAMPUS CHARACTERISTICS

8.1.1 Description of the Alternative

The proposed University of Washington development under Alternative 4 is anticipated to be primarily located in the West and East campus sectors. The technical analysis of Alternative 4 focuses on the weekday PM peak period.

Alternative 4 would include the development total of 6 million net new square footage of gross floor area (gsf), of which approximately 3 million gsf would be in West Campus and 1.7 million gsf would be located in East Campus. The remaining development would be located in South and Central campus, approximately 200,000 gsf and 1.1 million gsf, respectively, as shown in Figure 8.1.



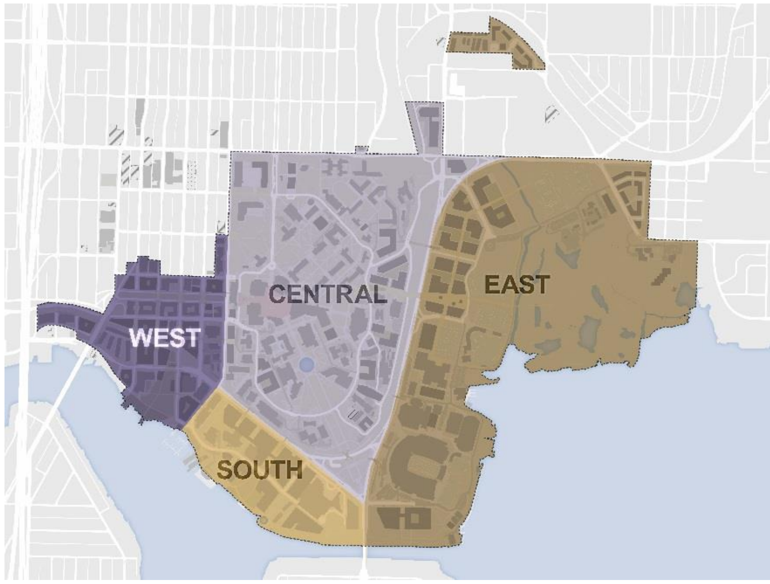


Figure 8.1 Alternative 4 Development Allocation

8.1.2 Trip Generation by Mode

The following provides a summary of the anticipated trip generation for pedestrian, bicycle, transit, and vehicle trips to campus.

The trip generation methodology used for assessing the increase in trips under Alternative 4 is the same as described in Chapter 4, Impacts of No Action. The increase in trips anticipated with Alternative 4 would be similar to other development alternatives and is compared to the No Action Alternative to determine the net increase associated with population growth.

8.2 PEDESTRIANS

8.2.1 Performance Measures

Three pedestrian-related performance measures have been identified to assess and compare alternatives:

- Proportion of Development within 1/4 Mile of Multifamily Housing
- Proportion of Development within 1/4 Mile of University of Washington Residence Halls
- Quality of Pedestrian Environment
- Pedestrian Screenline Demand and Capacity
- Pedestrian Transit Station/Stop Area LOS

These measures reflect the effectiveness of the pedestrian network to provide safe and easy access to pedestrian destinations—specifically housing—and thereby maintain a high walk mode choice on campus. Comparisons of No Action conditions to the development alternatives is provided for each measure below:

Proportion of Development within 1/4 Mile of Multifamily Housing

Walking makes up nearly one-third of all existing campus-related trips to and from campus. Proximity of campus development to housing is therefore an important measure for assessing the propensity of people to walk. This measure assesses the proximity of current campus buildings and development to nearby multifamily housing. As shown in Table 8.1, 80 percent of Alternative 4 development would be within a 1/4 mile of multifamily housing.

Table 8.1
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF MULTIFAMILY HOUSING

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)	Alternative 2 Gross Square Feet (gsf)	Alternative 3 Gross Square Feet (gsf)	Alternative 4 Gross Square Feet (gsf)
West	211,000	3,000,000	3,000,000	3,200,000	3,000,000
South	NA	0	0	0	0
Central	NA	589,985	723,460	0	809,390
East	NA	0 gsf	897,964	645,884	972,832
Total	211,000	3,589,985	4,021,424	3,845,884	4,782,222
Percent	***100%***	***60%***	***67%***	***64%***	***80%***

Proportion of Development within 1/4 Mile of University of Washington Residence Halls

This performance measure assesses the proportion of new development within walking distance of residence halls. University of Washington residence halls were identified and then buffered by 1/4 mile. As shown in Table 8.2, 98 percent of the new development in Alternative 4 would be within 1/4 mile of residence halls.

Table 8.2
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF UNIVERSITY RESIDENCE HALLS

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)	Alternative 2 Gross Square Feet (gsf)	Alternative 3 Gross Square Feet (gsf)	Alternative 4 Gross Square Feet (gsf)
West	211,000	3,000,000	3,000,000	3,200,000	3,000,000
South	NA	249,344	249,344	332,215	200,000
Central	NA	798,357	723,460	788,727	972,747
East	NA	750,000	1,350,000	206,691	1,700,000
Total	211,000	4,797,701	4,722,804	4,527,632	5,872,747
Percent	***100%***	***80%***	***79%***	***76%***	***98%***

Quality of Pedestrian Environment (Primary & Secondary Impact Zones)

Alternative 4 would provide a number of enhancements to pedestrian travel within the Major Institution Overlay (MIO) where development would occur. Improvements in West Campus would mirror those of Alternative 1 with new pedestrian facilities in the waterfront green space and accessible connections to Central Campus. As identified in the Campus Master Plan (CMP), East Campus would have improved pedestrian facilities. South Campus would see little change in the pedestrian environment, maintaining the currently disconnected and impermeable Medical Center. In addition to these upgrades, the City of Seattle's Pedestrian Master Plan highlights new Neighborhood Greenways within the primary and secondary impact zones.

Within the primary impact zone, several greenways are planned in the following locations:

- A southern extension of the existing 12th Avenue NE Neighborhood Greenway
- Walla Walla Road
- NE Boat Street from NE Pacific Street to 15th Avenue NE, which would improve pedestrian connectivity from the Cheshiahud Lake Union Loop to the University of Washington campus
- 20th Avenue NE north of 45th Street and NE 47th Street west of 20th Ave NE, which would increase pedestrian connectivity to the secondary impact zone, and would connect to other planned greenways including 11th Avenue NE, NE 55th Street, and NE 62nd Street
- NE Clark Road

Within the secondary impact zone, greenways in the east section are planned in the following locations:

- 5th Avenue NE
- NE 46th Street
- Keystone Place N
- And in the west section:
- NE Surber Drive
- NE 50th Street

Pedestrian Screenline Capacity

The pedestrian screenline analysis capacity evaluates the peak hour demand, capacity, and level of service (LOS) at all at- and above-grade crossing locations along Montlake Boulevard NE, NE Pacific Street, 15th Avenue NE, and NE 45th Street. The following section summarizes pedestrian screenline volumes in Alternative 4.

Pedestrian Growth from Transit Ridership

Additional growth from increased transit ridership was added to transit stop pedestrian volumes aggregated by screenline, similar to Alternative 1 as described in Chapter 5. This growth accounts for all new pedestrians in the University of Washington study area that would be generated by additional net new transit trips to and from campus.

Pedestrian Growth from Alternative 4 Development

Pedestrian growth from Alternative 4 was assumed to be relative to the No Action Alternative, and evaluated using the same analysis process as Alternative 1 (Chapter 5). Table 8.3 summarizes future Alternative 4 peak hour pedestrian screenline volumes and LOS.

Table 8.3
PEAK HOUR PEDESTRIAN VOLUME AND LEVEL OF SERVICE

	No Action Alternative		Alternative 4	
Screenline	**Peak Hour Pedestrian Volume (People/hour)**	**Level of Service (LOS)**	**Peak Hour Pedestrian Volume (People/hour)**	**Level of Service (LOS)**
Montlake Boulevard NE	14,770	A	17,588	A
NE Pacific Street	3,744	A	4,524	A
15th Avenue NE	12,078	A	16,684	A
NE 45th Street	2,272	A	2,681	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition.

As shown in Table 8.3, future Alternative 4 peak hour aggregate pedestrian volumes for all screenlines would be at LOS A.

Pedestrian Transit Stop Space Analysis

This measure evaluates the peak hour demand, capacity, and LOS at key transit stops along Montlake Boulevard NE, NE Pacific Street, and 15th Avenue NE. The following sections summarize the pedestrian space per person and LOS at these locations considering Alternative 4 development.

Pedestrian Growth from Transit Ridership

Additional growth from increased transit ridership was added to transit stop pedestrian volumes aggregated by campus sector, similar to Alternative 1 as described in Chapter 5. This growth accounts for all new pedestrians in the University of Washington study area that would be generated by additional net new transit trips to and from campus.

Pedestrian Growth from Alternative 4 Development

Pedestrian space anticipated with Alternative 4 was assumed to be relative to the No Action Alternative, and evaluated using the same method as Alternative 1 (see Chapter 5). Table 8.4 summarizes Alternative 4 peak hour pedestrian space and LOS.

As shown in Table 8.4, Alternative 4 peak hour pedestrian space for all transit stops, with the exception of locations 3 and 5, would be at LOS C or better. Location 3 (mid-block near the 15th Avenue NE/ NE Pacific Street intersection) and location 5 (at the 15th Avenue NE/ NE 42nd Street intersection) would be at LOS F and LOS D, respectively.

Table 8.4
PEAK HOUR PEDESTRIAN VOLUME AND LEVEL OF SERVICE

Stop Location	Stop ID Number	No Action Alternative		Alternative 4	
		Pedestrian Space (ft^2/person)	Level of Service	Pedestrian Space (ft^2/person)	Level of Service
NE Pacific St Bay 1	1	45.0	A	11.3	B
NE Pacific St Bay 2	2	39.0	A	10.9	B
NE Pacific St at 15th Ave NE	3	7.5	C	1.7	F
15th Ave NE at Campus Pkwy	4	62.4	A	8.3	C
15th Ave NE at NE 42nd St	5	50.5	A	6.5	D
15th Ave NE at NE 43rd St	6	27.8	A	7.1	C
Montlake Blvd Bay 4	7	39.0	A	22.3	A
Montlake Blvd Bay 3	8	108.7	A	62.2	A
Stevens Way at Pend Oreille Rd	9	19.0	A	11.9	B
Stevens Way at Benton Ln	10	36.4	A	21.4	A

Source: TCRP Report 165: Transit Capacity & Quality of Service Manual, 3rd Edition.

