APPENDIX A

Distribution List

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	James McNeal
	Tris Samberg
	Tom Agnew
NEWSPAPERS	Seattle Times
	UW Today
	UW Daily
	Daily Journal of Commerce
	Everett Herald
	TOTALS

APPENDIX B

GHG Emissions Worksheets

City of Seattle Department of Planning and Development
SEPA GHG Emissions Worksheet
Version 1.7 12/26/07

Introduction

The Washington State Environmental Policy Act (SEPA) requires environmental review of development proposals that may have a significant adverse impact on the environment. If a proposed development is subject to SEPA, the project proponent is required to complete the SEPA Checklist. The Checklist includes questions relating to the development's air emissions. The emissions that have traditionally been considered cover smoke, dust, and industrial and automobile emissions. With our understanding of the climate change impacts of GHG emissions, the City of Seattle requires the applicant to also estimate these emissions.

Emissions created by Development

GHG emissions associated with development come from multiple sources:

- The extraction, processing, transportation, construction and disposal of materials and landscape disturbance (Embodied Emissions)
- Energy demands created by the development after it is completed (Energy Emissions)
- Transportation demands created by the development after it is completed (Transportation Emissions)

GHG Emissions Worksheet

This GHG Emissions Worksheet has been developed to assist applicants in answering the SEPA Checklist question relating to GHG emissions. The worksheet was originally developed by King County, but the City of Seattle and King County are working together on future updates to maintain consistency of methodologies across jurisdictions.

The SEPA GHG Emissions worksheet estimates all GHG emissions that will be created over the life span of a project. This includes emissions associated with obtaining construction materials, fuel used during construction, energy consumed during a buildings operation, and transportation by building occupants.

Using the Worksheet

1. Descriptions of the different residential and commercial building types can be found on the second tabbed worksheet ("Definition of Building Types"). If a development proposal consists of multiple projects, e.g. both single family and multi-family residential structures or a commercial development that consists of more than on type of commercial activity, the appropriate information should be estimated for each type of building or activity.

2. For paving, estimate the total amount of paving (in thousands of square feet) of the project.

3. The Worksheet will calculate the amount of GHG emissions associated with the project and display the amount in the "Total Emissions" column on the worksheet. The applicant should use this information when completing the SEPA checklist.

4. The last three worksheets in the Excel file provide the background information that is used to calculate the total GHG emissions.

5. The methodology of creating the estimates is transparent; if there is reason to believe that a better estimate can be obtained by changing specific values, this can and should be done. Changes to the values should be documented with an explanation of why and the sources relied upon.

6. Print out the “Total Emissions” worksheet and attach it to the SEPA checklist. If the applicant has made changes to the calculations or the values, the documentation supporting those changes should also be attached to the SEPA checklist.

UW Bothell and CC Campus Master Plan - No Action Scenario B

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	Transportation	Lifespan Emissions (MTCO2e)
Single-Family Home............................	0		98	672	792	**0**
Multi-Family Unit in Large Building	0		33	357	766	**0**
Multi-Family Unit in Small Building	0		54	681	766	**0**
Mobile Home.......................................	0		41	475	709	**0**
Education		386.1	39	646	361	**403660**
Food Sales		0.0	39	1,541	282	**0**
Food Service		0.0	39	1,994	561	**0**
Health Care Inpatient		0.0	39	1,938	582	**0**
Health Care Outpatient		0.0	39	737	571	**0**
Lodging		0.0	39	777	117	**0**
Retail (Other Than Mall).......................		0.0	39	577	247	**0**
Office		0.0	39	723	588	**0**
Public Assembly		0.0	39	733	150	**0**
Public Order and Safety		0.0	39	899	374	**0**
Religious Worship		0.0	39	339	129	**0**
Service		0.0	39	599	266	**0**
Warehouse and Storage		0.0	39	352	181	**0**
Other		0.0	39	1,278	257	**0**
Vacant		0.0	39	162	47	**0**

Section II: Pavement..........................

Pavement..		0.00				**0**

Total Project Emissions: **403660**

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UW Bothell and CC Campus Master Plan - Alternative 1

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	Transportation	Lifespan Emissions (MTCO2e)
Single-Family Home............................	0		98	672	792	**0**
Multi-Family Unit in Large Building			33	357	766	**0**
Multi-Family Unit in Small Building	0		54	681	766	**0**
Mobile Home.......................................	0		41	475	709	**0**
Education		1,072.3	39	646	361	**1121069**
Food Sales		0.0	39	1,541	282	**0**
Food Service		0.0	39	1,994	561	**0**
Health Care Inpatient		0.0	39	1,938	582	**0**
Health Care Outpatient		0.0	39	737	571	**0**
Lodging		0.0	39	777	117	**0**
Retail (Other Than Mall).......................		0.0	39	577	247	**0**
Office		0.0	39	723	588	**0**
Public Assembly		0.0	39	733	150	**0**
Public Order and Safety		0.0	39	899	374	**0**
Religious Worship		0.0	39	339	129	**0**
Service		0.0	39	599	266	**0**
Warehouse and Storage		0.0	39	352	181	**0**
Other		0.0	39	1,278	257	**0**
Vacant		0.0	39	162	47	**0**

Section II: Pavement..........................

Pavement...		0.00				**0**

Total Project Emissions: **1121069**

UW Bothell and CC Campus Master Plan - Alternative 2 and 3

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	Transportation	**Lifespan Emissions (MTCO2e)**
Single-Family Home............................	0		98	672	792	**0**
Multi-Family Unit in Large Building	0		33	357	766	**0**
Multi-Family Unit in Small Building	0		54	681	766	**0**
Mobile Home.......................................	0		41	475	709	**0**
Education		907.3	39	646	361	**948564**
Food Sales		0.0	39	1,541	282	**0**
Food Service		0.0	39	1,994	561	**0**
Health Care Inpatient		0.0	39	1,938	582	**0**
Health Care Outpatient		0.0	39	737	571	**0**
Lodging		0.0	39	777	117	**0**
Retail (Other Than Mall).......................		0.0	39	577	247	**0**
Office		0.0	39	723	588	**0**
Public Assembly		0.0	39	733	150	**0**
Public Order and Safety		0.0	39	899	374	**0**
Religious Worship		0.0	39	339	129	**0**
Service		0.0	39	599	266	**0**
Warehouse and Storage		0.0	39	352	181	**0**
Other		0.0	39	1,278	257	**0**
Vacant		0.0	39	162	47	**0**

Section II: Pavement..........................

Pavement...		0.00				**0**

Total Project Emissions: **948564**

Version 1.7 12/26/07

UW Bothell and CC Campus Master Plan - Alternative 4

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	Transportation	Lifespan Emissions (MTCO2e)
Single-Family Home............................	0		98	672	792	0
Multi-Family Unit in Large Building	0		33	357	766	0
Multi-Family Unit in Small Building	0		54	681	766	0
Mobile Home.......................................	0		41	475	709	0
Education		1,042.3	39	646	361	1089704
Food Sales		0.0	39	1,541	282	0
Food Service		0.0	39	1,994	561	0
Health Care Inpatient		0.0	39	1,938	582	0
Health Care Outpatient		0.0	39	737	571	0
Lodging		0.0	39	777	117	0
Retail (Other Than Mall)........................		0.0	39	577	247	0
Office		0.0	39	723	588	0
Public Assembly		0.0	39	733	150	0
Public Order and Safety		0.0	39	899	374	0
Religious Worship		0.0	39	339	129	0
Service		0.0	39	599	266	0
Warehouse and Storage		0.0	39	352	181	0
Other		0.0	39	1,278	257	0
Vacant		0.0	39	162	47	0

Section II: Pavement..........................

Pavement...		0.00				0

Total Project Emissions: **1089704**

Version 1.7 12/26/07

Definition of Building Types

Type (Residential) or Principal Activity (Commercial)	**Description**
Single-Family Home.................................	Unless otherwise specified, this includes both attached and detached buildings
Multi-Family Unit in Large Building	Apartments in buildings with more than 5 units
Multi-Family Unit in Small Building	Apartments in building with 2-4 units
Mobile Home..	
Education	Buildings used for academic or technical classroom instruction, such as elementary, middle, or high schools, and classroom buildings on college or university campuses. Buildings on education campuses for which the main use is not classroom are included in the category relating to their use. For example, administration buildings are part of "Office," dormitories are "Lodging," and libraries are "Public Assembly."
Food Sales	Buildings used for retail or wholesale of food.
Food Service	Buildings used for preparation and sale of food and beverages for consumption.
Health Care Inpatient	Buildings used as diagnostic and treatment facilities for inpatient care.
Health Care Outpatient	Buildings used as diagnostic and treatment facilities for outpatient care. Doctor's or dentist's office are included here if they use any type of diagnostic medical equipment (if they do not, they are categorized as an office building).
Lodging	Buildings used to offer multiple accommodations for short-term or long-term residents, including skilled nursing and other residential care buildings.
Retail (Other Than Mall)...........................	Buildings used for the sale and display of goods other than food.
Office	Buildings used for general office space, professional office, or administrative offices. Doctor's or dentist's office are included here if they do not use any type of diagnostic medical equipment (if they do, they are categorized as an outpatient health care building).
Public Assembly	Buildings in which people gather for social or recreational activities, whether in private or non-private meeting halls.
Public Order and Safety	Buildings used for the preservation of law and order or public safety.
Religious Worship	Buildings in which people gather for religious activities, (such as chapels, churches, mosques, synagogues, and temples).
Service	Buildings in which some type of service is provided, other than food service or retail sales of goods
Warehouse and Storage	Buildings used to store goods, manufactured products, merchandise, raw materials, or personal belongings (such as self-storage).
Other	Buildings that are industrial or agricultural with some retail space; buildings having several different commercial activities that, together, comprise 50 percent or more of the floorspace, but whose largest single activity is agricultural, industrial/ manufacturing, or residential; and all other miscellaneous buildings that do not fit into any other category.
Vacant	Buildings in which more floorspace was vacant than was used for any single commercial activity at the time of interview. Therefore, a vacant building may have some occupied floorspace.

Sources: ....

Residential — 2001 Residential Energy Consumption Survey
Square footage measurements and comparisons
http://www.eia.doe.gov/emeu/recs/sqft-measure.html

Commercial — Commercial Buildings Energy Consumption Survey (CBECS),
Description of CBECS Building Types
http://www.eia.doe.gov/emeu/cbecs/pba99/bldgtypes.html

Embodied Emissions Worksheet

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# thousand sq feet/ unit or building	Life span related embodied GHG missions (MTCO2e/ unit)	Life span related embodied GHG missions (MTCO2e/ thousand square feet) - See calculations in table below
Single-Family Home...............................	2.53	98	39
Multi-Family Unit in Large Building	0.85	33	39
Multi-Family Unit in Small Building	1.39	54	39
Mobile Home...	1.06	41	39
Education	25.6	991	39
Food Sales	5.6	217	39
Food Service	5.6	217	39
Health Care Inpatient	241.4	9,346	39
Health Care Outpatient	10.4	403	39
Lodging	35.8	1,386	39
Retail (Other Than Mall)..........................	9.7	376	39
Office	14.8	573	39
Public Assembly	14.2	550	39
Public Order and Safety	15.5	600	39
Religious Worship	10.1	391	39
Service	6.5	252	39
Warehouse and Storage	16.9	654	39
Other	21.9	848	39
Vacant	14.1	546	39

Section II: Pavement............................

All Types of Pavement...........................			50

	Columns and Beams	Intermediate Floors	Exterior Walls	Windows	Interior Walls	Roofs	Total Embodied Emissions (MTCO2e)	Total Embodied Emissions (MTCO2e/ thousand sq feet)
Average GWP (lbs CO2e/sq ft): Vancouver, Low Rise Building	5.3	7.8	19.1	51.2	5.7	21.3		
Average Materials in a 2,272-square foot single family home	0.0	2269.0	3206.0	285.0	6050.0	3103.0		
MTCO2e	0.0	8.0	27.8	6.6	15.6	30.0	88.0	38.7

Sources

All data in black text — King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

Residential floorspace per unit — 2001 Residential Energy Consumption Survey (National Average, 2001)
Square footage measurements and comparisons
http://www.eia.doe.gov/emeu/recs/sqft-measure.html

Floorspace per building — EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

Average GWP (lbs CO2e/sq ft): Vancouver, Low Rise Building — Athena EcoCalculator
Athena Assembly Evaluation Tool v2.3- Vancouver Low Rise Building
Assembly Average GWP (kg) per square meter
http://www.athenasmi.ca/tools/ecoCalculator/index.html
Lbs per kg 2.20
Square feet per square meter 10.76

Average Materials in a 2,272-square foot single family home — Buildings Energy Data Book: 7.3 Typical/Average Household
Materials Used in the Construction of a 2,272-Square-Foot Single-Family Home, 2000
http://buildingsdatabook.eren.doe.gov/?id=view_book_table&TableID=2036&t=xls
See also: NAHB, 2004 Housing Facts, Figures and Trends, Feb. 2004, p. 7.

Average window size — Energy Information Administration/Housing Characteristics 1993
Appendix B, Quality of the Data. Pg. 5.
ftp://ftp.eia.doe.gov/pub/consumption/residential/rx93hcf.pdf

Pavement Emissions Factors
MTCO2e/thousand square feet of asphalt
or concrete pavement 50 (see below)

Embodied GHG Emissions……………………Worksheet Background Information

Buildings
Embodied GHG emissions are emissions that are created through the extraction, processing, transportation, construction and disposal of building materials as well as emissions created through landscape disturbance (by both soil disturbance and changes in above ground biomass).

Estimating embodied GHG emissions is new field of analysis; the estimates are rapidly improving and becoming more inclusive of all elements of construction and development.

The estimate included in this worksheet is calculated using average values for the main construction materials that are used to create a typical family home. In 2004, the National Association of Home Builders calculated the average materials that are used in a typical 2,272 square foot single-family household. The quantity of materials used is then multiplied by the average GHG emissions associated with the life-cycle GHG emissions for each material.

This estimate is a rough and conservative estimate; the actual embodied emissions for a project are likely to be higher. For example, at this stage, due to a lack of comprehensive data, the estimate does not include important factors such as landscape disturbance or the emissions associated with the interior components of a building (such as furniture).

King County realizes that the calculations for embodied emissions in this worksheet are rough. For example, the emissions associated with building 1,000 square feet of a residential building will not be the same as 1,000 square feet of a commercial building. However, discussions with the construction community indicate that while there are significant differences between the different types of structures, this method of estimation is reasonable; it will be improved as more data become available.

Additionally, if more specific information about the project is known, King County recommends two online embodied emissions calculators that can be used to obtain a more tailored estimate for embodied emissions: www.buildcarbonneutral.org and www.athenasmi.ca/tools/ecoCalculator/.

Pavement
Four recent life cycle assessments of the environmental impacts of roads form the basis for the per unit embodied emissions of pavement. Each study is constructed in slightly different ways; however, the aggregate results of the reports represent a reasonable estimate of the GHG emissions that are created from the manufacture of paving materials, construction related emissions, and maintenance of the pavement over its expected life cycle. For specifics, see the worksheet.

Special Section: Estimating the Embodied Emissions for Pavement

Four recent life cycle assessments of the environmental impacts of roads form the basis for the per unit embodied emissions of pavement. Each study is constructed in slightly different ways; however, the aggregate results of the reports represent a reasonable estimate of the GHG emissions that are created from the manufacture of paving materials, construction related emissions, and maintenance of the pavement over its expected life cycle.

The results of the studies are presented in different units and measures; considerable effort was undertaken to be able to compare the results of the studies in a reasonable way. For more details about the below methodology, contact matt.kuharic@kingcounty.gov.

The four studies, Meil (2001), Park (2003), Stripple (2001) and Treolar (2001) produced total GHG emissions of 4-34 MTCO2e per thousand square feet of finished paving (for similar asphalt and concrete based pavements). This estimate does not including downstream maintenance and repair of the highway. The average (for all concrete and asphalt pavements in the studies, assuming each study gets one data point) is ~17 MTCO2e/thousand square feet.

Three of the studies attempted to thoroughly account for the emissions associated with long term maintenance (40 years) of the roads. Stripple (2001), Park et al. (2003) and Treolar (2001) report 17, 81, and 68 MTCO2e/thousand square feet, respectively, after accounting for maintenance of the roads.

Based on the above discussion, King County makes the conservative estimate that 50 MTCO2e/thousand square feet of pavement (over the development's life cycle) will be used as the embodied emission factor for pavement until better estimates can be obtained. This is roughly equivalent to 3,500 MTCO2e per lane mile of road (assuming the lane is 13 feet wide).

It is important to note that these studies estimate the embodied emissions for roads. Paving that does not need to stand up to the rigors of heavy use (such as parking lots or driveways) would likely use less materials and hence have lower embodied emissions.

Sources:

Meil, J. A Life Cycle Perspective on Concrete and Asphalt Roadways: Embodied Primary Energy and Global Warming Potential. 2006. Available: http://www.cement.ca/cement.nsf/eee9ec7bbd630126852566c40052107b/6ec79dc8ae03a782852572b90061b914/$FILE/ATTK0WE3/athena%20report%20Feb.%202%202007.pdf

Park, K, Hwang, Y., Seo, S., M.ASCE, and Seo, H. , "Quantitative Assessment of Environmental Impacts on Life Cycle of Highways," Journal of Construction Engineering and Management , Vol 129, January/February 2003, pp 25-31, (DOI: 10.1061/(ASCE)0733-9364(2003)129:1(25)).

Stripple, H. Life Cycle Assessment of Road. A Pilot Study for Inventory Analysis. Second Revised Edition. IVL Swedish Environmental Research Institute Ltd. 2001. Available: http://www.ivl.se/rapporter/pdf/B1210E.pdf

Treloar, G., Love, P.E.D., and Crawford, R.H. Hybrid Life-Cycle Inventory for Road Construction and Use. Journal of Construction Engineering and Management. P. 43-49. January/February 2004.

Energy Emissions Worksheet

Type (Residential) or Principal Activity (Commercial)	Energy consumption per building per year (million Btu)	Carbon Coefficient for Buildings	MTCO2e per building per year	Floorspace per Building (thousand square feet)	MTCE per thousand square feet per year	MTCO2e per thousand square feet per year	Average Building Life Span	Lifespan Energy Related MTCO2e emissions per unit	Lifespan Energy Related MTCO2e emissions per thousand square feet
Single-Family Home............................	107.3	0.108	11.61	2.53	4.6	16.8	57.9	672	266
Multi-Family Unit in Large Building	41.0	0.108	4.44	0.85	5.2	19.2	80.5	357	422
Multi-Family Unit in Small Building	78.1	0.108	8.45	1.39	6.1	22.2	80.5	681	489
Mobile Home...	75.9	0.108	8.21	1.06	7.7	28.4	57.9	475	448
Education	2,125.0	0.124	264.2	25.6	10.3	37.8	62.5	16,526	646
Food Sales	1,110.0	0.124	138.0	5.6	24.6	90.4	62.5	8,632	1,541
Food Service	1,436.0	0.124	178.5	5.6	31.9	116.9	62.5	11,168	1,994
Health Care Inpatient	60,152.0	0.124	7,479.1	241.4	31.0	113.6	62.5	467,794	1,938
Health Care Outpatient	985.0	0.124	122.5	10.4	11.8	43.2	62.5	7,660	737
Lodging	3,578.0	0.124	444.9	35.8	12.4	45.6	62.5	27,826	777
Retail (Other Than Mall).......................	720.0	0.124	89.5	9.7	9.2	33.8	62.5	5,599	577
Office	1,376.0	0.124	171.1	14.8	11.6	42.4	62.5	10,701	723
Public Assembly	1,338.0	0.124	166.4	14.2	11.7	43.0	62.5	10,405	733
Public Order and Safety	1,791.0	0.124	222.7	15.5	14.4	52.7	62.5	13,928	899
Religious Worship	440.0	0.124	54.7	10.1	5.4	19.9	62.5	3,422	339
Service	501.0	0.124	62.3	6.5	9.6	35.1	62.5	3,896	599
Warehouse and Storage	764.0	0.124	95.0	16.9	5.6	20.6	62.5	5,942	352
Other	3,600.0	0.124	447.6	21.9	20.4	74.9	62.5	27,997	1,278
Vacant	294.0	0.124	36.6	14.1	2.6	9.5	62.5	2,286	162

Sources

All data in black text — King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

Energy consumption for residential buildings

2007 Buildings Energy Data Book: 6.1 Quad Definitions and Comparisons (National Average, 2001)
Table 6.1.4: Average Annual Carbon Dioxide Emissions for Various Functions
http://buildingsdatabook.eren.doe.gov/
Data also at: http://www.eia.doe.gov/emeu/recs/recs2001_ce/ce1-4c_housingunits2001.html

Energy consumption for commercial buildings and Floorspace per building

EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

Note: Data in plum color is found in both of the above sources (buildings energy data book and commercial buildings energy consumption survey).

Carbon Coefficient for Buildings

Buildings Energy Data Book (National average, 2005)
Table 3.1.7. 2005 Carbon Dioxide Emission Coefficients for Buildings (MMTCE per Quadrillion Btu)
http://buildingsdatabook.eere.energy.gov/?id=view_book_table&TableID=2057
Note: Carbon coefficient in the Energy Data book is in MTCE per Quadrillion Btu.
To convert to MTCO2e per million Btu, this factor was divided by 1000 and multiplied by 44/12.

Residential floorspace per unit

2001 Residential Energy Consumption Survey (National Average, 2001)
Square footage measurements and comparisons
http://www.eia.doe.gov/emeu/recs/sqft-measure.html

average lief span of buildings, estimated by replacement time method

	Single Family Homes	Multi-Family Units in Large and Small Buildings	All Residential Buildings	
New Housing Construction, 2001	1,273,000	329,000	1,602,000	
Existing Housing Stock, 2001	73,700,000	26,500,000	100,200,000	
Replacement time:	57.9	80.5	62.5	(national average, 2001)

Note: Single family homes calculation is used for mobile homes as a best estimate life span.
Note: At this time, KC staff could find no reliable data for the average life span of commercial buildings.
Therefore, the average life span of residential buildings is being used until a better approximation can be ascertained.

Sources:

New Housing Construction, 2001 **Quarterly Starts and Completions by Purpose and Design - US and Regions (Excel)**
http://www.census.gov/const/quarterly_starts_completions_cust.xls
See also: http://www.census.gov/const/www/newresconstindex.html

Existing Housing Stock, 2001 **Residential Energy Consumption Survey (RECS) 2001**
Tables HC1:Housing Unit Characteristics, Million U.S. Households 2001
Table HC1-4a. Housing Unit Characteristics by Type of Housing Unit, Million U.S. Households, 2001
Million U.S. Households, 2001
http://www.eia.doe.gov/emeu/recs/recs2001/hc_pdf/housunits/hc1-4a_housingunits2001.pdf

Transportation Emissions Worksheet

Type (Residential) or Principal Activity (Commercial)	# people/ unit or building	# thousand sq feet/ unit or building	# people or employees/ thousand square feet	vehicle related GHG emissions (metric tonnes CO2e per person per year)	MTCO2e/ year/ unit	MTCO2e/ year/ thousand square feet	Average Building Life Span	Life span transportation related GHG emissions (MTCO2e/ per unit)	Life span transportation related GHG emissions (MTCO2e/ thousand sq feet)
Single-Family Home................................	2.8	2.53	1.1	4.9	13.7	5.4	57.9	792	313
Multi-Family Unit in Large Building	1.9	0.85	2.3	4.9	9.5	11.2	80.5	766	904
Multi-Family Unit in Small Building	1.9	1.39	1.4	4.9	9.5	6.8	80.5	766	550
Mobile Home...	2.5	1.06	2.3	4.9	12.2	11.5	57.9	709	668
Education	30.0	25.6	1.2	4.9	147.8	5.8	62.5	9247	361
Food Sales	5.1	5.6	0.9	4.9	25.2	4.5	62.5	1579	282
Food Service	10.2	5.6	1.8	4.9	50.2	9.0	62.5	3141	561
Health Care Inpatient	455.5	241.4	1.9	4.9	2246.4	9.3	62.5	140506	582
Health Care Outpatient	19.3	10.4	1.9	4.9	95.0	9.1	62.5	5941	571
Lodging	13.6	35.8	0.4	4.9	67.1	1.9	62.5	4194	117
Retail (Other Than Mall)...........................	7.8	9.7	0.8	4.9	38.3	3.9	62.5	2394	247
Office	28.2	14.8	1.9	4.9	139.0	9.4	62.5	8696	588
Public Assembly	6.9	14.2	0.5	4.9	34.2	2.4	62.5	2137	150
Public Order and Safety	18.8	15.5	1.2	4.9	92.7	6.0	62.5	5796	374
Religious Worship	4.2	10.1	0.4	4.9	20.8	2.1	62.5	1298	129
Service	5.6	6.5	0.9	4.9	27.6	4.3	62.5	1729	266
Warehouse and Storage	9.9	16.9	0.6	4.9	49.0	2.9	62.5	3067	181
Other	18.3	21.9	0.8	4.9	90.0	4.1	62.5	5630	257
Vacant	2.1	14.1	0.2	4.9	10.5	0.7	62.5	657	47

Sources

All data in black text — King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

people/ unit — Estimating Household Size for Use in Population Estimates (WA state, 2000 average)
Washington State Office of Financial Management
Kimpel, T. and Lowe, T. Research Brief No. 47. August 2007
http://www.ofm.wa.gov/researchbriefs/brief047.pdf
Note: This analysis combines Multi Unit Structures in both large and small units into one category;
the average is used in this case although there is likely a difference

Residential floorspace per unit — 2001 Residential Energy Consumption Survey (National Average, 2001)
Square footage measurements and comparisons
http://www.eia.doe.gov/emeu/recs/sqft-measure.html

employees/thousand square feet — Commercial Buildings Energy Consumption Survey commercial energy uses and costs (National Median, 2003)
Table B2 Totals and Medians of Floorspace, Number of Workers, and Hours of Operation for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set1/2003excel/b2.xls

Note: Data for # employees/thousand square feet is presented by CBECS as square feet/employee.
In this analysis employees/thousand square feet is calculated by taking the inverse of the CBECS number and multiplying by 1000.

vehicle related GHG emissions

Estimate calculated as follows (Washington state, 2006)_

56,531,930,000	2006 Annual WA State Vehicle Miles Traveled	
		Data was daily VMT. Annual VMT was 365*daily VMT. http://www.wsdot.wa.gov/mapsdata/tdo/annualmileage.htm
6,395,798	2006 WA state population	
		http://quickfacts.census.gov/qfd/states/53000.html
8839	vehicle miles per person per year	
0.0506	gallon gasoline/mile	
		This is the weighted national average fuel efficiency for all cars and 2 axle, 4 wheel light trucks in 2005. This includes pickup trucks, vans and SUVs. The 0.051 gallons/mile used here is the inverse of the more commonly known term “miles/per gallon” (which is 19.75 for these cars and light trucks). Transportation Energy Data Book. 26th Edition. 2006. Chapter 4: Light Vehicles and Characteristics. Calculations based on weighted average MPG efficiency of cars and light trucks. http://cta.ornl.gov/data/tedb26/Edition26_Chapter04.pdf Note: This report states that in 2005, 92.3% of all highway VMT were driven by the above described vehicles. http://cta.ornl.gov/data/tedb26/Spreadsheets/Table3_04.xls
24.3	lbs CO2e/gallon gasoline	
		The CO2 emissions estimates for gasoline and diesel include the extraction, transport, and refinement of petroleum as well as their combustion. Life-Cycle CO2 Emissions for Various New Vehicles. RENew Northfield. Available: http://renewnorthfield.org/wpcontent/uploads/2006/04/CO2%20emissions.pdf Note: This is a conservative estimate of emissions by fuel consumption because diesel fuel,
2205		with a emissions factor of 26.55 lbs CO2e/gallon was not estimated.
4.93	lbs/metric tonne	
	vehicle related GHG emissions (metric tonnes CO2e per person per year)	

average lief span of buildings, estimated by replacement time method — See Energy Emissions Worksheet for Calculations

Commercial floorspace per unit — EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

APPENDIX C

Air Quality Technical Memorandum

RAMBOLL ENVIRON

ENVIRONMENT & HEALTH

July 17, 2017

MEMORANDUM

To:	Rich Schipanski, EA Engineering	Project No:	29-41789A
CC:	Julie Blakeslee, UW		
From:	Kurt Richman	Project Name:	UW Bothell/CC Master Plan Supplemental Air Quality Assessment

Subject: The Potential for Air Quality Impacts Related to Parking Lots and Parking Garages

Ramboll Environ completed the following qualitative assessment of air quality impacts related to the operation of parking facilities associated with the *2017 Campus Master Plan* for the University of Washington Bothell (UW Bothell) and Cascadia College (CC) (UW Bothell & CC, or the "Project"). The assessment includes a discussion of current air quality conditions and regulatory standards, identification of "worst-case" traffic conditions associated with the proposed parking facilities, and comparison with "hot-spot" modeling results of a congested intersection.

EXISTING AIR QUALITY CONDITIONS AND AIR QUALITY STANDARDS

Ambient Air Quality Standards

Air quality is generally assessed in terms of whether concentrations of air pollutants are higher or lower than ambient air quality standards set to protect human health and welfare. Ambient air quality standards are set for what are referred to as "criteria" pollutants (e.g., carbon monoxide - CO, particulate matter, nitrogen dioxide - NO_2, and sulfur dioxide - SO_2). Three agencies have jurisdiction over the ambient air quality in the proposed Project area: the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the Puget Sound Clean Air Agency (PSCAA). These agencies establish regulations that govern both the concentrations of pollutants in the outdoor air and rates of contaminant emissions from air pollution sources. Unless the state or local jurisdiction has adopted more stringent standards, the EPA standards apply. These standards have been set at levels that EPA and Ecology have determined will protect human health with a margin of safety, including the health of sensitive individuals like the elderly, the chronically ill, and the very young.

Ecology and PSCAA maintain a network of air quality monitoring stations throughout the Puget Sound area. In general, these stations are located where there may be air quality problems, and so are usually in or near urban areas or close to specific large air pollution sources. Other stations located in more remote areas provide indications of regional or background air pollution levels. Based on monitoring information for criteria air pollutants collected over a period of years, Ecology provides input and EPA designates regions as being "attainment" or "nonattainment" areas for particular pollutants. Attainment status is therefore a measure of whether air quality in an area complies with the federal health-based ambient air quality standards for criteria pollutants. The Project area is located in the former King County CO and Ozone maintenance areas, but as of 2017 these areas are considered to be in attainment. A list of applicable state and federal ambient air quality standards are displayed in Table 1.

Table 1. Applicable Ambient Air Quality Standards for Criteria Pollutants

Pollutant	Averaging Period	Terms of Compliance [a]	Concentration
Inhalable Particulate Matter (PM10)	24-Hour	Not to be exceeded more than once per year on average over 3 years	150 µg/m³
Fine Particulate Matter (PM2.5)	Annual	The 3-year annual average must not exceed	12 µg/m³
	24-Hour	The 3-year average of the 98th percentile of daily concentrations must not exceed	35 µg/m³
Sulfur Dioxide (SO_2) [b]	3-Hour	3-hour average must not exceed must not exceed more than once per year	0.5 ppm
	1-Hour	The 3-year average of the 99th percentile of daily max 1-hour conc. must not exceed	0.075 ppm
Carbon Monoxide (CO)	8-Hour	The 8-hour average must not exceed more than once per year	9 ppm
	1-Hour	The 1-hour average must not exceed more than once per year	35 ppm
Ozone (O_3)	8-Hour	The 3-year average of the 4th highest daily maximum 8-hour average must not exceed	0.075 ppm
Nitrogen Dioxide (NO_2)	Annual	The annual mean of 1-hour averages must not exceed	0.053 ppm
	1-Hour	3-year avg. of 98th percentile of daily max 1-hour averages must not exceed	0.1 ppm
Lead (Pb)	Rolling 3-month average	Rolling 3-month average not to exceed	0.15 µg/m³

Note: µg/m³ = micrograms per cubic meter; ppm = parts per million

[a] All limits are federal and state air quality standards except as noted. All indicated limits represent "primary" air quality standards intended to protect human health.

[b] Under WAC 173-476-130 (5), the annual and 24-hour SO_2 standards do not apply to areas that have been in attainment for the one-hour SO_2 standard for more than one year. The annual and 24-hour standards were not provided because they are not applicable to the Bothell area.

Sources of Emissions Affecting the Project Area

Typical air pollution sources in the Project area include: vehicular traffic on the nearby streets and highways, retail/commercial facilities in the area, medical offices and facilities, and residential wood-burning devices. While many types of pollutant sources are present in the

Project vicinity, the single largest contributor to most criteria pollutant emissions in the area during most meteorological conditions would be on-road mobile sources emitting carbon monoxide (CO). Pollutant emissions from diesel sources (e.g., diesel-fueled emergency generators and most heavy-duty truck engines) include fine particles and a variety of toxic air pollutants. Non-diesel vehicle emissions are comprised primarily of CO, but also include small amounts of sulfur dioxide, toxic air pollutants, and both hydrocarbons and nitrogen oxides, which can transform in the atmosphere to become ground-level ozone. Residential wood burning produces a variety of air contaminants, including relatively large quantities of fine particulate matter.

For the various vehicular emissions for which there are ambient air quality standards, CO is the pollutant emitted in the largest quantities. Therefore, the air pollutant of primary concern related to vehicles is often CO, and CO is usually considered an indicator of potential air quality problems related to traffic sources. Other pollutants generated by traffic include the ozone precursors hydrocarbons and nitrogen oxides. Fine particulate matter (PM_{10} and $PM_{2.5}$) is also emitted in vehicle exhaust and generated by tire action on pavement (or unpaved areas), although these levels are small compared with other sources (e.g., a wood-burning stove). Sulfur oxides and nitrogen dioxide are also both emitted by motor vehicles, but ambient concentrations of these pollutants are not usually high except near large industrial facilities.

Air Quality Impacts

Air Quality Analysis Methods

Air emissions from parking facilities are primarily related to operational traffic idling and traveling within the facility. All parking structures are assumed to be naturally vented above ground parking structures. Parking structures may be equipped with emergency generators to ensure safe operation during power outages. Emissions from emergency generators result from routine maintenance in addition to emergency use, but impacts are generally localized to areas immediately surrounding the generators.

Ecology established the small quantity emission rates (SQER) and acceptable source impact level (ASIL) to screen facilities for their potential to impact human health. Under WAC 173-460-050, Ecology requires dispersion modeling for facilities with the potential for stationary sources to emit toxics above the SQER and a risk analysis to be performed if modeling indicates concentrations may exceed the ASIL.[(1)] At this time, specific details regarding whether emergency generators would be required, their type, quantity, rating, and typical maintenance

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(1) Current SQER and ASIL thresholds, by pollutant and averaging period, are defined in WAC 173-460-150.

schedule are not available. Generators constructed as part of the Project would be required to operate within these thresholds to ensure human health and safety.

The following review for operational traffic considered the issue of potential CO emissions from the parking facilities that would be developed as part of the Project. The air quality review was based on comparisons of Project-related traffic conditions with previously considered air quality analyses that involved "hot-spot" intersection CO modeling.

Air Quality Impact Review

The EPA has established guidelines for addressing impacts related to traffic emissions by performing "hot-spot" modeling of signalized intersections with poor level of service (LOS).[(2)] Intersection LOS is a measure of total weighted average vehicle delay, with rankings ranging from "A" for intersections with little or no congestion or delay to "F" for very congested intersections. PSCAA, Ecology, and the EPA have not provided any similar guidelines for addressing air quality impacts associated with the operation of parking facilities. For this analysis, the potential for CO impacts was assessed by considering worst-case traffic conditions associated with Project parking facilities and comparing to traffic conditions with previously conducted air quality CO results near a heavily congested intersection in King County.

Vehicles at parking facilities and congested intersections have similar emission modes: "free-flow" and "queued." "Free-flow" emissions occur when vehicles are moving and "queued" emissions occur when vehicles are idling. Idling vehicle emissions typically are much higher than "free-flow" emissions, therefore, an appropriate comparison would consider both the total traffic volume and total vehicle delay (i.e., idle time) during the peak hour.

In a recent air quality study for the *Terminal 5 Wharf Rehabilitation, Berth Deepening, and Improvement Project* (2016),[(3)] future 2020 traffic conditions at the intersection of SW Spokane St / West Marginal Way SW and Chelan Ave SW were modelled in accord with EPA's latest guidelines.[(4)] CO "hot-spot" model results and the traffic conditions on which they were based are provided in **Table 2**.

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(2) U.S. Environmental Protection Agency (U.S. EPA). 1992. Guideline for Modeling Carbon Monoxide from Roadway Intersections. Office of Air Quality Planning and Standards. Technical Support Division. Research Triangle Park, North Carolina. EPA-454/R-92-005.

(3) Port of Seattle. *Terminal 5 Wharf Rehabilitation, Berth Deepening, and Improvement Project*, September 2016.

(4) "Hot-spot" modeling used EPA's CAL3QHC dispersion model (version 2.0, dated 04244) with "free-flow" and "queue" emission factors from EPA's Mobile Vehicle Emission Simulator (MOVES version 2014a).