8.3 BICYCLES

8.3.1 Performance Measures

The following bicycle-related performance measures have been identified to assess and compare alternatives:

- Burke-Gilman Trail Capacity
- Bicycle Parking and Utilization
- Quality of Bicycle Environment

Burke-Gilman Trail Capacity

Alternative 4 would concentrate growth in East and South campus sectors, resulting in the largest growth in pedestrian and bike demand in East Campus among the alternatives. This alternative would likely create the largest change in pedestrian and bicycle travel patterns along the Burke-Gilman Trail because it would diversify uses on East Campus away from surface parking. This alterative would likely increase travel along the eastern segment of the Burke-Gilman Trail between Rainier Vista and Pend Oreille Road. Planned expansion of the Burke-Gilman Trail by separating pedestrian and bicycle uses would provide adequate capacity to meet CMP demands.

LOS results for segments along the Burke-Gilman Trail were based on the Federal Highway Administration's Shared-Use Path Level of Service Calculator (SUPLOS). These results are anticipated to be similar to those presented in Impacts of Alternative 1 (Chapter 5).

Bicycle Parking and Utilization
As described in the Affected Environment chapter, the University has effectively managed bicycle parking demand. As new buildings are constructed, bicycle parking will be provided. For these reasons, additional bicycle parking analysis was not conducted for any of the growth alternatives (Alternatives 1-4).

Quality of Bicycle Environment (Primary and Secondary Impact Zones)
The quality of bicycle facilities and demand anticipated with Alternative 4 would be similar to Alternative 1 in West Campus. In South Campus, limited changes in facilities and demand would be expected. Compared to other alternatives, growth in bicycle travel demand within East Campus would likely be largest under this alternative. Due to the scale of development in East Campus, proximity to the Burke-Gilman Trail, flat terrain, existing bicycle travel patterns, and longer walking distance to transit could result in the largest growth in bicycle travel. In addition to the above-mentioned improvements, the Seattle Bicycle Master Plan includes several proposed improvements within the primary and secondary impact zones.

Within the primary impact zone, planned improvements include:

- A protected bike lane running north/south along Roosevelt Way NE highlights bicycle connectivity improvements (recently installed)
- Protected bike lanes along 11th Avenue NE and 12th Avenue NE
- Protected bike lanes along NE 40th Street, west of Brooklyn Avenue NE that would connect with the existing cycling infrastructure on NE 40th Street, thereby improving connectivity to campus

Within the secondary impact zone, planned improvements include:

- A new protected bike lane along Ravenna Place NE that would provide a direct connection between the Burke-Gillman Trail and Ravenna Park
- A protected bike lane along 36th Avenue NE that would increase bicycle connectivity in the north/south directions

A planned Neighborhood Greenway along Fairview Avenue E that would increase the cycle connection to campus from the south.

8.4 TRANSIT

8.4.1 Performance Measures

The following transit-related performance measures have been identified to assess and compare alternatives:

- Proportion of Development within 1/4 Mile of RapidRide
- Proportion of development within 1/2 Mile of Light Rail
- Transit Stop Capacity
- Transit Travel Times and Delay
- Transit Loads at Screenlines

Proportion of Development within 1/4 Mile of RapidRide
This measure calculates the proportion of development within 1/4 mile of RapidRide service to the University of Washington. As shown in Table 8.5 below, 100 percent of the new development would be within a 1/4-mile proximity of RapidRide.

Table 8.5
PROPORTION OF DEVELOPMENT WITHIN 1/4 MILE OF RAPIDRIDE

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)	Alternative 2 Gross Square Feet (gsf)	Alternative 3 Gross Square Feet (gsf)	Alternative 4 Gross Square Feet (gsf)
West	211,000	3,000,000	2,400,000	3,200,000	3,000,000
South	NA	1,350,000	1,350,000	1,650,000	200,000
Central	NA	900,000	900,000	900,000	1,100,000
East	NA	750,000	1,350,000	250,000	1,700,000
Total	**211,000**	**6,000,000**	**6,000,000**	**6,000,000**	**6,000,000**
Percent	***100%***	***100%***	***100%***	***100%***	***100%***

Proportion of Development within 1/2 Mile of Light Rail

This measure calculates the proportion of development within a 1/2-mile walkshed of light rail stations. This action includes the U District Station at Brooklyn Street between NE 45th and NE 43rd streets, assumed to be completed in 2021. Table 8.6 summarizes the square footage of development within a 1/2-mile walkshed of light rail in No Action, Alternative 1, Alternative 2, Alternative 3, and Alternative 4. Similar to Alternative 2, Alternative 4 would concentrate more development in East Campus outside of the 1/2-mile walkshed, which would result in a lower overall coverage.

Table 8.6
PROPORTION OF DEVELOPMENT WITHIN 1/2 MILE OF LIGHT RAIL

Sector	No Action Gross Square Feet (gsf)	Alternative 1 Gross Square Feet (gsf)	Alternative 2 Gross Square Feet (gsf)	Alternative 3 Gross Square Feet (gsf)	Alternative 4 Gross Square Feet (gsf)
West	211,000	2,680,232	2,160,729	2,880,973	2,680,232
South	NA	1,350,000	1,350,000	1,650,000	200,000
Central	NA	900,000	900,000	900,000	1,100,000
East	NA	750,000	452,036	250,000	727,168
Total	**211,000**	**5,680,232**	**4,862,766**	**5,680,973**	**4,707,400**
Percent	***100%***	***89%***	***90%***	***90%***	***89%***

Transit Stop Capacity

This measure evaluates the number of buses that a transit stop can process in an hour. This analysis was performed for four pairs of stops on key transit corridors around the University of Washington: 15th Avenue NE, NE 45th Street, Montlake Boulevard and NE Pacific Street. The transit stop capacity and demand do not change by alternative. Therefore, the summary provided in Chapter 4, Impacts of No Action, Alternative reflects the expected operations.

Transit Travel Times and Delay

Transit travel speeds do not vary between development alternatives. Therefore, the transit corridor speeds are the same as Alternative 1 (Chapter 5).

Transit Loads at Screenlines
See Chapter 5, Impacts of Alternative 1.

8.5 VEHICLE

8.5.1 Performance Measures

Six measures of effectiveness were analyzed to evaluate the impact of the campus growth on the surrounding transportation network:

- Intersection operational level of service for intersection located in the primary and secondary impact area
- Arterial Corridor Operations
- Screenline Volumes
- Cordon Volumes
- Caps are set as 1990 trip levels to the University District and University (MIO)
- Freight Corridor Impact

8.5.2 Traffic Volumes

Increased vehicle traffic associated with Alternative 4 was assigned to potential garage locations based on existing vehicle travel patterns, previous studies in the project vicinity, review of University information, and U.S. Census Bureau's *OnTheMap* tool. *OnTheMap* is a web-based mapping and reporting application that shows where workers are employed and where they live based on census data. The ZIP codes within the data were evaluated to determine if a person would be more likely to travel from the ZIP code via vehicle or by other means. Individuals making trips to ZIP codes closer to the proposed project sites or in more transit-oriented locations are more likely to use transit, walk, bicycle, or other non-drive alone modes. Individuals making trips to ZIP codes outside the Seattle city limits and/or farther from the site are more likely to drive. The general trip distribution to/from the University of Washington is shown in Chapter 4, Impacts of No Action.

Primary Impact Zone
Project trips for each potential garage location were assigned to the study intersections based on the general trip distribution patterns shown in Chapter 4. Project trips at each intersection are shown on Figure 8.2 and Figure 8.3 below. The resulting Alternative 4 volumes are shown in Figure 8.4 and Figure 8.5.

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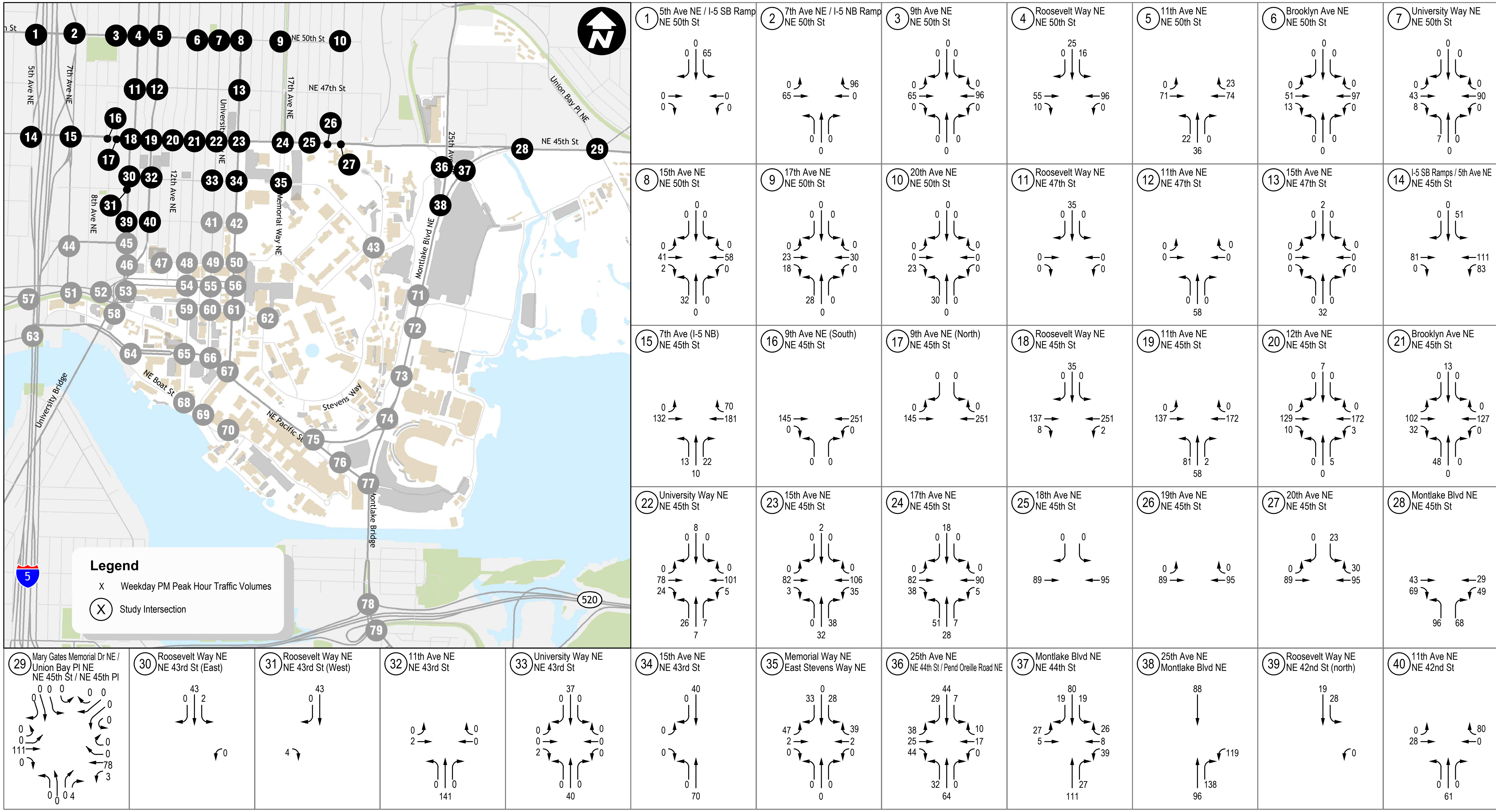

Future (2028) Alternative 4 (Intersections 1-40) Project Trips

University of Washington 2018 Campus Master Plan

FIGURE 8.2

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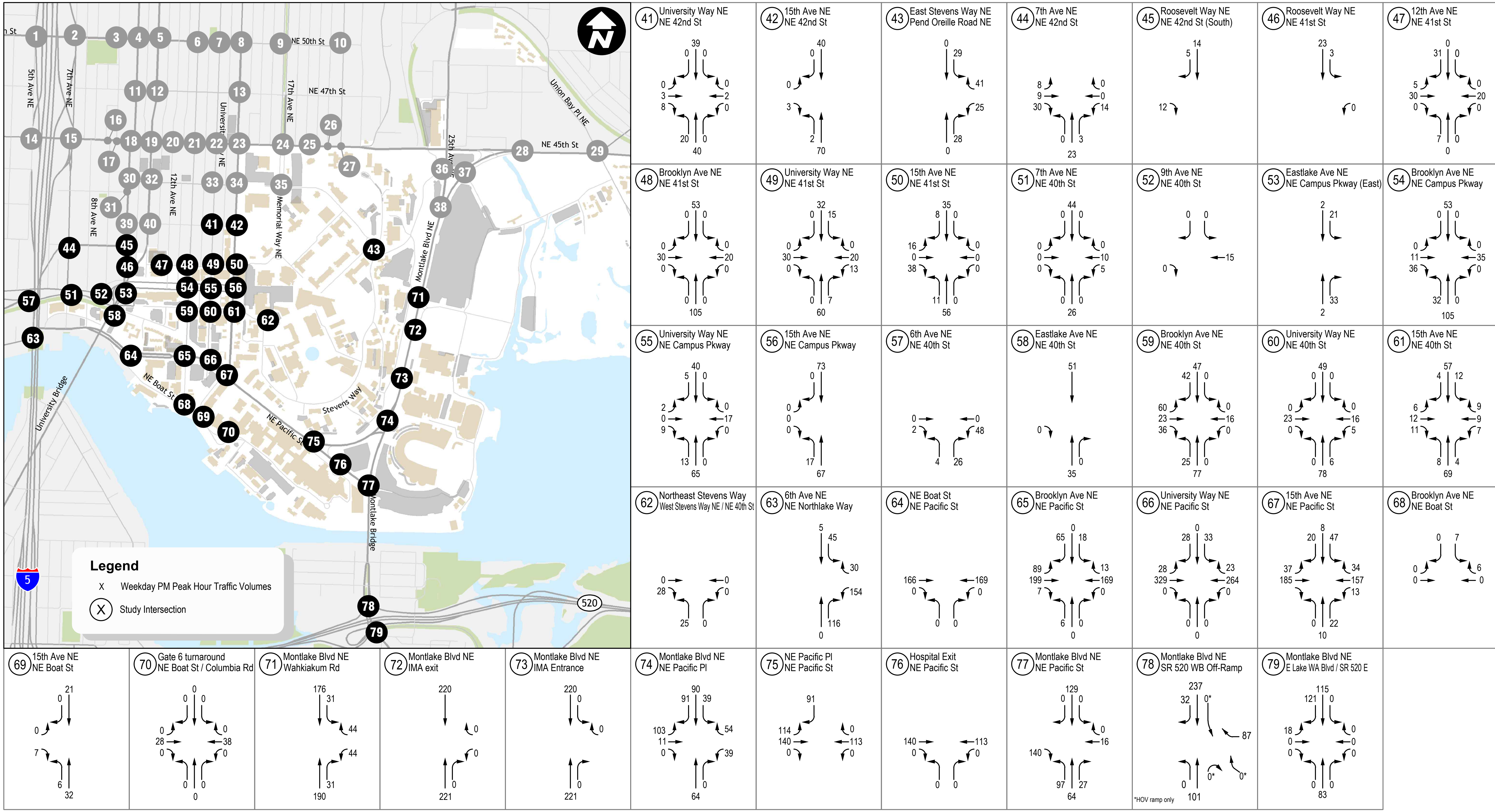

Future (2028) Alternative 4 (Intersections 41-79) Project Trips

University of Washington 2018 Campus Master Plan

FIGURE
8.3

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WHAT TRANSPORTATION CAN BE.

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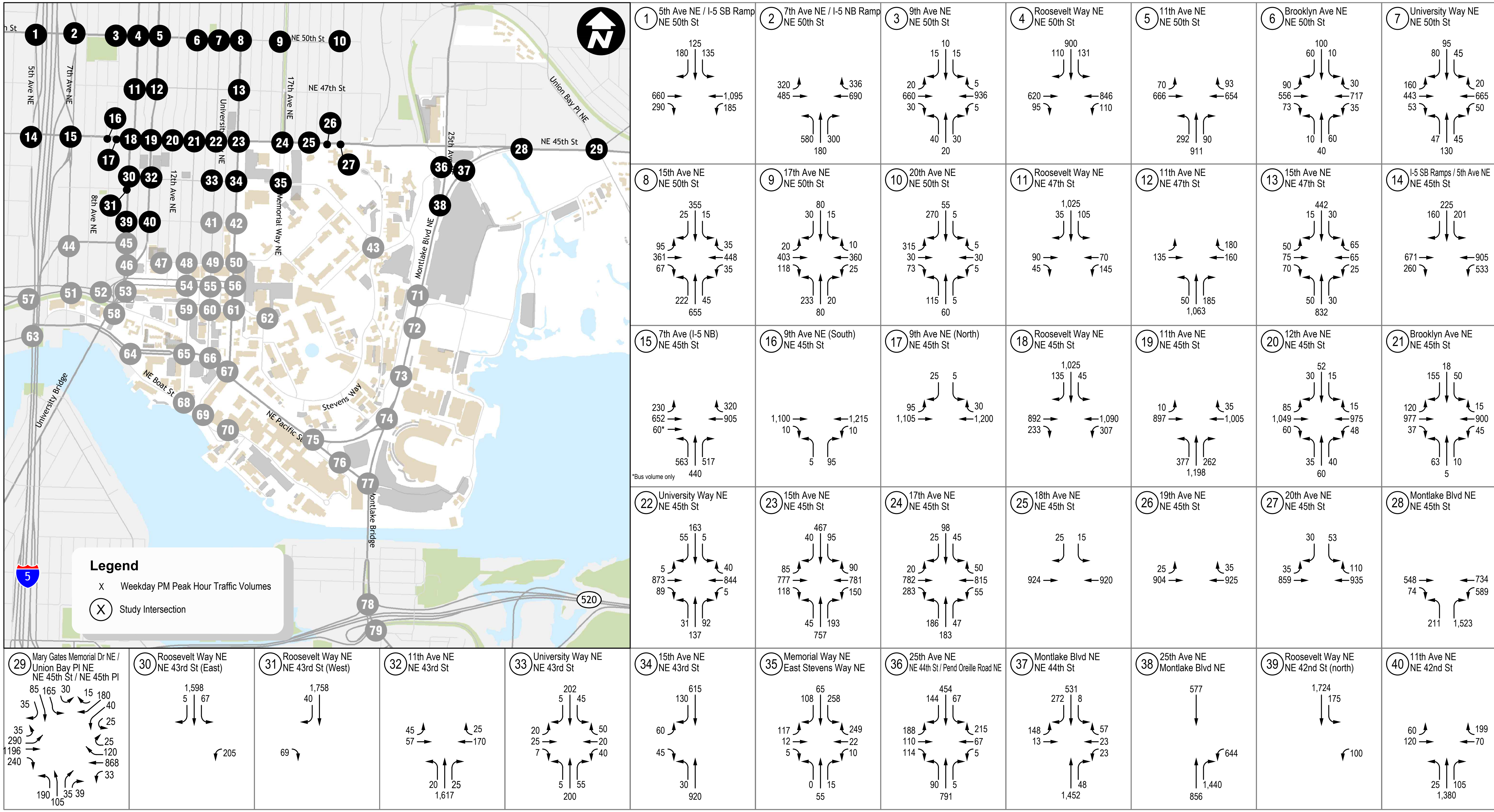

Future (2028) Alternative 4 (Intersections 1-40) Weekday PM Peak Hour Traffic Volumes