Table 2. Reference CO "Hot-Spot" Modeling and Traffic Conditions Summary

Intersection	Traffic Conditions				Model Results (ppm) [e]	
	LOS [a]	Delay [b]	Volume [c]	Total Delay [d]	1-Hour CO	8-Hour CO
SW Spokane St / West Marginal Way SW / Chelan Ave SW	F	124	2440	84	5.7	5.5

Notes:

(a) Intersection level of service (LOS) is a measure of intersection performance. LOS "F" represents a very congested intersection.

(b) Delay represents the average traffic delay at the intersection, in seconds per vehicle.

(c) Volume represents the total intersection volume for the PM peak period, in vehicles per hour.

(d) Total Delay is calculated by multiplying intersection volume and average vehicle delay, expressed in hours.

(e) 1-hour and 8-hour modeled CO concentrations include 5 ppm CO background. 8-hour concentrations assume a 0.7 persistence factor.

Sources: Terminal 5 Wharf Rehabilitation, Berth Depending and Improvement Project traffic data by Heffron Transportation Group, 2016; air quality modeling data by Ramboll Environ, 2016.

Under the EIS alternatives, the largest of the assumed parking structures in Development Area C is under Alternative 1, which would have approximately 620 parking spaces. For estimation of vehicle emissions from the parking structure, all 620 parking stalls are assumed to be occupied, all vehicles are assumed to start up, idle for 1 minute, and leave the facility, and another 620 vehicles are assumed to enter and park – all within a single 1-hour period. While such a scenario, with a total of about 1,240 vehicle trips per hour and about 10 hours of total idling could *possibly* occur, the probability of such an event is very low. Nonetheless, if this sort of worst-case condition were to arise, it would have little likelihood of impacting air quality because traffic conditions at a heavily congested intersection with approximately double the traffic volumes and 8 times the total delay also would not likely affect air quality. Therefore, there would be little potential for CO emissions from the normal parking structure operations to result in air quality impacts.

Mobile Source Air Toxics (MSATs)

In addition to the "criteria" air pollutants like CO discussed above, there are a variety of other potentially hazardous air pollutants for which health-based ambient air quality standards have not been established. Of the identified hazardous air pollutants, some have been designated as

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CAL3QHC is designed to calculate pollutant concentrations caused by transportation sources based on intersection geometry, wind direction, and other meteorological factors.

mobile source air toxics (MSATs). MSATs are emitted by on-road and off-road vehicles with internal combustion engines burning biofuels, diesel, or gasoline. Of these vehicles, heavy-duty diesel trucks are the largest contributor of MSATs. Actual data related to potential effects of MSATs as well as the mechanisms related to analyzing dispersion of MSATs are incomplete or unavailable, so specific analyses of these substances are not as yet typically performed. However, the FHWA has released guidance for considering when and how to analyze MSAT effects during the process of NEPA evaluations for transportation projects subject to FHWA review. While the Project is not subject to FHWA review, FHWA guidance for screening level review for MSATs was applied in the event there is interest or concern regarding such emissions related to this project.

Under FHWA guidance, projects with low potential MSAT effects include projects where design year traffic is projected to be less than 140,000 to 150,000 annual average daily traffic (AADT). The transportation analysis for the final EIS estimated a total of 20,308 future daily trips would result for the entire campus. Therefore, traffic-related emissions near the parking garages would have a low potential for MSAT effects because total daily trips would be less than 140,000 vehicles. In addition, MSAT emissions in future years are expected to decline compared with existing levels of emissions as a result of national emission control programs. For example, FHWA projects MSAT reductions from on-highway vehicles of 90 percent between 2010 and 2050.[5]

Mitigation Measures

Based on the above qualitative review, no significant air quality impacts associated with the Project have been identified. However, to minimize the potential for air quality impacts affecting adjacent residences, emergency generators should be placed as far from residential properties as is feasible.

[5] Federal Highway Administration (FHWA). 2016. Updated Interim Guidance on Air Toxic Analysis in NEPA Documents. Web Page Accessed July 2017: https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/.

APPENDIX D

Wetland Technical Memorandums

TECHNICAL MEMORANDUM

March 6, 2017

To:	Mr. Rich Schipanski EA Engineering, Science, and Technology, Inc.
From:	Will Hohman, BS, PWS, Wetland Ecologist Emmett Pritchard, BS, Principal / Wetland Ecologist Annamaria Clark, BS, Wetland Technician Raedeke Associates, Inc.
RE:	UW Bothell Husky Hall & Husky Village Wetland, Streams, and Habitat Reconnaissance Summary (RAI Project No. 2016-087-001)

Per your request, this technical memorandum summarizes the site reconnaissance work performed to identify the presence and/or absence of wetlands, streams, and Washington Department of Fish and Wildlife (WDFW) designated Priority Habitats or Species (PHS) at the Husky Hall and Husky Village project sites (Project Location). The purpose of this memorandum is to provide preliminary planning, recommendations, and guidance regarding the approximate location of wetlands, streams, WDFW PHS, and/or critical area buffers on the project sites per Title 13 Shoreline Management and Title 14 Environment of the City of Bothell (2017) Municipal Code in accordance with the methods described below.

PROJECT LOCATION (EXTENT OF RECONNAISSANCE SERVICES)

For purposes of this analysis, the project consists of two study areas and is located on the University of Washington Bothell & Cascadia College campus within the City of Bothell, King County, Washington. Raedeke Associates, Inc. performed this site reconnaissance on two study areas totaling approximately 8.79 acres (Project) of the approximate 135-acre college campus. Specifically, the Husky Hall study area is made up of three parcels (Parcel Nos. 0826059095, 0826059300, and 0826059078) consisting of approximately 4.42 acres of a commercial building with associated parking and surrounding mixed growth scrub-shrub and forested areas. The Husky Hall study area is bound to the north by 185th street NE and Husky Village apartments, the east by 110th Avenue NE, the south by single family residential homes and a portion of the college campus parcel no.

0526059057, and to the west by 108th Avenue NE. The approximate 4.37-acre Husky Village study area (Parcel No. 0526059175) is made up of several apartment buildings, paved parking, landscaped areas, and a stormwater wet pond facility. It is bound to the north and west by Beardslee Boulevard, the east by the college campus Parcel No. 0526059057 and 110th Avenue NE, and the south by 185th street NE and Husky Hall site parcels. This analysis focuses on the two study areas known as the Husky Hall and Husky Village (Figure 1).

PROJECT DESCRIPTION

Per discussions via email and telephone with EA Engineering, Science, and Technology, Inc. (Mr. Rich Schipanski) on December 16, 2016 (Husky Hall site), February 22, 2017 (Husky Village site), the University of Washington is evaluating various development and re-development alternatives as part of a Draft Environmental Impact Statement being prepared to support the University of Washington Bothell (UW Bothell)/Cascadia College (CC) Campus Master Plan. The work performed herein describes results of the site reconnaissance work, preliminary wetland ratings for consideration during planning phases, estimated critical area buffers, and general regulatory requirements if critical areas, wetlands, and/or stream impacts are unavoidable at the project location.

METHODS

Raedeke Associates, Inc. (RAI) performed a site reconnaissance for the presence and/or absence of wetlands, streams, and WDFW PHS at the Husky Hall and Husky Village study areas. RAI did not delineate the natural areas nor were areas professionally surveyed during this work. Therefore, the locations and sizes of wetlands, streams, and buffers described herein should be considered approximate until otherwise verified, flagged, and professionally surveyed. The following describes the methods used to identify wetlands, streams, critical area buffers, and WDFW PHS areas at the project location.

Wetlands

The U.S. Army Corps of Engineers (COE) wetland definition was used to determine if any portions of the project area could be classified as wetland. A wetland is defined as an area “inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (Federal Register 1986:41251).

We based our investigation upon the guidelines of the U. S. Army Corps of Engineers (COE) Wetlands Delineation Manual (Environmental Laboratory 1987) and subsequent amendments and clarifications provided by the COE (1991a, 1991b, 1992, 1994), as updated for this area by the regional supplement to the COE wetland delineation manual for the Western Mountains, Valleys, and Coast Region (COE 2010). The COE wetlands manual is required by state law (WAC 173-22-035, as revised) for all local jurisdictions, including the City of Bothell. As outlined in the COE wetland delineation manual, wetlands are distinguished by the presence of three diagnostic characteristics: hydrophytic vegetation (wetland plants), hydric soil (wetland soil), and wetland hydrology.

Streams

We based our investigation for the presence of streams within the project area on the definition of streams from the City of Bothell (2017) Municipal Code and Washington Administrative Code (WAC) 220-110-020.

Background Review

In preparation for our site investigation, we collected and analyzed background information available for the site prior to the on-site investigation. We collected maps and information from the U.S.D.A Natural Resources Conservation Service (NRCS 2017) Web Soil Survey and U.S. Fish and Wildlife Service (USFWS 2017) National Wetland Inventory on-line mapper, the Washington State Department of Natural Resources (WDNR 2017) on-line water types map. We also we accessed the online priority habitats and species (PHS) database maintained by Washington Department of Fish and Wildlife (WDFW 2016) to search for the occurrence or habitat of species of concern. Figures 2 and 3 depict soils and City of Bothell wetland inventory respectively. Additional information regarding the background information we reviewed is discussed in the results section of this report.

Field Sampling Procedures & Data Analysis

Raedeke Associates, Inc. staff visited the Husky Hall study area on December 21, 2016 and the Husky Village study area on February 24, 2017. We visually examined vegetation, soils, and hydrology in representative portions of the study area according to the procedures described in the Regional Supplement (COE 2010). Plant communities were characterized generally within the roadside right-of-way ditches, and soil, hydrology and vegetation data was collected at one sample plot.

We estimated the percent coverage of each species. Plant identifications were made according to standard taxonomic procedures described in Hitchcock and Cronquist (1976), with nomenclature as updated by the U.S. Army Corps of Engineers National Wetland Plant List (Lichvar, et. al. 2016). Wetland classification follows the USFWS wetland classification system (Cowardin et al. 1992). We determined the presence of a hydrophytic vegetation community using the procedure described in the Regional Supplement (COE 2010), which requires the use of the dominance test, unless positive indicators of hydric soils and wetland hydrology are also present, in which case the prevalence index or the use of other indicators of a hydrophytic vegetation community as described in the Regional Supplement (COE 2010) may also be required.

We excavated pits to at least 18 inches below the soil surface in order to describe the soil and hydrologic conditions throughout the study area. We sampled soil at locations that corresponded with vegetation sampling areas and potential wetland areas. Soil colors were determined using the Munsell Soil Color Chart (Munsell Color 2009). We used the indicators described in the Regional Supplement (COE 2010) to determine the presence of hydric soils and wetland hydrology.

Critical area wetland buffer widths were evaluated based on the City of Bothell (2017) Municipal Code Title 14 Chapter 14.04 Critical Area Regulations (2017). Raedeke Associates, Inc. prepared a preliminary wetland rating for the wetlands observed during the two site visits per the 2014 Updates to the Washington Department of Ecology (WDOE 2014) Wetland Ratings Systems. Scores were converted utilizing WDOE's tables for converting category and function scores described on WDOE's website to date.

Off-site Evaluation

We reviewed recent aerial photos (Google Earth 2016) of the study areas and vicinity in conjunction with the background resource inventory maps provided by the King County, City of Bothell, and U.S. Fish and Wildlife Service (USFWS 2017) National Wetland Inventory on-line databases to determine whether off-site wetlands were located within 100 feet of the project study areas. In addition, we walked roads and other public access areas and campus property in the vicinity of the project location to verify the presence of any off-site wetland areas that had been identified during our background review and to determine whether other wetland areas were present that may not have been identified by the resource inventory maps and aerial photos.

RESULTS

During our visit of the Husky Hall site, we identified a small depressional wetland area located along the eastern boundary of the study area. The wetland is a closed depression located along the eastern property boundary in the southeast corner between the Husky Hall parking lot and 110th Ave NE. Based on property boundary markings we observed, this area appears to be within the right of way for 110th Ave NE and located just off site. The attached Figure 4 presents a sketch map showing the approximate location of the wetland. The wetland was not field flagged, professionally surveyed, nor has it been reviewed by regulatory agencies. Figures 4 and 5, for the two project sites, are preliminary sketches for orientation purposes and to assist with initial preliminary site planning. Our preliminary analysis indicated that this wetland area (Husky Hall Wetland) meets the criteria to be classified as a Category III depressional wetland with 17 points per WDOE 2014 ratings and City of Bothell (2017) Municipal code. The required standard wetland buffer, based on wetland category and habitat score, would be 100 feet. It should be noted that the size and location of the wetlands described herein are approximate as shown on Figures 4 and 5. Figure 2 maps the entire site as Alderwood gravelly sandy loam, which is typically not a hydric "wetland" soil. However, in the location of the Husky Hall wetland hydric soil conditions were observed in the form of depletions (redoxomorphic features found in wetland soils) below a dark surface and saturated to the surface. Vegetation consisted of dominant herbaceous hydrophytes (wetland plants). Based on the soil, hydrology (saturated soils), and vegetation data collected within this depression, the area meets the criteria of a wetland per Environmental Laboratory 1987 and the COE 2010 regional supplement

During our site visit of the Husky Village study area, we identified a sloped wetland area that appeared to be located just off the site property and within campus property Parcel no. 0526059057. A stormwater pond was located within the Husky Village study area just west of the eastern property boundary. The stormwater pond was inaccessible at the time of our visit since it was completely enclosed in a fence with a locked gate. Signage clearly indicated its use as a stormwater facility associated with the Husky Village apartment complex.

The approximate location of the observed emergent scrub-shrub wetland located downstream of the stormwater pond along the eastern property boundary of the Husky Village study area is depicted on Figure 5. This wetland area is primarily seasonally fed by the stormwater pond's principal outfall pipe and another stormwater pipe associated with catch basins collecting stormwater from NE 185th street. It also does appear to have some groundwater influences and drains into a pipe that crosses 110th Avenue NE that discharges east of the roadway. Upon preliminary review, this wetland area (Husky Village) meets the criteria to be classified as a Category III sloped wetland with 16 points per WDOE 2104 ratings and City of Bothell (2017) Municipal Code. The required standard buffer, based on wetland category and habitat score, would be 100 feet for this wetland. Soils at the site are primarily mapped as Alderwood gravelly silt loam which is not a hydric soil except under certain circumstances. Figure 2 also maps soils within the vicinity of the wetland and stormwater areas on the eastern side of the study area as Seattle Muck which is a hydric "wetland" soil. Soils observed during the site reconnaissance exhibited thick dark surface soils overlaying depleted redoxomorphic soil features consistent with hydric soil conditions. Furthermore, soils were saturated to the surface. Dominant shrubs and herbaceous plant species consisted of hydrophytes (wetland plants). Based on the soil, hydrology, and vegetation data collected within this sloped area, the area meets the criteria of a wetland per Environmental Laboratory 1987 and the COE 2010 regional supplement.

For both project areas, national wetland inventory maps do not show any wetlands within the Husky Hall study area, but it does show the stormwater pond on the Husky Village study area. City of Bothell and King County iMap online mapping programs do show the Husky Village wetland area described above. All three online wetland inventory maps do show wetlands on the eastern side of 110th Avenue NE. PHS maps also show wetlands to the east of the project study areas. No other priority habitat species were listed in the PHS search.

Based on the data we collected during this site reconnaissance, we did not observe or identify any wetlands, streams, or indications of wildlife use by any species of concern on either of the project study area's site parcels. Field flagging and professional survey of parcel lot lines and wetland areas discussed herein, would confirm the presence or absence of wetlands on the project parcels.

Off-site areas of concern that were separated by impervious uses such as roadways and not immediately adjacent to the project study areas consisted of a large wetland area and the North Creek stream located across 110th Avenue NE and east of the project study areas. Figure 3 depicts wetlands adjacent to North Creek. North Creek and any adjacent wetlands are considered to be under Shoreline Jurisdiction.

These results should be considered preliminary findings and the wetlands will need to be delineated, professionally surveyed, and rated for buffers prior to finalizing proposed work on or around the project study areas. The following section presents a brief summary of potential regulatory requirements to consider if proposed work will have unavoidable impacts to the wetlands or buffer areas described herein.

REGULATORY CONSIDERATIONS

Wetlands and streams are protected by Section 404 of the Federal Clean Water Act and other state and local policies and ordinances including the City of Bothell (2017) Municipal code. Regulatory considerations pertinent to wetlands identified within the study area are discussed below; however, this discussion should not be considered comprehensive. Additional information may be obtained from agencies with jurisdictional responsibility for, or interest in, the site. A brief review of federal and state regulations and local policy, relative to wetlands, is presented below.

If proposed project work cannot avoid or minimize impacts to buffers or wetlands described herein and unavoidable impacts are anticipated, the following presents a list of regulatory considerations to anticipate during project planning.

As an isolated wetland depression, The Husky Hall depressional wetland area is likely not federally regulated by the Army Corps of Engineers (ACOE). The Husky Village sloped wetland area may be regulated by the ACOE. However, the Husky Village wetland area would need to be further examined for connectivity to regulated waters and wetlands and additional information collected beyond the scope of services provided herein. Both wetland areas would be regulated at the Washington Department of Ecology (WDOE) and City of Bothell and would require permits from these agencies if impacts are unavoidable. City of Bothell online mapping indicates that the Husky Village wetland area is not part of Shoreline Jurisdiction. However, the pipe that drains the sloped Husky Village wetland under 110th Avenue NE would need to be further examined with the City of Bothell to determine if WDOE Shoreline Management Act Jurisdiction would apply in this situation. Supplemental information such as the pipe inverts, dimensions, lengths, sizes of contributory drainage areas, and the location of the nearest downstream wetland edge would assist the City in making a determination of WDOE Shoreline and ACOE jurisdiction over the Husky Village wetland area.

It is important to note that the decision as to whether or not the Corps or WDOE would take jurisdiction over these wetland areas ultimately lies with their jurisdictional authority and is based on the applicable regulations to date. Typically, WDOE requires information from the ACOE indicating whether or not a wetland area is federally regulated under ACOE jurisdiction. Generally, this is handled one of two ways and depending on the proposed project work, schedule, and timing:

- Apply for an approved jurisdictional determination (AJD) from the ACOE that has a 6+ months turnaround time from application submittal to receiving the AJD documentation, OR

- Assume that the wetland is federally regulated, apply for a preliminary jurisdictional determination (PJD), and apply for your applicable permit (3-6 months from application submittal, sometimes less). The amount/size of proposed impact(s) will determine if the project falls under a nationwide permit (which may or may not require submittal of an application) or an individual permit.

In any case, impacts to regulated wetlands would require applying for a permit with WDOE (3-6 month turnaround time from the time the application is submitted) and for State 401 Certification for water quality and coastal zone consistency for water quality and work within a coastal county, respectively. If the wetlands are not federally regulated, then coastal zone consistency and 401 water quality would not be involved.

Any impacts to these wetlands and/or buffer, would have to go through the City's critical areas review process for buffer concurrence, reduction, and be appropriately mitigated through buffer averaging or buffer enhancements, as appropriate

Bothell has the final authority to determine ratings, buffers, and allowed uses of wetlands, their buffers, and other sensitive areas that are under their critical areas jurisdiction. During the development/re-development process, Bothell will need to evaluate and approve the projects impacts to critical areas such as wetland buffers. Impacts will need to be appropriately mitigated for per Bothell code. For Category III wetlands there is a 2:1 replacement:alteration ratio if project impacts are unavoidable.

The stormwater management area located on the Husky Village project site would need to be managed, maintained and operated per the stormwater management requirements for the City of Bothell and King County. Work in and around the outfall pipe that discharges into the adjacent wetland would need to be evaluated for and may require federal, state, and local wetlands permitting.

LIMITATIONS

We have prepared this report for the exclusive use of the University of Washington, EA Engineering, Science, and Technology, Inc., and their consultants. No other person or agency may rely upon the information, analysis, or conclusions contained herein without permission from the University of Washington or EA Engineering, Science, and Technology, Inc..

The determination of ecological system classifications, functions, values, and boundaries is an inexact science, and different individuals and agencies may reach different conclusions. With regard to wetlands, the final determination of their boundaries for regulatory purposes is the responsibility of the various agencies that regulate development activities in wetlands. We cannot guarantee the outcome of such agency determinations. Therefore, the conclusions of this report should be reviewed by the appropriate regulatory agencies prior to any detailed site planning or construction activities. This summary does not address other potential permitting necessary to perform work in these project areas.

We warrant that the work performed conforms to standards generally accepted in our field, and has been prepared substantially in accordance with then-current technical guidelines and criteria. The conclusions of this report represent the results of our analysis of the information provided by the project proponent and their consultants, together with information gathered in the course of the study. No other warranty, expressed or implied, is made.

If you have any questions or comments, or wish to discuss this issue further, please contact myself or Mr. Emmett Pritchard at (206) 525-8122 or at whohman@raedeke.com and epritchard@raedeke.com.

ATTACHMENTS:

Figure 1: "Project Site Parcel Locations" RAI # 2016-087-001 (Raedeke Associates Inc.) Prepared February 28, 2017
Figure 2: "Hydric Rating by Map Unit" Natural Resources Conservation Services Web Soil Survey 2/28/2017
Figure 3: "City of Bothell Wetland Inventory" prepared February 28, 2017
Figure 4: "Sketch Map – Approximate Location of Husky Hall Wetland" prepared 02/24/2017
Figure 5: "Sketch Map – Approximate Location of Husky Village Wetland" prepared 02/24/2017

LITERATURE CITED

Bothell, City of. 2017 Title 14, Chapter 14.04 Critical Areas Regulations. Current through 2218, passed February 7, 2017. Accessed online at http://www.codepublishing.com/WA/Bothell/ on February 28, 2017.

Cowardin L., V. Carter, F. Golet, and E. LaRoe. 1992. Classification of wetlands and deepwater habitats of the United States. USDI Fish and Wildlife Service Publication. FWS/OBS-79/31. 131 pp.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1, US Army Engineers Waterways Experiment Station, Vicksburg, Mississippi. 100 pp.

Federal Register. 1986. 40 CFR Parts 320 through 330: Regulatory programs of the Corps of Engineers; final rule. Vol. 51. No. 219. pp. 41206-41260, U.S. Government Printing Office, Washington, D.C.

Google Earth. 2016. Image for 47.761947 N, - 122.194049 E in City of Bothell, Washington © 2016 Google. Accessed February 28, 2017.

Hitchcock and Cronquist. 1976. Flora of the Pacific Northwest. Univ. of Washington Press, Seattle, Washington.

King County. 2017. iMap. Interactive Mapping Tool. http://gismaps.kingcounty.gov/iMap/. Accessed February 28, 2017.

Lichvar, Robert W., D.L. Banks, W.N. Kirchner, and N. C. Melvin. 2016. U.S. Army Corps of Engineers, State of Washington 2016 Wetland Plant List.. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X.

Munsell Color. 2009. Munsell soil color charts. Munsell Color, Grand Rapids, MI.

U.S. Army Corps of Engineers. 1991a. Special notice. Subject: Use of the 1987 wetland delineation manual. U.S. Army Corps of Engineers, Seattle District. August 30, 1991.

U.S. Army Corps of Engineers. 1991b. Memorandum. Subject: Questions and answers on the 1987 manual. U.S. Army Corps of Engineers, Washington D.C. October 7, 1991. 7 pp. including cover letter by John P. Studt, Chief, Regulatory Branch.

U.S. Army Corps of Engineers. 1992. Memorandum. Subject: Clarification and interpretation of the 1987 methodology. U.S. Army Corps of Engineers, Washington D.C., March 26, 1992. 4 pp. Arthur E. Williams, Major General, U.S.A. Directorate of Civil Works.

U.S. Army Corps of Engineers. 1994. Public Notice. Subject: Washington regional guidance on the 1987 wetland delineation manual. May 23, 1994, Seattle District. 8 pp.

U.S. Army Corps of Engineers. 2010. Regional supplement to the Corps of Engineers wetland delineation manual: western mountains, valleys, and coast region (Version 2.0). Wakeley, J.S., R.W. Lichvar, and C.V. Noble, eds. May 2010. ERDC/EL TR-10-3. U.S. Army Engineer Research and Development Center, Vicksburg, MS.

U.S. Army Corps of Engineers. 2012. Special Public Notice. Final Regional Conditions, 401 Water Quality Conditions, Coastal Zone Management Consistency Responses, for Nationwide Permits for the Seattle District Corps of Engineers for the State of Washington. U.S. Army Corps of Engineers, Seattle District. March 19, 2012.

U.S.D.A. Natural Resources Conservation Service. 2017. On-line Web Soil Survey. http://websoilsurvey.nrcs.usda.gov . Accessed February 28, 2017.

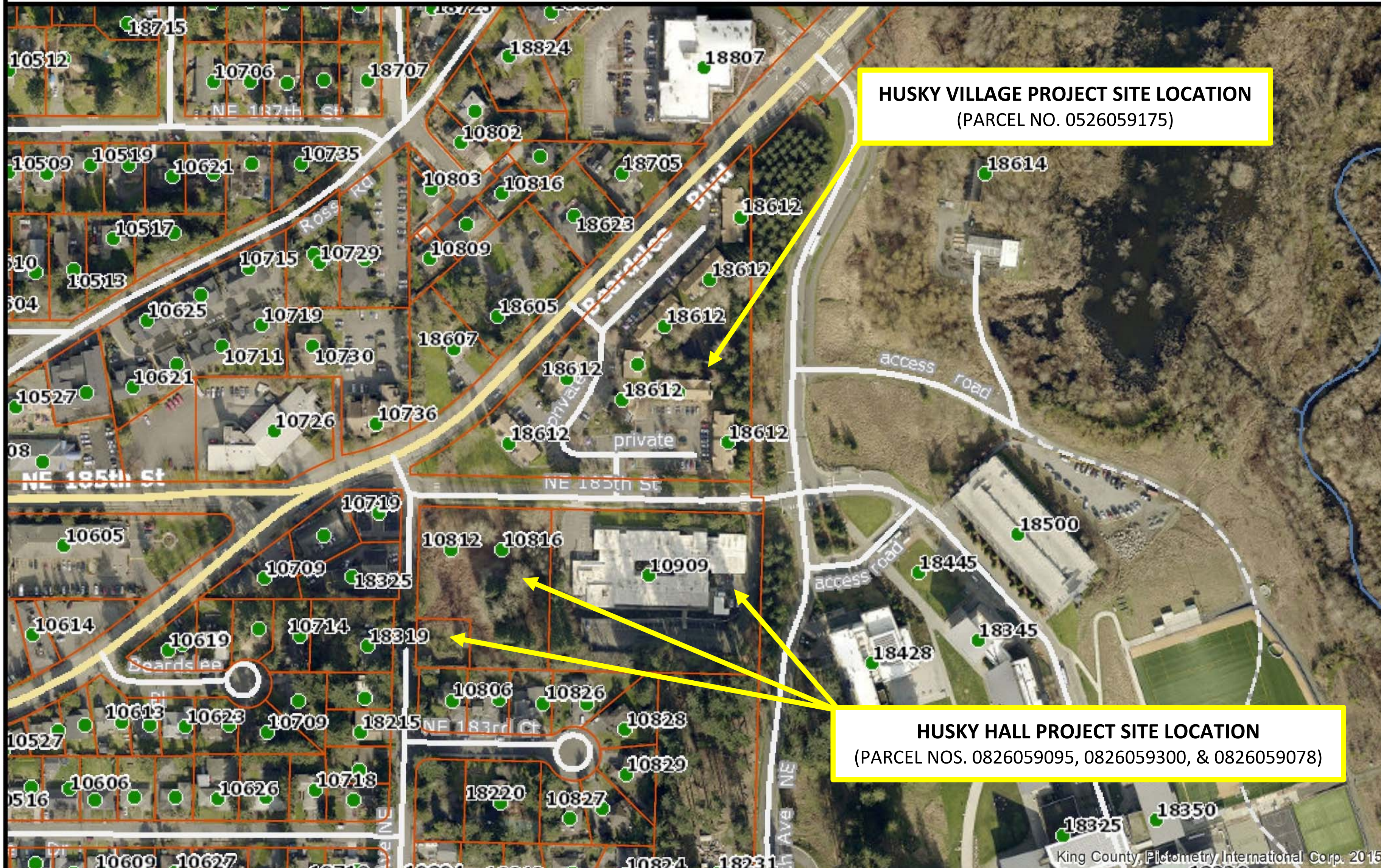
U.S. Fish and Wildlife Service National Wetland Inventory Wetland Mapper. 2017. https://www.fws.gov/wetlands/data/mapper.HTML

Washington State Department of Ecology. Washington State Wetland Rating System for Western Washington 2014 Update (Effective January 2015). Publication Number 14-06-029. October 2014.

Washington Department of Fish and Wildlife. 2016. Priority Habitat Species on the web. Available at: http://wdfw.wa.gov/mapping/phs/. Last accessed December 15, 2016.

Washington Department of Natural Resources Forest Practices Application Mapping Tool. 2017. https://fortress.wa.gov/dnr/protectiongis/fpamt/

King County iMap - Project Parcel Locations



The information included on this map has been compiled by King County staff from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a survey product. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.

Date: 2/28/2017 Notes:

N

King County GIS CENTER

FIGURE 1 – PROJECT SITE PARCEL LOCATION

RAI PROJECT REFERENCE NO. 2016-087-001

Hydric Rating by Map Unit—King County Area, Washington

FIGURE 2

Map Scale: 1:3,420 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 12, Sep 8, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 31, 2013—Jul 8, 2014

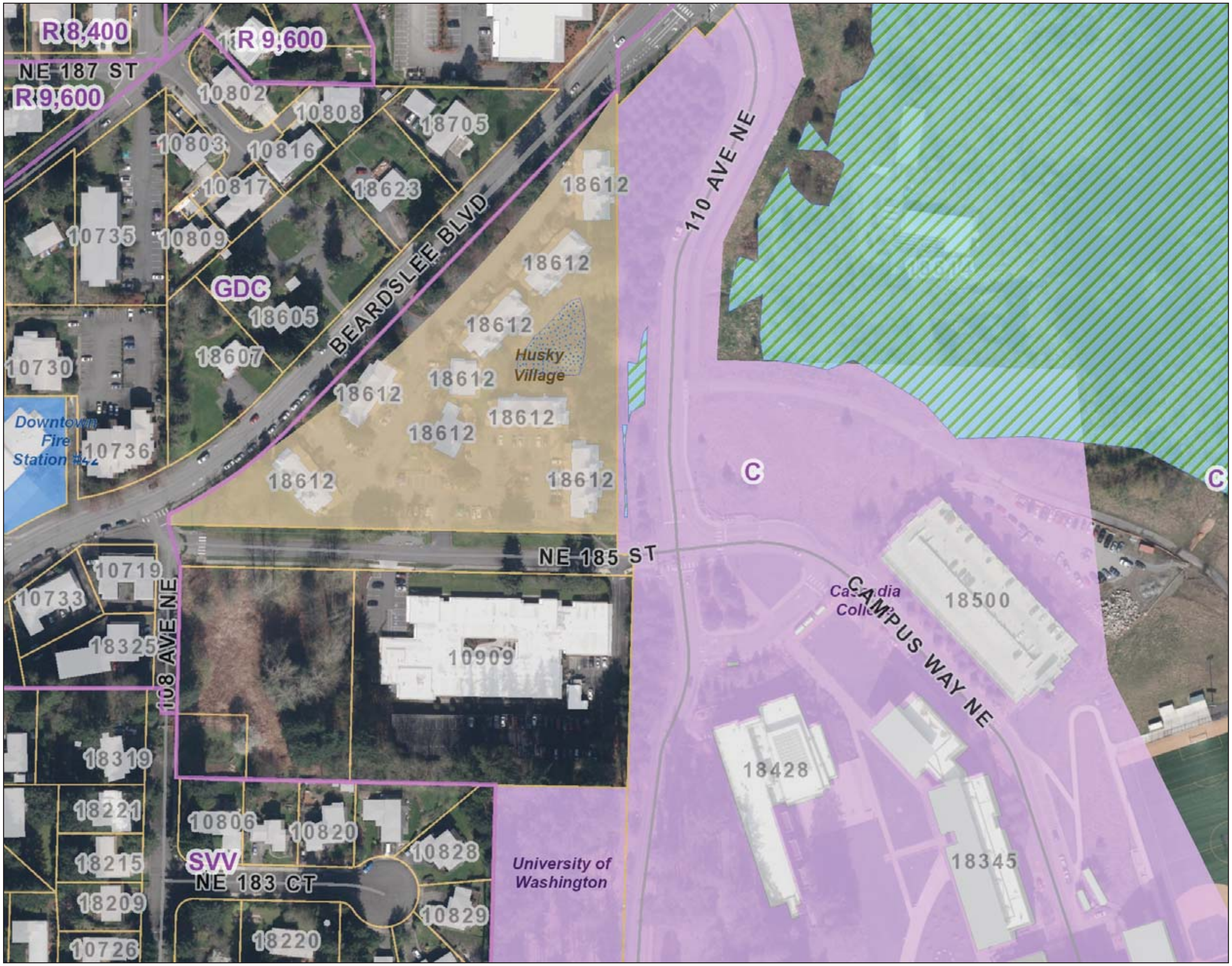
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — King County Area, Washington (WA633)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
AgC	Alderwood gravelly sandy loam, 8 to 15 percent slopes	5	43.0	82.1%
AmC	Arents, Alderwood material, 6 to 15 percent slopes	0	4.5	8.6%
EvC	Everett very gravelly sandy loam, 8 to 15 percent slopes	0	1.7	3.2%
Sk	Seattle muck	100	3.2	6.1%
Totals for Area of Interest			**52.3**	**100.0%**

City of Bothell Map- Environmental

City of Bothell COBMap



414 0 207 414

Feet

1: 2,482

N W E S

The City of Bothell delivers this data (map) in an AS-IS condition. GIS data (maps) are produced by the City of Bothell for internal purposes. No representation or guarantee is made concerning the accuracy, currency, or completeness of the information provided.