University of Washington 2018 Campus Master Plan

FIGURE
8.4

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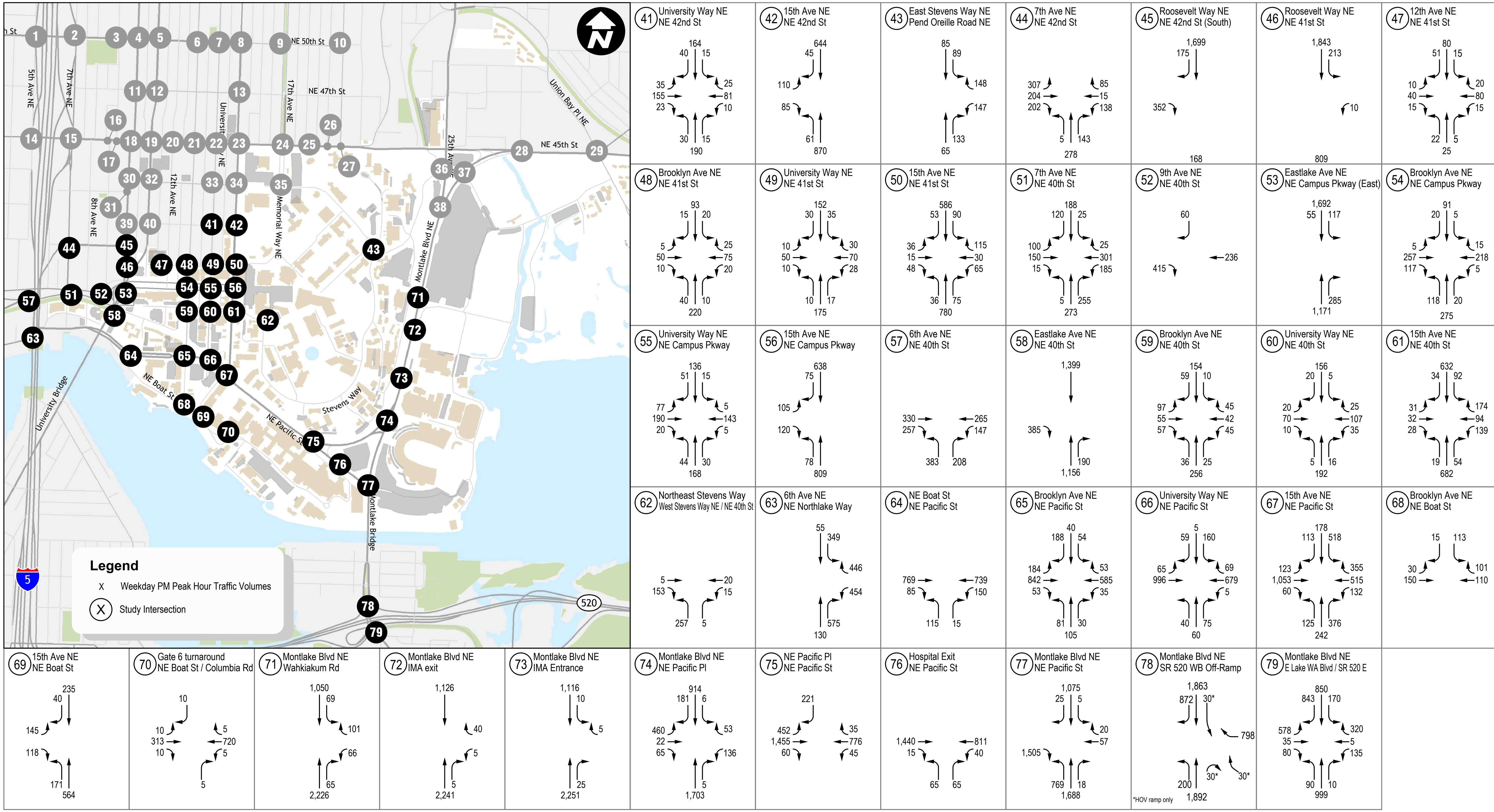
WHAT TRANSPORTATION CAN BE.



Future (2028) Alternative 4 (Intersections 41-79) Weekday PM Peak Hour Traffic Volumes

University of Washington 2018 Campus Master Plan

FIGURE
8.5

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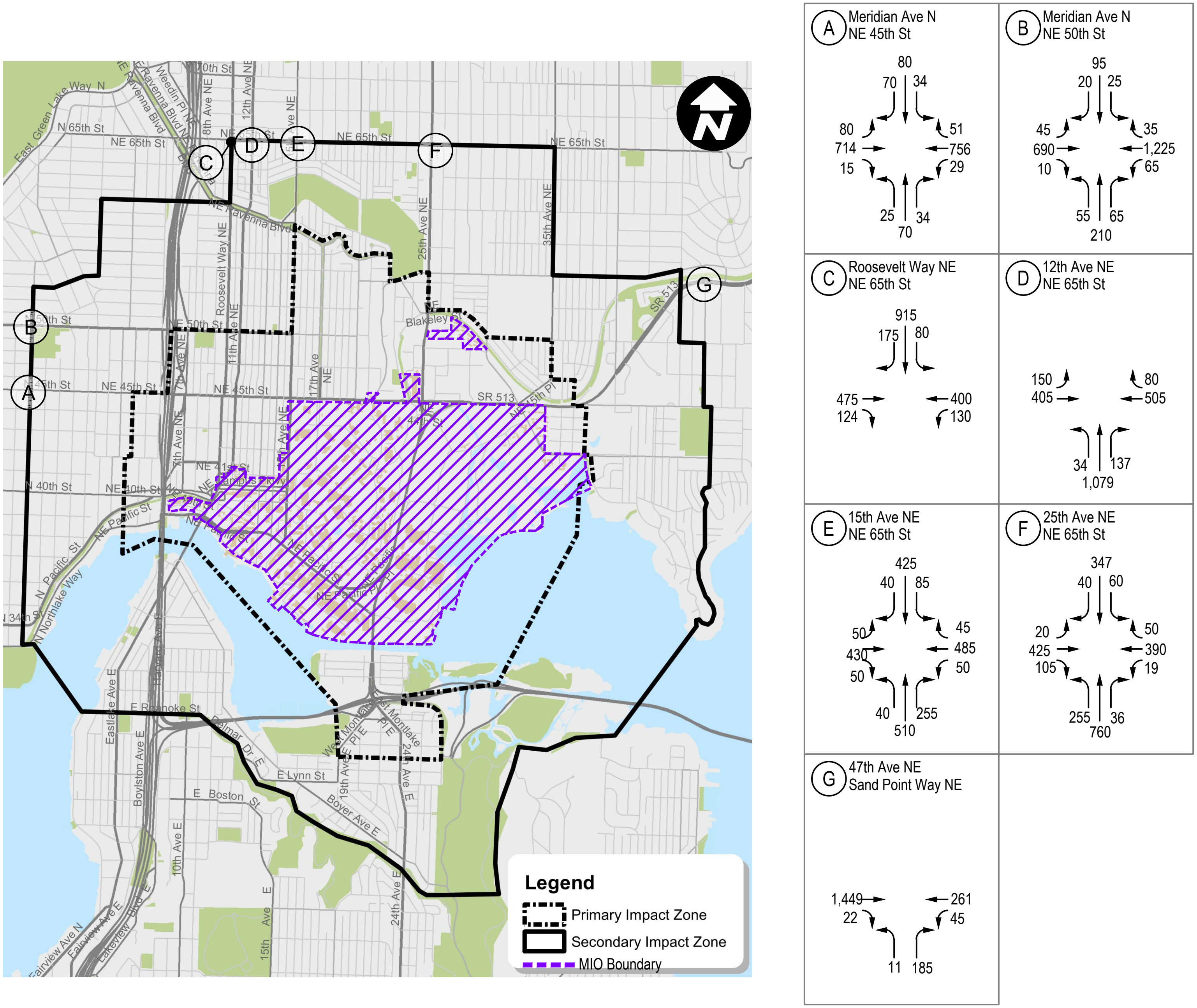
Secondary Impact Zone

Weekday PM peak hour volumes at seven intersections in the secondary impact zone were analyzed by considering future background traffic and volumes associated with the Alternative 4 development. Alternative 4 directional volumes were forecast in the same manner as all primary impact zone study intersections as described above. It was assumed that 5 percent of future volumes would be distributed into the neighborhood roadway network and therefore would not travel through the secondary impact zone study intersections. The resulting secondary impact zone volumes are shown in Figure 8.6.



Alternative 4 Secondary Impact Zone Weekday PM Peak Hour Volumes

University of Washington 2018 Campus Master Plan

FIGURE
8.6

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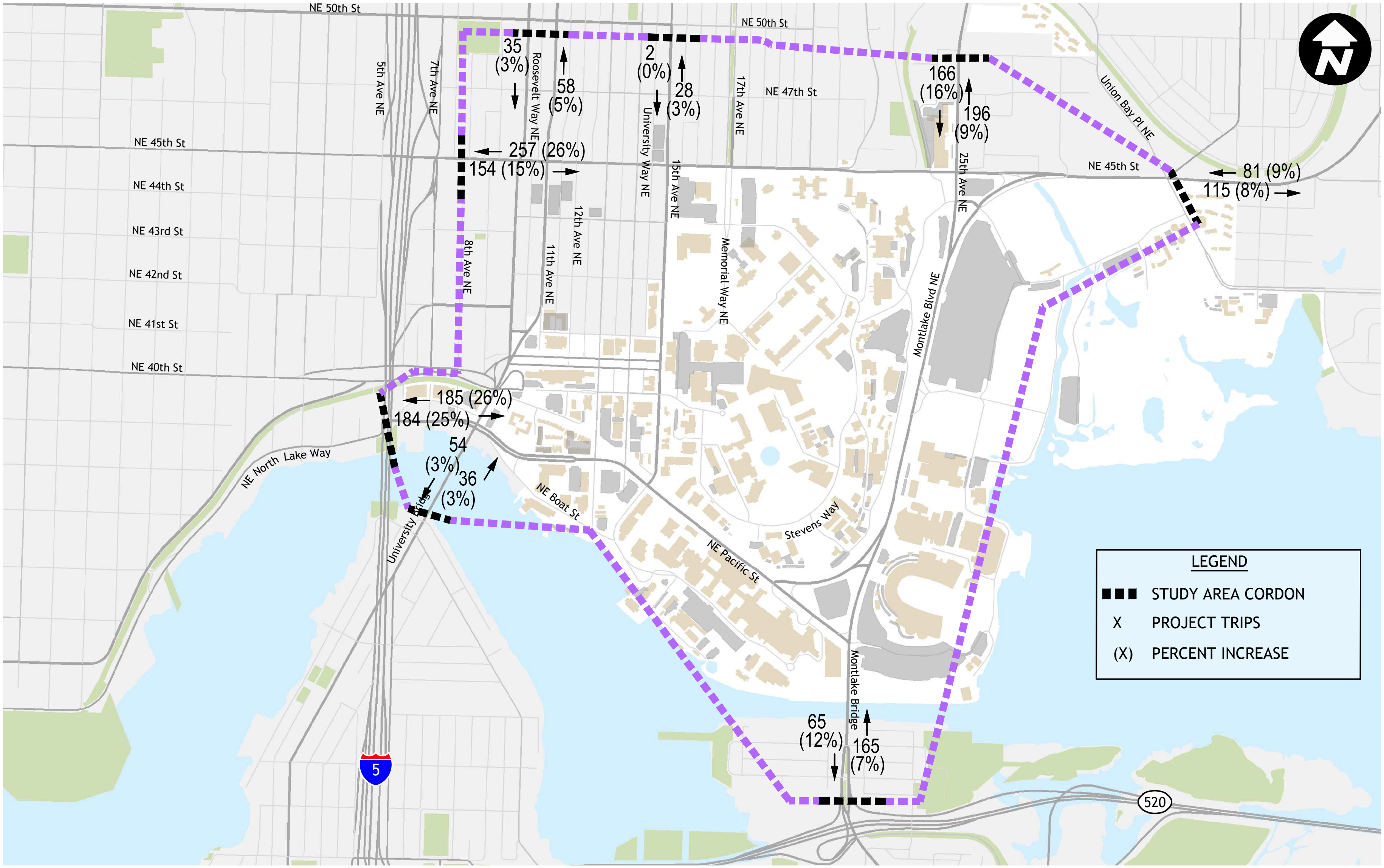
8.5.1 Cordon Volume Analysis

Cordon: An imaginary line used to evaluate traffic in and out of the University area and measure the change or increase in traffic associated with the proposed alternatives.

To understand the volumes considered under the different alternative scenarios, a cordon volume analysis was completed. The cordon volume analysis focused on the major roadways leading to and from the University. The cordon volume analysis also showed the percentage of total trips along the corridor that were associated with the increased traffic generated by Alternative 4. The cordon volume and project share associated with Alternative 4 are shown in Figure 8.7. Note that these data reflect the percentage increase associated with continued development on-campus. As shown in the figure, project-related volumes would increase cordon volumes by 10–11 percent. Similar to Alternative 1, this increase could be constrained by the available arterial street capacity.



Future (2028) Alternative 4 PM Peak Hour Cordon Volumes and Proportional Increase

University of Washington 2018 Campus Master Plan

FIGURE **8.7**

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8.5.2 Traffic Operations Performance

Methodology

The methodology used in assessing intersection and corridor LOS is consistent with that described for the Affected Environment (Chapter 3) and No Action Alternative (Chapter 4) scenarios. A detailed description of the methodology used can be found in Appendix B: Methods and Assumptions.

Intersection Operations – Primary Impact Zone

Weekday PM peak hour intersection traffic operations during the Alternative 4 conditions are summarized in Figure 8.8 and

Figure 8.9. The year 2028 geometry for all of the study-area intersections was assumed to remain the same as No Action Alternative conditions except when modifications are expected as part of the alternative. Additionally, signal timing splits and offsets were optimized under Alternative 4. Complete intersection LOS summaries are provided in Appendix C.

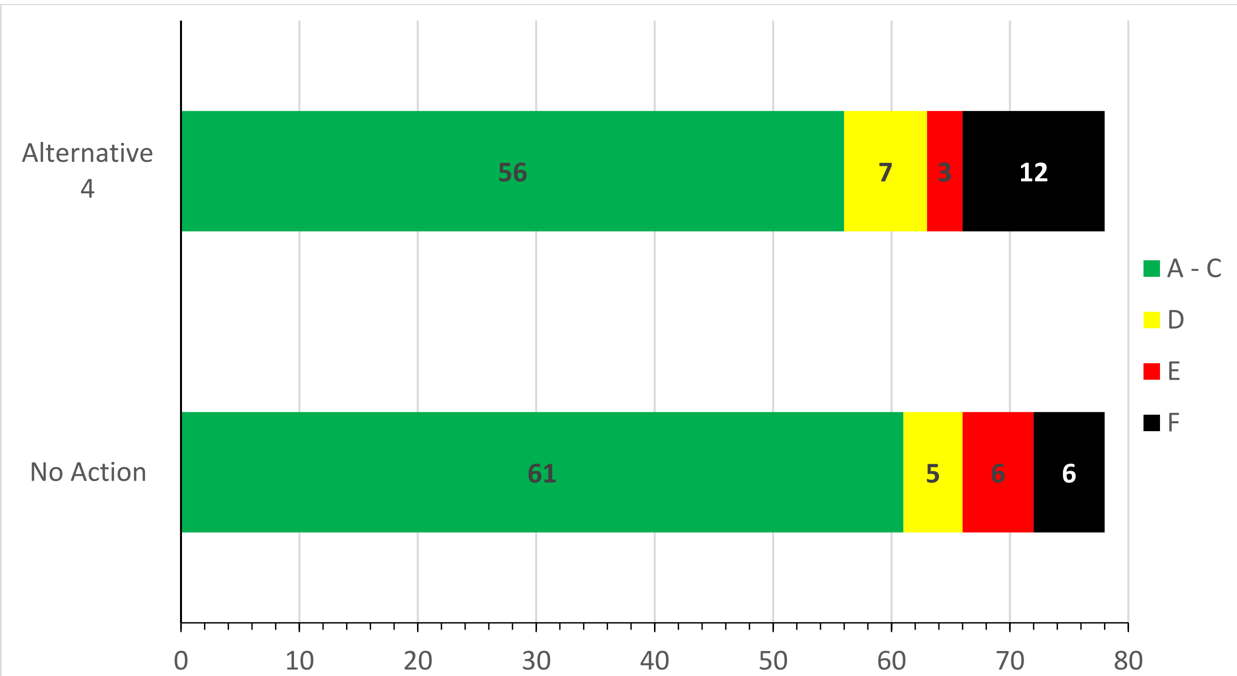
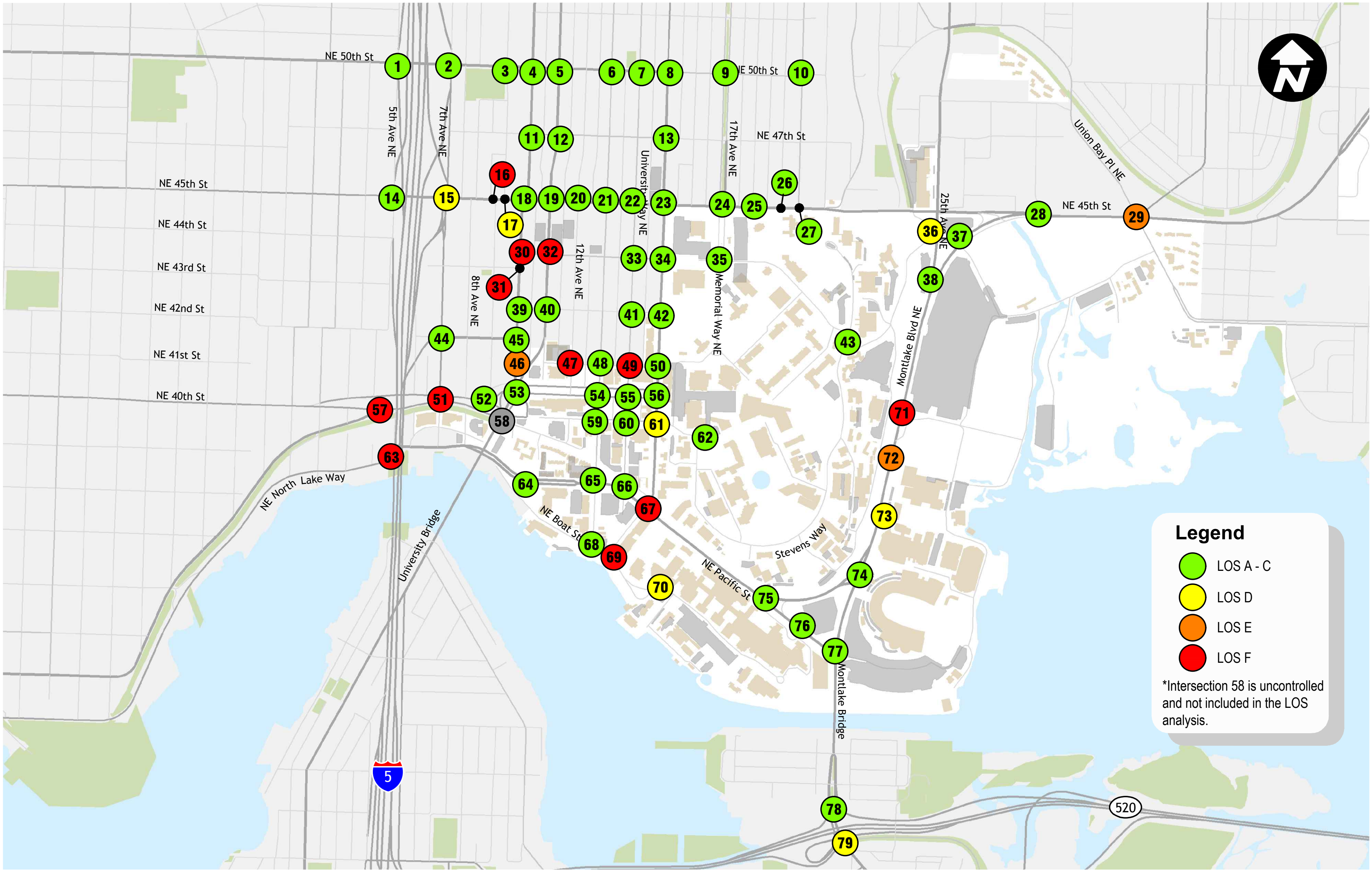


Figure 8.8 Weekday PM Intersection Level of Service Summary



Future (2028) Alternative 4 Weekday PM Peak Hour Traffic Operations

FIGURE 8.9

University of Washington 2018 Campus Master Plan

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WHAT TRANSPORTATION CAN BE.

Table 8.7 illustrates changes in intersection traffic operations at intersections anticipated to operate at LOS E or F during the weekday PM peak hour under Alternative 4 conditions.

Table 8.7
INTERSECTION LEVEL OF SERVICE PM PEAK HOUR SUMMARY

Intersection	No Action		Alternative 4		Change in Delay (sec)	Project Share
	LOS[1]	Delay[2]	LOS[1]	Delay[2]		
16. 9th Ave NE (South) / NE 45th St	E	41	F	68	27	16.4%
29. Montlake Blvd NE / Mary Gates Memorial Dr NE	D	50	E	56	6	5.2%
30. Roosevelt Way NE / NE 43rd St (East)	F	793	F	950	157	2.4%
31. Roosevelt Way NE / NE 43rd St (West)	F	74	F	111	67	2.5%
32. 11th Ave NE/ NE 43rd St	E	72	F	105	33	7.4%
46. Roosevelt Way NE / NE 41st St	E	36	E	39	3	1.3%
47. 12th Ave NE / NE 41st St	F	52	F	664	612	24.6%
49. University Way NE / NE 41st St	F	*	F	*	*	28.7%
51. 7th Ave NE / NE 40th St	E	44	F	61	17	6.5%
57. 6th Ave NE / NE 40th St	F	107	F	136	29	6.3%
63. 6th Ave NE / NE Northlake Way	E	38	F	110	72	18.6%
67. 15th Ave NE / NE Pacific St	D	37	F	99	62	25.5%
69. 15th Ave NE/NE Boat St	C	18	F	142	124	36.8%
71. Montlake Blvd NE / Wahkiakum Rd	F	343	F	3,022	2679	9.1%
72. Montlake Blvd NE / IMA exit	D	34	E	42	8	9.3%

*Volume exceeds capacity and Synchro could not calculate the delay.