Legend

- Planning Area Boundary
- Zoning
- Rivers or Streams
  - Open Stream
  - Piped Stream
- River or Stream Buffer
- Sammamish River
- Wetland
- Wetland Buffer
- Water Body
  - Lake
  - Pond
- Buildings
- Bothell City Limits
- Local Government
- Public Services
- Public School
- Mobile/Multi-Family
- Golf Course
- 2015-Mar Ortho (Bothell)

Notes

FIGURE 3: CITY OF BOTHELL WETLAND INVENTORY

NE 58th Street, King County, Bothell, WA 98011 (Parcel No.'s: 0826059095, 0826059300, and 0826059078)

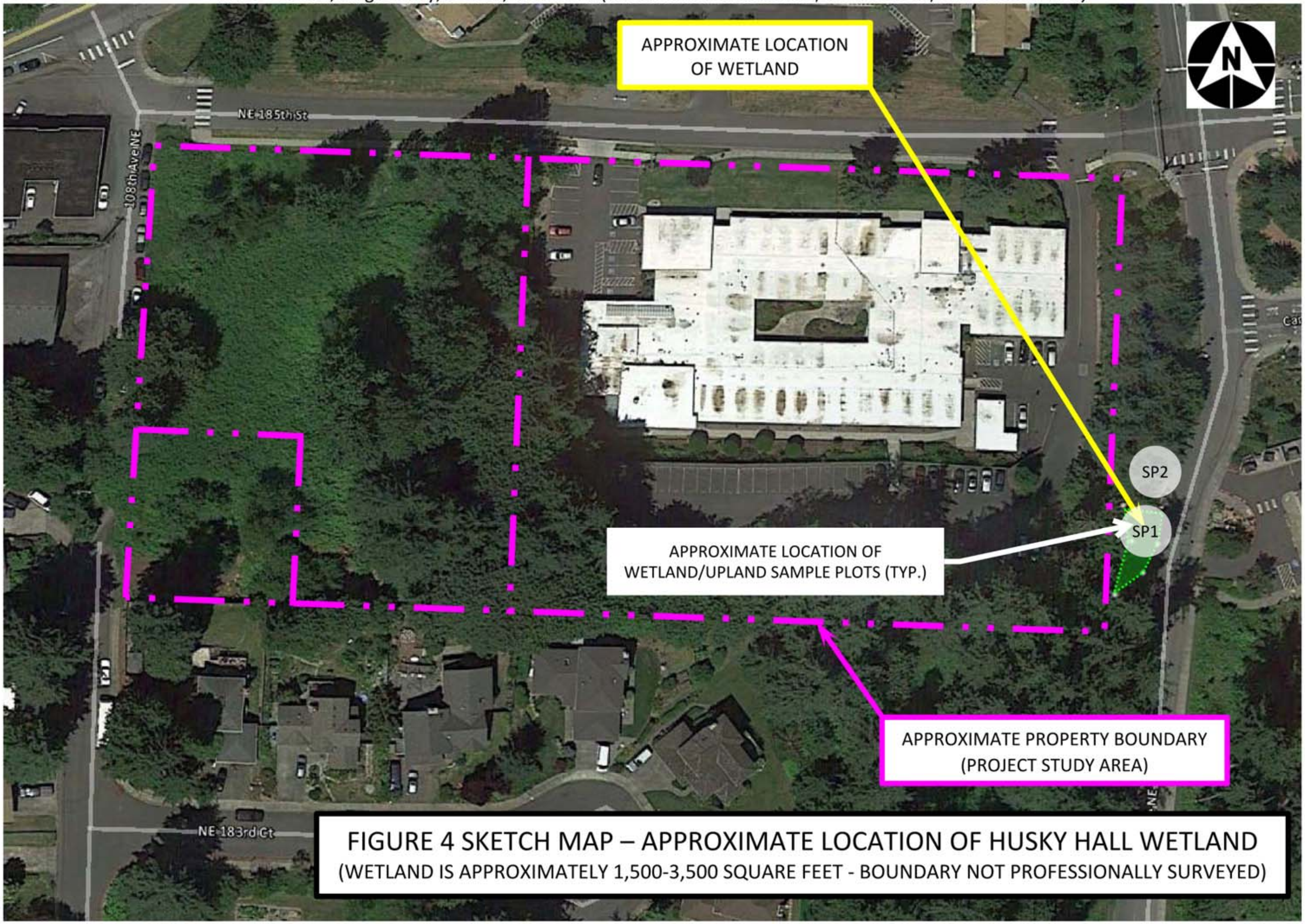


FIGURE 4 SKETCH MAP – APPROXIMATE LOCATION OF HUSKY HALL WETLAND
(WETLAND IS APPROXIMATELY 1,500-3,500 SQUARE FEET - BOUNDARY NOT PROFESSIONALLY SURVEYED)

Image Source: Google Earth, Image Date: 6/27/2016

Sketch Prepared: 02/24/2017
Sketch Updated 07/04/17 per Draft EIS Document

18612 Beardslee Blvd, King County, Bothell, WA 98011 (Parcel No.: 0526059175)

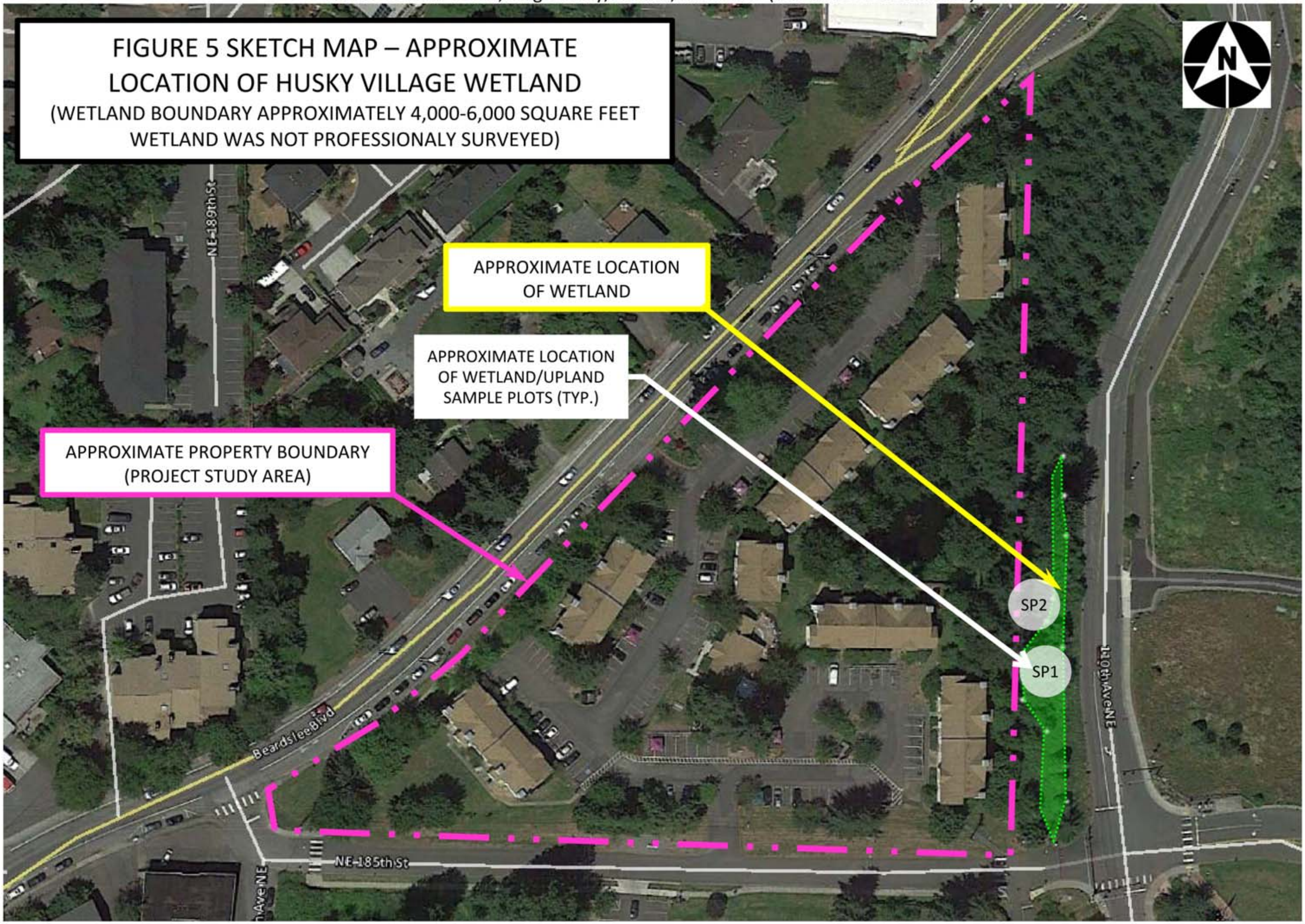


Image Source: Google Earth, Image Date: 6/27/2016

Sketch Map Prepared: 02/24/2017

Sketch Updated 07/04/17 per Draft EIS Document

ATTACHMENT A

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Husky Hall City/County: City of Bothell / King Sampling Date: 12/21/2016

Applicant/Owner: University of Washington / EA Engineering Science and Technology State: WA Sampling Point: SP 1

Investigator(s): E. Pritchard and W. Hohman Section, Township, Range: S8, T26N, R5E, W.M.

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): Northwest Forests & Coasts (LRR A) Lat: 47.761364 Long: -122.193467 Datum: Unknown

Soil Map Unit Name: Alderwood gravelly sandy loam, 8 to 15 percent slope NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	**Is the Sampled Area within a Wetland?**	Yes ☒ No ☐
Hydric Soil Present?	Yes ☒ No ☐		
Wetland Hydrology Present?	Yes ☒ No ☐		

Remarks: Sample Point 1 is located between the parking lot located in the SE corner of the project area and adjacent to 110th Ave NE. Area is an apparent closed depression with ponding water. Latitude and longitude are approximated from Google Earth.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5 m)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 m)			
1. Salmon Raspberry (Rubus spectabilis)	10	Y	FAC
2.			
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 1 m)			
1. Creeping Buttercup (Ranunculus repens)	60	Y	FAC
2. Western Lady Fern (Athyrium cyclosorum)	30	Y	FAC
3. Lesser Herbrobert (Geranium robertianum)	2	N	FACU
4. Bittercress species (Cardamine sp.)	5	N	-
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	97	= Total Cover	
Woody Vine Stratum (Plot size: 3 m)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 3

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☒ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

SOIL

Sampling Point: SP 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/1						Silt Loam	
7-18+	10YR 4/1		10YR 4/4	10	C	M	Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☒ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Clay Loam

Depth (inches): 7 inches

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☒ No ☐ Depth (inches): 0.01

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☒ No ☐ Depth (inches): 0

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Husky Hall City/County: City of Bothell / King Sampling Date: 12/21/2016

Applicant/Owner: University of Washington / EA Engineering Science and Technology State: WA Sampling Point: SP 2

Investigator(s): E. Pritchard and W. Hohman Section, Township, Range: S8, T26N, R5E, W.M.

Landform (hillslope, terrace, etc.): Small knoll Local relief (concave, convex, none): Convex Slope (%): 2-5

Subregion (LRR): Northwest Forests & Coasts (LRR A) Lat: 47.761479 Long: -122.193380 Datum: Unknown

Soil Map Unit Name: Alderwood gravelly sandy loam, 8 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐ No ☐	**Is the Sampled Area within a Wetland?**	Yes ☐ No ☒
Hydric Soil Present?	Yes ☐ No ☐		
Wetland Hydrology Present?	Yes ☐ No ☐		

Remarks: Sample Point 2 is located between the parking lot located in the SE corner of the project area and adjacent to 110th Ave NE. Sample plot location is approximately 25 feet north of sample plot 1. Latitude and longitude are approximated from Google Earth.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 5 m)			
1. Douglas Fir (Pseudotsuga mensiesii)	70	Y	FACU
2. Big-Leaf Maple (Acer macrophyllym)	10	N	FACU
3.			
4.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 m)			
1. Oso-berrry (Oemleria cerasiformis)	5	Y	FACU
2. Red Elder (Sambucus racemosa)	10	Y	FACU
3.			
4.			
5.			
	15	= Total Cover	
Herb Stratum (Plot size: 1 m)			
1. Mahonia nervosa	10	N	FACU
2. Reed Canary Grass (Phalaris arundinacea)	20	Y	FACW
3. Lesser Herbrobert (Geranium robertianum)	10	N	-
4. Himalayan Blackberry (Rubus armeniacus)	50	Y	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90	= Total Cover	
Woody Vine Stratum (Plot size: 3 m)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum 10			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	20	x 2 = 40
FAC species	50	x 3 = 150
FACU species	105	x 4 = 420
UPL species	0	x 5 = 0
Column Totals:	175 (A)	610 (B)

Prevalence Index = B/A = 3.4

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☐ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☐ **No** ☒

Remarks:

SOIL

Sampling Point: SP 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/2						Loam	
3-7	10YR 3/6						Loam	
7-15+	10YR 6/4						Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

☐ 2 cm Muck (A10)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☐ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Surface Soil Cracks (B6)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Sparsely Vegetated Concave Surface (B8)
☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B)**
☐ Salt Crust (B11)
☐ Aquatic Invertebrates (B13)
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Stunted or Stressed Plants (D1) (**LRR A**)
☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

☐ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☐ FAC-Neutral Test (D5)
☐ Raised Ant Mounds (D6) (**LRR A**)
☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ______

Water Table Present? Yes ☐ No ☒ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ☐ No ☐ Depth (inches): ______

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No hydrology present. Area appeared to be well drained at the time of our site visit.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Husky Village City/County: City of Bothell / King Sampling Date: 02/23/2017

Applicant/Owner: University of Washington / EA Engineering Science and Technology State: WA Sampling Point: SP 1

Investigator(s): A. Clark and W. Hohman Section, Township, Range: S8, T26N, R5E, W.M.

Landform (hillslope, terrace, etc.): Sloped drainage way Local relief (concave, convex, none): Concave Slope (%): 2-5

Subregion (LRR): Northwest Forests & Coasts (LRR A) Lat: 47.762421 Long: -122.193505 Datum: Unknown

Soil Map Unit Name: Seattle Muck NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	**Is the Sampled Area within a Wetland?** Yes ☒ No ☐
Hydric Soil Present?	Yes ☒ No ☐	
Wetland Hydrology Present?	Yes ☒ No ☐	

Remarks: Sample Plot 1 is located in low point of drainage way approximately 50-75 fro outlet outfall under 110th Ave NE Latitude and longitude are approximated from Google Earth.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5 m)	Absolute % Cover	Dominant Species?	Indicator Status
1. Balsam Poplar (Populus balsamifera)	5	Y	FAC
2. Red Alder (Alnus rubra)	20	Y	FAC
3.			
4.			
	25	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 m)			
1. Red Osier (Cornus alba)	10	N	FACW
2. Creambush (Holodiscus discolor)	10	N	FACU
3. Sitka Willow (Salix sitchensis)	50	Y	FACW
4. Himalayan Blackberry (Rubus armeniacus)	10	N	FAC
5.			
	80	= Total Cover	
Herb Stratum (Plot size: 1 m)			
1. Reed Canary Grass (Phalaris arundinacea)	85	Y	FACW
2. Pineland Swardfern (Polystichum munitum)	5	N	FACU
3. Lesser Herbrobert (Geranium robertianum)	10	N	FACU
4. Musci sp.	-	N	-
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 3 m)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum 0			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☒ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

SOIL

Sampling Point: SP 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/1						Silt Loam	trace gravel
7-11	10YR 4/2		10YR 4/6	30	C	M	Clay Loam	trace gravel
11-18+	10YR 3/1		10YR 4/6	10	C	PL	Clay Loam	trace gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☒ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B)**
- ☒ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ________

Water Table Present? Yes ☐ No ☒ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ☒ No ☐ Depth (inches): 6

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Husky Village City/County: City of Bothell / King Sampling Date: 02/23/2017

Applicant/Owner: University of Washington / EA Engineering Science and Technology State: WA Sampling Point: SP 2

Investigator(s): A. Clark and W. Hohman Section, Township, Range: S8, T26N, R5E, W.M.

Landform (hillslope, terrace, etc.): slightly pitched terrain Local relief (concave, convex, none): None Slope (%): 2-5

Subregion (LRR): Northwest Forests & Coasts (LRR A) Lat: 47.762699 Long: -122.193521 Datum: Unknown

Soil Map Unit Name: Seattle Muck NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒
Hydric Soil Present?	Yes ☐ No ☒	
Wetland Hydrology Present?	Yes ☐ No ☒	

Remarks: Sample Point 2 is located north of sample plot 1 and north of the Husky Village stormwater pond outfall. Latitude and longitude are approximated from Google Earth.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5 m)	Absolute % Cover	Dominant Species?	Indicator Status
1. Douglas-Fir (Pseudotsuga mensiesii)	40	Y	FACU
2.			
3.			
4.			
	40	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 m)			
1. Himalayan Blackberry (	20	Y	FAC
2.			
3.			
4.			
5.			
	20	= Total Cover	
Herb Stratum (Plot size: 1 m)			
1. Reed Canary Grass (Phalaris arundinacea)	20	Y	FACW
2. Creeping Buttercup (Ranunculus repens)	15	Y	FAC
3. Pineland Swordfern (Polystichum munitum)	10	N	FACU
4. Stinging Nettle (Urtica dioca)	10	N	FAC
5. Musci sp.	10	N	-
6.			
7.			
8.			
9.			
10.			
11.			
	65	= Total Cover	
Woody Vine Stratum (Plot size: 3 m)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum 0			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ________

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☒ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

SOIL

Sampling Point: SP 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2						GrSiLm	Gravelly Silt Loam
12-18+	10YR 3/3						GrSiLm	Gravelly Silt Loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________________

Depth (inches): ____________________

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ________

Water Table Present? Yes ☐ No ☒ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): ________

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

ARCADIS U.S., Inc.
1100 Olive Way, Suite 800
Seattle, Washington 98101
Tel 206 325 5254
Fax 206 325 8218
www.arcadis-us.com

Amy Van Dyke
Director of Physical Planning & Space Management
University of Washington, Bothell
Box 358500
18115 Campus Way NE
Bothell, WA 98011

ENVIRONMENT

Subject:
University of Washington / Cascadia College – Development Reserve Parcel

Date:
April 13, 2015

Contact:
Douglas Partridge

Phone:
203.489.3008

Email:
Doug.Partridge@
Arcadis-us.com

Our ref:
B00023350.0003.

Dear Ms. Van Dyke:

This letter report has been prepared by ARCADIS U.S., Inc. at the request of the University of Washington, Bothell (UWB) and Cascadia College (CC) campus in support of planning and permitting associated with potential jurisdictional wetlands within the campus Planned Unit Development (PUD) boundary. More specifically, this letter report discusses a previously delineated isolated wetland along the western property boundary of the UWB/CC campus (i.e., immediately west of 110th Avenue NE). This report is necessary because previous permitting associated with campus development (Phase 1 PUD) mitigated for impacts to this isolated wetland; however, site activities never filled the wetland as anticipated during planning and permitting. While current wetland conditions were observed in February 2014 by an ARCADIS wetland ecologist (resume submitted as Attachment A), ARCADIS maintains that mitigation performed as part of the North Creek Riverine Ecosystem Restoration project (hereafter restoration project) more than compensates for impacts to this wetland. UWB/CC contends that they should not be required to provide mitigation for impacts to this wetland twice.

ARCADIS has prepared this short letter report to provide historical information pertaining to original wetland impacts on the campus, a summary of the regulatory framework and existing conditions of this wetland of interest, a discussion of recent functional assessment performed in the restored wetlands, and conclusions.

Phase 1 PUD Waters/Wetlands Impacts and Associated Mitigation

Federal, state, and City of Bothell permits associated with unavoidable impacts to waters and wetlands on the campus property were supported by the *Final Mitigation and Monitoring Plan* (LCLA 1996) and the *Addendum to the Final Mitigation and*

Monitoring Plan (LCLA 1998). The former represented a plan based upon the 75% design level, and the latter based upon the 100% design. The final accounting for impacts to waters and wetlands as a result of campus construction was 6.1 acres (LCLA 1998). To compensate for these impacts, the project restored 31.3 acres of waters and wetlands, enhanced 19 acres of waters and wetlands, and restored 2.4 acres of transitional uplands (ARCADIS 2011). Included in this project is the re-construction of approximately 4,000 feet of valuable salmonid stream habitat.

Exhibit D of the *Final Mitigation and Monitoring Plan* illustrates the waters and wetlands to be impacted during Phase 1 PUD, and differentiates between impacts as a result of construction (i.e., campus development) or “restoration” (Attachment B). Please note that consistent with current day terminology within the field of restoration science, this latter group would be identified as those wetland areas to be “enhanced” as a result of the proposed project and are reflected as such in the restored or enhanced area estimates provided above.

Wetland 14 is a wetland that has remained unfilled since original campus development, and is located within the development reserve parcel west of 110th Avenue NE. The original wetland delineation determined the wetland to be 4,609 square feet (sf) or 0.11 acres. It is an isolated depressional wetland that has no hydrologic connection to the restoration project. Strangely, Exhibit D maps impacts to this wetland as a result of “restoration.” Given ARCADIS staff historical involvement with the project (i.e., dating back to the planning and permitting phase of the restoration project), it is our professional opinion that the map identifies impacts as a result of “restoration” in error. This wetland does not occur anywhere near the restoration project, nor would it provide any functional value to this project. While recognizing this mapping error, ARCADIS does believe that impacts to this wetland were accounted for under the original permit package.

Jurisdiction of Wetland 14 and Existing Site Conditions

Specific to federal and state jurisdiction of waters and wetlands, ARCADIS has determined Wetland 14 to be isolated from navigable waters and therefore not jurisdictional under Section 404 and 401 of the Clean Water Act. However, ARCADIS does recognize the jurisdiction of the isolated wetlands under the City of Bothell Critical Areas Ordinance (Chapter 14.04).

A site investigation was performed on February 14th, 2014 to review existing site conditions. The technical criteria for wetlands as defined by the 1987 *Corps of Engineers Wetland Delineation Manual* and the 2010 *Regional Supplement to the*

Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0) were determined to be met. Suitable wetland hydrology, hydric soils, and hydrophytic vegetation were present within the previously delineated wetland, and the geographic extent of the wetland was estimated to be comparable to the previous mapping. In addition, ARCADIS believes this wetland meets the characteristics of a Category 4 wetland as defined by the State of Washington.

The wetland can be best characterized as an isolated depressional wetland with no outlet. It occurs immediately proximate to (i.e., north of) a lay down area currently used by campus Facilities Services. Common wetland vegetation species included: red alder (*Alnus rubra*), salmonberry (*Rubus spectabilis*), Indian plum (*Oemleria cerasiformis*), creeping buttercup (*Ranunculus repens*), reed canary grass (*Phalaris arundinacea*), Himalayan blackberry (*Rubus discolor*), cutleaf blackberry (*Rubus laciniatus*), and sword fern (*Polystichum munitum*). Surrounding upland forest is dominated by: Douglas' fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), big leaf maple *(Acer macrophyllum*), and scattered red alder. Minimal understory vegetation exists, but scattered sword fern and Himalayan blackberry were observed. Photographs of the wetland from February 2014 are included as Attachment C.

Functional Assessment of North Creek Ecosystem Restoration Project

To support the construction of the Sarah Simonds Green Wetland Conservatory, ARCADIS recently performed a functional assessment on the existing restoration project to demonstrate overall project success. Consistent with the original permit conditions, ARCADIS relied upon *the Draft Guidebook to Functional Assessments of Depressional Wetlands of the Pacific Northwest/Puget Sound Lowlands Region* (Puget Sound Lowlands Guidebook) (LCLA 1995a) with support from the *Guidebook for Application of Hydrogeomorphic Assessments to Riverine Wetlands* (Riverine HGM Model) (Brinson et al. 1995). While recognizing that City of Bothell ordinances currently require wetland assessments utilizing the Washington State Wetland Rating System for Western Washington (revised), ARCADIS contended that the historical nature of this project and the fact that this site was originally permitted based upon these original protocols warranted use of these previously used models. Consistency with the past permitting and associated protocols allows a more effective comparison to pre-restoration conditions as well as provides consistency with communications between the multiple regulatory agencies (i.e., USACE, Washington Department of Ecology, and City of Bothell). This approach was accepted by the City of Bothell.

A summary table for scaling of all variables (i.e., pre-project, 2006, and 2009) including the scaling rationales is included in Attachment D. Scaling was performed based upon knowledge of on-site conditions, 2009 monitoring results, and assumed continued use of the nursery area. A summary table for resulting functional indices is also included in Attachment D. The results of this 2011 assessment indicate that restoration activities continue to increase functional indices in fourteen of the fifteen (93%) ecosystem functions assessed. The only function excluded was subsurface water storage, which was not enhanced by this project due to the fact that it met the reference standard condition prior to implementation of the project.

The results of the 2011 functional assessment continue to show success of the restoration project. Relative to the future development of the development reserve parcel, unavoidable impacts to Wetland 14 will not adversely affect the overall functioning of the North Creek riverine ecosystem.

Conclusions

ARCADIS believes that permanent impacts to Wetlands 14 were originally accounted for under environmental permitting for original campus development which includes the Phase 1 PUD. Regardless of this fact, it has to be recognized that the State of Washington went far beyond what was required by federal, state or City regulatory agencies by restoring the entire North Creek riverine ecosystem and exceeding any mitigation ratio that would have been, or currently would be, required by the pertinent regulatory agencies. Unfortunately for future campus planning, this wetland was never filled during initial campus development as was envisioned during the planning and permitting process.

ARCADIS believes that suitable mitigation for impacts to Wetland 14 have already been achieved through the successful implementation of the North Creek Ecosystem Restoration Project. While impacts to this wetland have been delayed due to phasing of campus development, the mitigation project has since been determined to be successfully implemented and has met all success criteria as outlined in the *Final Mitigation and Monitoring Plan* (LCLA 1996, 1998). In addition, the filling of Wetland 14 will not adversely affect the functioning of the greater North Creek riverine ecosystem. Given the isolated geomorphic position, this potential environmental impact would only be realized at this small upgradient position along the western boundary of the campus that is already impacted by anthropogenic disturbances and surrounded by development.

UWB/CC hopes the continued support of the restoration project demonstrate their commitment to preserving the North Creek riverine ecosystem within the campus property. Wetland 14 was previously accounted for in past mitigation accounting, but unfortunately anticipated construction never occurred in this area of the campus. Taking all this into consideration, UWB/CC does not believe they should be required to provide mitigation for impacts to this wetland twice. In conclusion, consistent with overall goals of the City of Bothell Critical Areas regulation, the future build out the development reserve parcel:

1. Includes only a small area of permanent impacts to wetlands which were accounted for in initial Phase 1 PUD permitting.

2. The future construction will not have a direct effect on the adjacent wetland ecosystem or adjacent wetland buffer areas.

3. There are no cumulative adverse environmental impacts to water quality, wetlands, and fish and wildlife habitat that will result from future development.

If there are any questions, comments or concerns regarding the letter, please do not hesitate to contact me at 203.489.3008 or doug.partridge@arcadis-us.com.

Sincerely,

ARCADIS U.S., Inc.

Douglas Partridge, PWS, CE
Principal Ecologist

References

ARCADIS 2011. Letter to U.S. Army Corps of Engineers, on behalf of the University of Washington, Bothell and Cascadia Community College. Dated September 7, 2011.

Brinson, M.M., F.R. Hauer, L.C. Lee, W.L. Nutter, R.D. Rheinhardt, R.D. Smith, and D. Whigham. 1995. The Guidebook for Application of Hydrogeomorphic Assessments to Riverine Wetlands (Riverine HGM Model). Technical Report WRP-DE-11, U.S. Army Engineer Waterways and Experimental Station, Vicksburg, MC. NTIS No. AD A308 365.

L.C. Lee & Associates, Inc. 1995. Draft Guidebook to Functional Assessments of Depressional Wetlands of the Pacific Northwest/Puget Sound Lowlands Region (Puget Sound Lowlands Guidebook)

L.C. Lee & Associates, Inc. 1996. Final Mitigation and Monitoring Plan: University of Washington – Bothell, Cascadia Community College Co-located Campus. Prepared for the State of Washington Higher Education Coordinating Board. June 28, 1996.

L.C. Lee & Associates, Inc. 1998. Addendum to the Final Mitigation and Monitoring Plan: University of Washington – Bothell, Cascadia Community College Co-located Campus. Prepared for the State of Washington Higher Education Coordinating Board. May1998.

ATTACHMENT A

Resume – Douglas Partridge

ARCADIS

Education

MS, Plant Ecology, University of Michigan, 2000

BA, Biology and Philosophy, Kenyon College, 1997

Years of Experience

With ARCADIS Since 2004

Professional Registrations

Ecological Society of America - Certified Ecologist

Society of Wetland Scientists - Professional Wetland Scientist

Douglas Partridge, MS, PWS, CE

Principal Ecologist

Mr. Partridge has over 15 years of professional experience focused on ecosystem restoration and large-scale land reclamation projects through revegetation. His project experiences have spanned the United States for a wide range of clients related to the energy sector, mining, utilities, oil and gas, private institutions, and local and state governments. Most recently his project experiences have focused on regulatory site closures under voluntary actions, the Resource Conservation and Recovery Act (RCRA), or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Areas of expertise include revegetation designs for wetland and floodplain restoration projects as well as large scale land reclamation projects, constructed wetland and phytoremediation designs, environmental compliance focused on permitting, special status species surveys and conservation plans, wetland delineations, construction oversight, and adaptive management strategies for noxious weeds. Mr. Partridge frequently begins a project during the initial design stages, and throughout the life of a project managed implementation of pilot studies, restoration design, regulatory compliance and permitting, large scale construction implementation, and monitoring and adaptive management.

Selected Experience

Remediation Projects

Picatinny Arsenal Associated with Landfill Cap

U.S. Army, Rockaway, New Jersey

Preparation of mitigation plan and associated permitting in support of landfill cap to close burning grounds within Picatinny Arsenal. Worked with client to locate suitable mitigation location within Arsenal, and prepare a plan to enhance 12 acres of existing wetlands. Oversaw all restoration implementation.

Mt. Erie Pipeline Release Project

Confidential Client, Mt. Erie, Illinois

Preparation of forested wetland restoration design and associated permits associated with Natural Resource Damages activities associated with an oil pipeline release. Provided senior ecological support throughout the Natural Resource Damages consultation process, and oversight of restoration. Restoration included 21 acres of onsite impacts and adjacent agricultural fields, in addition to 3 acres of bioremediation within emergent wetland habitat.

Conceptual Restoration Design for Swan Pond Embayments
Tennessee Valley Authority (TVA) Fly Ash Response. Kingston, Tennessee
Preparation of a conceptual restoration design report to assist with a response to an ash dike failure at TVA's Kingston Fossil Plant in Roane County, Tennessee. Specifically, the restoration plan provided an evaluation of site concepts for restoration of the Swan Pond Embayment and associated riparian habitat that was filled with ash following the dike failure.

Lower Neches Estuarine Marsh Complex and Coastal Wet Prairie Restoration Project
Confidential Client, Lower Neches Wildlife Management Area. Orange County, Texas
Ecological support of Natural Resource Damages project involving the restoration of 115 acres of estuarine wetland habitat in the Chenier Plain of the Texas Gulf Coast on Texas Parks & Wildlife Department property. Project included restoration of mounds, terraces, and mudflat habitats through the beneficial re-use of historic and fresh dredge materials.

Restoration Design for Constructed Wetlands Associated with Landfill Cap
Confidential Client, Port Arthur, Texas
Ecological support of Natural Resource Damages project involving the creation of over 100 acres of estuarine and freshwater wetland habitat over a constructed landfill cap. Project specifically targets the restoration of Mottled duck (*Anas fulvigula*) habitat in the Chenier Plain of the Texas Gulf Coast.

Wetland Evaluation for Treatment of Mine Leachate
Confidential Client. Saskatchewan, Canada.
Preparation of an evaluation for using wetlands to treat leachate anticipated to be collected as a result of a future diamond mine. The evaluation reviewed six constituents of concern that were expected to exceed federal and/or state water quality standards. The evaluation included modeling of loading for the identified heavy metals of concern, and calculation of treatment areas required for the mine life.

Constructed Treatment Wetlands Design and Construction
State of Kentucky Division of Waste Management and Finance and Administration
Preparation of design for a four-cell, one acre constructed treatment wetland to treat leachate generated by the Winchester Municipal Utilities/Clark County Landfills near Lexington, Kentucky. This wetland treatment system was designed to reduce suspended solids (TSS) and nitrogen concentrations through sorption, biotransformation, plant uptake process and denitrification so that the effluent achieves NPDES stream discharge standards.

Constructed Wetland Conceptual Design

Confidential Client, Ravensdale, Washington

Preparation of a constructed wetland conceptual design report to assist with managing leachate seeps on an existing mining property. The leachate was highly alkaline with elevated metals (including arsenic, lead, and potassium) and associated high total dissolved solids and conductivity.

Evaluation of Tree Preservation Measures for Soil Remediation within Protected Root Zones of Trees. Confidential Client. Middleport, New York

Evaluation of tree preservation measures that might be employed in the course of remediation of potential constituents of concern (primarily arsenic) in soil located within the protected root zones of trees found within affected residential neighborhoods in Middleport, New York. The report was developed as part of an effort to maintain the environmental character of affected neighborhoods. Conclusions are to be considered during development of a final remedial action work plan.

Soil Amendment Pilot Study

Confidential Client. Hurley, New Mexico.

Preparation of design work plan and monitoring of a soil amendment pilot study designed to evaluate possible remediation options to address elevated copper concentrations and depressed pH in surface soils near a copper mining facility. The study is testing longevity of pH stabilization (after lime amendments), copper sequestration ability, vegetative re-colonization, and constructability.

Remediation Cap Restoration

Confidential Client, Caribou-Targhee National Forest, Idaho

Evaluation of suitable borrow soils to support remedial cap at old phosphate mine location in southeastern Idaho. Subsequently assisted with restoration plan for re-vegetation of cap.

Manufactured Gas Plant Remediation

Confidential Client, Lakewood and Cape May, New Jersey

Ecological support relative to planning and permitting associated with remediation of former manufactured gas plant facilities in Lakewood Township and Cape May, New Jersey. Permitting included the preparation of restoration plan for impacts to wetlands and riparian woodlands.

<u>**Restoration Projects**</u>

Wetland Mitigation Project

Confidential Client, Rockaway Township, New Jersey

Completed environmental planning and permitting associated with landfill cap across approximately 6 acres, immediately proximate to a New Jersey Category 1 waters. Mitigation plan approved that adequately compensated for impacts to both freshwater wetlands, flood hazard areas, and riparian zones. Restoration included 12 acres of freshwater wetlands and associated floodplain habitats.

Riverine Steep Bank Restoration

Confidential Client, Milford, New Jersey

Completion of all planning and permitting associated with failed bank within a remedial site in western New Jersey. Restoration of steep bank included bio-engineering techniques, and mosaic of native plant communities. Managed implementation of restoration, and currently in monitoring and adaptive management phase.

Forested Wetland Restoration

Confidential Client, Bordentown, New Jersey

Completed planning and permitting associated with remedial excavation at former industrial site in southern New Jersey. Restoration included approximately 1 acre of forested and scrub-shrub wetland restoration. Currently managing all monitoring and adaptive management.

Wetland Mitigation Project

CN Rail, Lansing, Michigan

Assumed management of wetland mitigation project in central Michigan after initial design was determined to be inadequate to meeting State of Michigan requirements. Re-designed and implemented mitigation project to increase wetland area across approximate 5 acre site. Wetland area determined to significantly increase, and meet state requirements. Manage monitoring and adaptive management of site.

North Creek Riparian Ecosystem Restoration Project

University of Washington, Bothell/Cascadia Community College, Bothell, Washington

Environmental planning and permitting, construction supervision, oversight of native plant nursery, and adaptive management and compliance monitoring for 58-acre stream and floodplain ecosystem restoration project. First project in Pacific Northwest which was permitted using a functional assessment approach. Work included permitting associated with four salmonid species. Subsequently, assisted client with application of “excess” mitigation credits using a functional assessment approach to future projects occurring on the campus property.

Newskah Creek Riparian Ecosystem Restoration Project

Washington Department of Corrections, Aberdeen, Washington

Long-term management and compliance monitoring of 10-acre tidally-influenced stream ecosystem restoration project adjacent to Grays Harbor. Newskah Creek is a salmonid producing stream, primarily supporting Chinook (*Oncorhynchus tshawytscha*) and Coho (*O. kisutch*) salmon. Project was permitted and subsequently monitored based upon the application of the HGM functional assessment to riverine wetlands.

Calera and San Pedro Creeks Flood Control, Restoration, and Fish Habitat Projects
City of Pacifica, California
Environmental planning and permitting, grant procurement, restoration design, endangered species issues including fish passage, construction observation, and compliance monitoring for multiple projects along both Calera and San Pedro Creek in the City of Pacifica. Endangered species included the California red legged frog, San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), and Central California Coast Steelhead (*Oncorhunchus mykiss*). Project was permitted based upon the application of the HGM functional assessment to riverine wetlands.

Biological Species and Habitat Survey and Restoration Plan
Confidential Client, Casmalia, California
Preparation of a Biological Species and Habitat Report intended to synthesize results of previously conducted field surveys focused on determining the presence or absence of 39 known or potentially occurring sensitive species within or proximate to the site. Work culminated in the restoration design of wetland habitat to support the California red-legged frog (*Rana aurora draytonii*).

Raritan River Natural Resource Restoration Project
Confidential Client, Kin Buc Landfill. Edison, New Jersey
Compliance monitoring and adaptive management of a wetland and upland restoration project along the Raritan River in Edison, New Jersey. Restoration project included 30 acre tidal wetland restoration, 4 acre freshwater wetland enhancement, and 60 acre upland habitat enhancement.

<u>Site Planning</u>

Waters/Wetlands Delineation
Former Hercules Kenvil Works Facility. Kenvil, New Jersey
Completed comprehensive habitat mapping, as well as delineation of waters/wetlands across the 1,200 facility. Currently assist with planning and permitting relative to both site remediation and re-development. Current work includes stream restoration project, as well as formal consultation associated with bog turtle.

Waters/Wetlands Delineation and Regulatory Assistance
Former Hercules Facility, Louisiana, Missouri
Assisted with planning and permitting associated with closure of ash ponds immediately proximate to the Mississippi River. Assisted planning stages, and prepared environmental permits associated with finalized closure plan. Included both waters/wetlands delineation, as well as formal consultation and Phase 1 surveys associated with Indiana Bat.

Waters/Wetland Delineation and Regulatory Assistance
Confidential Client, Windham, Vermont

Assist with all planning and permitting associated with former talc mine in southern Vermont. Work has included full waters/wetlands delineation, management of beaver abatement program, and permitting associated with demolition and any remedial activities.

Waters/Wetlands Delineation and Site Wide Planning

Confidential Client, Carteret, New Jersey

Delineate waters/wetlands on 104 acre property, and assist client with site wide planning and permitting.

Waters/Wetlands Delineation

San Diego Gas and Electric Company, Southern California

Delineation of the geographic extent of waters of the U.S., including wetlands, as well as California waters of the state along the proposed Sunrise Powerlink^{SM} (SRPL) project area. The entire project traversed approximately 170 miles between the El Centro area of Imperial County and northwestern San Diego County. As part of the project, ARCADIS evaluated the impacts to waters/wetlands that were expected to result from the construction and operation of the proposed project.

Waters/Wetlands Delineation and Rare Plant Surveys

Confidential Client, San Jose, California

Work included delineation of waters of the U.S., including wetlands, as well as California waters of the state over approximately 3,500 acres of the site to assist site planning and permitting associated with remediation as well as site redevelopment. Conducted surveys for rare plant species across 5,000 acres of the site. Site surveys occur across a range of plant communities including chaparral, scrub-shrub, serpentine grasslands, exotic grasslands, and riparian and oak woodland.

Waters/Wetlands Delineation and Stormwater Management Planning

California Department of Parks and Recreation, Sacramento, California

Delineate waters/wetlands over approximately 1000 acres, and preparation of planning documents to control sediment and erosion control as well as stormwater within an off-road vehicle park.

Development of Sarah Simonds Green Wetland Conservatory

University of Washington, Bothell, Washington.

Completed all environmental permitting associated with development of the Sarah Simonds Green Wetland Conservatory. Responsibilities included preparation of wetland mitigation plan, and endangered species compliance.

Waters/Wetlands Delineation and Biological Assessment
San Francisco Public Utilities Commission, San Francisco, California
Delineate waters/wetlands, and prepare biological assessment to assist with planning and permitting associated with a new treated water reservoir development project.

Rare Plant Survey and Monitoring
Napa County Flood Control and Water Conservation District, Napa County, California
Conducted rare plant survey in the lower Napa River ecosystem for the Napa River/Napa Creek flood control project.

Suisun Thistle Survey
Solano County Water Agency, Solano County, California
Conducted survey for the federally endangered Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*) in the upper Suisun Marsh of Rush Ranch.

Wetland Functional Assessments

HGM Guidebook Development
California Regional Water Quality Control Board (RWQCB), California
Development of the Guidebook to Hydrogeomorphic Functional Assessment of Riverine Waters/Wetlands in the Santa Margarita Watershed. Project completed in cooperation with USEPA Region IX, the California Coastal Conservancy, and the California RWQCB.

HGM Guidebook Development
Santa Barbara County Water Agency, Santa Barbara County, California
Development and training of the Draft Guidebook for Referenced Based Assessment of the Functions of Riverine Waters/Wetlands Ecosystems in the South Coast Region. Project completed in cooperation with Santa Barbara Water Agency and U.S. Environmental Protection Agency (USEPA) Region IX.

Selected Publications

Partridge, D., S. Mondziel, G. Markiewicz and J. Olsen. Restoration of a Gulf of Mexico Coastal Salt Marsh Ecosystem Through Beneficial Use of Dredge Sediments: Successes, Challenges and Lessons Learned from Four Years of Monitoring and Adaptive Management. Presented at the 2012 National Society of Wetland Scientist Conference, Orlando, Florida.

Partridge, D., J.K. Shisler and C. Tuttle. 2011. Restoration of a Tidal Salt Marsh along the Raritan River Using Intensive Adaptive Management. Presented at the National Conference for Ecological Restoration, July, Baltimore, Maryland.

Partridge, D. 2010. Restoration of a Pacific Northwest Stream Ecosystem in an Urban Environment: Successes, Challenges and Lessons Learned from Seven Years of Monitoring and Adaptive Management. Poster presented at Society of Wetland Scientist Conference, June, Salt Lake City, Utah.

Peggy L. Fiedler, Megan Keever, Brenda J. Grewell, and Douglas J. Partridge. 2007. Rare Plants in the Golden Gate Estuary (California): The Relationship between Scale and Understanding. Australian Journal of Botany.

Partridge, D., and L. C. Lee. 2005. Application of the hydrogeomorphic approach to restoration, monitoring, and adaptive management to the lower North Creek ecosystem, Bothell, Washington. Presentation at Association of State Wetland Managers conference on Integrated Restoration of Riverine Wetlands, Streams, Riparian Areas, and Floodplains in Watershed Context. Amherst, Massachusetts. November 2005.

Partridge, D., P.L. Fiedler, and M. Keever. 2003. "Monitoring of a Metapopulation, Lilaeopsis masonii, in the Lower Napa River Ecosystem." Poster presented at the State of the Estuary Conference, September.

Keever, M., P.L. Fiedler, and D. Partridge. 2003. "Geographic Distribution and Population Parameters of the Endangered Suisun Thistle (Cirsium hydrophilum var. hydrophilum) at Rush Ranch." Poster presented at the State of the Estuary Conference, September.

Partridge, D. 2001. "Remote Functional Assessment Protocol for Riverine Ecosystems in the South Coast Region of Santa Barbara County, California." Presentation at the Society of Wetland Scientists, May, Chicago, Illinois.

ATTACHMENT B

Exhibit D of the Final Mitigation and Monitoring Plan

LEGEND
IMPACTED BY CONSTRUCTION
IMPACTED BY RESTORATION
SCALE: 1"=100'
WETLAND A
WETLAND L
WETLAND 11
WETLAND 12
WETLAND 13
WETLAND 14
WETLAND 15
WETLAND 16
WETLAND 17
WETLAND 18
WETLAND 19
WETLAND J
CONSULTANT TEAM
NBBJ
Peter Walker William Johnson & Partners
L.C. Lee & Associates
OTAK
Weinstein Copeland Architects
Geoengineers
Aquatic Resource Consultants
Robert Bernstein, Inc./David Kline & Assoc.
L.C. LEE & ASSOCIATES, INC.
University of Washington - Bothell and Cascadia Community College
COLLOCATED CAMPUS AT THE TRULY FARM SITE
Designed by LCL
Drawn by MJB/RE
Checked by LCL
Date SEPTEMBER 15, 1995
SCALE 1"=100'
Exhibit D
Impacts to Waters/ Wetlands from Proposed Campus and Wetland Mitgation
U.S. Army Corps of Engineers Permit 95-4-01737

ATTACHMENT C

February 2014 Site Photographs

Photograph 1. Looking to west through Wetland 14.

Photograph 2. Looking southwest.

Figure 3. Looking east.

Figure 4. Looking south.

ATTACHMENT D

Wetland Functional Assessment Summary Tables

Table 1. Riverine Waters/Wetlands Functions Addressed by the North Creek Restoration Project

Functional Group	Function	Definition
Hydrology	Dynamic surface water storage	Capacity of a wetland to detain water from overbank flow for a short duration when flow is out of the channel.
	Long term surface water storage	Capacity of a wetland to temporarily store (detain) surface water for long durations; associated with standing water not moving over the surface.
	Energy dissipation	Allocation of the energy of water to other forms as it moves through, into, or out of the wetland as a result of roughness associated with large woody debris,
	Subsurface water storage	Availability of water storage beneath the wetland surface. Storage capacity becomes available as periodic draw down of water table or reduction in soil
	Moderation of groundwater flow and	Capacity of a wetland to moderate the rate of groundwater flow or discharge from upgradient sources.
Biogeochemistry	Nutrient cycling	Abiotic and biotic processes that convert nutrients and other elements from valence to another; primarily recycling processes.
	Removal of elements and compounds	Removal of imported nutrients, contaminants, and other elements and compounds.
	Retention of particulates	Deposition and retention of inorganic and organic particulates (>0.45 μm) from the water column, primarily through physical processes.
	Organic carbon export	Export of dissolved and particulate organic carbon from a wetland. Mechanisms include leaching, flushing, displacement, and erosion.
Plant Community	Plant community	Species composition and physical characteristics of living plant biomass.
	Detrital biomass	Production, accumulation, and dispersal of dead plant biomass of all sizes.
Faunal Support/Habitat	Spatial structure and habitat	Capacity of a wetland to support animal populations and guilds by providing heterogeneous habitats.
	Interspersion and connectivity of habitat	Capacity of a wetland to permit aquatic organisms to enter and leave the wetland via permanent or ephemeral surface channels, overbank flow, or unconfined
	Distribution and abundance of	Capacity of a wetland to maintain characteristic density and spatial distribution of aquatic, semi-aquatic, and terrestrial invertebrates.
	Distribution and abundance of	Capacity of a wetland to maintain characteristic density and spatial distribution of aquatic, semi-aquatic, and terrestrial vertebrates.

Table 2. Summary of Variable, Reference Standards, Data, Score, and Rationale

Variable	Variable Name	Reference Standard	1996 Pre-Project Score	2005 Post Project (Year 3) Score	Data/Scaling Rationale (2005)	2011 Post Project Score	Data/Scaling Rationale (2011)
V_{BEAV}	Beaver Abundance	Surrogate measure (e.g., recent aerial photos, presence of active and abandoned lodges and dams, cut and chewed plants, scat, trails) similar to reference standard.	0.5	1.0	Active beaver dam construction in main North Creek Channel	1.0	Continued active beaver activity throughout the main and secondary channels.
V_{BIRD}	Distribution and Abundance of Resident and Migratory Birds	Presence of great horned owls, dippers, pileated woodpeckers, belted kingfishers, wrens, marsh hawks, eagles, etc.	0.5	0.5	Presence of Bald eagles, Kingfishers, Red-tail hawks, Osprey, etc. Absence of other bird species more representative of a structurally mature/complex riverine ecosystem.	0.5	Limited additional data available. Similar species as noted in 2006 continue to be observed throughout the site.
V_{BTREE}	Tree Basal Area	Greater than or equal to 100 ft^2/acre	0.1	0.5	Average tree basal area was 20ft^2/acre (n=15)	0.5	No additional data available. Tree cover and basal area continue to increase throughout the restoration site. Conservatively assumed that current condition was less than 100 ft2/acre. No decrease from 2006 condition has occurred, consistent with 2009 Monitoring Report and on site observations.
V_{NATIVE}	Species Composition for Tree, Shrub, and Ground Cover Strata	Greater than or equal to 75%	0.0	0.5	Average percent native individuals was 69%.	1.0	2009 Monitoring Report data demonstrated >75% of identified species were native in 50 sample locations.
V_{CONTIG}	Contiguous Vegetation Cover	Recent aerial photographs during leaf season show abundant vegetation and vegetated corridors connecting mosaics of habitat types similar to reference standard conditions	0.1	0.1	See Appendix D	0.1	Conditions off property are consistent with 2006 results.
V_{CWD}	Coarse Woody Debris	Average diameter = 3.5 in. Average length = 4 ft. Average CWD cover = 15%	0.1	0.5	Average diameter = 12 in. Average length = 20 ft Average CWD cover = <1%	0.5	Limited additional data available. Beaver activity has increased throughout the site, and helps facilitate CWD inputs to floodplain. Also flooding brings additional inputs. Conservatively assumed 2006 condition without additional data.
V_{DURAT}	Duration of Overbank Flow	Average duration of connection between channel and floodplain = 2 days	0.1	1.0	Observed evidence of flow and persistent water on the floodplain for greater than 1 day.	1.0	Continued duration of connection between channel and floodplain equal or great than 2 days.
V_{FISH}	Distribution and abundance of resident and migratory fish	On-site evidence of salmonids and cutthroat	1.0	1.0	On-site evidence of salmonids and cutthroat.	1.0	On-site evidence of salmonids and cutthroat.

Table 2. Summary of Variable, Reference Standards, Data, Score, and Rationale

Variable	Variable Name	Reference Standard	1996 Pre-Project Score	2005 Post Project (Year 3) Score	Data/Scaling Rationale (2005)	2011 Post Project Score	Data/Scaling Rationale (2011)
V_{FWD}	Fine Woody Debris	Cover greater than 50%	0.1	1.0	An average percent litter cover of 64%.	1.0	Litter data fluctuates with flood frequency and durations. But continued inputs observed throughout restoration site, and developing O horizon.
V_{FREQ}	Frequency of overbank flow	Frequency of overbank flooding event = return period 1.2 years AND/OR Presence of stratified O horizon/C horizon	0.5	1.0	Direct and indirect observation of floodplain engagement during flow levels that exceed the design bankfull flow.	1.0	Direct and indirect observation of floodplain engagement during flow levels that exceed the design bankfull flow.
V_{GAPS}	Gaps in forest	Average gap cover 15% of assessment site.	0.0	0.0	No gaps in tree canopy observed.	0.5	Gaps in forest have developed throughout the floodplain as a result of beaver activities and felled trees by other natural events (i.e., weather, flooding). Conservatively assumed a condition slightly less than reference standard conditions.
V_{HERB}	Herbaceous plant cover	*Forest community:* Less than or equal to 20% *Scrub-shrub community: Less than* or equal to 20% *Emergent community:* Greater than or equal to 85%	0.5	0.5	The average herbaceous was 89% (n=50). Specific to community types, average herbaceous cover in palustrine forest, palustrine scrub-shrub, and emergent wetland communities was 88%, 87%, and 88% respectively.	0.5	While the herbaceous cover continues to decrease in forest and scrub shrub communities, it has likely not hit the reference standard condition.
V_{HERP}	Distribution and abundance of Herptiles	Presence of Pacific salamanders and Pacific spotted frogs	0.5	0.5	Absence of both species identified in reference standard condition, but more common herptiles (e.g., Pacific treefrog, Red-legged frogs, Garter snakes) widespread and abundant across site.	0.5	Limited data. Both species identified in reference standard condition have not been identified. Similar observations to 2006 condition.
V_{INUND}	Average depth of inundation	Average flood depth 0.5 ft	0.5	1.0	Direct and indirect evidence of depth of flow on the floodplain during flows that exceed the design bankfull flow.	1.0	Direct and indirect evidence of depth of flow on the floodplain during flows that exceed the design bankfull flow.
V_{DECOMP}	Logs in several stages of decomposition	Greater than or equal to 3 decomposition classes	0.5	0.1	Average of one decomposition class.	0.5	Conservatively assumed equal to 2 decomposition classes throughout the restoration site. Significant CWD throughout the site in various states of decomposition.
V_{MACRO}	Macrotopographic Relief	Average surface of floodplain in: Backwater sloughs = 7% Secondary channels = 17% Off-channel ponds = 3%.	0.0	0.5	Percentages of site: Primary channel = 6% Secondary channel = 2% Backwater Slough = <1% Off Channel Ponds =18%	0.5	Consistent with 2006 conditions.
V_{MAMM}	Distribution and abundance of permanent and seasonally resident mammals	Presence of black bear, otters, beaver, mountain beaver, deer, etc.	0.5	0.5	Absence of bears and cougars. Presence of deer, coyote, beaver, and otter.	0.5	Consistent with 2006 conditions.

Table 2. Summary of Variable, Reference Standards, Data, Score, and Rationale

Variable	Variable Name	Reference Standard	1996 Pre-Project Score	2005 Post Project (Year 3) Score	Data/Scaling Rationale (2005)	2011 Post Project Score	Data/Scaling Rationale (2011)
V_{MICRO}	Microtopographic Complexity	Average microtopographic relief = 1 ft.	0.1	1.0	Average depth of microtopographic variation on the floodplain = 1.0 ft +/- 25%.	1.0	Based upon 2009 Monitoring Report, conditions consistent with 2006.
V_{ORGAN}	Organic matter in wetland	Organic material in upper profile (12 inches) 4% Average woody debris cover 30% Average litter depth 1 inch Average litter cover 65%	0.1	0.5	The average percent litter cover across the 50 vegetation plots in 2005 was 64%. This is an insignificant decrease from 66% in 2004, but significantly higher than 26% in 2003. We anticipate a further increase of litter detritus over the 10-year monitoring interval.	0.5	Conservatively assumed conditions consistent with 2006 due to limited data. However, the depth of the O horizon continues to develop throughout the site. Litter cover fluctuates based upon flood frequency and duration.
V_{PATCH}	Vegetation patchiness	Average of three plant communities within 100 feet of the centerline of the North Creek channel.	0.1	1.0	Average of 6 plant communities along 200-ft transect centered on the channel.	1.0	Conditions consistent with 2006.
V_{PORE}	Soil Pore Space	Average depth to perching layer and/or abrupt textural change = 12 inches Texture range = fine sand to silty sand	1.0	1.0	Texture ranges fall within reference standard conditions	1.0	Conditions consistent with 2006.
V_{REDVEL}	Reduction in flow velocity	Presence of stratified 0 horizon/C horizon AND/OR Presence of directionally oriented "stacked" wrack covering 15% of wetland	0.0	0.5	"Stacked" wrack observed on floodplain covering less than 5% of wetland.	0.5	Conditions consistent with 2006; stacked wrack does not cover 15% of wetland.
V_{REGEN}	Presence of seedling/saplings	Not provided.	0.0	0.5	Average density of seedlings/saplings was 1,150 stems/acre. Patchy recruitment across restoration site.	1.0	Recruitment of native species increasing throughout the restoration site. Diversity increased since 2006 based upon this continued recruitment throughout the site.
V_{SEDIM}	Retained sediments	Presence of stratified o horizon/C horizons AND/OR Presence of layered silts and sands AND/OR Presence of sediment accretion behind wrack or woody debris.	0.1	0.5	Silt or sediment layering at 25 to 75% of reference standard.	1.0	Sediment accretion behind wrack or woody debris.
V_{SHRUB}	Shrub density or canopy coverage	*Forest community:* Greater than or equal to 20% and less than 75% *Scrub-shrub community:* Greater than or equal to 85% *Emergent community:* 0%	0.1	0.5	Average shrub canopy cover was 45% (n=50). Specific to community types, average shrub canopy cover in forest, scrub-shrub, and emergent wetland communities was 27%, 62%, and 17% respectively.	0.5	Conditions consistent with 2006
V_{SNAGS}	Basal area of standing dead trees (Snags)	Greater than or equal to 20 ft^2/acre	0.0	0.0	Average basal area of snags equal to 0 ft^2/acre.	0.5	Conditions consistent with 2006.

Table 2. Summary of Variable, Reference Standards, Data, Score, and Rationale

Variable	Variable Name	Reference Standard	1996 Pre-Project Score	2005 Post Project (Year 3) Score	Data/Scaling Rationale (2005)	2011 Post Project Score	Data/Scaling Rationale (2011)
V_{SORPT}	Sorptive properties of soils		0.5	0.5	Low chroma and gley in matrix. Accumulation of organic matter	0.5	Conditions consistent with 2006.
V_{STRATA}	Number and attributes of vertical strata of vegetation	Greater than or equal to 3 vegetative strata	0.1	0.5	Average of two vegetative strata.	0.5	2009 Monitoring Results demonstrate an average of 2 vegetative strata.
V_{SUBIN}	Subsurface flow into wetland	Evidence of hyporheic flow – local piezometric surface above wetland surface or upwelling channel gravels AND/OR Evidence of riparian transport/return flow – surface seepage at toeslope to alluvium transition.	0.1	1.0	Local piezometric surface above wetland surface in wet season.	1.0	Conditions consistent with 2006.
V_{SUBOUT}	Subsurface flow from wetland to aquifer or baseflow	Sandy soils without underlying impeding layer OR Permeable underlying stratigraphy	1.0	1.0	Restoration activities did not impact overall soil stratigraphy.	1.0	Conditions consistent with 2006.
$V_{SURFCON}$	Surface hydraulic connections	Presence of secondary channels AND/OR Frequency of overbank flooding event = Return Interval 1.2 years	0.0	1.0	Secondary channel present.	1.0	Conditions consistent with 2006.
V_{SURWAT}	Surface Water Presence	Observed presence of surface water for 7 days or longer AND/OR Presence of microtopographic lows containing hydric soils and hydrophytic vegetation	0.0	1.0	Direct observation of ponded water on the floodplain for more than 7 days in microtopographic lows.	1.0	Conditions consistent with 2006.
V_{TREE}	Tree density or canopy coverage	*Forest community:* Greater than or equal to 55% *Scrub-shrub community*: Greater than or equal to 40% and less than 75% *Emergent community:* 0%	0.1	0.5	Average tree canopy cover was 47% (n=50). Average canopy cover within sample plots located in forest communities (n= 28) was 47%, in scrub-shrub communities (n=17) was 9%, and in emergent wetland (n=5) was 19%.	1.0	2009 Monitoring Results demonstrate meeting reference standard conditions.
V_{WTF}	Fluctuation of Water Table	Water table fluctuates rapidly between at least 30 cm depth to soil surface	1.0	1.0	Water table fluctuates to a depth of at least 30 inches to above the soil surface.	1.0	Conditions consistent with 2006.

Table 3. Summary of HGM Functional Assessment for the UWB/CCC North Creek Ecosystem Restoration Project

Function	Function Definition	Pre-Project (1996) Condition	Year 3 (2005) Condition	Change In Functional Index (2005)	Year 9 (2011) Condition	Overall Change In Functional Index (2011)
Hydrology						
Dynamic surface water storage	Capacity of a wetland to detain water from overbank flow for a short duration when flow is out of the channel.	0.3	0.8	+0.5	0.9	+0.6
Long term surface water storage	Capacity of a wetland to temporarily store (detain) surface water for long durations; associated with standing water not moving over the surface.	0.0	0.8	+0.8	0.8	+0.8
Energy dissipation	Allocation of the energy of water to other forms as it moves through, into, or out of the wetland as a result of roughness associated with large woody debris, vegetation structure, micro- and macro-topography, and other obstructions.	0.0	0.7	+0.7	0.7	+0.7
Subsurface water storage	Availability of water storage beneath the wetland surface. Storage capacity becomes available as periodic draw down of water table or reduction in soil saturation occurs.	1.0	1.0	0.0	1.0	0.0
Moderation of groundwater flow and discharge	Capacity of a wetland to moderate the rate of groundwater flow or discharge from upgradient sources.	0.6	1.0	+0.4	1.0	+0.4

Table 3. Summary of HGM Functional Assessment for the UWB/CCC North Creek Ecosystem Restoration Project

Function	Function Definition	Pre-Project (1996) Condition	Year 3 (2005) Condition	Change In Functional Index (2005)	Year 9 (2011) Condition	Overall Change In Functional Index (2011)
Biogeochemistry						
Nutrient cycling	Abiotic and biotic processes that convert nutrients and other elements from valence to	0.1	0.5	+0.4	0.7	+0.6
Removal of elements and	Removal of imported nutrients, contaminants, and other elements and compounds.	0.2	0.8	+0.6	0.8	+0.6
Retention of particulates	Deposition and retention of inorganic and organic particulates (>0.45 µm) from the water	0.2	0.8	+0.6	0.8	+0.6
Organic carbon export	Export of dissolved and particulate organic carbon from a wetland. Mechanisms include	0.1	0.6	+0.5	0.6	+0.5
Plant Community						
Plant community	Species composition and physical characteristics of living plant biomass.	0.1	0.5	+0.4	0.9	+0.8
Detrital biomass	Production, accumulation, and dispersal of dead plant biomass of all sizes.	0.1	0.1	0.0	0.5	+0.4
Faunal Support/Habitat						
Spatial structure and habitat	Capacity of a wetland to support animal populations and guilds by providing heterogeneous habitats.	0.1	0.4	+0.3	0.6	+0.5

Table 3. Summary of HGM Functional Assessment for the UWB/CCC North Creek Ecosystem Restoration Project

Function	Function Definition	Pre-Project (1996) Condition	Year 3 (2005) Condition	Change In Functional Index (2005)	Year 9 (2011) Condition	Overall Change In Functional Index (2011)
Interspersion and connectivity of habitat	Capacity of a wetland to permit aquatic organisms to enter and leave the wetland via permanent or ephemeral surface channels, overbank flow, or unconfined hyporheic gravel aquifers.	0.2	0.8	+0.6	0.8	+0.6
Distribution and abundance of invertebrates	Capacity of a wetland to maintain characteristic density and spatial distribution of aquatic, semi-aquatic, and terrestrial invertebrates.	0.2	0.8	+0.6	0.8	+0.6
Distribution and abundance of vertebrates	Capacity of a wetland to maintain characteristic density and spatial distribution of aquatic, semi-aquatic, and terrestrial vertebrates.	0.6	0.7	+0.1	0.7	+0.1

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ENVIRONMENT

Subject:
University of Washington / Cascadia College – Development Reserve Parcel

Date:
February 24, 2016

Contact:
Douglas Partridge

Phone:
206.484.2743

Email:
Doug.Partridge@
arcadis.com

Our ref:
B0023350.

Dear Ms. Karaman,

This letter report has been prepared by Arcadis U.S., Inc. (Arcadis) at the request of the University of Washington Bothell and Cascadia College (UWB/CC) in support of planning and permitting associated with potential jurisdictional wetlands which may occur within the campus Planned Unit Development (PUD) boundary. More specifically, this letter report discusses potential jurisdictional wetlands along the southern boundary of the Development Reserve Parcel. Please note that a discussion of regulated wetland areas in the northern portion of the Development Reserve Parcel is done under separate cover in a letter dated April 13, 2015. To support this letter report, a Development Reserve Parcel map included as Figure 1.

This report is necessary because previous permitting associated with campus development under the Phase 1 PUD mitigated for impacts to jurisdictional waters and wetlands throughout the campus property based upon an anticipated build out scenario (Attachment 1). Wetland areas previously mapped within and immediately proximate to the Development Reserve Parcel were accounted for in site-wide mitigation planning; however, some were never filled at the time of initial campus development (Arcadis 2015). While wetlands were not historically mapped along this southern property boundary of the Development Reserve Parcel, neighboring property owners have recently voiced concerns over the extent of ponding observed along this property boundary.

The objectives of this letter report are as follows:

- Provide historical site background information as it pertains to waters and wetlands as regulated by federal, state, and City of Bothell regulations.
- Describe site conditions and preliminary data collection from field work performed during week of February 1, 2016.
- Provide a regulatory framework as it pertains to waters and wetlands on the Development Reserve Parcel.
- Outline recommended action items.

Regulatory Background

Federal, state, and City of Bothell environmental permits associated with unavoidable impacts to waters and wetlands on the campus property were supported by the *Final Mitigation and Monitoring Plan* (L.C. Lee & Associates [LCLA] 1996) and the *Addendum to the Final Mitigation and Monitoring Plan* (LCLA 1998). The former represented a plan based upon the 75% design level, and the latter based upon the 100% design. The final accounting for impacts to waters and wetlands as a result of campus construction was 6.1 acres (LCLA 1998). To compensate for these impacts, the project restored 31.3 acres of waters and wetlands, enhanced 19 acres of waters and wetlands, and restored 2.4 acres of transitional uplands (ARCADIS 2011). Included in this project is the re-construction of approximately 4,000 feet of valuable salmonid stream habitat.

Exhibit D of the *Final Mitigation and Monitoring Plan*, included as Attachment 1, illustrates the waters and wetlands to be impacted during Phase 1 PUD, and differentiates between impacts as a result of construction (i.e., campus development) or “restoration.” Please note that consistent with current day terminology within the field of restoration science, this latter group would be identified as those wetland areas to be “enhanced” as a result of the proposed project and are reflected as such in the restored or enhanced area estimates provided above.

Two wetland areas occur on or immediately adjacent to the Development Reserve Parcel. Wetland 14 occurs in the northern portion of the parcel, and is addressed separately in the letter report dated April 13, 2015. Wetland 19 is a small (i.e., 201 square feet [sf]) wetland located immediately southeast, and downgradient, from the southeastern corner of the Development Reserve Parcel. This wetland feature appears to represent a fragmented drainage feature that historically connected to Wetlands 92 and 93. Its location appears to be approximately within the footprint of 110th Avenue NE; and thus was impacted during initial campus development.

Site Background

During the week of February 1st, 2016, Arcadis Principal Ecologist, Douglas Partridge, visited the site to review existing site conditions as well as to meet with pertinent parties that could provide more site background relative to historical conditions and land uses. Specifically, Mr. Partridge met with Jeff Truly, currently on UWB/CC Facilities staff, who lived on the property prior to purchase by the State of

Washington; as well he met with Nico Vanderhorst of OTAK who was been part of the campus engineering team since initial campus development.

While no wetlands were originally mapped along the southern boundary of this parcel, a site drainage feature was constructed which pre-dates the purchase of this parcel by the State of Washington (as per communications with Jeff Truly). Specifically, a linear, man-made ditch was historically constructed along the property boundary and which still exists today. Site photographs are included as Attachment 2. Mr. Truly noted that the Development Reserve Parcel was historically well drained, but that the ditch was constructed to manage water that historically ponded immediately south of the property line and on the City of Bothell property.

A review of the original campus design drawings show a planned road side swale (or ditch) which should run parallel to 110th Avenue NE and immediately to the east and southeast of the Development Reserve Parcel (Attachment 3). A swale with a minimum 2 percent slope was intended to convey surface and shallow surface water to a 24" inch culvert that runs below 110th Avenue NE. Based upon communication with Mr. Vanderhorst, the swale was intended to capture surface water draining from areas north of 110th Avenue NE and prevent any backwatering or impoundment of water that could occur as a result of road construction.

Site Observations

Mr. Partridge observed that the stormwater swale running parallel to, and west of, 110th Avenue NE was no longer functioning and had been filled with sediment as well as an accumulation, and subsequent decomposition of, organic matter. Site photographs of the culvert and areas immediately proximate to it are included as Attachment 2. At the time of the site survey, the culvert was only draining less than 1 inch depth of water that appeared to be primarily captured shallow subsurface water. Observations of staining and/or rack accumulation within and proximate to the culvert did not demonstrate signs of the culvert capturing larger flows than which were observed during the site visit.

As a result of this unmaintained swale that was no longer functioning, significant water was observed to be impounded west of 110th Avenue NE and extending to the western most property boundary. The central portion of this impounded area was the historic, man-made ditch that was observed to have stagnant water with depths ranging from 6 to 16 inches. The extent of ponding at the time of the site visit was far greater than had been previously observed in this portion of the property based upon historic site knowledge of Arcadis, OTAK, and Jeff Truly. A map of surface water ponding as observed during the week of February 2016 site visit is included as Figure 1. These water levels appear to have been exaggerated for potentially at least one year as a result of the un-maintained drainage system and subsequent water impoundment.

Regulatory Framework

The historic ditch that has existed in this portion of the property was not included of the original waters and wetlands site-wide delineation, as performed by L.C. Lee & Associates, Inc. The potential explanation for its exclusion is the feature is an isolated, man-made ditch. Areas to the south within the Development Reserve Parcel never likely met the definition of a regulated wetland. This is confirmed by Mr. Truly's knowledge that these areas were well drained and the man-made ditch effectively conveyed water down-slope. The extent of ponding as observed during the site visit was clearly exaggerated due to long-term impoundment of water in this portion of the property.

The observed feature would not likely be currently regulated under Section 404 and 401 of the Clean Water Act as it is an isolated feature with no hydrologic connection to a "navigable waters". However, portions of the waters/wetlands complex may currently be regulated as a critical area (i.e., wetland) under the City of Bothell Municipal Code (BMC; Section 14.04 Critical Areas Regulation). The man-made ditch is potentially an artificial watercourse as defined by BMC. However, areas proximate to this ditch both north and south potentially now meet the definition of a wetland as defined by U.S. Army Corps of Engineers' *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (2010).

A number of preliminary sampling plots were established along five transects which extended from the southern property line (i.e., fence-line) into the Development Reserve Parcel and ending at the existing silt fence along the southern boundary of existing lay-down pad. Hydrophytic vegetation parameters were observed in the majority of sample plots along this portion of the property. However it is recognized that significant clearing of Himalayan blackberry (*Rubus armeniacus*), a facultative upland species[1], has occurred in recent past. In addition, restoration plantings with a number of wetland tree and shrub species (i.e., dogwoods, willows) has also occurred in this area. Wetland hydrology indicators were observed; but it is recognized that water has been impounded for a minimum of one year. Finally, hydric soils were observed in certain locations (i.e., depleted below dark surface) immediately proximate to the man-made ditch. However, soil plots were difficult to effectively characterize due to the extent of ponding at the time of the site survey. The soils didn't maintain structural integrity in deeper, more saturated portions of the soil plots; and Mr. Partridge recognized that redox concentrations may be difficult to see under these conditions without significant drying of the soils. A formal wetland line was not established at the time of the survey due to the difficult site conditions. It is recommended that repairs are made to the original drainage swales/ditches along 110th NE Avenue, and then the site revisited later this spring to re-evaluate the soil borings and more effectively delineate any potential regulatory boundary.

Finally, the waters/wetlands complex was evaluated based upon protocols of the Washington State Wetland Rating System for Western Washington (revised October 2014), Department of Ecology publication #0406029. The applicable data sheets are included as Attachment 4. The complex was scored as a Category IV wetland, which is has the lowest level of wetland functioning. These are

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[1] Facultative upland is defined as "usually occur in non-wetlands (estimated probability 67% – 99%), but occasionally found in wetlands (estimated probability 1% – 33%)."

wetlands “that should be able to be replaced, and in some cases be able to be improved”. The standard buffer width associated with a Category IV wetland is 50 feet, and a minimum width of 37.5 feet. The later minimum width may only be sought in combination with extensive wetland and buffer enhancements as provided for within Bothell Municipal Code (BMC) 14.04.540 (C)(3) and (F)(2)(a).

Recommended Action Items

The following action items are recommended in chronological order based upon site observations and subsequent discussions with UWB/CC staff.

1. Restore functioning to the designed drainage swale which runs parallel to, and west of 110th Avenue NE. These repairs should be covered under an exempt activity as defined at BMC 14.04.120, and specifically the operation, maintenance, or repair. Specifically, the code states, “Operation, maintenance, or repair of existing structures, infrastructure improvements, utilities, public or private roads, dikes, levees, or drainage systems, that do not require construction permits, if the activity does not further alter or increase the impact to, or encroach further within, the critical area or buffer and there is no increased risk to life or property as a result of the proposed operation, maintenance, or repair.” The applicability of the intended repairs as an exempt activity under BMC could be coordinated with City of Bothell staff.

   It should be stressed that repair is necessary to prevent future impacts to the UWB/CC campus property and/or adjacent land owners from to the water impoundment. Based upon site observations, repairs to the drainage swale will **not** (1) increase the impact to the critical areas; (2) expand further into the critical area or associated buffer; or (3) directly impact an endangered or threatened species.

   Arcadis recommends that OTAK is brought into the discussion for best path forward to ensure that the repairs are made consistent with the original construction drawings and any necessary sediment and erosion control.

2. Upon returning the site conditions to pre-existing conditions through repairs to the drainage swale, it is recommended that Arcadis re-visit the site to more formally delineate any potential wetland regulatory boundary. Arcadis will look to incorporate a professional soil scientist in this site visit.

3. Currently planning activities can conservatively measure the wetland buffer from the mapped extent of water at the time of survey (Figure 1). This boundary will be further refined based upon results of a spring site visit; however it provides a conservative measure to further evaluate site development planning.

If there are any questions, comments or concerns regarding the letter, please do not hesitate to contact me at 203.489.3008 or doug.partridge@arcadis-us.com.

Sincerely,

Arcadis U.S., Inc.

Douglas Partridge, PWS
Principal Ecologist

Copies:
Anthony Guerrero, UWB
Christine Lavelle, UWB
Amy Van Dyke, UWB
Chad Weiser, OTAK
Nico Vanderhorst, OTAK

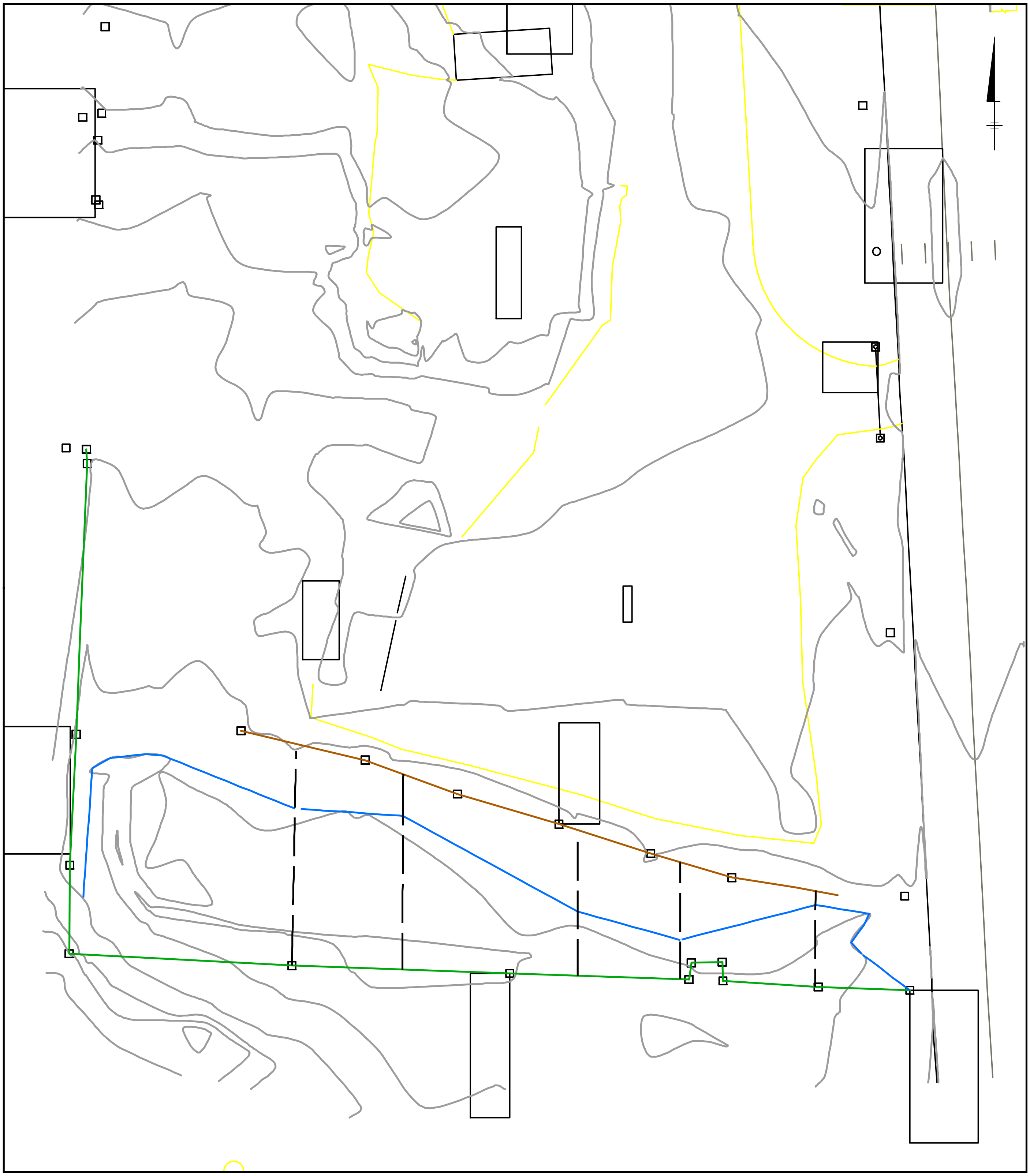
Enclosures:

Figures

1 Development Reserve Parcel Map

Attachments

1 Historic Wetland Map
2 Site Photographs
3 Historic Engineering Site Design Figure
4 Wetland Rating Data Sheet



Legend

- 2016 Field Transects
- Approximate Water Line Feb 2016
- Silt Fence
- Existing Fence Line
- Contours

UNIVERSITY OF WASHINGTON BOTHELL
CASCADIA COLLEGE
BOTHELL, WASHINGTON

DEVELOPMENT RESERVE PARCEL

SITE MAP - 2016 FIELD EFFORT

ARCADIS

FIGURE
1

ATTACHMENT 1

Historic Wetland Map

Exhibit D

Impacts to Waters/ Wetlands from Proposed Campus and Wetland Mitgation

U.S. Army Corps of Engineers Permit 95-4-01737

ATTACHMENT 2

Site Photographs

Project Photolog

University of Washington, Bothell and
Cascadia College – Development
Reserve Parcel

Photo: 1

Date:
2016

Description:
Man-made ditch along southern property boundary of Development Reserve Parcel

Photo: 2

Date:
2016

Description:
Man-made ditch along southern property boundary of Development Reserve Parcel

Project Photolog

University of Washington, Bothell and
Cascadia College – Development
Reserve Parcel

Photo: 3

Date:
2016

Description:
Un-maintained drainage swale to 24” culvert. Proximate to 110 Avenue NE. Note no water is flowing to culvert.