1. Level of service. 2. Average delay per vehicle in seconds rounded to the whole second.

During the weekday PM peak hour, six additional intersections are anticipated to operate at LOS F under Alternative 4 traffic conditions compared to the No Action Alternative conditions. Overall, 22 intersections are anticipated to operate at LOS D or worse during the weekday PM peak hour with Alternative 4, as compared to 17 under No Action conditions. The City of Seattle does not have an LOS standard but generally considers LOS E and LOS F at signalized intersections and LOS F at unsignalized intersections to reflect poor operations. Intersections that degrade from LOS D to E or operate at LOS E or LOS F under the “with-project” condition, or increase by more than 5 seconds, could be considered significant by the City.

The following intersections are anticipated to degrade to LOS D or worse under Alternative 4 conditions:

16. 9th Avenue NE (South)/NE 45th Street
17. 9th Avenue NE (North)/NE 45th Street
29. Montlake Boulevard NE/Mary Gates Memorial Drive NE
32. 11th Avenue NE/NE 43rd Street
51. 7th Avenue NE/NE 40th Street
61. 15th Avenue NE/NE 40th Street
63. 6th Avenue NE/NE Northlake Way
67. 15th Avenue NE/NE Pacific Street
69. 15th Avenue NE/NE Boat Street
70. Gate 6 turnaround/NE Boat Street/Columbia Road
72. Montlake Boulevard NE/IMA exit
73. Montlake Boulevard NE/IMA entrance

Intersections where the LOS would be E or F and where the Alternative 1 traffic would increase delay by more than 5 seconds are shown in Table 8.8. A majority of the intersections is unsignalized. At the two-way stop controlled (TWSC) intersections, the change in delay is represented for the worst movement.

Table 8.8
INTERSECTION OPERATIONS POTENTIAL IMPACTS SUMMARY

Intersection	Traffic Control	Change in Delay (Seconds)	Percent of Total (Project Share)
16. 9th Avenue NE (South)/NE 45th Street	TWSC	27	16.4%
29. Montlake Boulevard NE/Mary Gates Memorial Drive NE	Signalized	6	5.2%
30. Roosevelt Way NE/NE 43rd Street (East)	TWSC	157	2.4%
31. Roosevelt Way NE/NE 43rd Street (West)	TWSC	37	2.5%
32. 11th Avenue NE/NE 43rd Street	Signalized	34	7.4%
47. 12th Avenue NE/NE 41st Street	TWSC	612	24.6%
49. University Way NE/NE 41st Street	TWSC	-[1]	28.7%
51. 7th Avenue NE / NE 40th Street	AWSC	17	6.5%
57. 6th Avenue NE / NE 40th Street	AWSC	29	6.3%
63. 6th Avenue NE / NE Northlake Way	AWSC	72	18.6%
67. 15th Avenue NE / NE Pacific Street	Signalized	61	25.5%
69. 15th Avenue NE/NE Boat Street	AWSC	124	36.8%
71. Montlake Boulevard NE / Wahkiakum Road	TWSC	2679	9.1%
72. Montlake Boulevard NE / IMA exit	TWSC	8	9.36%

Note: TWSC = two-way stop controlled, AWSC = all-way stop controlled

1. Volume exceeds capacity and Synchro could not calculate the delay.

Of the stop controlled intersections listed in Table 8.8, some of the increased delay can be attributed to the higher pedestrian and bicycle volumes. Additionally, the following intersections are located at or near potential garage access locations resulting in higher project share percentages:

47. 12th Avenue NE/NE 41st Street
49. University Way NE/NE 41st Street
63. 6th Avenue NE/NE Northlake Way
67. 15th Avenue NE/NE Pacific Street
71. Montlake Boulevard NE / Wahkiakum Road
72. Montlake Boulevard NE/IMA exit

Driveways and building access features to be incorporated into planned development can have impacts on the overall trip distribution and individual movements at intersections near these locations. Given the preliminary planning nature of this evaluation, individual traffic impacts should be assessed when final building size and driveway locations are determined. Also, given the grid network, if drivers were to experience long delays at unsignalized locations, they could alter their trip patterns to reduce delays. It is also recognized that LOS for vehicle traffic, while a consideration, must be increasingly balanced against the assumption that pedestrian, bicycle, and transit travel modes would be encouraged and facilitated. Intersections that are calculated to operate at poor LOS for vehicle traffic are not always considered a high priority for improvement by the City.

Intersection Operations – Secondary Impact Zone

Weekday PM peak hour intersection traffic operations under the 2028 No Action Alternative and Alternative 4 conditions are shown in Table 8.9. The 2028 geometry for all of the study area intersections were assumed to remain the same as existing conditions. Signal timing splits were optimized under 2028 Alternative 4 conditions. Complete intersection LOS summaries are provided in Appendix C.

Table 8.9
INTERSECTION LEVEL OF SERVICE SUMMARY – SECONDARY IMPACT ZONE

Intersection	No Action		Alternative 4		Change in Delay (sec)
	LOS[1]	Delay[2]	LOS[1]	Delay[2]	
A. Meridian Avenue N/N 45th Street	B	12	B	13	1
B. Meridian Avenue N/N 50th Street	B	17	B	17	0
C. Roosevelt Way NE/NE 65th Street	E	73	F	81	8
D. 12th Avenue NE/NE 65th Street	C	23	C	22	-1
E. 15th Avenue NE/NE 65th Street	F	161	F	160	-1
F. 25th Avenue NE/NE 65th Street	E	80	F	111	31
G. 47th Avenue NE/Sand Point Way NE	D	30	F	59	29

1. Level of service.
2. Average delay per vehicle in seconds rounded to the whole second.

As shown in Table 8.9 the secondary impact zone intersections are anticipated to operate at the same LOS under Alternative 4 as they do under the No Action Alternative conditions with the exception of the 25th

Avenue NE/ NE 65th Street, 47th Avenue NE/ Sand Point Way NE, and Roosevelt Way NE/ NE 65th Street intersections. The 25th Avenue NE/ NE 65th Street intersection is anticipated to degrade from LOS E to LOS F with approximately a 31 second increase in delay. The 47th Avenue NE/ Sand Point Way NE intersection is anticipated to degrade from LOS D to LOS F with approximately a 29 second increase in delay. The Roosevelt Way NE/ NE 65th Street intersection is anticipated to degrade from LOS E to LOS F with approximately an 8 second increase in delay. Additionally, the 15th Avenue NE/NE 65th Street and 12th Avenue NE/ NE 65th Street intersections are anticipated to experience a slight decrease in delay.

8.5.3 Arterial Operations

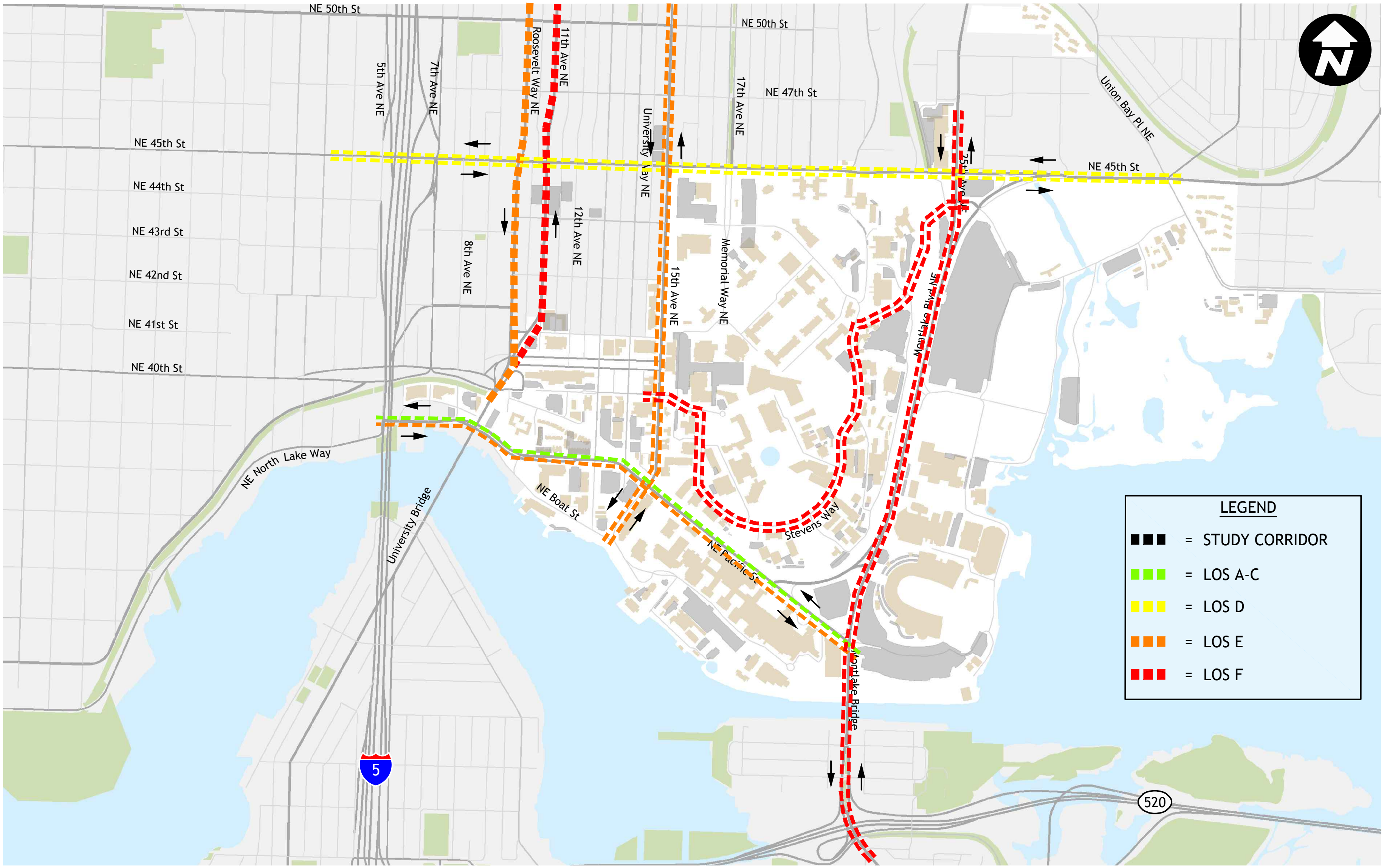
Arterial travel times and speeds were evaluated along NE 45th Street, Pacific Street, 11th Avenue NE, Roosevelt Way NE, 15th Avenue NE, Montlake Boulevard NE, and Stevens Way NE, along with traffic data associated with Alternative 4. These data are consistent with the previously described methodology for No Action conditions. This includes the application of the adjustment factors previously described. Table 8.10 and Figure 8.10 summarize weekday PM peak hour arterial travel times and speeds. Detailed arterial operations worksheets are provided in Appendix C.