Photo: 4

Date:
2016

Description:
Impounded water upstream of 24” culvert. Photo taken looking towards culvert. Water is not allowed to flow to culvert due to sediment and debris accumulation.

Project Photolog

University of Washington, Bothell and
Cascadia College – Development
Reserve Parcel

Photo: 5

Date:
20146

Description:
24” culvert below 110th Avenue NE. Note limited lack of staining in culvert, as well as minimal amount of debris accumulation.

Photo: 6

Date:
2015

Description:
North

Location:
Un-maintained swale with now water flowing to 24” culvert.

Project Photolog

University of Washington, Bothell and
Cascadia College – Development
Reserve Parcel

Photo: 7

Date:
2016

Description:
Water ponding, due to impoundment downstream, to north of man-made ditch.

Photo: 8

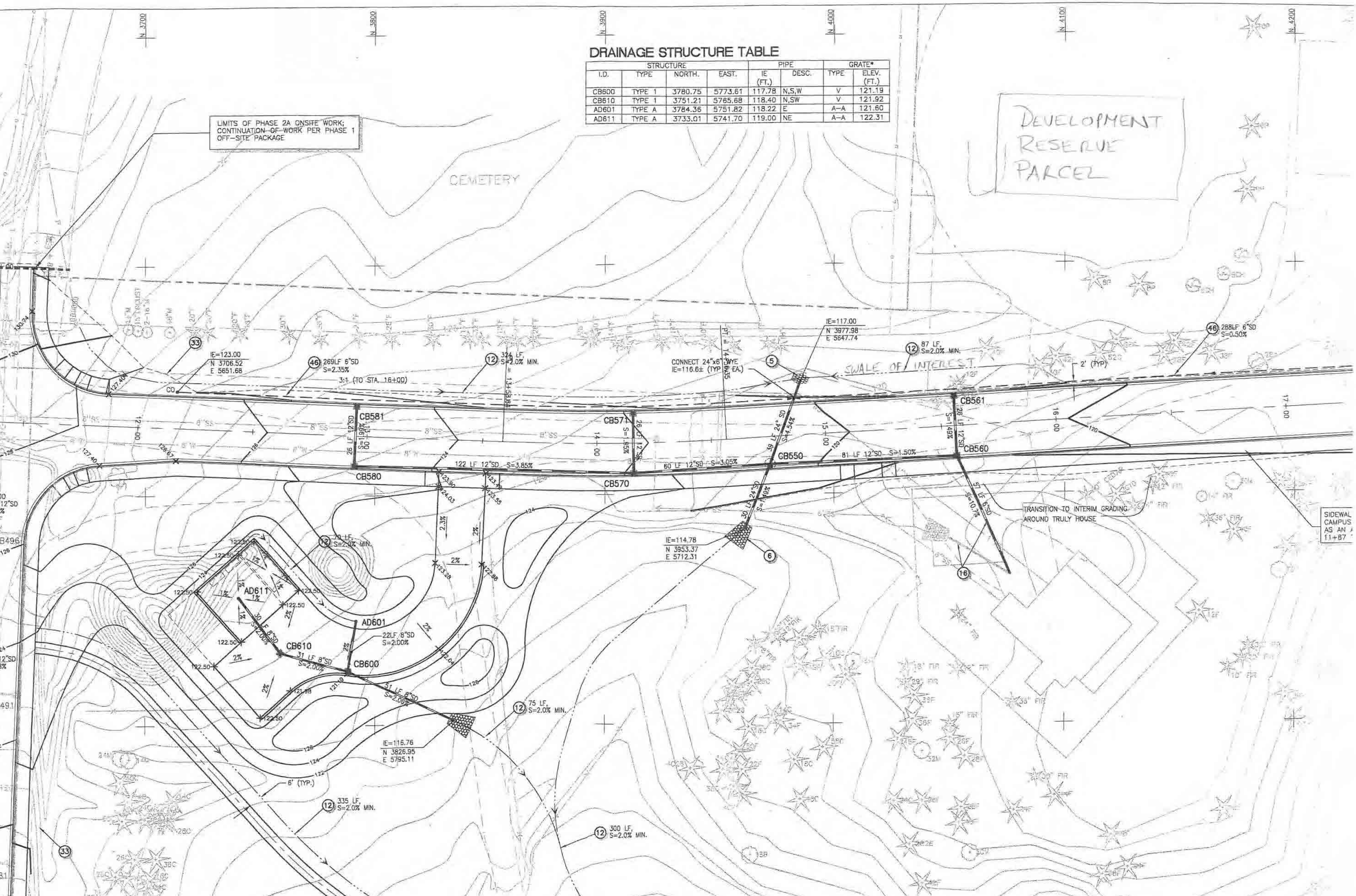
Date:
2016

Description:
Ponded water along western property boundary of Development Reserve Parcel.

ATTACHMENT 3

Historic Engineering Site Design Figure

MAY 1999



DRAINAGE STRUCTURE TABLE

STRUCTURE				PIPE		GRATE*	
I.D.	TYPE	NORTH.	EAST.	IE (FT.)	DESC.	TYPE	ELEV. (FT.)
CB600	TYPE 1	3780.75	5773.61	117.78	N,S,W	V	121.19
CB610	TYPE 1	3751.21	5765.68	118.40	N,SW	V	121.92
AD601	TYPE A	3784.36	5751.82	118.22	E	A–A	121.60
AD611	TYPE A	3733.01	5741.70	119.00	NE	A–A	122.31

ATTACHMENT 4

Wetland Rating Data Sheet

RATING SUMMARY – Western Washington

Name of wetland (or ID #): UWB/CC DEVELOPMENT RESERVE Date of site visit: FEB 3, 2016

Rated by DOUGLAS PARTRIDGE, PWS Trained by Ecology?__ Yes X No Date of training______

HGM Class used for rating DEPRESSION Wetland has multiple HGM classes? X Y ____N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.
Source of base aerial photo/map GOOGLE EARTH

OVERALL WETLAND CATEGORY IV (based on functions___ or special characteristics___)

1. Category of wetland based on FUNCTIONS

_______**Category I** – Total score = 23 - 27

_______**Category II** – Total score = 20 - 22

_______**Category III** – Total score = 16 - 19

14 **Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
Circle the appropriate ratings				
Site Potential	H (M) L	H M (L)	H (M) L	
Landscape Potential	H (M) L	H (M) L	H M (L)	
Value	H (M) L	H M (L)	H M (L)	**TOTAL**
Score Based on Ratings	6	4	4	14

Score for each function based on three ratings
(order of ratings is not important)

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	

DEPRESSIONAL AND FLATS WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	2
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions).* Yes = 4 No = 0	0
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > $^{1}/_{10}$ of area points = 1 Wetland has persistent, ungrazed plants < $^{1}/_{10}$ of area points = 0	5
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0 Scored based upon anticipated/historic condition.	0
Total for D 1 Add the points in the boxes above	7

Rating of Site Potential If score is:___**12-16 = H** _X_**6-11 = M** ___**0-5 = L** *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	0
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 No = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source________________ Yes = 1 No = 0	0
Total for D 2 Add the points in the boxes above	1

Rating of Landscape Potential If score is:___**3 or 4 = H** _X_**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	1
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 No = 0	0
Total for D 3 Add the points in the boxes above	1

Rating of Value If score is:___**2-4 = H** _X_**1 = M** ___**0 = L** *Record the rating on the first page*

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?	
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outletpoints = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0	2
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 The wetland is a "headwater" wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) points = 0	3
D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of the unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire wetland is in the Flats class points = 5	0
Total for D 4 Add the points in the boxes above	5

Rating of Site Potential If score is:___**12-16 = H** ___**6-11 = M** _X_**0-5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?	
D 5.1. Does the wetland receive stormwater discharges? Yes = 1 No = 0	0
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0	1
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0	1
Total for D 5 Add the points in the boxes above	2

Rating of Landscape Potential If score is:___**3 = H** _X_**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?	
D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): • Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 • Surface flooding problems are in a sub-basin farther down-gradient. points = 1 Flooding from groundwater is an issue in the sub-basin. points = 1 The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* _____________ points = 0 There are no problems with flooding downstream of the wetland. points = 0	0
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for D 6 Add the points in the boxes above	0

Rating of Value If score is:___**2-4 = H** ___**1 = M** _X_**0 = L** *Record the rating on the first page*

*Conservatively assumed based upon location of road and lay down pad.

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

____Aquatic bed — 4 structures or more: points = 4
____Emergent — 3 structures: points = 2
_X_Scrub-shrub (areas where shrubs have > 30% cover) — 2 structures: points = 1
_X_Forested (areas where trees have > 30% cover) — 1 structure: points = 0

If the unit has a Forested class, check if:

_X_The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

2

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

____Permanently flooded or inundated — 4 or more types present: points = 3
_X_Seasonally flooded or inundated — 3 types present: points = 2
____Occasionally flooded or inundated — 2 types present: points = 1
_X_Saturated only — 1 type present: points = 0
____Permanently flowing stream or river in, or adjacent to, the wetland
____Seasonally flowing stream in, or adjacent to, the wetland
____**Lake Fringe wetland** — **2 points**
____**Freshwater tidal wetland** — **2 points**

1

H 1.3. Richness of plant species

Count the number of plant species in the wetland that cover at least 10 ft^2.

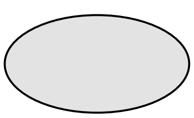
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted: > 19 species — points = 2
5 - 19 species — points = 1
< 5 species — points = 0

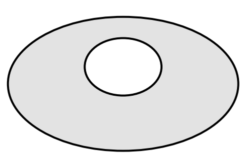
1

H 1.4. Interspersion of habitats

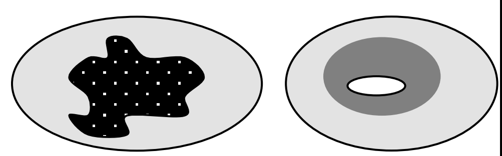
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points

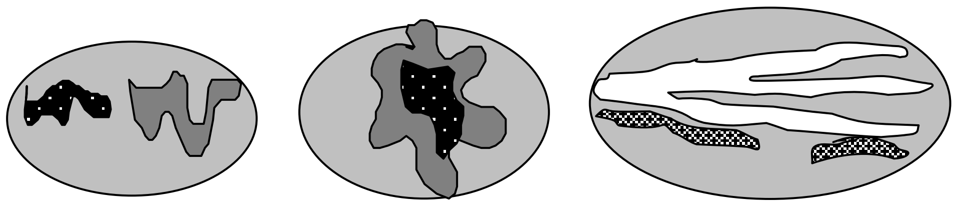


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **HIGH** = 3points



2

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* _X__Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). _X__Standing snags (dbh > 4 in) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* ____At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* _X__Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	3
Total for H 1 — Add the points in the boxes above	9

Rating of Site Potential If score is:___**15-18 = H** _X_**7-14 = M** ___**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _______% If total accessible habitat is: > $^{1}/_{3}$ (33.3%) of 1 km Polygon — points = 3 20-33% of 1 km Polygon — points = 2 10-19% of 1 km Polygon — points = 1 < 10% of 1 km Polygon — points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _______% Undisturbed habitat > 50% of Polygon — points = 3 Undisturbed habitat 10-50% and in 1-3 patches — points = 2 Undisturbed habitat 10-50% and > 3 patches — points = 1 Undisturbed habitat < 10% of 1 km Polygon — points = 0	0
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use — points = (- 2) ≤ 50% of 1 km Polygon is high intensity — points = 0	-2
Total for H 2 — Add the points in the boxes above	-2

Rating of Landscape Potential If score is:___**4-6 = H** ___**1-3 = M** _X_**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: — points = 2 — It has 3 or more priority habitats within 100 m (see next page) — It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) — It is mapped as a location for an individual WDFW priority species — It is a Wetland of High Conservation Value as determined by the Department of Natural Resources — It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m — points = 1 Site does not meet any of the criteria above — points = 0	0

Rating of Value If score is:___**2 = H** ___**1 = M** _X_**0 = L** *Record the rating on the first page*

APPENDIX E

Noise Technical Memorandum

ENVIRONMENT
& HEALTH

July 24, 2017

MEMORANDUM

To:	Rich Schipanski, EA Engineering	Project No:	2941789A
CC:	Julie Blakeslee, UW		
From:	Kevin Warner Lanka DeSilva	Project Name:	UW Bothell/CC Master Plan Supplemental Noise Assessment

Subject: UW Bothell and Cascadia College Campus Supplemental Noise Assessment

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The following memorandum summarizes a noise assessment prepared at your request to supplement a noise study prepared for the Draft Environmental Impact Statement (DEIS) for the *2017 Campus Master Plan* for the University of Washington Bothell (UW Bothell) and Cascadia College (CC) (UW Bothell & CC, or the "Project"). The following assessment was prepared by Ramboll Environ US Corporation (Ramboll Environ) and addresses concerns raised by existing off-site residences regarding potential for increased noise emissions from potential on-site sources of noise, including a proposed parking garage and traffic along on-site roadways. The assessment includes a brief project description overview, a summary of DEIS comments, reference to relevant terms, criteria, and assessment details provided in the Project's DEIS Noise Section, results of ambient noise monitoring at the Project, and results of assessment results.

Summary of Assessment Results

The Project would include construction of a new parking garage in Area C (under most Project alternatives), as well increased traffic along 110th Ave NE (an on-site roadway). Both the Area C garage and 110th Ave NE are located within the vicinity of existing off-site residential properties to the west of the Project. Residents within this nearby community have raised concern of increased noise emissions from on-site activity, including from the proposed parking garage and on-site roadways. The following assessment was completed to analyze the potential for noise impact from these sources, and whether noise mitigation is warranted. The assessment reviewed the worst-case (and unlikely) scenario relative to average hourly and afternoon peak-hour traffic. The analysis found that, regardless of Project alternative, noise emissions from operation of the nearest parking garage (located in Area C), and from traffic along the nearest on-site roadway (110th Ave NE), would not exceed applicable noise limits established in the Bothell Municipal Code (BMC), and would not exceed criteria employed by the US FTA for evaluation of noise impact from operation of transit-related sources, include parking garages and roadways. Noise mitigation is not required at this time to shield these receivers from potential noise impact, but may be considered to reduce the potential for exposure to audible noise emissions.

BACKGROUND

The University of Washington Bothell (UW Bothell) and Cascadia College (CC) propose the *2017 Campus Master Plan* in order to meet anticipated campus growth over the next 20 years. As indicated in Chapter 2 of the DEIS, UW Bothell and CC require a net increase of up to approximately 848,300 gross square feet (gsf), including new academic space and approximately 255,800 gsf of new housing spaces, intended to meet campus goals and anticipated demand for building space, as identified for the Project's 20-year planning horizon.

A noise assessment was requested to be included as a supplement to the Section 3.5, *Environmental Health*, for the Project's Final EIS. Specifically, the supplemental noise assessment was requested to provide response to public comments following issuance of the DEIS.

The requested supplemental noise assessment is not intended to replace the Noise section within Section 3.5; for a discussion of noise terminology, regulations, and the existing environment on campus and the surrounding areas, refer to Section 3.5 of the DEIS.

COMMON NOISE DESCRIPTORS

Noise generally is defined as unwanted sound, and the terms "noise" and "sound" are used interchangeably in this memorandum. The human ear responds to a very wide range of sound intensities. The decibel (dB) scale used to describe sound is a logarithmic rating system capable of assessing large differences in audible sound intensities. This scale accounts for the human perception of a doubling of loudness as an increase of 10 dB. For example, a person would perceive a 70-dB sound level to be about twice as loud as a 60-dB sound level.

People generally cannot detect sound level differences (increases or decreases) of 1 dB in a given noise source. Differences of 2 dB or 3 dB can be detected under ideal laboratory situations, although they are often difficult to discern in an active, outdoor noise environment. A 5-dB change in a given noise source or environment would likely be perceived by most people under normal listening conditions.

On the logarithmic decibel scale used to describe noise, a doubling of sound-generating activity (i.e., a doubling of the sound energy) causes a 3-dB increase in average sound produced by that source, not a doubling of the loudness of the sound (which requires a 10-dB increase). For example, if an exhaust stack is causing a 50 dB sound level at some nearby location, two similar exhaust stacks would cause the sound level at this same location to increase to 53 dB.

When addressing the effects of noise on people, it is useful to consider the frequency response of the human ear. Sound-measuring instruments are therefore often programmed to "weight" measured sounds based on the way people hear. The frequency-weighting most often used is A-weighting because it approximates the frequency response of human hearing and is highly correlated to the effects of noise on people. Measurements from instruments using this system are reported in "A-weighted decibels" or dBA. Sound levels in this evaluation are reported in A-weighted decibels, unless otherwise specified.

Sound waves from discrete events or stationary "point" sources, such as a stationary blower motor, spread as a sphere, and sound levels from such sources decrease 6 dBA per doubling of the distance from the source. Relatively long, multi-source "line" sources, such as roads with continuous traffic, emit cylindrical sound waves. Due to the cylindrical spreading of these sound waves, sound levels from such sources decrease with each doubling of distance from the source at a rate of about 3 dBA. Conversely, moving half the distance closer to a source increases sound levels by 6 dBA and 3 dBA for point and line sources, respectively.

In addition to distance from the source, the frequency of the sound, the absorbency of the intervening ground, the presence or absence of intervening obstructions (e.g., buildings), and the duration of the noise-producing event all affect the transmission and perception of noise. The degree of the effect on perception also depends on who is listening (individual physiological and psychological factors) and on existing sound levels (background noise). Visual barriers, such as small stands of trees or shrubs, or low-density fences (e.g., cedar board fences) often do little by way of noise mitigation, especially at mid-range and low-range frequencies, but may be beneficial by removing visual cues of the potentially offensive noise(s), and creating the perception of an abated noise source.

NOISE REGULATIONS

City of Bothell

Noise criteria established by the City of Bothell are applicable to this analysis. These criteria include maximum permissible sound level limits that have been adopted from the Washington Administrative Code (WAC) Chatper173-60, as summarized in DEIS Table 3.5-2.

Further to DEIS summary of WAC limits, the "maximum permissible" environmental noise levels may be exceeded for short periods by a total of not more than 15 minutes in any one-hour period. The allowed short-term increases follow: up to 5 dBA for no more than 15 minutes in any hour, or up to 10 dBA for no more than 5 minutes of any hour, or up to 15 dBA for no more than 1.5 minutes of any hour. These allowed short-term increases can be described in terms of noise metrics that represent the percentage of time certain levels are exceeded. For example, the hourly L_{25} metric represents the sound level that is exceeded 25 percent of the time or 15 minutes in an hour. Similarly, the $L_{8.3}$ and $L_{2.5}$ are the sound levels exceeded 5 and 1.5

minutes in an hour, respectively. The maximum permissible levels are not to be exceeded by more than 15 dBA at any time, and this limit is represented by the L_{max} noise metric.

Federal Transit Authority

The US Federal Transit Administration (FTA) describes its noise impact criteria for transit projects in the manual entitled *Transit Noise and Vibration Impact Assessment*.[1] These criteria commonly apply to rail projects, fixed facilities such as transit stations, maintenance facilities, park-and-ride lots, parking garages, and buses in bus-only highway lanes. Although not directly applicable to the Project, the FTA noise impact criteria provide a convenient and useful method to determine noise emissions from parking garages, as well as area roadways. The FTA impact criteria are based on well-established methods to evaluate the potential for community response and annoyance, relative to the existing background sound levels. These criteria were applied to this assessment to determine whether noise from Project's parking garages and roadways have the potential to result in perceived noise impact at the nearest off-site residential areas.

FTA impact criteria are based on the land use category of the receiving properties (**Table 1**). Criteria for lands with uses confined primarily to daytime activities (e.g. schools, churches, etc.) are based on the hourly equivalent sound level, or L_{eq} of the noisiest hour of transit-related activity, especially during periods of increased sensitivity to noise.[2] In contrast, FTA criteria apply the day-night sound level, or L_{dn}, at residential uses and other locations used for habitation/sleep (e.g. hospitals and hotels) because of the potential for sleep disturbance.[3]

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1 Transit Noise and Vibration Impact Assessment. Federal Transit Administration. May 2006.

2 The L_{eq} is a noise metric that represents the level of a constant sound that contains the same sound energy as the actual fluctuating sound over the same time period. As such, the Leq can be considered on energy-average sound level.

3 The L_{dn} is similar to a 24-hour L_{eq}, except that the metric includes an additional 10 dBA penalty that is applied to sound levels in each hour between 10PM and 7AM to account for possible sleep disturbance.

Table 1. Land Use Categories and Metrics for Transit Noise Impact Criteria

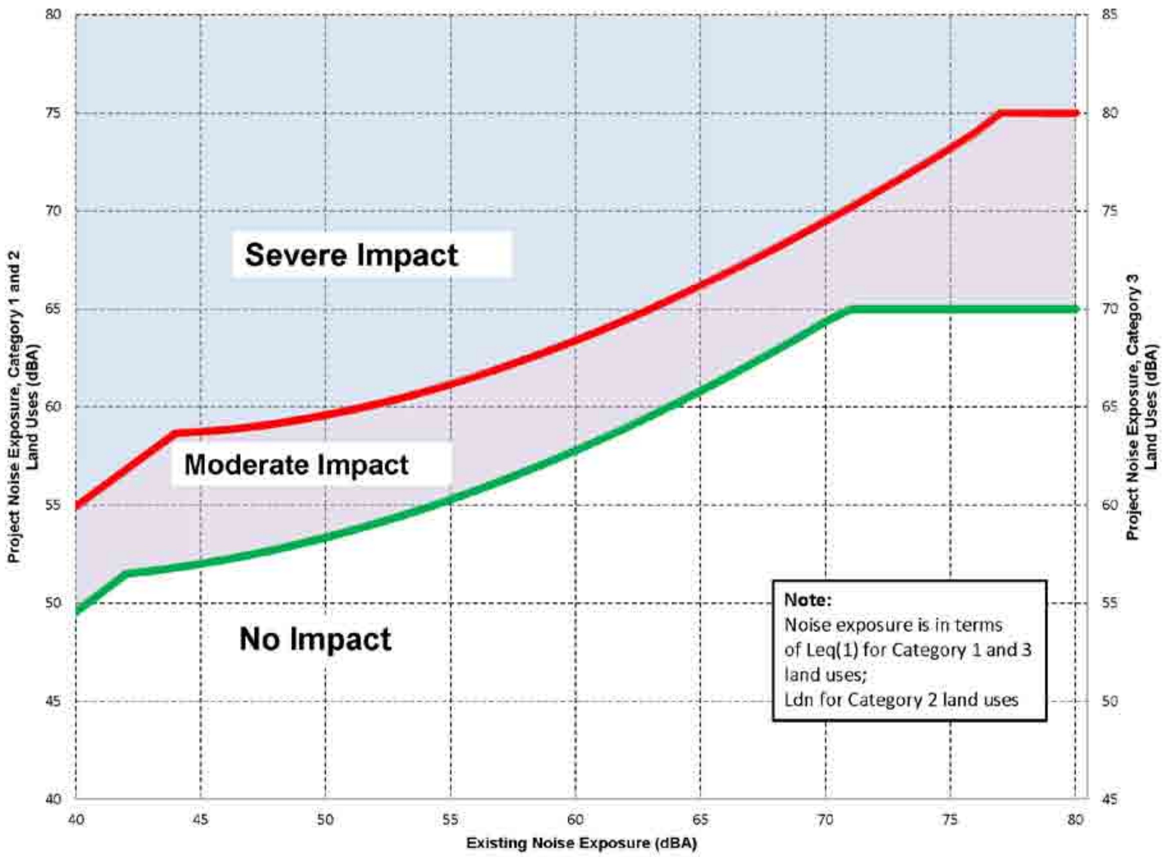
Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor Leq(1)[(a)]	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
2	Outdoor Ldn	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels, where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor Leq(1)[(a)]	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches, where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

[(a)] Leq for the noisiest hour of transit-related activity during hours of noise sensitivity.

Source: FTA, 2006

The FTA noise impact criteria apply a sliding scale of impact levels for project-related noise based on the existing sound levels (see **Figure 1**). Based on these criteria, receiving locations with low existing sound levels can be exposed to greater increases in overall noise before an impact occurs. Conversely, locations with higher existing sound levels can be exposed to smaller increases in overall noise before an impact occurs. For example, residential locations with an existing sound level of Ldn 40 dBA would not be considered severely impacted unless a project would cause a 15-dBA increase in overall levels, while residential locations with an Ldn 60 dBA baseline would be considered severely impacted by less than a 5-dBA increase due to a project.

The FTA impact criteria are to be used only when considering exterior locations such as backyard patios, decks, pools, and play areas. When there are no exterior uses near a sensitive receiver, the impact criteria are applied near building doors and windows. FTA guidance assumes a typical building will provide an outdoor-to-indoor noise reduction of about 25 dBA, which may result in interior sound levels that do not warrant additional noise mitigation even if impacts are predicted at the exterior of the building (FTA 2006).



Source: Transit Noise and Vibration Impact Assessment
FTA, 2006, page 3-3 and Appendix A page A-5

Figure 1. FTA Noise Impact Criteria

EXISTING CONDITIONS

Existing conditions are described qualitatively in the DEIS under “Existing Noise Conditions”, including both “On-Campus” conditions and conditions in the “Surrounding Areas”. To facilitate the quantitative assessment warranted for this supplemental study, sound level measurements were taken in the Project vicinity. The following summarizes results of these measurements.

Both short-term and long-term measurements were taken in the Project vicinity to document existing sound levels in areas that may be affected or influenced by Project operation. A single long-term sound level measurement was made along the western boundary of the Project site, east of both NE 182nd Ct and NE 183rd Ct, immediately north of the existing maintenance yard. The measurement, made between May 31 and June 1, 2017, was representative of existing sound levels near the residences immediate west of this measurement location, at the eastern ends of both NE 182nd Ct and NE 183rd Ct. Observations during sound level meter setup and retrieval suggest that the primary sources of noise at this location included traffic on 110th Ave NE, and less dominant or intermittent sound sources included noise from UW Bothell staff at the nearby service yard, and distant traffic on SR-522 and I-405.

Short-term measurements were made on May 31, 2017 at three (3) locations (identified as ST-1, ST-2, and ST-3). ST-1 was made at the northwest boundary of the UW campus at the intersection of NE 185th St and 108th Ave NE. The sound level meter was about 70 feet to the south of Beardslee Blvd. The measurement was representative of residential dwellings near Beardslee Blvd, especially within the vicinity of the Project area, south of this road. Traffic on Beardslee Blvd and NE 185th ST was the major noise sources at this location. Other sources of noise included nearby pedestrian noises.

ST-2 was made approximately 100 feet north of the intersection of 110th Ave NE and NE 180th St. The measurement was representative of existing sound levels at this location on the campus, and near residences southwest of this location, south of NE 180th St/Valley View Rd. Noise sources include traffic along 110th Ave NE and NE 180th St, as well as parking lot noise and pedestrians.

ST-3 was made near the southern boundary of the campus, at southwest corner of the south parking lot. The measurement was representative of existing sound levels near the residential dwellings west of the measurement location, located above the elevation of Campus Way NE and SR-522, both located immediately south of ST-3. Noise sources included traffic on SR-522, noise from the adjacent parking area, and pedestrian noises.

Table 2 provides a summary of sound level data measured at the above locations, including short-term and long-term L_{eq}, and the 24-hour long-term L_{dn}.

Table 2. Measured Existing Sound Levels

Long-term Sound Level Measurements			
Location	**Time of Day** [(a)]	**Range of Existing Hourly Leq (dBA)**	**Existing Ldn (dBA)**
LT-1	Day	47 – 54	54
	Night	43 – 50	
Short-term Sound Level Measurements			
Location	**Measured Time and Date** [(a)]	**Leq**	**Lmax**
ST-1	10:36 AM - 10:56 AM 5/31/2017	63	80
ST-2	11:12 AM – 11:32 AM 5/31/2017	59	77
ST-3	12:08 PM – 12:28 PM 5/31/2017	57	67
[(a)] "Day" refers to the hours between 7AM and 10PM, "Night" to the hours between 10PM and 7AM.			

Sound level measurements were taken using a Brüel & Kjær model 2250 Class 1 sound level meter that had been factory certified within the previous 12 months, and was field calibrated immediately prior to use. The microphone of the meter was fitted with a wind screen, and for each measurement, was positioned at a typical listening height of 5 feet above the ground.

A graphical illustration of the sound level measurement locations is found in **Figure 2**.

TRANSIT NOISE ASSESSMENT

As part of the Project, the existing transit center, located on Campus Way NE south of NE 185th Street, will either remain at its current location or will be moved to a new location along either NE 185th Street or along Beardslee Blvd. Regardless of alternative, noise from operation of the transit center (i.e., noise from buses) is not anticipated to result in an acoustically-significant change in off-site sound levels, and is not anticipated to result in impacts relative to the BMC due to distance attenuation and intervening topography. Note that observations during existing noise measurements did not include noise from on-site transit operation.

Operational Stationary Sources (Non Traffic)

An assessment of noise from the stationary equipment that may located within the proposed parking garage in Area C. The assessment of these potential sources was completed to determine whether noise from stationary sources within the parking garage would comply with the applicable City of Bothell sound level limits, and whether these equipment could result in perceived noise impacts at the nearest residential receiving locations.

Typically there are a limited number of non-traffic sources of noise from parking garages, namely air-handling equipment (if applicable) and testing of emergency generators (if applicable). As of the date of this assessment, alternative configurations of the project layout are not designed to a level of detail that would allow for assessment of these equipment, however air-handling equipment are not anticipated as the parking garage are expected to be an open-wall design. Emergency generators, however, may be warranted, and these equipment can present major new noise sources if located near noise-sensitive areas. Therefore it is recommended that regardless of the Project alternative, that emergency generators be located on the sides of parking garages that are farthest from residential or noise-sensitive areas (including noise-sensitive on-site uses), and/or shielded from these areas by intervening buildings or barriers.

Emergency Generators

Use of emergency generators, when need for power emergencies, is exempt from the WAC noise limits, as adopted by the City of Bothell's Municipal Code (BMC) under chapter BMC 8.26.050, *Exemptions*. The adopted WAC reference under BMC 8.26.050 is WAC 173-60-050, and specifically regarding emergency use of backup generators is 173-60-050(f): "*Sounds created by emergency equipment and work necessary in the interests of law enforcement or for health safety or welfare of the community*".

During testing of emergency generators, generator noise is subject to the BMC's adopted WAC limits. Therefore, to ensure compliance with the BMC, the generator should be placed in a location that is shielded from noise-sensitive uses, either from intervening buildings or a designated noise barrier. Other means to mitigate generator noise can include acoustical-enclosures, typically offered by generator manufacturers when located near noise-sensitive uses, and limiting generator testing to daytime hours.

Operational Traffic Noise Assessment

Noise from on-site traffic during Project operation would be generated by both existing and future parking areas, including parking lots and garages, and by on-site roadways. The following assessment evaluates noise from both sources, as predicted at the nearest noise-sensitive receiving locations to the Project. The assessment of noise from operational traffic includes both compliance with the BMC sound level limits, as well as potential increase over existing ambient conditions, as evaluated using FTA methodology.

To estimate roadway and parking garage noise emissions from proposed Project roadways, vehicle traffic distribution data, as well as parking garage capacity data, as summarized for the DEIS, were analyzed in detail. Noise estimates were calculated for the proposed Project alternative that would result in the worst-case assessment of noise at the residential areas adjacent to the west of the Project. These residential areas include homes located at the east ends of the cul-de-sacs of NE 182nd Ct and NE 183rd Ct.

Parking garages are proposed in multiple locations (or areas, designated by a letter code), and vary depending on the project alternative. Under Project Alternatives 1, 3, and 4, parking garages are proposed in Areas A, C, and E. Under Project Alternative 2, parking garages are proposed in Areas A and E.

The Project alternative that would result in the highest volumes of traffic within the vicinity of nearby off-site residential areas is Alternative 1, specifically relative to vehicles that would access the proposed parking garage in Area C. Note that the parking garages proposed for Areas A and C would be approximately similar in parking capacity (estimated at 621 and 617 stalls, respectively), and would include more than are proposed for Area E (estimated at 406 stalls).

Traffic traveling along 110th Ave NE was evaluated, including vehicles that would access the parking garage in Area C, as well as those vehicles that would travel farther south and access parking areas in Area A. Alternatives 1, 2, and 4 would result in either similar or fewer vehicle volumes, or would include parking garages that are similarly situated in Area C, or farther from the nearby homes.

Therefore, the assessment of garage noise for Area C, as received at the nearest homes to west, would represent a worst-case assessment of garage noise within the Project.

<u>Parking Garage Traffic Volumes</u>

To calculate noise emission from future parking garages, Ramboll Environ reviewed traffic data that was generated for the Project, as well as anticipated parking garage capacities.

The nearest noise-sensitive (residential) areas to a proposed parking garage are the residential homes immediately west of Area C, at the east end of the cul-de-sacs of NE 182nd Ct and NE 183rd Ct. The nearest parking garage within Area C (for Alternatives 1, 3, and 4) could be as close as 50 feet from the property line of these residential areas. This residential area is represented by receptor R1, as illustrated in **Figure 3**.

On-site traffic distribution to parking garages, parking lots, and along Project roadways was not available. Therefore, hourly and daily traffic volume estimates for the parking garage at Area C were computed using the expected *total* Project traffic, including existing and new Project-related trips, and applying the relative percentage of Area C's parking garage to Project-wide parking. That is, the capacity of parking garage C was compared to overall future parking capacity, and this relative percentage (17%) was applied to overall UW Bothell/CC traffic (including existing and Project-related traffic) to determine an conservative and unlikely worst case estimate of traffic volumes that would access parking garage C.

Traffic volumes were determine for both the afternoon peak-hour period (because it is slightly higher than the morning peak-hour period, and thus a more worst-case scenario), and over an entire daytime period (15 hours, 7 a.m. to 10 p.m.).

Table 3 summarizes the above discussion of how traffic volumes were computed for the parking garage in Area C.

Table 3. Parking Garage Traffic Volume Summary

Scenario	Daily Average Volumes	Afternoon Peak-Hour Volumes(dBA)
Total Parking, All Garages	3,550	
Parking Capacity Garage at Lot C	617	
Percentage of Total Park at Lot C	17%	
Total Campus Traffic Volumes (existing + Project)	20,300	2,404
Traffic to Lot C, assuming same percentage of total traffic (i.e., 17%)	3,528	418
Total Hours During Time Period	15 (7 am – 10 pm)	1 (afternoon peak hour)
Average Volumes/hr (Lot C traffic ÷ time period)	235	418
[a] need to add		

Ramboll Environ notes that this approach computes a very conservative estimate of parking garage traffic volumes at Lot C. However, in lieu in Project-level details regarding anticipate hourly and daily parking garage traffic volumes, this approach provides traffic volume estimates that are useful for predicting unlikely worst-case assessments of compliance and potential increases over the existing noise environment.

On-Site Traffic Volumes

Noise from on-site roadways also was evaluated for potential impact at the nearest existing off-site residential areas (see R1 in **Figure 3**).

There are several on-site roadways that provide access to various locations within the campus, however the roadway nearest to R1 is 110th Ave NE, which runs north-south, approximately 215 feet east of the property line of the homes represented by R1. Under all project alternatives, this roadway would provide access to parking areas within Area A and Area C.

To calculate daily traffic on 110th Ave NE, the total capacity of parking in Area C (estimated at 617 parking stalls) and Area A (estimated at 621 parking stalls) were added together (estimated total of 1,238 parking stalls), and the percentage of these lots was computed relative to the total Project parking (35% of all Project parking). This percentage was applied to the total future Project traffic that would access UW Bothell/CC, as reported in the Project's traffic study. That is, 35% of 20,300 total daily trips, or 7,079 vehicles during daytime operating hours. Hourly average volumes were computed by dividing this total by the number of daytime hours (15), for an average of 472 vehicles per hour along 10th Ave NE.

To calculate afternoon *peak-hour* traffic volumes, the same approach as above was applied to the total Project peak-hour volumes reported in the Project's traffic study (2,404 total afternoon peak-hour volumes). The resulting peak-hour volumes along 110th Ave NE is 838 vehicles.

Note that above methods to compute average hourly and peak-hour traffic volumes along 110th Ave NE is considered highly conservative, resulting unlikely traffic scenarios that will result in unlikely conservative estimates of traffic noise received off-site at the nearest residential areas (R1).

Noise from Parking Garage and On-Site Traffic

To compute noise from the parking garage at Lot C and from the nearest on-site roadway to R1 (110th Ave NE), Ramboll Environ applied the US FTA "Noise Impact Assessment Spreadsheet", an noise calculation tool that allows for estimates of noise from parking garages and roadways based on factors such as hourly and daily traffic volumes, travel speeds, and distances from the noise-receiving location.

The daily average and peak-hour traffic data, as summarized above and in **Table 3**, was input into the FTA tool to determine afternoon peak hour sound levels (L_{eq}), and the average day-night sound level (L_{dn}) from parking garages and 110th Ave NE.

BMC Compliance Assessment

The total predicted peak-hour L_{eq} was compared with the applicable sound level limits for a commercial sound source affecting a residential receiver (BMC-adopted WAC limits for a commercial source affecting a residential receiver is 57 dBA during daytime hours). As noted above, the sound levels BMC sound level limits can be exceeded for short periods of time, and the maximum permissible sound levels identified in the WAC can be interpreted as an L_{25}, or the sound level exceed by 25% of any one hour (i.e., 15 minutes). For a quasi-steady sound source, such as continuous traffic entering, exiting, and moving within a parking garage, and continuously along a roadway, the L_{25} is *approximately* equal to the L_{eq}. Therefore, the predicted Leq, as is generated by the FTA tool, can be *approximately* compared to the sound level limits identified in the BMC.

As summarized in **Table 4**, the hourly sound level from parking garage activity during the afternoon peak-hour period (representing the hour of highest traffic volumes) is expected to be within the allowed BMC sound level limits at the nearest residential receiving location (R1). As noted, the traffic estimates summarized in this table are considered to be conservative, and actual noise emissions from on-site traffic sources are expected to be lower.

Table 4. Bothell Noise Compliance Assessment Summary

Scenario	Daytime Peak Hour Sound Level, Leq (dBA) Received at R1
Parking Garage Noise *Based on **418** vehicles during peak hour*	54
On-Site Roadway Noise *Traffic Accessing Areas C & A, along 110th Ave NE* *Based on **838** vehicles during peak hour, 10 mph*	39
TOTAL, Garage + Roadways (Leq)	***54***
BMC Limit (L25)	57
Complies With BMC Limit** (L25 ≈ Leq)**?	***YES***

FTA Noise Increase Impact Assessment

As indicated, the FTA noise impact criteria are not directly applicable to this project, however these criteria provide a convenient method by which to determine the potential for impact-based increases over the existing background sound level. The FTA criteria for residential receivers (i.e., locations where people reside or sleep) are based on the day-night (L_{dn}) sound level, and the assessment requires evaluation of both the existing measured L_{dn} and a computed Project-specific L_{dn}.

The measured existing L_{dn} is summarized in **Table 2** (54 dBA). The existing sound level is based on existing ambient sources, including from existing UW Bothell/CC sources, background traffic, etc., over a 24-hour period.

The predicted day-night sound level from the proposed parking garage at Area C and on-site traffic along 110th Ave NE was calculated to be 50 dBA L_{dn}. The predicted traffic noise level was added to the existing measured day-night sound level (54 dBA) to determine the total predicted sound level (55 dBA). The predicted total sound level, and the resulting increase over existing sound levels (1 dBA) was compared to the FTA noise impact criteria to determine if impacts would result, based on FTA methodology.

Table 5 summarizes the predicted day-night sound level and impact assessment per FTA criteria. As shown in this table, the increase over existing L_{dn} levels would be well within the FTA impact criteria for an existing sound level of 55 dBA, L_{dn} (predicted Project-only level is 50 dBA, FTA limit is 55 dBA; predicted increase is 1 dBA, FTA limit is 3 dBA).

Note that noise from on-site sources was assumed during daytime hours only, between 7 a.m. and 10 p.m. Should nighttime use of the parking garage or 110th Ave NE occur, it is not anticipate that traffic would occur at volumes that would measurably influence the predicted Ldn.

Table 5. Noise Impact Assessment using FTA Criteria

Scenario	**Day-Night Sound Level Ldn (dBA)** **Received at R1**
Existing Measured Sound Level	54
FTA Impact Criteria (Ldn)	**Project Only: 55** **Increase, Existing + Project over Existing: 3**
Parking Garage Noise *Based on Average of **235** vehicles/hr during daytime hours (7am – 10pm)* *Assumes no or little traffic between 10pm and 7am*	50
On-Site Roadway Noise *Traffic Accessing Areas C & A, along 110th Ave NE* *Based on Average of **472** vehicles /hr, 10 mph* *During daytime hours (7am – 10pm)* *Assumes no or little traffic between 10pm and 7am*	34
TOTAL, Project Only (Garage + Roadways)	***50***
Increase, Existing + Project over Existing	***1***
FTA impact?	***NO***

Parking Garage and Traffic Noise Received at Other Receiving Locations

For all other noise-sensitive receiving locations (both on-site and off-site) noise emissions from other Project parking garages, parking lots, and roadways are expected to be lower than are summarized in **Table 4** and **Table 5**. Therefore noise from parking garages and on-site traffic is expected to comply with BMC limits, and be within FTA impact criteria.

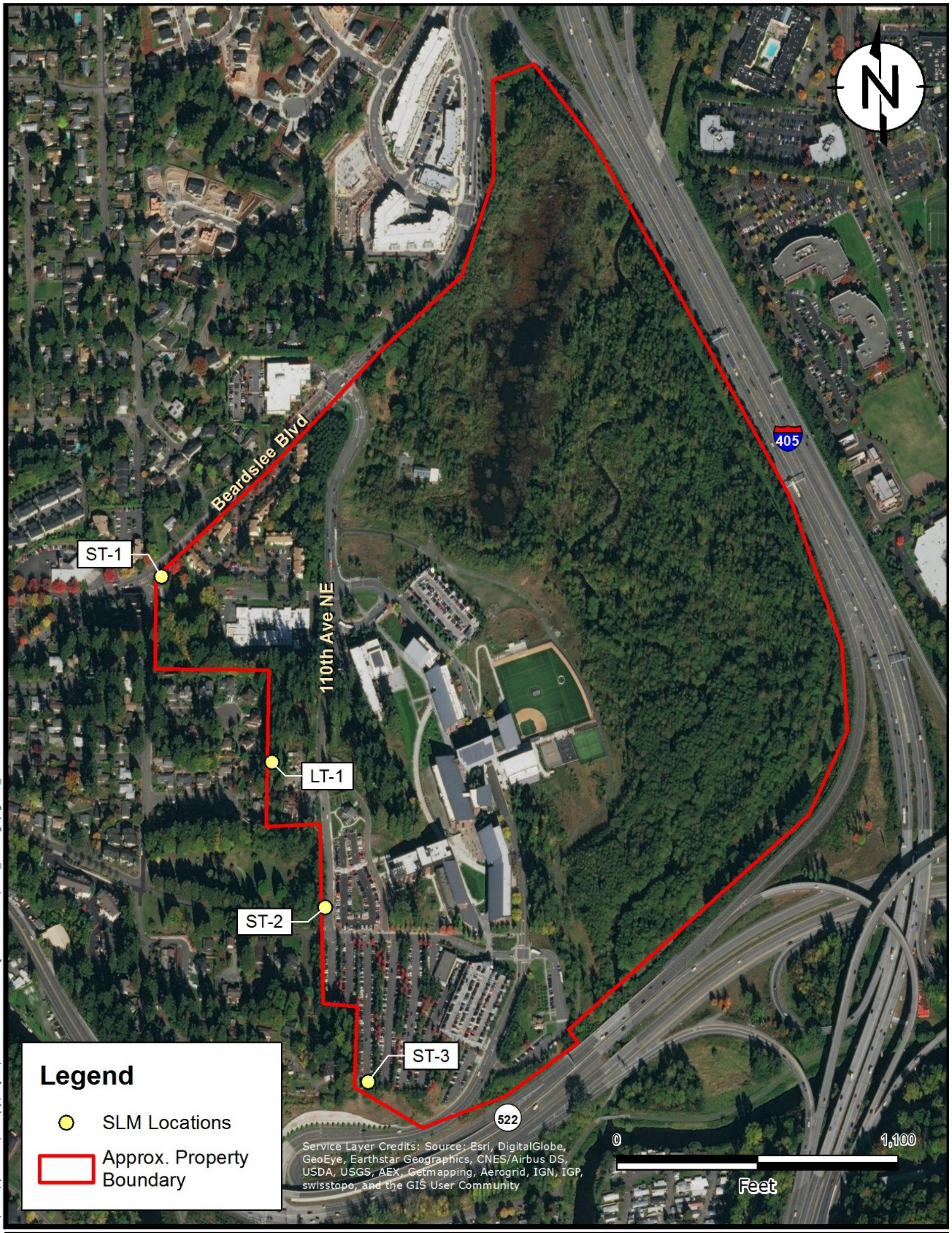
Mitigation

Noise impacts have not been identified, however, noise emissions from the proposed parking garage in Area C may be audible at times at the nearest off-site residential areas (i.e., during peak-traffic hours and/or during hours of low background noise). Considerations regarding fenestration and additional measures could be incorporated into the design of the west wall to further reduce parking garage noise received at adjacent residential properties.

As indicated, emergency generators, if necessary, should be located as far from nearby residential or other noise-sensitive areas to reduce the potential for impact during routine generator testing.

CONCLUSION

The *2017 Campus Master Plan* for the University of Washington Bothell and Cascadia College would include construction of new parking areas including parking garages, as well increased traffic along on-site roadways, all within vicinity of existing off-site residential receivers. Nearby existing off-site residences have raised concern of increased noise emissions from on-site sources of noise including the proposed parking garages and on-site roadways. In response, Ramboll Environ, on behalf of UW Bothell/CC, completed an analysis of potential (and unlikely) worst-case noise emissions from Project operation. The analysis found that, regardless of Project alternative, noise emissions from operation of the nearest parking garage (located in Area C), and from traffic along the nearest on-site roadway (110th Ave NE), would not exceed applicable noise limits established in the Bothell Municipal Code, and would not exceed criteria employed by the US FTA for evaluation of noise impact from operation of transit-related sources include parking garages and roadways. To reduce the potential for audible noise emissions from the proposed garage at Area C, the west wall of the garage could be constructed of a solid material to shield line of sight between traffic within the garage and off-site residential areas; wall design should include a visual assessment to ensure that a solid barrier at this location does not have an unintended negative visual impact.



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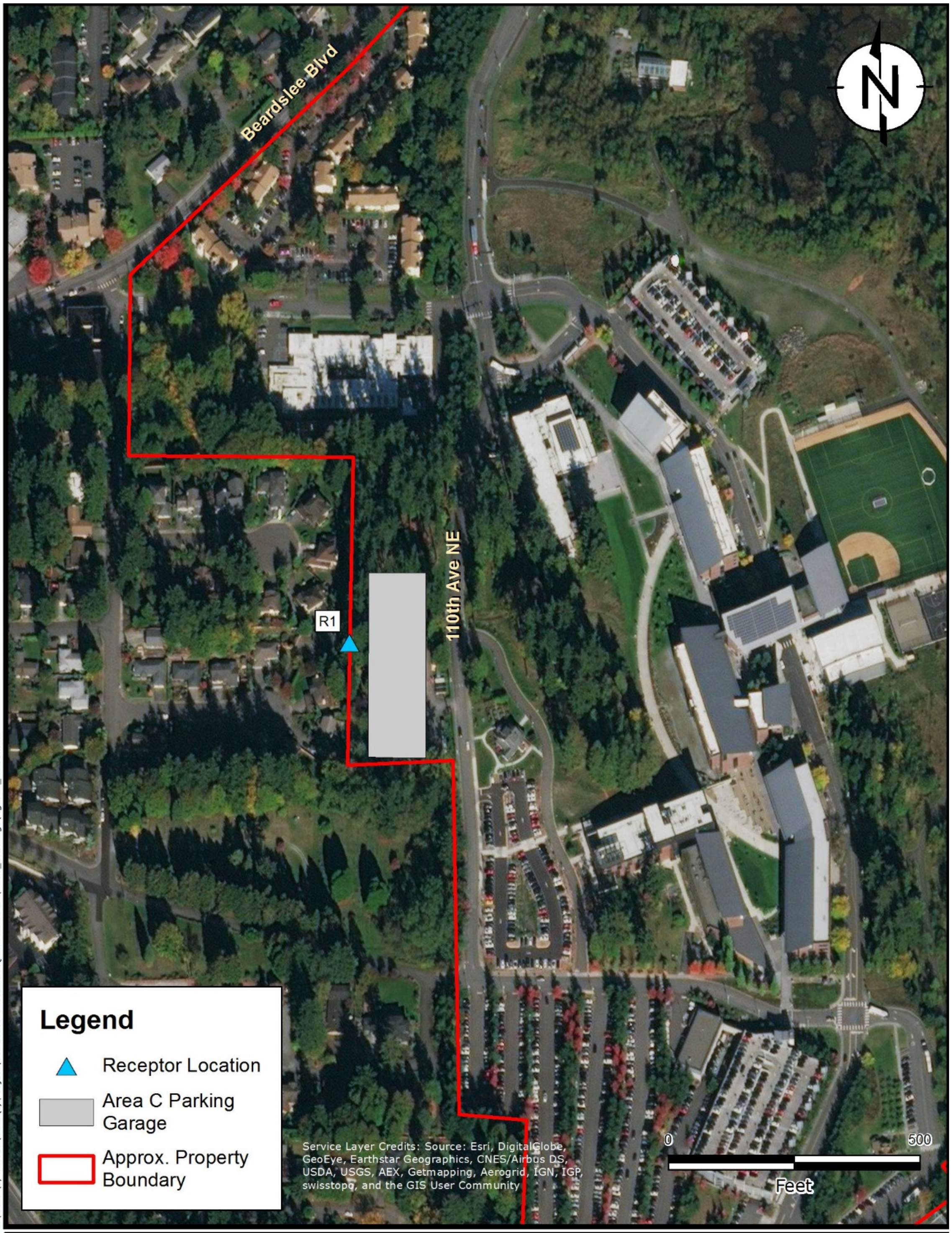
RAMBOLL ENVIRON	**Sound Level Measurement Locations** University of Washington and Cascadia Campus Project Bothell, Washington	FIGURE **2**
DRAFTED BY: LD / DATE:7/1/2017		29-41789A

Figure 2. Sound Level Measurement Locations



RAMBØLL ENVIRON		Noise Source and Receptor Location University of Washington and Cascadia Campus Project Bothell, Washington	FIGURE 3
DRAFTED BY: KAR	DATE:7/11/2017		29-41789A

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Figure 3. Noise Source and Receptor Location

APPENDIX F

Historic Resources Addendum

The Truly House & Chase Residence
University of Washington Bothell/Cascadia College Campus
Historic Resources Addendum

BOLA Architecture + Planning
Revised March 9, 2017

1. INTRODUCTION

Background

The University of Washington Bothell is situated on the site of a wetland along the Sammamish River, near the interchange of highways 405 and 522. The 128-acre campus is located about one mile west of the commercial core of Bothell, Washington. Planned in 1995, in accordance with an initial master plan by NBBJ Architects of Seattle, it was built in phases over the past 18 years. The campus site was made up by a small, early 20th century agricultural property, identified as the George Wilson Homestead and the Boone-Truly Ranch, along with a collection of late 19th and early 20th century residences in a community known originally as Stringtown. Among these was the residence of Dr. Reuben Chase, the first medical doctor in the city of Bothell.

Initial planning and construction of the new campus in the mid- to late-1990s involved restoration of wetlands on the site and demolition of all but one of buildings and structures that remained on the ranch site. It later involved relocation of the Truly House from its original location on what would become the center of the campus to a new site at a higher elevation level near its west side. The Truly House presently serves as the Teaching & Learning Center and auxiliary faculty workspace for UW Bothell.

Historic Research

Research for this report and a site visit to review current conditions were undertaken in late July and early August 2016. The HRA report was drafted and reviewed in late August and September, and completed in early October 2016. In late February and early 2017 additional research was undertaken, and the report was revised following the development of options for the campus master plan.

In developing the report BOLA personnel undertook research to provide historical context and factual data about the development of the Cascadia College and UW Bothell campus and the rehabilitations of the two buildings. Research sources included drawings, maps, and studies provided by the University of Washington and those available from its Facilities Records Archives, reviews of digital photo collections of the UW Libraries Special Collections (UWLSC), Museum of History and Industry (MOHAI), and Bothell Historical Museum (BHM), as well as historic inventories and National Register nomination documents available through the DAHP website, and the 1997 Historic American Building Survey (HABS) report on the Boone-Truly Ranch, which is available from the Library of Congress.

This report was developed by principal Susan Boyle, AIA, and Preservation Planning Intern Julia Grey, with assistance from Associate Sonja Molchany of BOLA Architecture + Planning, UW Project Manager Julie Blakeslee, and UW Bothell Director of Physical Planning and Space Management, Amy Van Dyke.

Regulatory Framework for Historic Preservation

The University of Washington established historic preservation policies over a dozen years ago, which are cited in the "University of Washington Master Plan—Seattle Campus" of January 2003 (Campus Master Plan). As noted in this plan, the University has required historic and urban design information for any project that makes exterior alterations to a building over 50 years old, or is adjacent to a building or a significant campus feature older than 50 years. The information, along with an evaluation of the project's impacts and mitigation recommendations, are provided in a document, such as this one, known as a Historic Resources Addendum (HRA).

The University's HRA format has been used to develop this report. The information it contains is intended to help guiding future planning on the UW Bothell campus. It also will contribute to environmental reviews of the proposed campus master plan in compliance with the State Environmental Policy Act (SEPA), and in reviews by the University with interested parties and individuals, the City of Bothell, and the Washington State Department of Archaeology and Historic Preservation (DAHP).

2. CAMPUS PLANNING

The Setting

According to King County i-Map, the University of Washington/Cascadia College Campus is located at 18225 NE Campus Parkway, Bothell 98011, and the parcel number is 052605-9057. The legal description cites the following: LOT A BOTHELL BLA #BLA2003-00008 REC #20040825900002 SD BLA BEING POR SE 5-26-5 LY SWLY OF ST HWY & SELY OF BEARDSLEY BLVD TGW POR NE 8-26-5 LY NWLY OF ST HWY TGW POR SE 1/4 OF SD NE 1/4 LY SELY OF ST HWY & NLY OF SAMMAMISH RIVER TGW LOT 36 QUADRANT BUSINESS PARK - BOTHELL LESS POR FOR HWY PER REC# 20061204000292.

The campus covers nearly 130 acres, made up by a partially sloping site, with forested edges and a wetland. It is bordered by Beardslee Boulevard, North Creek Heights residential neighborhood, and the Sunrise/Valley View neighborhood to the north and west. Interstate 405 is to the east and State Route 522 to the south.

Development of the Campus Site

UW Bothell was established in 1990 as part of a Washington Higher Education Coordinating Board proposal (Warner, n.p.). The establishment of the campus followed a 1987 identification of inadequate higher level education within the state of Washington, and a 1989 legislative authorization to add two "branch" campuses to the University of Washington (CMP 1995, p. 4). These two branches became UW Bothell and UW Tacoma. UW Bothell held classes for about 10 years in an office park while plans were made to relocate its facilities to an adequate campus (Van Dyke).

The current site was chosen to be shared by UW Bothell and Cascadia College in response to population forecasts, educational needs assessments, site/environmental evaluations, and a need for both higher education and work force training in a similar geographic area (Pennucci, p. 16; CMP 1995, p. 4). This general area of Bothell was targeted due to an anticipated population increase in recent years, accompanied by a lack of community colleges accessible to those preparing to enter the workforce.

The plan to collocate the two institutions was initiated in 1993 as a directive from the Legislature. The proposal for a higher education institution was a response to a reported need for increased post-secondary education and work training for residents of King and Snohomish Counties. The initial master plan sought to summarize the needs identified in several studies leading up to the founding of the colleges and involved a cooperative endeavor between community representatives, public servants, and university constituents (CMP 1995, p. 1). After approval of the Truly Farms/Stringtown site, a series of documents were produced along with the initial Campus Master Plan, including draft and final environmental statements and a Planned Unit Development document for the City of Bothell (CMP 1995, p. 3). Classes began on the new campus site in 2000.

The college and university, in keeping with their mission to provide opportunities for higher education within the state of Washington, continue to maintain a high in-state enrollment rate (approximately 80%). For the 2015 academic year, the combined enrollment was 5,279, with 4,402 undergraduates and 530 graduate students.

Design and Construction on the Campus

Construction of the campus has taken place in several phases as legislation and funding have allowed. Designs have been approved in seven Planned Unit Developments (PUDs) to date. The following chart cites continuing construction phases and their corresponding dates:

PUD	Project	Approved Date	Construction Completed
1	Phase 1	1998	2000
2	Phase 2a	1999	2001
3	Cascadia College 3 (GLA)	2008	2010
4	UWB3 (Discovery Hall)	2011	2014
5	Sportsfield/Conservatory	2012	2013
6	Student Activities Center	2014	2015
7	Surface Parking Lot	2015	2016

(Information sources: UW Engineering Records 1998-2016; UW Bothell website; Amy Van Dyke, Director of Physical Planning and Space Management, UW Bothell.)

The first step (Phase 1) called for preparation of the site and involved conducting environmental restoration and enhancement (CMP 1995, p. 78). Phase 1 also involved construction of the library and two other campus buildings, partial completion of pedestrian promenade, establishment of parking areas and garages, and informal paths linking parking to buildings (CMP 1995, p. 78). A major goal of Phase 1 construction was to restore the wetlands to their previous state, which was done in large part by re-routing the bend in North Creek. By the end of Phase 1, three campus buildings had been constructed: the main building and library (shared by UW Bothell and Cascadia College), CC1 (classrooms and offices for Cascadia College) and UW1 (classrooms and offices for UW Bothell).

Phase 2a included construction of an auxiliary library building and bookstore, and two new buildings – CC2 (classrooms and offices for Cascadia College) and UW2 (classrooms and offices for UW Bothell) – and the addition of access by the creation of a pedestrian connection to downtown Bothell and extending the pedestrian boardwalk from the center of campus to the wetlands.

In 2008-2010, the South Entrance access point, via State Route 522, was constructed. During this time, Cascadia College 3 or the Global Learning & the Arts building for Cascadia College was also completed. This was followed by plans for a multi-purpose sports field, which were developed in 2011. The sports field was completed in 2013, along with construction of a greenhouse conservatory that serves as a research center for the surrounding wetlands.

In 2014, UW Bothell Phase 3, later identified as Discovery Hall, was the first major building to be constructed on the campus in over a decade. The new, 74,000 square foot, four-story building, situated adjacent to the earlier Commons Hall, was designed to accommodate the growing student population and expend STEM academic disciplines. The new building featured a flat roof mass with brick cladding and large windows, affirming the general architectural design that has characterized the campus. Later, in 2015, the Activities and Recreation Center, a student-initiated project, was completed.

Left, a view of Discovery Hall, the newest major building on the campus. This view, looking southwest from the Library shows the main area of the campus. The Truly House is situated at the upper level to the northwest (photo courtesy of Glumac).

In 2016 a 143-stall surface parking lot was built on an open space along 110th Avenue NE near the eastern edge of campus in close proximity to the relocated Truly House. The new lot resulted in a total of over 2,500 parking spaces on the campus, serving commuting students, faculty and staff.

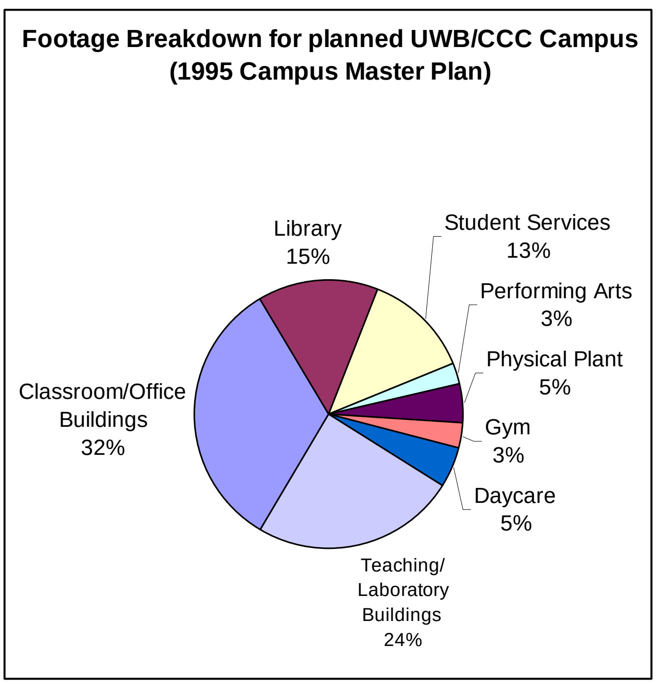
Left, a site plan of the new parking lot in proximity of the relocated Truly House. The western portion of Discovery Hall is shown also on this plan. (North is oriented to the right.) Below, aerial view of the lot, looking west, with the house partially visible to the right (north) (University of Washington Bothell News, April 2016).

Campus Master Plans

The land makes up 128 acres (approximately 5,532,120 square feet). Of this, 55% is protected and/or undevelopable due to its ecological fragility, and 18% has already been developed. The remaining 27%, or 34 acres, is available for future development.

The University of Washington Bothell has updated its initial 1995 campus master plan in 2003, 2006, and 2010 with a 2011 amendment. Recurring themes of the master plan include integration with and retention of the natural environment, simplicity and accessibility of the campus, and assimilation with the community of Bothell. The unique setting of the campus has, in a general sense, dictated the site and construction planning. To that end, the UW Bothell/Cascadia College planning components have sought opportunities to create a "*functional campus* developed in an *environmentally sensitive* manner" (CMP 1995, p. 2).

Objectives of the First Campus Master Plan, involved formulating the mission statements of the respective institutions, allocation of space and a site plan, and beginning a phasing structure for construction, revolving around routine Regulatory Reviews and Approvals (CMP 1995, p. 5-6). While meeting the education needs of the greater community was paramount to the Master Plan, the committee recognized the multi-faceted use of the developed site: "the State recognizes the importance of addressing multiple public policy goals at the Truly Farm-Stringtown site: expanded educational access, *environmental enhancement and preservation*, and public use" (emphasis added, CMP 1995, p. 5). In addition, the plan acknowledged the importance of the existing cultural resources on the chosen site, and pledged to "reflect and respect historical aspects of the built environment, both on- and off-site (e.g. the cemetery, Stringtown)" (CMP 1995, p. 11).



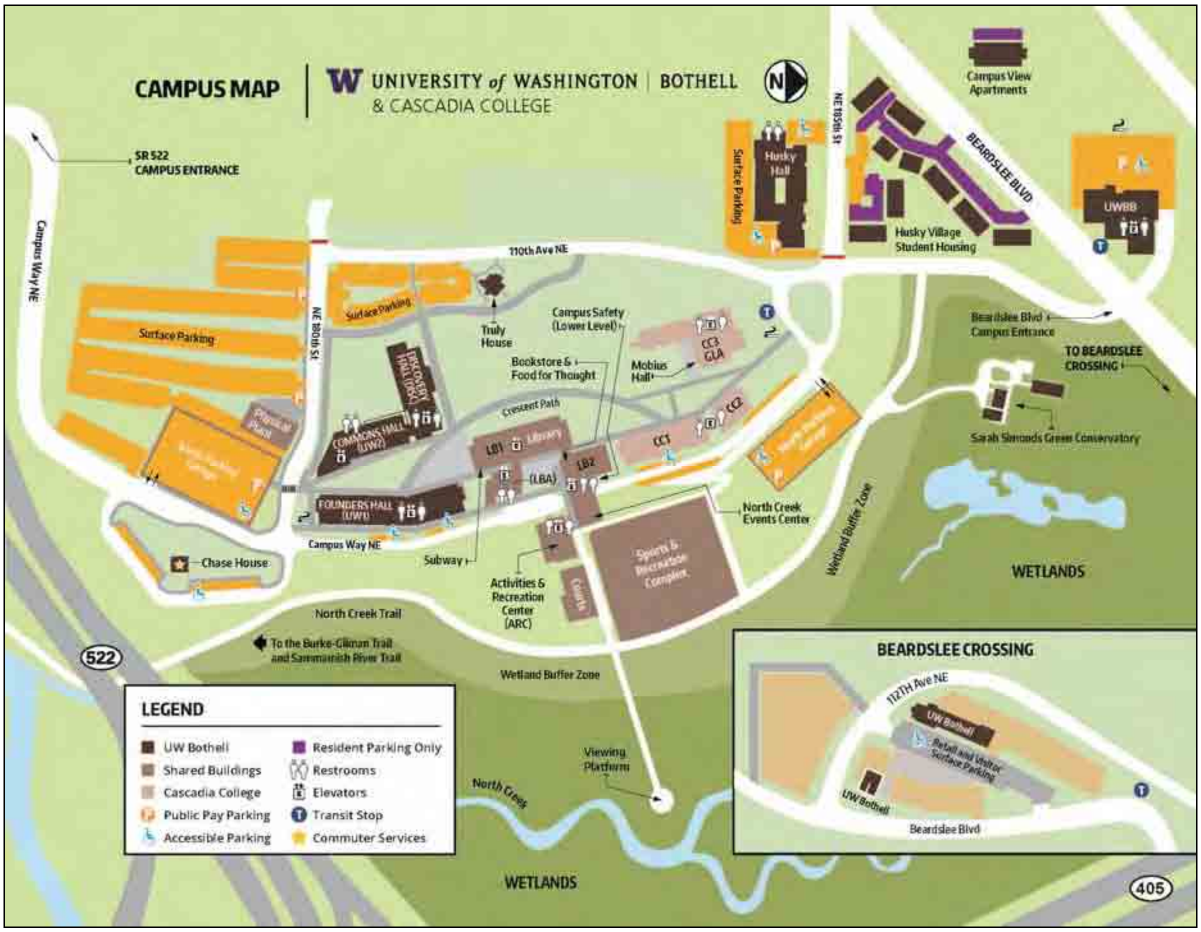
Goals of the original Master Plan were centered on the community, environment, and campus facilities. Community goals of included a desire to "complement the 'hometown' feel of downtown Bothell" and "promote formal economic development connections with the business community" (CMP 1995, p. 10). Environmental goals included balancing "environmental protection and public access to stream and wetlands ecosystem." Campus Facilities Goals emphasized a "flexible," building forms, while keeping the library the focal point of the physical campus (CMP 1995, p. 11-12).

Left, an illustration of the proposed allocation of facility resources based on the 1995 Master Plan, which anticipated an eventual maximum of 10,000 full-time equivalent student and equal number of faculty, and a projected capacity of 7,400 individuals on campus at any one time (CMP 1995, p. 16).

Plans call for the construction of architecturally prominent campus buildings, exemplified by recently constructed Cascadia College's Global Learning & the Arts building (2010), Sarah Simonds Green Conservatory (2013), and Discovery Hall (2014). In addition, the campus plans promote a long-term effort to restore the environmental flood plain. The campus has met the federal Clean Water Act Section

404 permit requirements for monitoring. Long-term maintenance includes ongoing weed and pest control, cleanup of trash, trail maintenance and possible thinning.

Access and transportation have been at the forefront of campus planning. The targeted UW Bothell or Cascadia College student, and much of the staff and faculty, often commuter to campus and may not be on campus for the full day. As a result ease of access, on-site parking, and connection to transit systems have been a priority in developing the campus layout. This has resulted in recent construction of additional parking lots on the campus.



Above, a current campus map showing existing conditions, including building, recreational and parking facilities and the wetlands, along with student housing. The historic Chase House is identified in the lower left and the Truly House in the center top. North is oriented to the right (UW Bothell Campus Map Update, April 2016).

The current, ongoing master planning effort has identified three potential options for future development. These are illustrated in preliminary presentation documents as cited as “Grow along Topography,” “Develop the Core,” and “Institutional Identity.” The “cohesive character” of the buildings is one of the conceptual principles adopted to guide the Campus Master Plan.

3. HISTORIC CONTEXT

Historical Overview

Prior to the presence of European-Americans, the area along the Sammamish River and the north end of Lake Washington was settled by Duwamish people known as "willow people" or "people of the Lake." Other Native American tribes in the area included the Suquamish, Duwamish, and Snoqualmie tribes, who were connected with the Sammamish. Bothell was founded in 1889, but the area was settled nearly 20 years prior to this date by George Rutter Wilson and Columbus Greenleaf (Warner, p. 6). Enabled by the Homestead Act of 1862, Wilson began acquiring land in 1870. By his death in 1916, he had amassed a 360 acre estate, which sustained the activities of agriculture, livestock pasturing, and logging. Benjamin E. Boone, a Seattle businessman, acquired Wilson's farm in the early 1920s and developed the area, primarily as a cattle ranch.

Above, a historic photo of the Stringtown area. This view shows the road and houses, which may include the Chase Residence in the late 19th century (photo courtesy of Bothell Historical Museum).

The Boone –Truly House was built in the 1920s to replace Wilson's house and accommodate Boone's hunting activities (Warner, p. 7). A few years after Boone's death in 1960, his daughter Beverly Boone-Truly and her husband, Richard Truly, purchased the homestead. They continued to operate it along with their children and other friends as family members as a cattle ranch. Activities on the site included an annual community gathering during a three-day summer round-up and branding activities (Freidberg, ca. 2013).

In contrast to the largely 20th century development of the Boone-Truly ranch, the original Stringtown area was developed by pioneer settlers as early as the 1870s (CMP 2006, p. 7). Stringtown received its name from the series of houses arranged in a linear manner during settlement. The area, historically a swampy wetland, was drained by the construction of a log flume in the 1880s, enabling pioneers to build their homes along the Sammamish slough (HABS WA-217, p. 3). Stringtown was regarded as the first residential development in Bothell (Wilma, HistoryLink.org, n.p.) This area is located on the southern portion of the present-day campus site, southeast of downtown Bothell. The Chase Residence, home of the area's earliest doctor Reuben Chase, is a remnant of this residential settlement, and it is associated with the development of nearby Bothell. This town was incorporated in 1909. At that time, it contained an area of approximately 450 acres with a population of about 500. Its subsequent development was based on logging and agriculture with products shipping by boat along the river to Lake Washington and from there to settlements along the shoreline and Seattle. There were few local roads by this period, and passengers traveling to and from Bothell arrived on boats.

In 1917, Lake Washington was lowered upon completion of the Ship Canal and Government Locks, and water transport on the river and lake largely ended. The economy of the city continued to rely largely on the trade and shipping of agricultural products from nearby farms (Wilma, HistoryLink.org, n.p.). Roads through the city developed, linking it with the cities of Maltby and Edmonds, and later with Seattle.

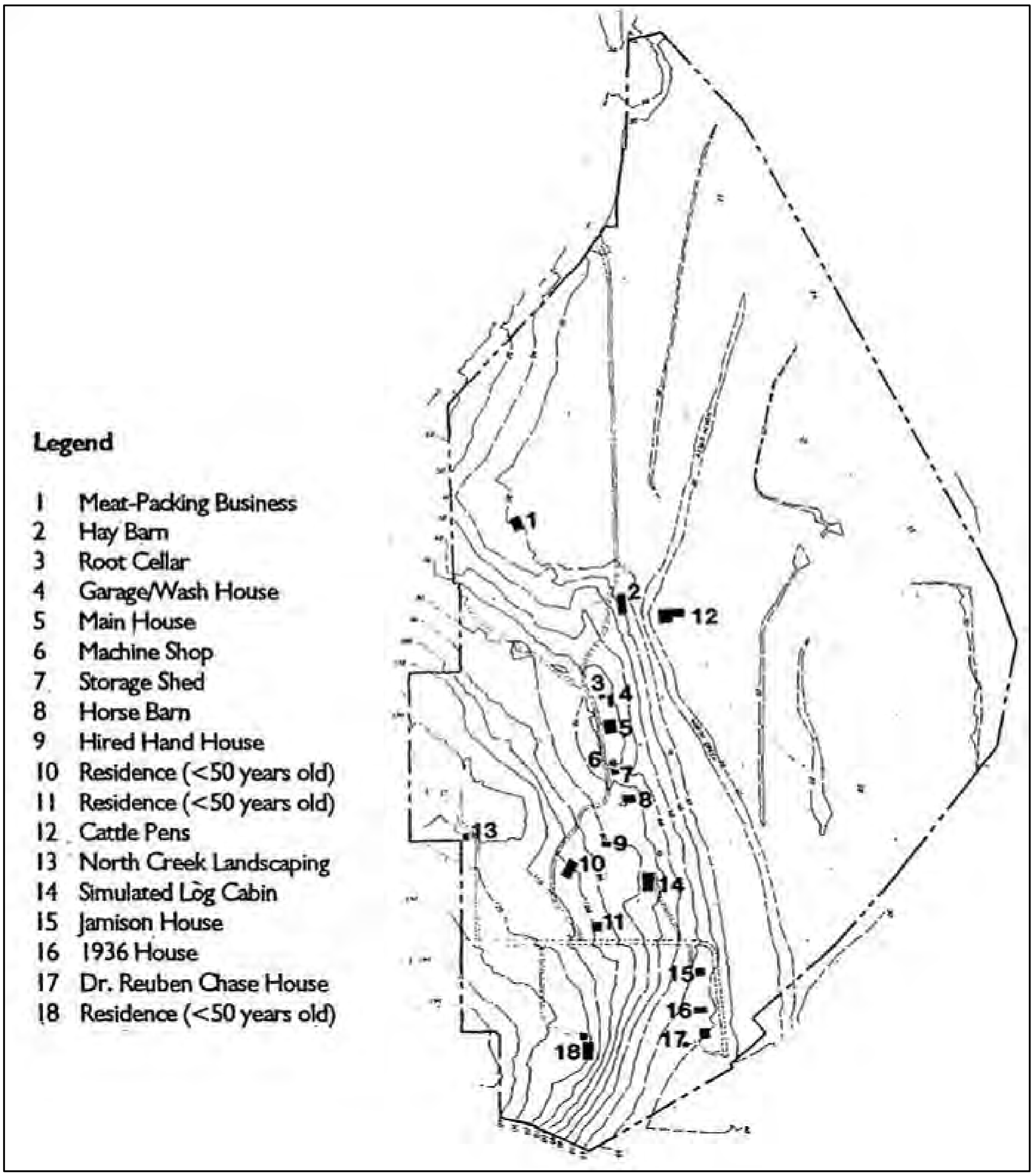
The Bothell-Everett Road, built initially State Highway No. 1, was paved by 1926, long before the Seattle-Everett section of Highway 99. It linked Bothell to Everett and Bellingham and beyond to northwest Washington communities and Canada. These connections helped to spur local commercial and residential growth. Bothell grew slowly through the 1930, reaching a population of fewer than 800 residents by 1940. By this time, it served largely as a bedroom community for Seattle and Everett. During the post-war period of economic expansion, the city grew from its original 450 acres to its present area of 8,732 acres (13.7 square miles), with numerous annexations between 1950 and 2014.