Table 8.10
WEEKDAY PM PEAK HOUR ARTERIAL LEVEL OF SERVICE AND TRAVEL TIME SUMMARY

Corridor	No Action		Alternative 4	
	LOS[1]	Speed[2]	LOS[1]	Speed[2]
11th Avenue NE between NE Campus Parkway and NE 50th Street				
Northbound	F	5.0	F	4.0
15th Avenue NE between NE Boat Street and NE 50th Street				
Northbound	E	8.0	E	7.5
Southbound	D	9.2	F	6.8
Montlake Boulevard NE between E Lake Washington Boulevard and NE 45th Street				
Northbound	E	11.5	F	10.0
Southbound	F	8.5	F	8.7
NE 45th Street between 5th Avenue NE and Union Bay Place NE				
Eastbound	D	12.0	D	11.3
Westbound	D	11.6	D	10.8
NE Pacific Street (NE Northlake Way) between 6th Avenue NE and Montlake Boulevard E				
Eastbound	C	18.3	E	11.9
Westbound	C	21.9	C	20.8
Roosevelt Way NE between NE Campus Parkway and NE 50th Street				
Southbound	D	10.4	E	8.9
Stevens Way NE between 15th Avenue NE and 25th Avenue NE				
Eastbound	F	3.6	F	3.3
Westbound	F	3.1	F	2.4

1. Level of service.
2. Average speed in miles per hour

As shown in Table 8.10, with Alternative 4 the arterials would generally experience increases in delay and slower travel speeds. Anticipated LOS expected is as follows: Southbound 15th Avenue NE (from LOS D to LOS F), northbound Montlake Boulevard NE (from LOS E to LOS F), eastbound NE Pacific Street (from LOS C to LOS E), and southbound Roosevelt Way NE (from LOS D to LOS E).



Future (2028) Alternative 4 Weekday PM Peak Hour Corridor Traffic Operations

FIGURE **8.10**

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8.5.4 Screenline Analysis: Primary Impact Zone

Screenline: An imaginary line across which the number of passing vehicles is counted.

This section describes the analysis completed for two designated screenlines within the study area, consistent with the City of Seattle Transportation Concurrency system. Screenlines are imaginary lines across which the number of passing vehicles is counted. In this study, screenlines were selected to count vehicle traffic entering and exiting the University of Washington primary and secondary impact zones. As part of the Mayor's Seattle 2035 Comprehensive Plan (City of Seattle, 2016), two screenlines were identified within the vicinity of the University of Washington, as shown in Figure 8.11. Screenline 5.16 is an east-west screenline, measuring north-south travel, and extending along the Lake Washington Ship Canal to include the University and Montlake bridges. Screenline 13.13 is a north-south screenline, measuring east-west travel, and extending east of Interstate 5 (I-5) between NE Pacific Street and NE Ravenna Boulevard.

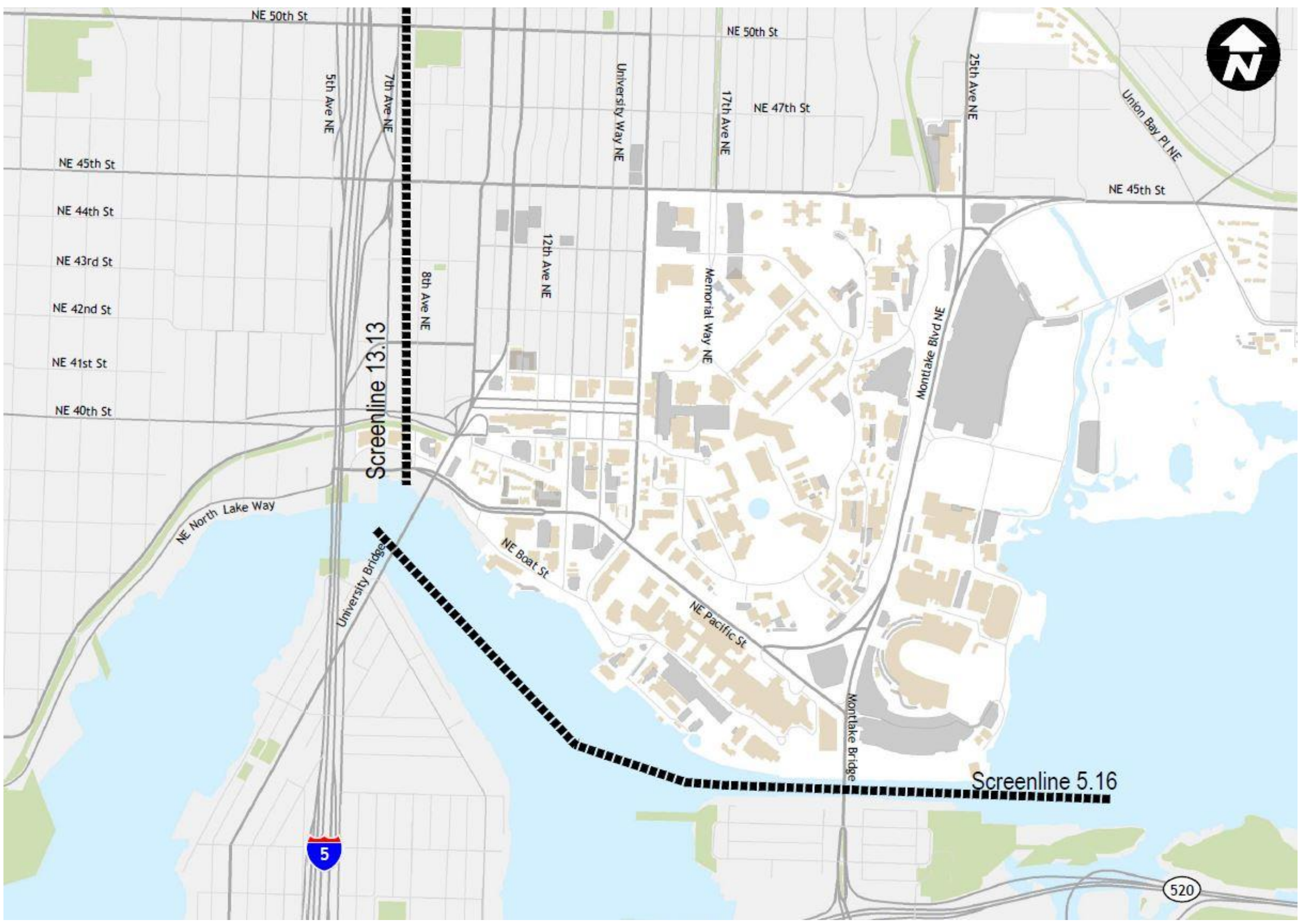

Figure 8.11 Study Area Screenlines

The screenline analysis included volume-to-capacity (V/C) calculations for the vehicles traversing the screenlines using Alternative 4 traffic volumes and interpolated roadway capacity estimates. Roadway capacity for the 2028 future horizon year was interpolated using 2016 capacity estimates described in Chapter 3, Affected Environment, and 2035 capacity estimates referenced in the May 2016 Seattle Comprehensive Plan Update Final EIS. Alternative 4 roadway capacity estimates are shown in Table 8.11 below. Detailed screenline volumes and V/C calculations are included in Appendix C.

Table 8.11
ROADWAY CAPACITY AT STUDY AREA SCREENLINES

Screenline	Alternative 4 Capacity
5.16 – Ship Canal, University and Montlake Bridges	
Northbound	4,210
Southbound	4,210
13.13 – East of I-5, NE Pacific Street to NE Ravenna Boulevard	
Eastbound	6,119
Westbound	6,119

Source: Transpo Group, 2016

LOS standards for the screenline analysis were based on the V/C ratio of a screenline. As described in the Seattle Comprehensive Plan Update EIS, the LOS standard V/C ratio for Screenline 5.16 and Screenline 13.13 were 1.20 and 1.00, respectively. For this study, screenline V/C ratios that did not exceed the LOS standard were considered acceptable. A summary of the Alternative 4 screenline analysis is shown in Table 8.12. Detailed screenline analysis calculations are included in Appendix C.

Table 8.12
SCREENLINE ANALYSIS SUMMARY

Screenline	Screenline Volume	Capacity	V/C	LOS Standard V/C
5.16 – Ship Canal, University and Montlake Bridges				
Northbound	4,036	4,210	0.96	1.20
Southbound	4,519	4,210	1.07	1.20
13.13 – East of I-5, NE Pacific Street to NE Ravenna Boulevard				
Eastbound	3,655	6,119	0.60	1.00
Westbound	3,900	6,119	0.64	1.00

Source: NACTO, Seattle Comprehensive Plan Update EIS, and Transpo Group, 2016

As shown in Table 8.12, all Alternative 4 screenline V/C ratios would meet the acceptable LOS standard.

8.5.5 Service/Freight Routes

Campus-wide, the overall freight/service-related activities with Alternative 4 are anticipated to be similar to that planned for Alternative 1 as the total development area for each is the same. Increase in volume would shift based on the allocation of development area. With Alternative 4, comparative increases in campus development-related freight and service activity would occur mostly in the East campus sector, accessed off Montlake Boulevard. Therefore, no significant impact due to added freight traffic associated with Alternative 4 was identified.

8.5.6 Parking

Parking Supply

Similar the other development alternatives, it was assumed that parking supply would be increased or decreased within each campus sector to achieve an 85-percent utilization without exceeding the Alternative 4 parking cap of 10,420 spaces. The location of parking and strategies used to maintain the existing City University Agreement (CUA) parking cap would be consistent with those outlined for Alternative 1.

Parking Demand

Overall parking demand for Alternative 4 would be the same as the other development alternatives. Alternative 4 on-campus parking demand and utilization was reviewed by sector to provide context on where parking demand would occur (see Table 8.13). Allocation of Alternative 4 parking demand by sector was based on projected development as documented in Appendix B: Methods and Assumptions. This evaluation assumed that on-street parking would be allocated to on-campus facilities given the increases and reallocation of parking supply to achieve an 85-percent utilization.

Table 8.13
PEAK PARKING DEMAND BY SECTOR

Sector	Parking Supply Cap	Parking Demand			% Utilization
			Alternative 4		
		No Action[1]	Growth[2]	Total	
West	2,820	1,428	969	2,397	85%
South	1,470	1,187	65	1,252	85%
Central	3,580	2,689	355	3,044	85%
East	2,370	1,464	549	2,013	85%
Total	**10,240**	**6,768**	**1,938**	**8,706**	**85%**

Source: Transpo Group, 2016

1. On-campus parking demand for the No Action Alternative is based on a projected increase in population. This does not include on-street parking demand increases noted in the previous table since these would not be parking within the campus sectors.
2. Growth in parking demand is based on a projected increase in population for Alternative 4. The analysis assumes with the street vacation and reallocation of parking supply in Alternative 4, on-street parking demand would shift to on-campus parking.

As shown in Table 8.13, reallocation of parking would result in a parking supply under the existing cap and an 85-percent utilization by campus sector and for the campus as a whole. The additional parking and reallocation of parking supply would provide a better relationship between localized supply and demand and thus reduce the likelihood of parking beyond the University of Washington facilities (i.e., within the neighborhoods).

Secondary Parking Impacts

Parking outside the primary impact zone would likely continue with Alternative 4 similar to the No Action Alternative. This would include people parking their vehicles in unrestricted spaces and then using transit to travel to campus. With future campus growth, this could occur at higher levels compared to the No Action Alternative.

8.6 AERIAL/STREET VACATIONS

Alternative 4 impacts for the street vacation would be consistent with those described for Alternative 1 (Chapter 5). As noted in the Alternative 1 analysis, the City of Seattle has defined polices related to assessing and approving the vacation of public rights-of-way. Further analysis would be provided to the City consistent with the policy requirements at such time an application for a street vacation is made. The EIS alternatives and supporting analysis reflect the vacation as proposed.

8.7 VEHICLE TRIP CAPS

CUA vehicle trip caps are considered campus-wide and would not materially change between the development alternatives. See the related discussion in Chapter 5, Impacts of Alternative 1.

9 MITIGATION

This mitigation chapter identifies mitigation to address impacts identified for each alternative. Mitigation is considered for all modes.

By 2028, any of the development alternatives would accommodate up to 6 million net gross square footage (gsf) of new development at the University of Washington, in addition to anticipated development that would occur under the No Action Alternative (211,000 gsf). This new development would include improvements such as new and wider sidewalks and bikeways, bicycle lockers, and loading areas as well as replacement parking. Table 9.1 summarizes improvements by campus sector and travel mode with the development alternatives.

Table 9.1
SUMMARY OF PROPOSED PEDESTRIAN, BICYCLE, TRANSIT, AND VEHICULAR IMPROVEMENTS BY CAMPUS SECTOR

West Campus	South Campus	East Campus
Pedestrian		
• Mid-block connections south of Gould Hall • Walkways adjacent to West Campus Green • Improvements along NE Campus Parkway • Mid-block connector east from West Campus Green	• Connection between Central Campus and waterfront along East Campus lawn • Connection along Continuous Waterfront Trail and Waterfront green	• Improved pedestrian network
Bicycle		
• Connection between West Campus Park and Burke-Gilman Trail • Improved bicycle parking facilities	• Improved bicycle parking facilities	• Improved bicycle parking facilities • Improved bicycle network and Burke-Gilman Trail access
Transit		
• Expanded transit stops	• Expanded transit stops	• No proposed improvements
Vehicular		
• Removal of University of Washington NE Cowlitz Road • Extensions of 11th and 12th avenues NE	• New or consolidated signal for garage access along NE Pacific Street • Removal of University of Washington NE San Juan Road • New University of Washington roadway connections between NE Columbia Road/NE Pacific Street • Enhanced access for Marine Sciences from NE Columbia Road	• No proposed improvements

9.1 TRANSPORTATION MANAGEMENT PLAN

As described in Chapter 1 of this report, the University has successfully maintained traffic levels that fall well below the agreed-upon traffic and parking caps, which hold University of Washington traffic and parking impacts at and below 1990 levels. The University has accomplished this, despite a campus population that has grown by more than 35 percent since 1990, by successfully reducing the percentage of student, faculty, and staff commuters who choose to drive alone as their commute mode. Implementation of the University's transportation management plan (TMP), within which the U-PASS program exists, has been the means through which all primary and supporting strategies have been implemented. The Transportation Management Plan is included as a chapter within the CMP and describes updated strategies that the University will apply to meet these three goals:

- Limit the proportion of drive-alone trips of students, staff and faculty, to and from the campus to 15% by 2028.
- To reinforce the University's commitment to limiting auto travel, the University will continue to cap the number of parking stalls available to commuters within the Major Institution Overlay boundary to 12,300. This parking cap has remained unchanged since 1984.

The TMP describes monitoring including annual surveys to assess these goals. As noted in the TMP within the CMP, strategies to meet these goals are described within 8 programmatic areas.

1. U-PASS Program
2. Transit
3. Shared-Use Transportation
4. Parking Management
5. Bicycle
6. Pedestrian
7. Marketing and Education
8. Institutional Policies

Transportation Management Plan (TMP): The University's transportation management plan that provides strategies for limiting traffic impacts and promoting active communities by managing vehicle trips and parking, and accommodating transit and non-motorized travel modes.

A history of the caps and how they are calculated is included in the Appendix B Methods and Assumptions As described briefly in Chapter 1 and in greater detail in Chapter 3, the University has been successful at meeting the TMP goals and has not exceeded these goals even though the University has grown. It is notable that the University is committing to a drive alone goal of 15% by 2028, which is lower than the 20% drive alone rate conservatively assumed for this analysis. If this is achieved, actual impacts associated with the proposed campus development would be less than described for the development alternatives in Chapters 5 through 8 of this report.

The University will continue to mitigate transportation impacts through implementation of their TMP to ensure that 1990 levels of impact are not exceeded, despite ongoing growth. Specific strategies will continue to be refined annually, subsequent to the annual transportation survey and publication of the CMP annual monitoring reports. The TMP also includes ongoing coordination with agency partners through a quarterly transit Stakeholders committee meeting.

The Link light rail University of Washington Station at Husky Stadium is already resulting in substantial changes in the way commuters and visitors access campus. Additionally, anticipated extensions of Link light rail to Northgate in 2021 and to Lynnwood, Redmond, and Federal Way in 2024 will improve the opportunities and access to transit for University students, faculty, staff, and visitors.

9.2 PEDESTRIAN OPERATIONS

As described in Chapters 5-8 facilities for pedestrians will be adequate to meet the needs of a growing Campus. Potential impacts may occur at bus transit stops which may require expansion to meet a comfortable waiting space. Space is available to make these adjustments within the University right of way.

9.3 TRANSIT OPERATIONS

As described in Chapter 4 increased anticipated transit service including extensions of light rail and new RapidRide will encourage transit use for students, faculty, and staff. Chapter 5 describes impacts to transit for all development alternatives and as noted, transit service may be slowed in some corridors due to background and campus increased transit travel. Potential mitigation includes accommodating all door boarding to reduce delays caused by boarding. This can be done with off-board fare payment that is part of RapidRide systems. Additionally, improvements in transit speed and reliability including strategies like queue jumps and exclusive bus lanes can further enhance transit operations.

9.4 INTERSECTION OPERATIONS

Improving overall intersection operations through Intelligent Transportation Systems (ITS) consistent with the City ITS Next Generation plan could enhance and improve overall traffic operations, particularly during peak periods. The University supports implementation of ITS system enhancements in the University District. Other specific mitigation measures were considered for the signal-controlled intersections anticipated to operate at LOS E or F and experience a 5 second or greater increase in delay with any of the development alternatives.

29. Montlake Boulevard NE/Mary Gates Memorial Drive NE (signalized)
32. 11th Avenue NE/NE 43rd Street (signalized)
67. 15th Avenue NE/NE Pacific Street (signalized)

With limitations in right-of-way at current signal-controlled intersections, potential mitigation measures could include modifications to signal timing, such as phasing, offsets, and cycle length. While such modifications could decrease delay at these intersections, they wouldn't decrease the delay to at or near forecasted the No Action Alternative conditions.

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10 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Development of the University of Washington to a Campus Master Plan (CMP) maximum with 6 million net new gross square footage by the year 2028 will result in increases of trips in all travel modes—pedestrian, bicycle, transit, vehicle, and freight. While the University has been extremely successful at reducing overall single driver travel through their Transportation Management Plan (TMP), overall, the level of growth identified in this 10-year planning horizon (2018–2028) could have significant impacts on pedestrian conflicts. Specifically, such conflicts could occur at new Link light rail stations and local arterial crossings, for parking within the University District (U District), and with overcrowding on transit. In addition to the University of Washington, local agency partners like the City of Seattle, King County Metro, and Sound Transit have plans to increase transportation facilities and services. These plans include expanding the Burke-Gilman Trail, completing pedestrian and bicycle networks, and expanding the frequency, capacity, and travel time of transit. The University will be working to enhance connectivity and circulation with each development. Lastly, the University of Washington, through their City-University Agreement (CUA), continues to annually monitor parking and trips. The University also conducts annual surveys of mode splits.

With access to light rail at the University of Washington Station that opened in March 2016, the campus is already seeing a significant (roughly 13 percent) increase in transit ridership. With the opening of another light rail station serving the U District, scheduled for 2021, access to expanded RapidRide and new regional trail connections across Montlake will give students, faculty, staff, and visitors more reliable transportation alternatives to driving alone. Also, with planned construction of affordable and multifamily housing nearby, drive alone trips may continue to decline as students, faculty, and staff will have more choices for living near campus.

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