Left, a 1936 aerial view of campus area showing the locations of the Truly House and Chase Residence at that date (King County i-Map with added notations by BOLA). (North is oriented up.)

4. THE TRULY HOUSE

Historic Significance

The Richard H. Truly House is presently addressed at 18140 110th Avenue NE, but before the campus was built it was at 11119 NE 185th Street. As part of the preliminary assessment for the site of the UW Bothell and Cascadia College, the Boone-Truly Ranch was included in a historic resource assessment in 1995 by HRA Consulting and was documented in a Historic American Building Survey (HABS) report, WA-218, in 1997 by Boyle Wagoner Architects. The map below, which cites all of the constructed components of the ranch and surrounding buildings, was part of this report. It identifies the Truly House as No. 5, and the Chase House as No. 17.



A historic property inventory form was developed for the Truly House in 1995 and updated in 2008. (DAHP has not reviewed the property and has not made a determination of its eligibility for listing in the National Register of Historic Places.)

After white pioneers arrived in the area, the site was settled by George Wilson and William Bramwell Bishop, who staked respective claims on the unsurveyed land in the early 1870s (Boyle, WA-218, p. 2). George Wilson was primarily responsible for developing the homestead, using the surrounding timber to establish a logging operation on his territory. He built a house on the property in 1888, accompanied by several outbuildings (Boyle Wagoner, p. 3). Wilson owned the property (which he had augmented by buying several surrounding lots), until his death in 1916.

The homestead was subsequently sold to Benjamin Ewing Boone (a relative of early pioneer Daniel Boone). Boone was born in 1876 in Arkansas, and moved with his family several times—to Texas and Montana—before he set off on his own to pan gold in Cripple Creek, Colorado. From there, he joined the Klondike Gold Rush in 1897, and met with a good measure of success, such that his family came to join him and assist with the mining operation. In 1908, following his years mining gold in Alaska, Boone moved to Seattle, relocated to New York briefly to obtain business training, and then moved back to the Pacific Northwest, establishing automobile dealerships in Portland, Seattle, and Vancouver, B.C. Eventually he settled in Seattle, married his second wife and raised his family (Boyle Wagoner, p. 4).

Boone originally used the Wilson property as a second residence for duck hunting, but moved his family there around 1920, a few years after Lake Washington was lowered due to the construction of the Montlake Ship Canal. The drainage of Boone's property provided him with a more pastoral landscape, which worked well for developing his cattle ranching operation. In addition to breeding and selling cattle, the Boone family was instrumental in bringing the Texas rodeo culture to the Northwest (Boyle Wagoner, p. 6; Ott, n.p.).

The presence of a cattle ranch was unique in the area, and it continued to operate until Boone's death in 1960. His daughter, Beverly Boone-Truly, and her husband Richard Truly, bought the property and resumed cattle ranching operation two years later, maintaining it into the early 1990s.

The Truly House was built in 1924 to replace an earlier pioneer era structure, which had served as the residence of homesteader George Wilson and dated from his occupancy in the 1880s. Some elements that remained in the kitchen in the mid-1990s, when the house was still at its original location, indicated that there may have been some historic fabric from Wilson's home used in the later, craftsman style residence (Boyle Wagoner, p. 4). At that time, prior to the development of the campus, the Boone-Truly Ranch consisted of nineteen buildings and structures, including a hay barn, root cellar, garage, wash house, machine shop, horse barn and hired hand house, along with the main house and non-historic cattle pens, storage shed and meat processing structure. The historic inventory of the property in 1995, when it remained intact, noted the surveyor's preliminary evaluation that , "several buildings and one structure of what is now the Truly Farm are eligible for listing in the National Register as an historical district … significant for long-term history in the agricultural land use of the Bothell area" (Warner, executive summary, n.p.). The Truly House is presently the only building remaining from the historic Boone-Truly Ranch.

Above, the UW Bothell/Cascadia College campus and surrounding area, with indications of the original and present locations of the Truly House, as well as the location of the Chase Residence (King County i-Map, ca. 2013, with added notation by BOLA).

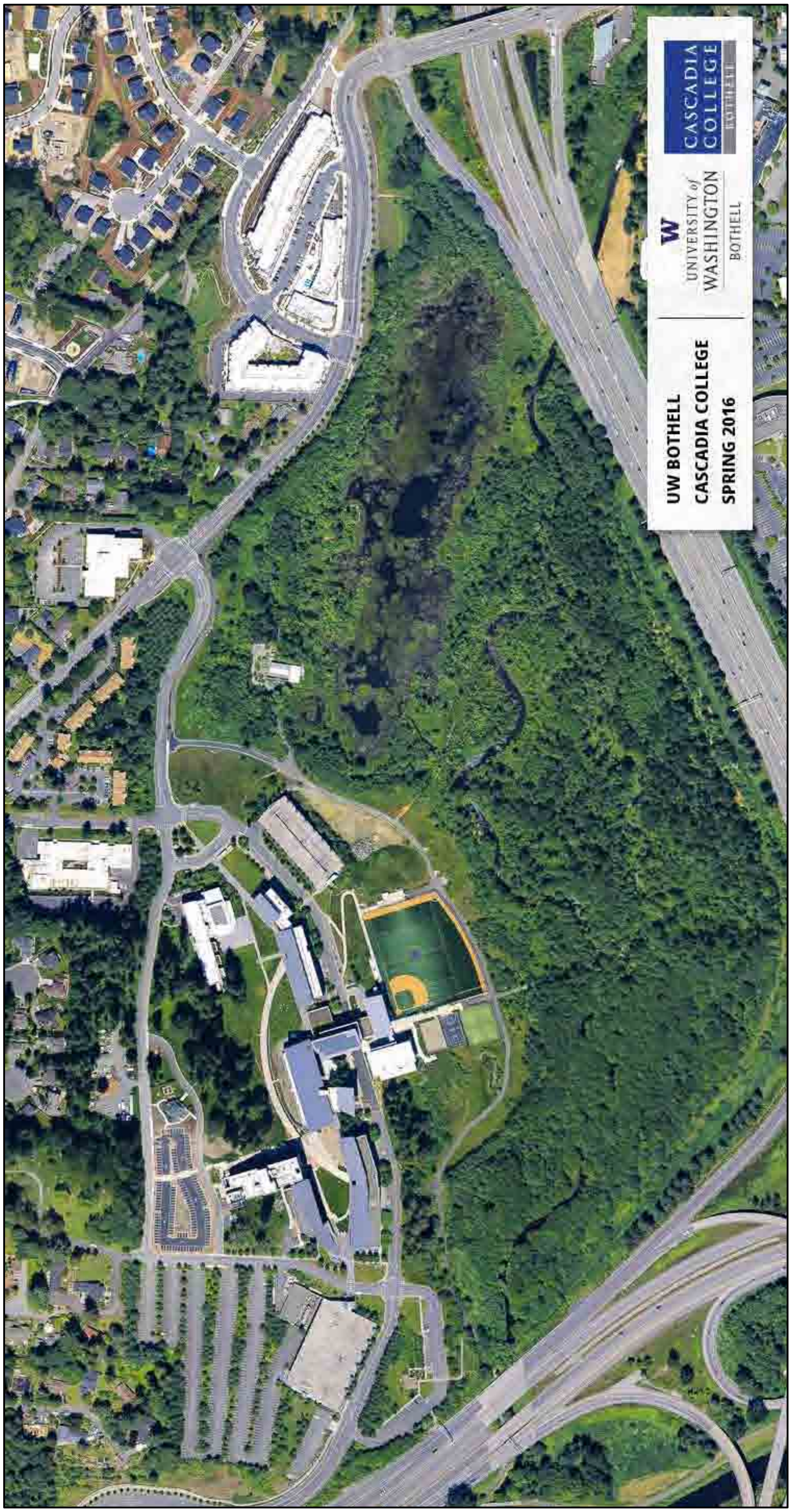
Above, the HABS photo of the west elevation in 1997 (Photographer: John Stamets).

Above, the Truly House in its present location (Historic Property Inventory Form, ca. 2002 update, DAHP WISAARD database). The main entrance to the house, which originally faced west, presently faces northwest.

In addition to the main residence, the Boone-Truly Ranch included a wash house, wood shed/garage, root cellar, machine shop, storage shed, hired hand house, horse barn, cattle pens, and hay barn. These buildings were demolished to make way for the new campus, and the ranch house was relocated to a site southwest of its original location around 1998.

The house continued to be accessible to Richard Truly until his death on January 2, 2009. It is presently used as an auxiliary faculty facility and Teaching & Learning Center for UW Bothell.

Above, an aerial view from 2013 of the central part of the campus (King County i-map) during construction of Discovery Hall and prior to construction of the parking lot to the south of the Truly House. The house, visible in the center left section of the photo, was then somewhat isolated from other campus buildings. The street to the left (west) is 110th Avenue NE. A parking lot was recently constructed to the south of the house.



Left, a current aerial view of the campus. (North is oriented up). The Truly House is visible in the center left section of the photo and in the larger-scale view above, along with an associated garden with geometric pattern to the north of it and the newer parking lot to the south.

Architectural Features

The Truly House was designed in the bungalow/craftsman style indicative of the 1910s and 1920s, when the Sears and Roebuck catalogue and availability of standardized lumber sizes made it possible for the self-made homebuilder to construct planned buildings following common schematic drawings. The building's historical function as a ranch house is not clearly apparent from an onlooker's perspective; however, certain features, such as the wraparound porch, rustic details on the supporting porch columns, and the interior staircase give the impression of a humble country residence. The rose garden located on the northern elevation is a new addition, a memorial tribute to the rose garden of the original land owner, George Wilson, and to Beverly Boone-Truly's love of roses.

Changes to the House

Aside from some original spaces, such as the interior staircase and downstairs kitchen, the interior of the Truly House has been rehabilitated to serve the academic and office use of the building. The basic floor plan remains intact, but some changes made:

- The house was originally situated into a hillock, which made the north entry accessible from ground level, while the east elevation was raised up, exposing part of the cellar level. The present grade change is less severe in the new siting; the north (now NE) entrance accessible by a low-grade ramp from the southeast and new stairs that approach the door directly.
- Orientation changed, with the main entrance presently facing northwest. The current front year area contains a developed garden rather than restrained turf and shrubs; a meadow-like landscape is situated to west. A curvilinear concrete sidewalk leads up to the main entry steps. The romantic style of some of the current landscape is an amenity, but it appears inconsistent with the simpler vernacular design of the original ranch setting.
- A wide, paved pedestrian walkway (emergency vehicle access route) was built along the building's east side.
- The larger of two chimneys has been altered; some brick has been removed, exposing the lining.
- The main porch and stairs leading to it are more elevated; railings have been raised also.
- Address numbers and banners have been affixed to the entrance portico. .
- An original low fence, used to flank the steps to the main entry porch, is no longer extant. (The fence was wooden post and board to the south side of the house, and post and wire to the north.)
- In 2011-2012, the Truly House was modified for access control (wiring). Other minor alterations include repainting of the exterior cladding and trim. Flashing and gutters have been upgraded, and the roof was replaced
- In 2016 the site context was changed with the construction of the large paved parking lot to the south.

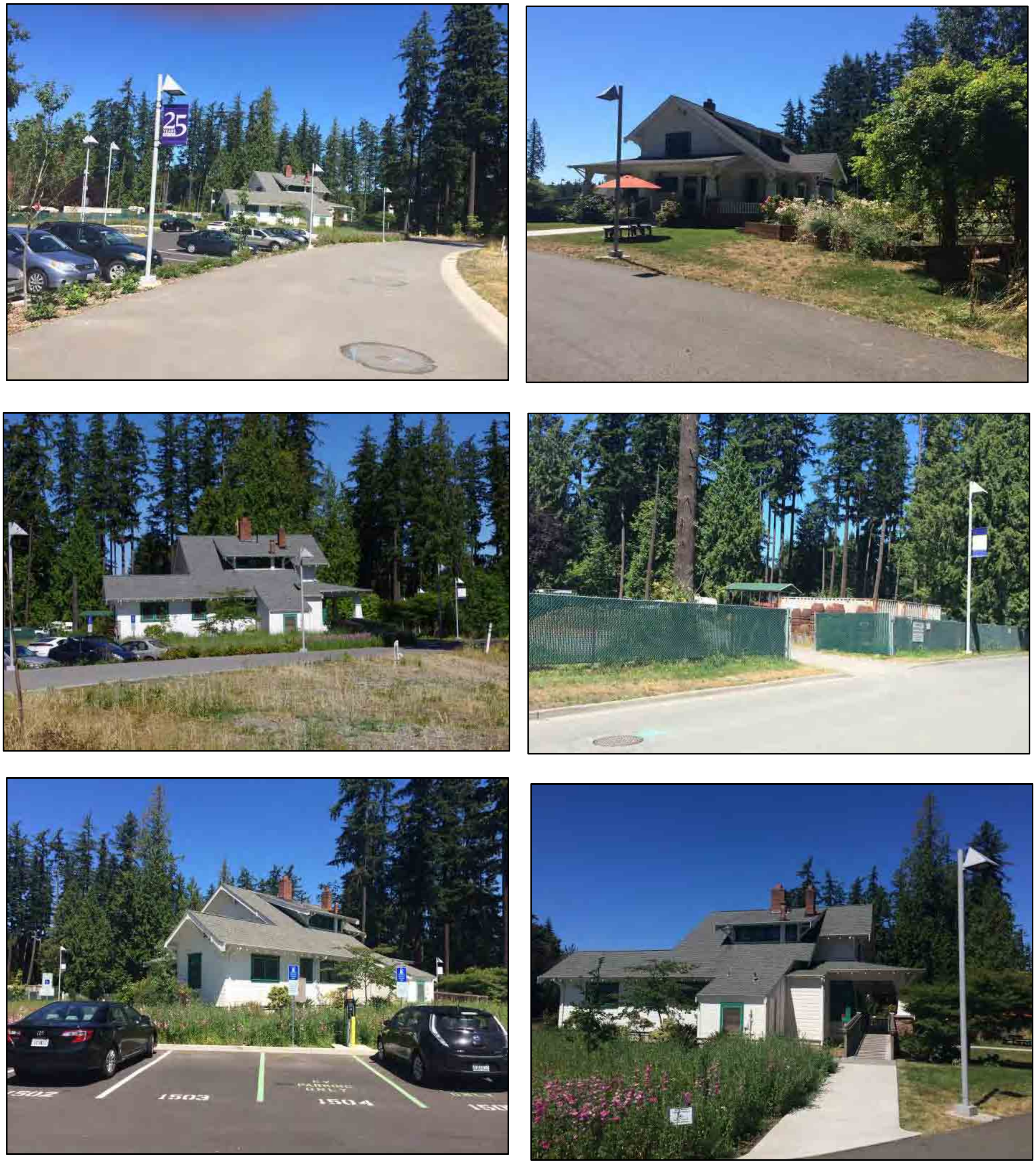
Historical Integrity

The Secretary of the U.S. Department of the Interior has established criteria for evaluating the integrity of a historic resource. Its integrity may be defined by the following seven aspects: location, design, setting, materials, workmanship, feeling, and association. Using these criteria, it appears that the Truly House retains some aspects of integrity in relation to materials and workmanship, but that these elements along, without the context of the original site, cannot convey its original significance as an early agricultural property. The location and setting of the house have been changed radically. As a result, the setting, feeling and association of place have been lost. Use of the land has changed also, and the landscape and environment have been altered with the re-establishment of a wetland reflecting a natural state prior to the establishment of the Wilson Homestead and Boone-Truly Ranch. With the return of the wetlands

and increased construction of new campus buildings and facilities – and in particular the nearby paved parking lot and roadbeds -- the ranch house feels anachronous. The "legacy" rose garden, while an attractive amenity, is a gestural reference to history without adequate basis for interpretation.
The present Truly House does not appear to convey its significance in connection to the agricultural past, and does not appear to meet the listing criteria of the National Register of Historic Places.

Benjamin Boone and Richard Truly well regarded people in the community. Boone's reputation as a Seattle businessman preceded his acquisition of the ranch, but he and Richard Truly and Beverly Boone-Truly were equally active in upholding ranch traditions and local rodeo culture for many years, and several of their family members remain in the area. Because of these associations, the University made efforts to retain the house by relocating and adapting it in the 1990s. It also recognized Richard Truly's legacy presence on the campus after he bequeathed scholarship funds upon his death in 2009.

Left, a photograph of north façade in its original location (Boone Truly Ranch HABS report, John Stamets, photographer, 1997). Below, a similar current photo of the corresponding elevation in the present location (BOLA, July 29, 2016).



Above, current context views of the Truly House, the nearby parking lot, and the campus facility services storage yard, across the street on the west side of 110th Avenue NE (BOLA, July 29, 2016).

Above, detail views of the front porch and interior of the Truly House.

Left, a view of the house from a newer campus building (BOLA, July 29, 2016, all photos).

5. THE CHASE RESIDENCE

Historic Significance

The Chase Residence is presently addressed at 17936 113th Avenue NE, although before the UW Bothell campus was built, the address was 17819 113th Avenue NE. The house was built in ca. 1885, and was one of the first houses in a small settlement of roughly six dwellings that made up the community of Stringtown. In 1990, over a century later, two other houses remained from the original settlement. One of these, the neighboring Jamison house, was documented in a 1997 Historic American Buildings Survey, after the property had been acquired by the University. The Jamison house was subsequently demolished. Of the original Stringtown settlement, the Chase Residence is the only remaining structure.

The historic owner of the property, Dr. Reuben Chase, came to the Pacific Northwest in 1889 after earning his medical degree in Cincinnati and practicing for several years. Born in Vermont, he served in the Civil War. He relocated to the Seattle area for health reasons, and was sent specifically to Bothell in order to respond to a localized typhoid epidemic that plagued the area. Chase lived and practiced out of the Stringtown house for about six years, building up a successful rapport. He made some modifications to the house, mainly with the addition of bay windows; the modifications were compatible with the building, and representative of the character of the settlement. During its period of historical significance, "The house served both as office, the community's first hospital, and Chase's residence" (Garwood, NR Nomination, n.p.).

The house has been further modified since Chase's occupancy; the porch was enclosed, and a shed-roof addition was constructed on the first level of the rear facade. Prior to the university's acquisition the house was owned and occupied by Susie and Jim Quinan. The Quinans purchased the property in the 1980s and had undertaken sensitive repairs. It was during their ownership that the City of Bothell prepared a National Register nomination for the property. The Chase Residence, at 17819 113th Avenue NE, was listed on the National Register of Historic Places on August 27, 1990 (Listing No. 900001246). In addition to its listing on the National Register, the house was designated a Bothell City Landmark.

Changes to the Property

According to the National Register nomination for the house, the gable-and-wing, frame construction was a good example of "pioneer era residential architecture" (NR Nomination, n.p.). The building features a T-shaped plan and one and half story, gable, post and beam construction with wood cladding and wood framed windows. The original site was a small parcel with garden landscaping. It was one of several small dwellings situated on a straight country road.

At one point there was consideration given to relocating the Chase Residence. However it has remained at its original location, where it has been provided with a new foundation. After the University acquired the property, the house was renovated and its interior changed to accommodate public access and office use. In 2001, the building received a new roof with asphalt roofing shingles and custom windows, new flooring and finishes, ADA compliant plumbing fixtures, HVAC components, lighting, electrical and security systems, and paint, along with lead abatement (University's facility records). The building is presently used as an office by Commuter Services.

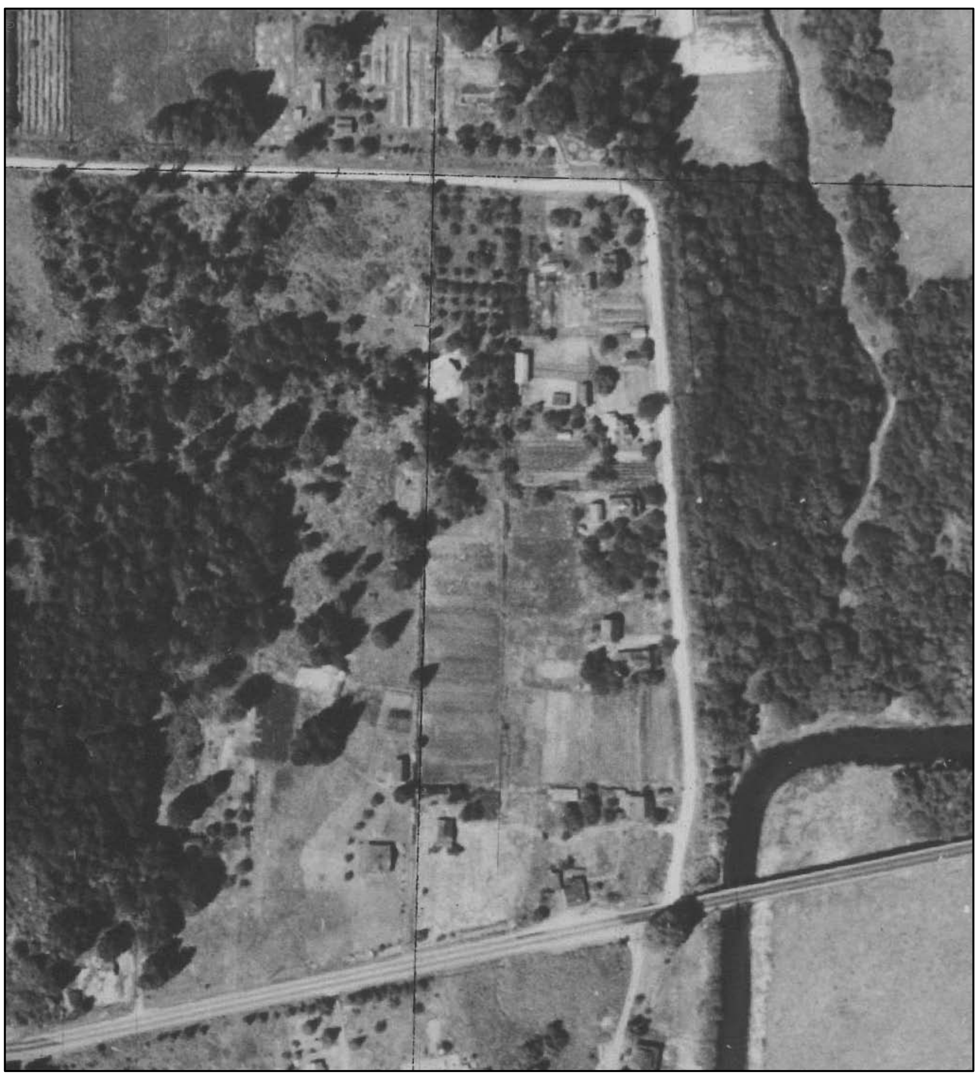
The setting and site context were changed by the establishment of a new curved campus road, and grading. A large berm, landscape with trees, is situated to the west (to the back of the house), where it recalls the original hillside and serves to enclose and visually separate the house from larger, contemporary structures to the west. A non-original orchard has been established to the north. While this landscape may not be authentic, it may help interpret the historic setting of Stringtown.

Historical and Architectural Integrity

The Chase Residence retains integrity in terms of location, design, and materials, workmanship and association. However, it is lacks the integrity of its setting, as the context has been changed drastically since the small residential block of houses that made up Stringtown in the late 19th century. The house, set in close proximity to a paved and striped parking lot, appears to have lost a sense of its historic setting and feeling.

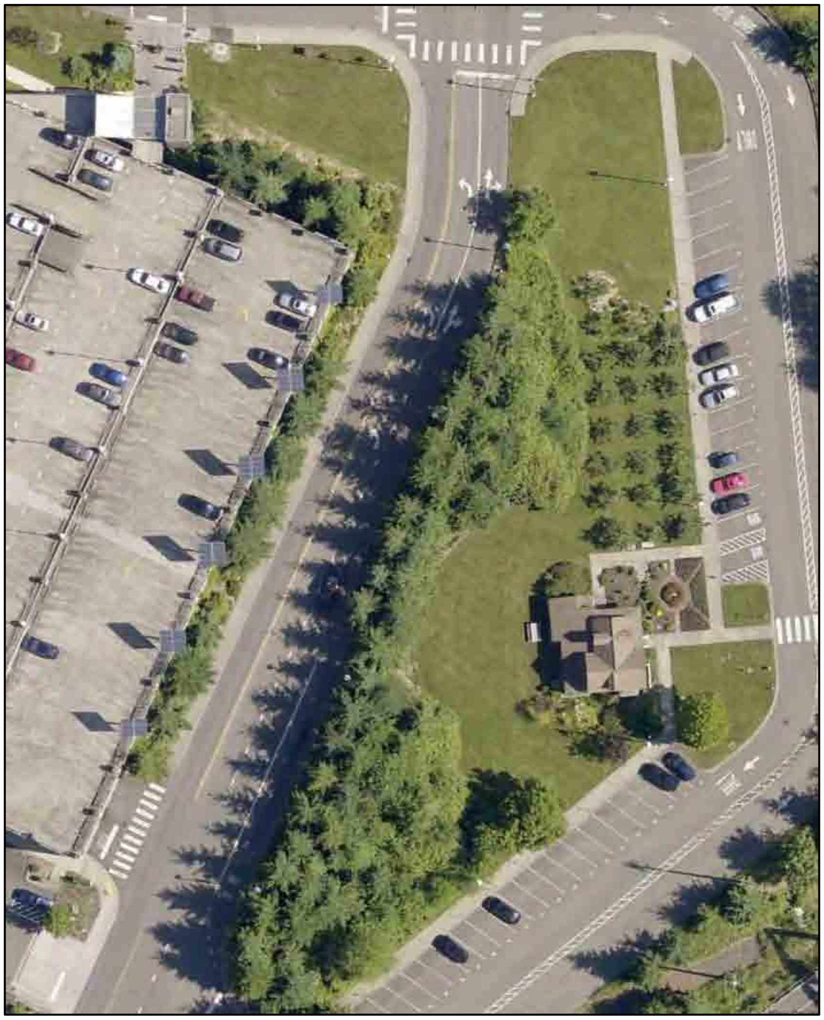
Above, an undated historic view of the Chase Residence (image courtesy of Bothell Historical Museum, "Bothell Then and Now").

Below, the present day Chase Residence, view looking west (BOLA, July 29, 2016).



Above left, historic portrait photo of Reuben Chase in his Civil war uniform. Above right, Chase and his second wife, Alice, circa 1905 (images courtesy of the Bothell Historical Museum).

Left, an aerial view of the Chase Residence and other houses in the Stringtown area in 1936. This area is presently the southern part of on the UW Bothell/Cascadia College campus (King County i-map).



Left, an aerial view from 2013 of the Chase Residence and surrounding area near the southeast edge of the campus (King County i-map). The landscaped berm to the west serves to buffer the building visually from newer structures. Below, current view of the building's exterior and the orchard, which was planted nearby to indicate the original rural setting.

6. RECOMMENDATIONS

Impacts of Potential Demolition

Several options in the proposed Campus Master Plan call for removal of the Truly House to allow for future expansion of campus facilities and new construction on its site.

The house is not individually listed on the National Register, and it is not a designated local landmark. As a single building it is insufficient to constitute a National Register Historic District. With the loss of integrity that has accompanied the relocation and changes in its setting, the present building cannot convey its historical significance and it does not appear eligible for the National Register of Historic Places. The National Register criteria strongly discourage inclusion of buildings that have been moved from their original locations unless they are "significant primarily for architectural value" or where the building is "the surviving structure most importantly associated with a historic person or event" (National Register Bulletin 15, p. 2). The Truly House was significant as part of an agricultural assembly, and thus does not appear to meet this exception. As a result, potential demolition does not appear to impact an historic resource.

As part of the original acquisition of the Truly Ranch property and development of the campus, the University addressed impacts on the historic ranch property. The July 7, 1997 HABS report was prepared "in response to a Memorandum of Agreement (MOA), regarding the construction of the University of Washington, Bothell/Cascadia Community College Campus, Bothell, King County, WA (Permit No. 35-4-01737), which was signed by representatives of the Seattle District Army Corps of Engineers, and the Washington State Office of Archaeology and Historic preservation, with concurrence of the Washington Higher Education Coordinating Board, [and] which was accepted by the Federal Advisory Council on Historic Preservation on June 28, 1996. The MOA was prepared because the construction of the campus will or may have an effect upon the National Register eligible Boone Farm Historic District." The HABS report served to mitigate these impacts by providing "historic documentation of the nine buildings and one structure on the site and as an appendix, several written family histories, which describe the life of Benjamin Ewing Boone and his family, which were written by his daughter, Lila Ellen Boone Michael" (Boyle Wagoner, July 7, 1997, p. 17)].

Additional Recommendations

Given the University's past efforts to retain the Truly House, its relocation should be considered as an alternative to demolition. The building is a sound. It appears to have value and it embodies energy. Should the adopted Campus Master Plan and future development involve new construction on its present site, the University should consider the following actions.

- Relocate the building to another location on the campus if an appropriate site can be identified. Analyze available new sites that provide sufficient space for the building and visual buffering from other campus building.

- Relocation of the Truly House near or next to the historic Chase Residence has been suggested. This is not recommended. Such a placement would create a false sense of history, not just about Truly House, but also of Stringtown. This small community, of which the Chase Residence is the only remaining building, was once a collection of individual dwellings along an established road. In contrast, the Truly House, as part of a family ranch, was isolated from its neighbors on a separate agricultural property. Stringtown was the home to pioneer families associated the early logging industry, and its architectural legacy is represented by in the Chase Residence. The two houses are of different styles and date from different eras. Grouping them together would be an inauthentic representation of the past.

- Relocate the Truly House off-campus by undertaking outreach efforts to identify interest by individuals or local parties in moving the building. To assist in this action the University could undertake a feasibility study to identify potential receiving sites, the technical design and construction issues, and estimated costs. The University should consider offering the building to a new owner with the demonstrated ability to relocate and retain it, and provide financial assistance equivalent to the cost of demolition.

- If relocating the building is infeasible and if there is inadequate interest by other parties, the building should be carefully evaluated by an experienced salvage contractor. The building elements and materials should be salvaged and made available for reuse.

- The University should continue to recognize the legacy of Bothell's agricultural past with educational programs that explore this history in the University's curriculum, such as oral history programs or cultural resource studies, and develop additional educational events for the university community and public that raise awareness of this history.

Reinforce the History of the Chase Residence

The Chase Residence is a recognized local landmark and National Register property, and it contributes to the historic legacy of the campus. Despite its reuse and changes to the surroundings, the building retains its ability to convey its historical significance and aspects of orignal design, materials, workmanship, feeling and association, in addition to its location. integrity of setting. The proposed Campus Master Plan retains the building in its present location, and the options cited in the plan do not appear to impact this historic resource.

Efforts to preserve and reinforce the historic character of the Chase Residence should continue. Recommendations include the following:

- The setting for the residence has been changed in ways that are inconsistent with the original site. Nearby parking should be reconfigured to move striped paving and curbs away from the front of the building. The revised design should be based on documentation of the original site setbacks.

- As interior changes are made, provide new finishes, such as wood flooring and trim, consistent with domestic buildings of the late 19th and early 20th century.

- Provide occupants with historic information about the house to encourage their stewardship.

- Celebrate the legacy of the original owner, Dr. Reuben Chase, through publications and public programs on the emergence of medicine in the pioneer era. Consider alternative future use of the Chase Residence for campus-related functions related to healing, medical treatment, and counseling.

7. BIBLIOGRAPHY AND SOURCES

Bevier, Charles, "Bothell home receives historic honor," *Bothell Citizen*, January 2, 1991, p. A2.

Bothell Historical Museum, email correspondence between volunteer Pat Pierce and Julia Grey, August 2016.

Bothell Landmark Preservation Board, *Bothell Then & Now, 1909-2009*. Bothell, Washington, n.d.

Boyle/Wagoner Architects, and John Stamets, photographer. HABS WA-218. "Boone/Truly Ranch 1119 Northeast 185th Street, Bothell, King County, WA 98011." Survey (Photographs, Written Historical and Descriptive Data), Historical Architectural Building Survey, National Park Service, U.S. Department of the Interior, July 7, 1997.

City of Bothell (email correspondence between Sarah Church, Landmarks, and Julia Grey, August 2016).

Freidberg, Jill, "UW Bothell Community Voices Digital Oral History Collection" http://www.jillfreidberg.com/uw-bothell.html (oral history with Jeff Truly), ca. 2013.

Garwood, Robert D. and the City of Bothell, "Dr. Reuben Chase House, National Register Nomination," July 9, 1990 (available from the DAHP website, WISAARD database).

Glumac, wwwglumac.com (Discovery Hall photograph) (accessed March 8, 2017).

King County Assessor, i-Map (property records for 18140 110th Avenue NE, Bothell, WA 98011, and aerial photographs), http://gismaps.kingcounty.gov/iMap (accessed March 8, 2017).

Ott, Jennifer. "Due to construction of Lake Washington Ship Canal…Black River Disappears." October 01, 2012. HistoryLink.org, http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=686 (accessed August 8, 2016).

National Register of Historic Places, "Bulletin 15, How to Apply the National Register Criteria for Evaluation," 2002.

Pennucci, Annie. *Higher Education Branch Campuses in Washington State: Interim Report*. Washington State Institute for Public Policy, Olympia, December, 2002.

Roloff, Oscar, "Daughter of pioneer Bothell doctor recalls his practice," *Bothell Citizen*, September 3, 1975, p. A-9.

Seattle Times (Seattle Times Archives database, available from the Seattle Public Library database).
"Turning a Farm into a Campus – UW, Cascadia Combining on New Kind of School," August 24, 1994, p. B3.
"UW Campus a Model of Sharing – 1st Phase of Unique Project to Open in '98," October 3, 1995, p. B1.
"Graveyard offers life stories – Exploring the Eastside," October 28, 2004, p. B3.
"UW Bothell/Cascadia Community College wetland trails - Walkabout," May 31, 2007, p.G6.

Stickney, Amy Eunice and Lucie McDonald, *Squak Slough, 1870-1920* (corrected copy, available at the Bothell Historical Museum). Bothell: Friends of the Bothell Library, 1977.

University of Washington Bothell and Cascadia College.
"Long-Range Physical Development Plan," Seattle 2003.
"2006 Campus Facilities Master Plan," Seattle 2006.
"2010 Master Plan (Revised 2011)," Seattle 2011.
"Quick Facts," n.d., https://www.uwb.edu/getattachment/admin/publications/uwb-quick-facts.pdf (accessed March 8, 2017).
"Points of Interest, Truly House – The Truly House – The Boon Family Ranch House."
"About UW Bothell – History," n/.d.
"On Campus – Things to Do On Campus," n.d.
UW Bothell E-News
"Passages, Longtime UW Bothell friend Richard H. 'Dick' Truly," January 2009.
"New parking lot adds 143 spaces on campus," April 2016.

University of Washington.
"University of Washington Master Plan – Seattle Campus." January 2003.
Libraries. Manuscripts and Special Collections. Digital Photo Collections, http://content.lib.washington.edu/all-collections.html (accessed April 28 and June 7-8, 2016).

Van Dyke, Amy, Director of Physical Planning and Space Management, UW Bothell, email correspondence with Susan Boyle, BOLA. July – August, 2016.

Warner, John P. "Historical Resources Assessment of the University of Washington, Bothell Branch and Cascadia Community College Collocation Project at the Truly Farms/Stringtown Site, Bothell Washington." Historical Research Associates: August 18, 1995.

Washington Higher Education Coordinating Board. "Final Environmental Impact Statement for the Development of the Collocated Campus of Cascadia Community College & the University of Washington – Bothell at Truly Farms – Stringtown." Olympia, September 1995.

Washington Higher Education Coordinating Board in Association with NBBJ. "Campus Master Plan: Cascadia Community College & The University of Washington – Bothell at Truly Farms – Stringtown." September 1995.

Wilma, David. "Bothell—Thumbnail History." June 12, 2003. HistoryLink.org. http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=4190 (accessed August 1, 2016).

APPENDIX G

Transportation Discipline Report

Final Transportation Discipline Report

UNIVERSITY OF WASHINGTON BOTHELL / CASCADIA COLLEGE CAMPUS MASTER PLAN EIS

Prepared for:
University of Washington Bothell

July 5, 2017

Prepared by:

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Chapter 1. Introduction

This document provides technical analysis in support of the transportation element of the Final Environmental Impact Statement (FEIS) prepared for the proposed University of Washington Bothell (UW Bothell)/Cascadia College (CC) Campus Master Plan. The following provides an overview of the project description and analysis approach. Further details are provided in subsequent sections that are specific to key transportation elements.

Alternatives Evaluated

Four Campus Master Plan Alternatives and two No Action Alternatives were evaluated and the results summarized in this report. Currently, the Campus leases off-site facilities to accommodate the demand. The Campus Master Plan Alternatives are developed with the intent to accommodate all campus functions on-site. The Alternatives evaluated in this study are defined as follows:

- No Action Alternatives
  - Scenario A - Baseline – Transportation impacts of the Campus Master Plan Alternatives are being compared to a future 2037 baseline condition assuming no growth in Campus population to identify and disclose SEPA related impacts.
  - Scenario B – Allowed in PUD – This alternative considers the campus population buildout numbers under the original (Phase 1) and existing PUD as identified and evaluated in the 1995 EIS. Build out would include the remaining 1,143,800 gross square feet (gsf) in the PUD (approximately 464,300 gsf) of campus building area as compared to the existing conditions, student enrollment up to 10,000 on-campus student full-time equivalents (FTE) and no change to the campus access and circulation patterns. An on-campus parking supply of 4,200 – 6,600 stalls were identified in that analysis. The range is a result of changes assumed in the mode split assumptions for the on-campus population.
- **Alternative 1 - Develop Institutional Identity (Southward Growth)** – This alternative includes an increase of approximately 816,500 gsf of academic and 255,800 gsf of housing compared to existing conditions resulting in a total campus building area of 1,830,000 gsf. Consistent with the No Action Alternative, student enrollment is assumed up to 10,000 on-campus student FTE. On-campus housing is proposed in the southern portion of the campus and would include a net increase of 959 beds for a total of 1,200 beds[1]. The existing housing (Husky Village) would remain but it would likely be configured and the bed count would be reduced. The projected student housing count referenced in this alternative reflects any decompression of the existing Husky Village housing and addition of new housing. Existing access points to the campus are assumed to remain unchanged except for the emergency access gate on NE 185th Street, which is proposed to be relocated west. This would require vehicular access to Husky Hall and Husky Village from the internal campus roadways. Campus circulation patterns may change from existing conditions due to the distribution of parking on campus. Up to 3,700 parking stalls are proposed, representing an increase of approximately 1,400 stalls on-campus compared to existing conditions.
- **Alternative 2 - Develop the Core (Central Growth)** – This alternative includes an increase of approximately 816,500 gsf of academic use and 90,800 gsf of housing resulting in a total campus building area of 1,665,000 gsf. Consistent with the No Action Alternative, enrollment was assumed up to 10,000 on-campus student FTE. On-campus housing is proposed in the eastern portion of the campus, on the east side of campus way. A net increase of 359 beds is

[1] The existing campus housing is apartments. The Campus Master Plan includes consideration of more traditional campus housing (dormitory) with dining services. As a conservative estimate of potential traffic and parking impacts of the Campus Master Plan, the initial analysis assumes apartment housing (with a higher parking per bed ratio than would be anticipated for a dormitory).

proposed for a total of 600 beds[2]. The existing housing (Husky Village) would remain. Existing access points to the campus are assumed to remain unchanged. Campus circulation patterns may change from existing conditions due to the distribution of parking on campus. Up to 3,700 parking stalls are proposed, representing an increase of approximately 1,400 stalls on-campus.

- **Alternative 3 - Growth Along Topography (Northward Growth)** – This alternative includes an increase of approximately 848,300 gsf of academic use (due to demolition of Husky Hall—31,800 gsf) and 165,000 gsf of housing (due to demolition of Husky Village—74,200 gsf) resulting in a total campus building area of 1,665,000 gsf. Consistent with the No Action Alternative, enrollment was assumed up to 10,000 on-campus student FTE. Existing student housing in the north areas of campus would be redeveloped resulting in a total of 600 beds[2]. An additional access point would be created through realignment of 110th Ave NE westward at the north end of campus (through the Husky Hall site and western Husky Village). The eastern 110th Ave NE/Beardslee Boulevard intersection would remain. No modification to the southern access point is proposed. Campus circulation patterns may change from existing conditions due to the distribution of parking on campus. Up to 4,200 parking stalls are proposed, representing an increase of approximately 1,900 stalls on-campus.
- **Alternative 4 – Blended Alternative** – This alternative includes an increase of approximately 684,720 gsf of academic use (due to demolition of Husky Hall—31,800 gsf) and 235,448 gsf of housing (due to demolition of Husky Village—74,200 gsf) resulting in a total campus building area of 1,800,000 gsf. Consistent with the No Action Alternative, enrollment was assumed up to 10,000 on-campus student FTE. On-campus housing is proposed in the southern portion of the campus and would include a net increase of 959 beds for a total of 1,200 beds. Existing access points to the campus are assumed to remain unchanged except for the emergency access gate on NE 185th Street, which is proposed to be relocated west. This would require vehicular access to Husky Hall and Husky Village from the internal campus roadways. Campus circulation patterns may change from existing conditions due to the distribution of parking on campus. Up to approximately 4,200 parking stalls are proposed, representing an increase of approximately 1,700 stalls on-campus compared to existing.

The proposed Campus Master Plan has a 20-year planning horizon. All the Campus Master Plan Alternatives consider up to 10,000 on-campus student FTE. The two No-Action alternatives evaluate the future conditions with the expansion of the campus from its current on-campus student FTE levels to the 10,000 on-campus student FTEs permitted with the existing PUD approvals. It is anticipated that there would be near-term development over the next 10-years including an increase of approximately 200,000 gsf of academic use and 149,800 gsf of housing. Enrollment for campus is assumed to be up to 8,739 on-campus student FTE. On-campus housing is proposed in the southern portion of the campus and would include a net increase of 501 beds for a total of approximately 742 beds[3]. Up to approximately 3,123 parking stalls are proposed (including 171 stalls off-site), representing an increase of approximately 660 stalls compared to existing. This report includes an evaluation of the near-term impacts associated with the next 10-years of campus buildout.

[2] The existing campus housing is apartments. The Campus Master Plan includes consideration of more traditional campus housing (dormitory) with dining services. As a conservative estimate of potential traffic and parking impacts of the Campus Master Plan, the initial analysis assumes apartment housing (with a higher parking per bed ratio than anticipated for a dormitory).

[3] The existing campus housing is apartments. The Campus Master Plan includes consideration of more traditional campus housing (dormitory) with dining services. As a conservative estimate of potential traffic and parking impacts of the Campus Master Plan, the initial analysis assumes apartment housing (with a higher parking per bed ratio than dormitory).

Study Approach and Area

The scope of the transportation analysis conducted for the FEIS has been based on information from the Autumn 2016 SEPA scoping period and coordination with City of Bothell staff. The following transportation elements are evaluated in this report:

- Street System
- Pedestrians and Bicycle Transportation
- Transit Service
- Traffic Volumes
- Traffic Operations
- Traffic Safety
- Parking

The transportation analysis evaluates a planning horizon year of 2037 for the alternatives identified and described above. Transportation impacts are identified by comparing the 2037 Baseline Alternative conditions, assuming no growth in on-campus student FTE, to the four Campus Master Plan Alternatives.

The scope of this transportation analysis meets the concurrency requirements outlined within the City of Bothell Municipal Code (BMC 17.03) and in the Transportation Element of the *City of Bothell 2015 Period Plan and Code Update Imagine Bothell…Comprehensive Plan* (herein referred to as Comprehensive Plan) adopted by the City Council July 7, 2015. To comply with City of Bothell concurrency requirements, an analysis is required for all concurrency corridors impacted by 10 or more weekday PM peak hour trips. Based on the estimated trip generation and distribution (see Chapters 3-6), the following corridors are anticipated to be impacted by 10 or more peak hour trips and are evaluated as part of this analysis:

- **SR 524 (208th Street SE/Maltby Road) Corridor** between 9th Avenue SE and SR 527
- **SR 527/Bothell-Everett Highway/Bothell Way Corridor** between SR 524 and SR 522
- **228th Street SE Corridor** between 4th Avenue W and 39th Avenue SE
- **39th/35th Avenue SE/120th Avenue NE/NE 180th Street** between 228th Street SE and 132nd Avenue NE
- **Beardslee Boulevard/NE 195th Street Corridor** between NE 185th Street and 120th Avenue NE
- **SR 522 (NE Bothell Way) Corridor** between 96th Avenue NE and Kaysner Way
- **NE 145th Street/Juanita-Woodinville Way NE/NE 160th Street** between 100th Avenue NE and 124th Avenue NE

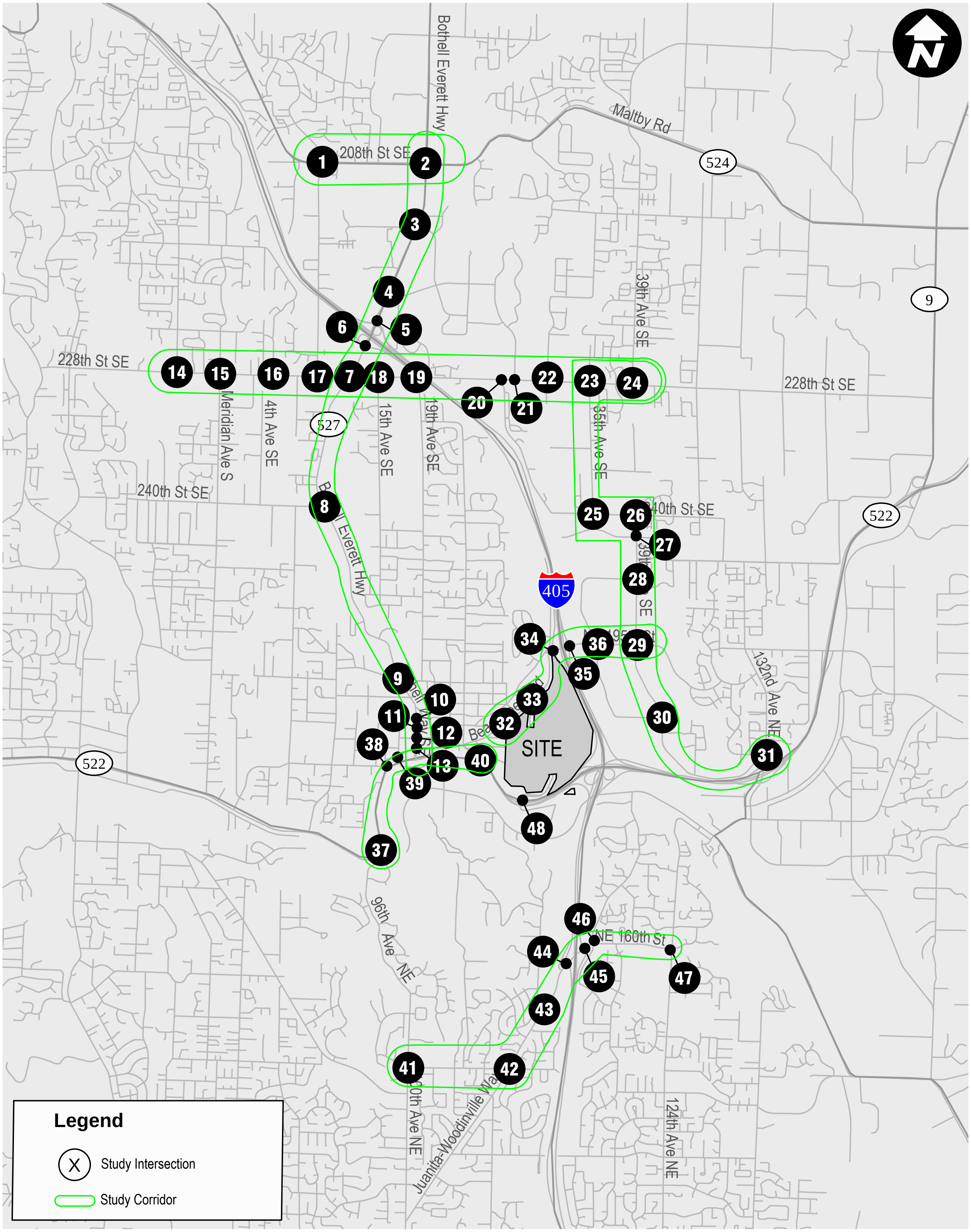
In addition to the corridors listed above, the proposed site access points along Beardslee Boulevard and SR 522 are evaluated with respect to traffic operations. The study area including study intersections and corridors are shown on Figure 1.

Report Organization

This report is organized into the following sections:

- **Chapter 1 Introduction** – This section outlines project background, description of alternatives, and overall approach and scope to the transportation analysis completed for the project.
- **Chapter 2 Affected Environment** – This section documents the existing transportation conditions focusing on the transportation elements noted above.

- **Chapter 3 Impacts of No Action Alternatives** – This chapter describes the No Action transportation conditions for the elements noted above under both Scenario A (Baseline) and Scenario B (Allowed in PUD) conditions.
- **Chapter 4-7 Impacts of Action Alternatives 1, 2, 3 and 4** – The impacts of the Campus Master Plan Action Alternatives on the transportation elements identified are described in three chapters. Transportation impacts are identified through a comparison of Alternatives 1-4 to the No Action Alternatives Scenarios A and B.
- **Chapter 8 Impacts of Near-Term Development** – This section describes the transportation impacts of development over the next ten years.
- **Chapter 9 Mitigation** – This section describes the potential transportation mitigation measures to mitigate Alternative-related impacts.
- **Chapter 10 Secondary and Cumulative Impacts** – This chapter describes secondary and cumulative impacts that could occur with development of the Campus Master Plan.
- **Chapter 11 Significant and Unavoidable Adverse Impacts** – This section documents adverse transportation-related impacts that could not be fully mitigated with the Campus Master Plan Alternatives.



Site Vicinity & Study Intersections

UW Bothell / Cascadia College Campus Master Plan

FIGURE

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Chapter 2. Affected Environment

This section provides an overview of the existing within the defined study area. The existing transportation system including street system, pedestrian and bicycle transportation, transit service, traffic volumes, traffic operations, traffic safety and campus parking are described.

Street System

The Campus is bounded by Interstate 405 (I-405) to the east, SR 522 to the south, and residential neighborhoods to the west and Beardslee Boulevard to the north. It is served by Beardslee Boulevard, a minor arterial and SR 522, a principal arterial. Campus Way NE is the main roadway within the campus with signalized intersections with both Beardslee Boulevard and SR 522. Regional access to the campus is provided via the I-405 interchange at Beardslee Boulevard and SR 522/I-405 interchange that is accessed via Campus Way NE at the southern end of the campus. Table 1 provides an inventory of the streets serving the Campus and the primary concurrency corridors.

Table 1. Roadway Network Existing Conditions Summary

Roadway	Roadway Classification[1]	Speed Limit[2]	# Lanes	Pedestrian Facilities	Bicycle Facilities	Parking
208th St SE	Principal Arterial	35 mph	5	Yes	Bike Lanes	No
Bothell Everett Hwy	Principal Arterial	45 mph	6	Yes	Bike Lanes	No
Bothell Way NE	Principal Arterial	30 mph	5	Yes	None	No
240th St SE	Minor Arterial	30 mph	2	Intermittent	None	No
228th St SE	Minor Arterial	35 mph	3	Intermittent	Bike Lanes	No
35th Ave SE	Minor Arterial	35 mph	2	Yes[4]	None	No
39th Ave SE	Minor Arterial	35 mph	5	Yes	None	No
NE 195th St	Minor Arterial	30 mph	4 – 5	Yes	Bike Lanes	No
120th Ave NE	Minor Arterial	35 mph	4 – 5	Yes	None	No
NE 180th St	Minor Arterial	35 mph	5	Yes[5]	Bike Lanes	No
SR 522	Principal Arterial/ Limited Access Hwy[3]	35 mph/ 60 mph	4	Yes[6]	None	No
NE 145th St	Local Street	25 mph	2	No	Sharrows	No
Juanita Woodinville Way	Minor Arterial	35 mph	2	No	Bike Lanes[8]	No
NE 160th St	Minor Arterial	35 mph	3-5	Yes	None	No
Interstate 405	Limited Access Hwy	60 mph	6	None	None	No
Beardslee Boulevard	Minor Arterial	30 mph	2	Yes	Bike Lanes	Yes[7]

1. Per Roadway Functional Classification Figure TR-1 of the City of Bothell 2015 Periodic Plan and Code Update July 7, 2015
2. Identified near study intersections and not necessarily along the entire length of the roadway.
3. SR 522 is a principal arterial west of the Campus and a limited access highway east of the campus.
4. Sidewalk provided on east side of roadway only.
5. Sidewalk provided on north side of roadway only.
6. Sidewalk provided on north side of roadway west of Campus Way NE only.
7. Parking is provided along the south side of the roadway.

Pedestrian and Bicycle Transportation

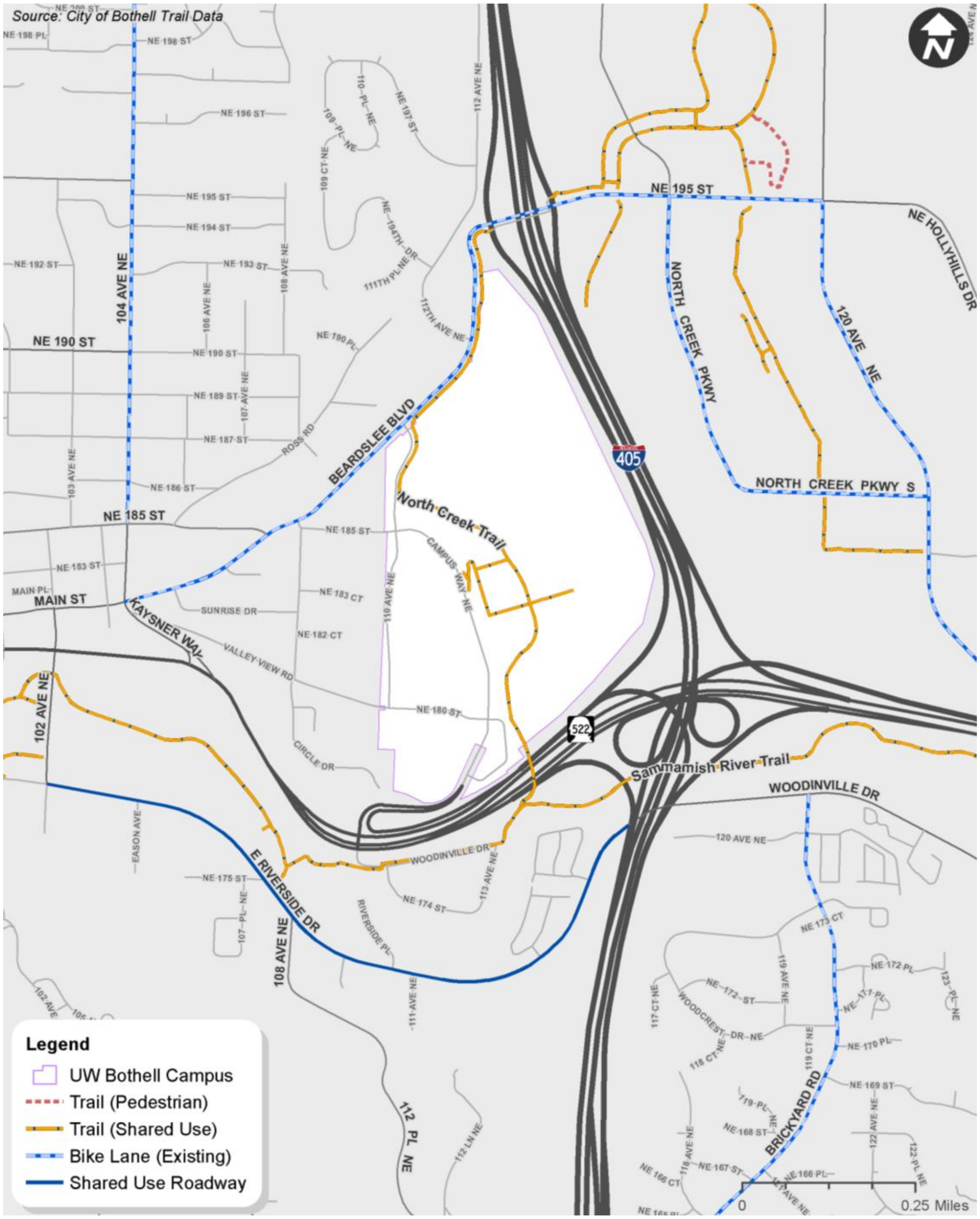
Sidewalks are provided throughout the Campus and along the streets adjacent to the campus. All the on-campus intersections and off-site access points have crosswalks on at least one leg. Along NE 180th Street west of Campus Way NE on the campus there is a midblock crosswalk, with a rapid flashing beacon, connecting the south parking garage to campus academic buildings to the north. Along Campus Way NE there is a pedestrian overpass in the center of the Campus, an at-grade crosswalk just south of the north parking garage and another at-grade crosswalk south of the WB2 Building.

Sidewalks are provided along NE 185th Street and Beardslee Boulevard connecting to Downtown. In addition, Valley View Road between Kaysner Way and 108th Avenue NE is improved to 25-feet. Previous PUD conditions for the campus required this road to be widened to its current width and a 5-foot striped shoulder be provided. This striping as well as a crosswalk at the Kaysner intersection have not been maintained. The width exists to accommodate striping consistent with the previous condition. Valley View Road connects to 104th Avenue NE in Downtown. There are pedestrian crossings at the Beardslee Boulevard/104th Avenue NE intersection.

Bicycle lanes are provided along Beardslee Boulevard between Main Street and 120th Avenue NE. A bike lane will be provided along Bothell Way within the limits of a current City of Bothell improvement project. The remaining roadways surrounding the campus have shared bicycle facilities.

In addition, there are several regional trails located in the vicinity of the campus. This includes the North Creek Trail, the Sammamish River Trail, and the Burke-Gilman Trail. The North Creek Trail runs along the east side of the Campus and connects between Beardslee Boulevard and the Sammamish River Trail. The North Creek Trail is a separated multi-use path that links the Cities of Bothell, Mill Creek, and Everett. The Sammamish River Trail runs along the south side of the Campus, south of SR 522, and can be accessed via the North Creek Trail. The Sammamish River Trail is also a separated multi-use path that links the Cities of Bothell, Woodinville, and Redmond. The Sammamish River Trail connects to the Burke-Gilman Trail. The Burke-Gilman Trail is a separated multi-use path which connects Bothell to many neighborhoods, including the University District, Wallingford, and Fremont, in Seattle and terminates in the Ballard neighborhood of Seattle. An overview of the bicycle facilities is shown on Figure 2.

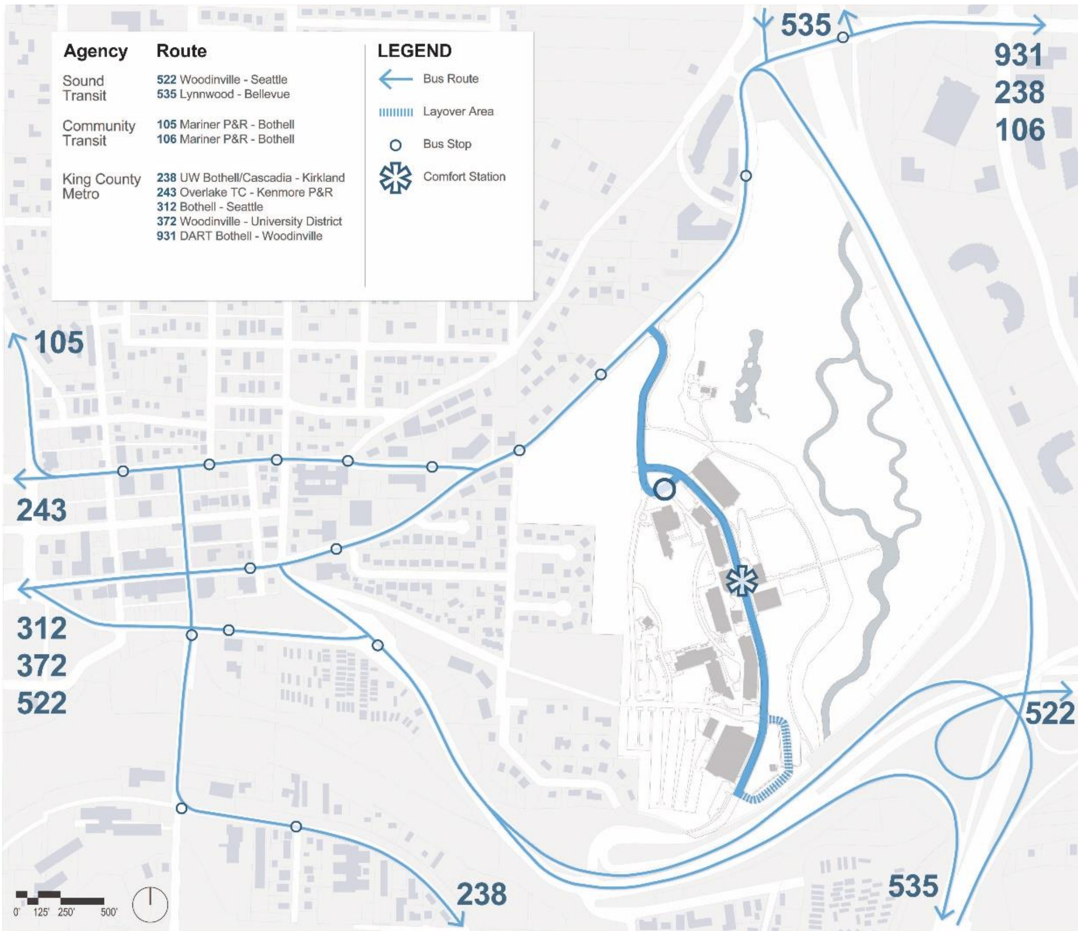
Figure 2. Existing Bicycle Facilities



Transit Service

Transit service in the area is currently provided by King County Metro, Sound Transit, and Community Transit. There is a transit center on Campus located south of NE 185th Street along Campus Way NE. Figure 3 illustrates the transit routes serving campus and the location of stops.

Figure 3. Existing Transit Routes



As illustrated in the figure, 9 routes provide transit service to the Campus and there is one stop on-site located south of NE 185th Street, connecting 110th Avenue NE and Campus Way NE. The Campus serves as the end point for 5 of the routes serving the campus and has a comfort station for transit drivers in the center of the campus and layover space at the southern end of the campus. Layover times vary from a few minutes to up to approximately 20 minutes. Current observations indicate that during the weekday PM commute period there are a maximum of approximately 5 buses using layover spaces on-campus at one time.

There are approximately 250 inbound and 250 outbound transit trips to and from the campus on weekdays. These trips serve both UW Bothell and Cascadia College. Figure 4 illustrates the weekday service to the Campus between 6 a.m. and 7 p.m. The figure shows that during the peak morning and evening hours there are approximately 45 buses serving the campus. Observations at the existing transit center on-campus indicate that during peak periods the amount of space is inadequate and transit vehicles queue outside the transit center waiting to access the bus stops. Additional detail on specific routes is summarized in Table 2.

Figure 4. Weekday Transit Service to Campus

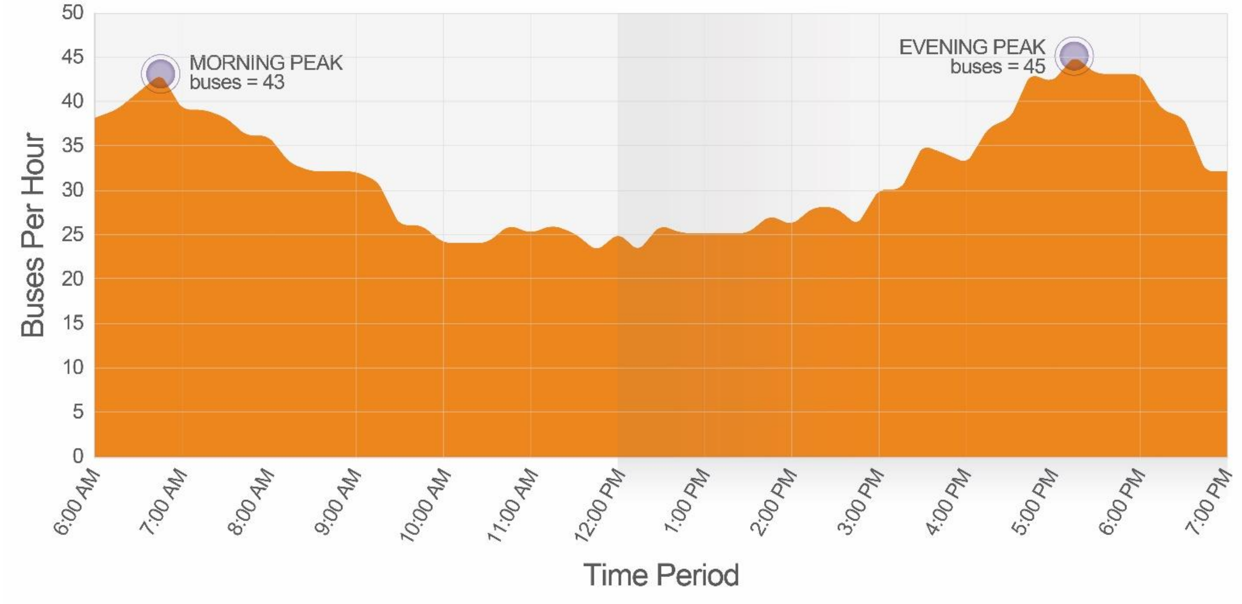


Table 2. Summary of Existing Transit Service

Route	Agency[1]	Hours of Operation at Campus	Weekday AM Peak Hour Headway	Weekday PM Peak Hour Headways	Starts/ Terminates at Campus
105 (Bothell to Mariner P&R)	Community Transit	Mon – Fri: 5:31 a.m. to 9:53 p.m. Sat: 6:43 a.m. to 9:43 p.m. Sun: 7:20 a.m. to 8:20 p.m.	30 Minutes	30 Minutes	Yes
106 (Bothell to Mariner P&R)	Community Transit	Mon – Fri: 6:23 a.m. to 8:32 a.m. 5:32 p.m. to 7:23 p.m.	30 Minutes	30 Minutes	Yes
535 (Bellevue to Lynnwood to Everett)	Community Transit	Mon – Fri: 6:15 a.m. to 10:44 p.m. Sat: 8:41 a.m. to 10:40 p.m.	30 Minutes	30 Minutes	No
238 (Woodinville P&R to UW Bothell/CC to Kirkland)	King County Metro	Mon – Fri: 5:23am to 6:51pm Sat: 7:55 a.m. to 6:50 p.m. Sun: 8:50 a.m. to 4:48 p.m.	30 Minutes	30 Minutes	No
243 (Overlake TC to Kenmore P&R)	King County Metro	Mon – Fri: 6:08 a.m. to 7:33 a.m. to Kenmore Mon – Fri: 5:32 p.m. to 7:00 p.m. to Overlake TC	30 Minutes	30 Minutes	No
312 (UW Bothell/CC to Downtown Seattle)	King County Metro	Mon – Fri: 4:33 a.m. to 8:48 a.m. to Downtown Seattle Mon – Fri: 3:34 p.m. to 8:06 p.m. to UW Bothell/CC Campus	10 Minutes	10 Minutes	Yes
372 (Bothell to University District)	King County Metro	Mon – Fri: 5:11 a.m. to 11:53 p.m.	15 Minutes	15 Minutes	Yes
522 (Woodinville to Seattle)	Sound Transit	Mon – Fri: 6:14 a.m. to 12:12 a.m. Sat: 7:13 a.m. to 12:16 a.m. Sun: 7:13 a.m. to 12:16 a.m.	30 Minutes	15 Minutes	No
Dart 931 (UW Bothell/CC to Redmond TC)	King County Metro	Mon – Fri: 6:16 a.m. to 9:17 p.m. 3:17 p.m. to 7:16 p.m.	30 Minutes	30 Minutes	Yes

1. Schedule based on King County Metro, Community Transit, and Sound Transit, December 2016.

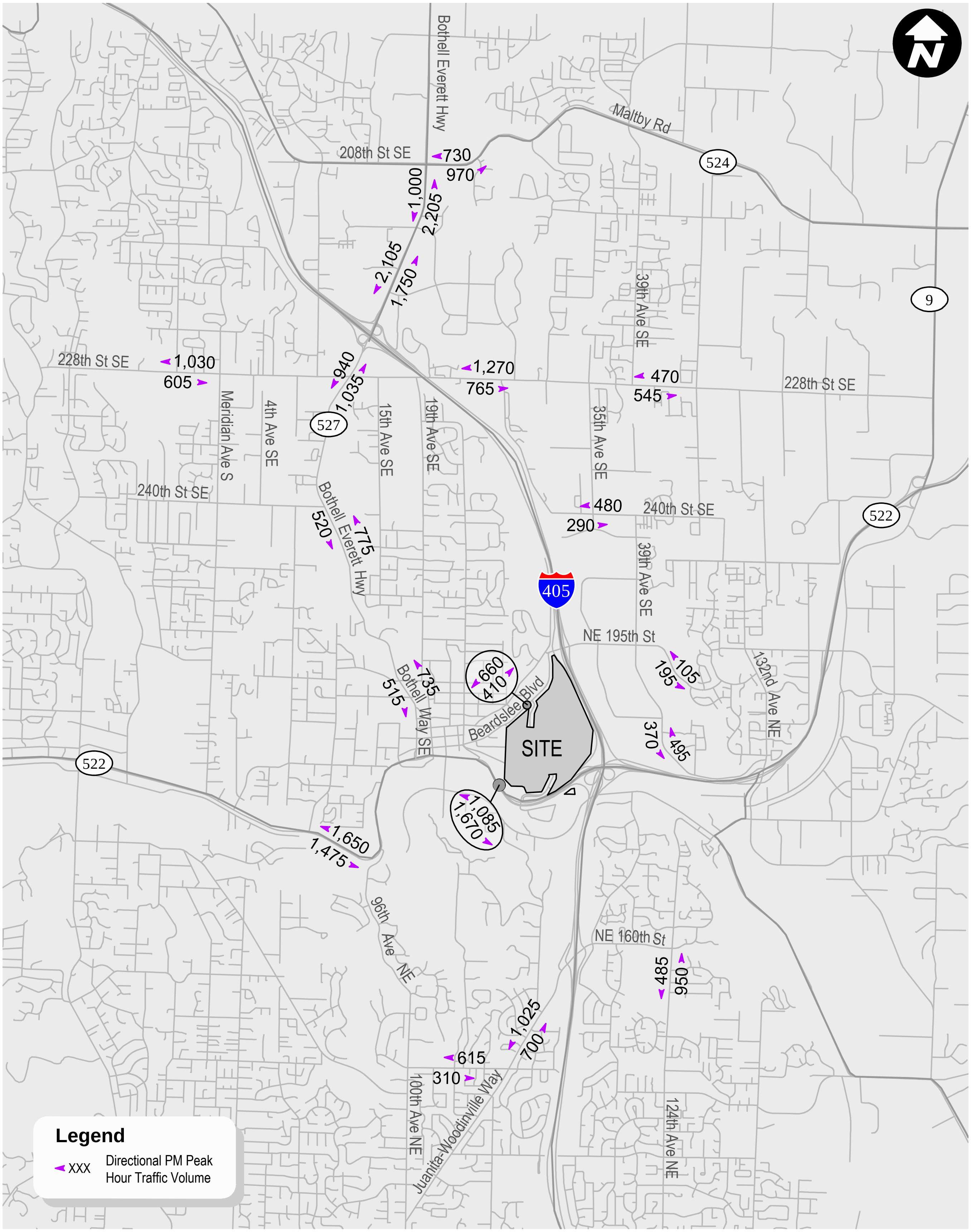
Traffic Volumes

The following describes traffic volumes off-site (see Figure 1 for study area) and trip generation generated by the existing campus.

Off-Site

Existing traffic counts at the study intersections were conducted in October 2016, November 2016 and January 2017. Downtown Bothell is currently under construction with major roadway improvements; therefore, existing traffic volumes for intersections within the Downtown were developed using the 2015 traffic counts included in the Comprehensive Plan and growing these volumes by 6 percent per year for 2-years. The growth rate of 6 percent is based on a comparison of 2015 and 2016 traffic counts for intersections just outside the Downtown area. Figure 5 shows existing weekday PM peak hour traffic volumes along the study corridors rounded to the nearest five vehicles to account for daily fluctuations. Existing turning movements for each study intersection are provided in Appendix A.

Along Beardslee Boulevard, during the weekday peak hours, campus-related vehicle traffic represents approximately 19 to 23 percent of the traffic volume west of 110th Avenue NE and 33 percent of the traffic east of 110th Avenue NE.



Existing (2017) Weekday PM Peak Hour Traffic Volumes

FIGURE 5

UW Bothell / Cascadia College Campus Master Plan

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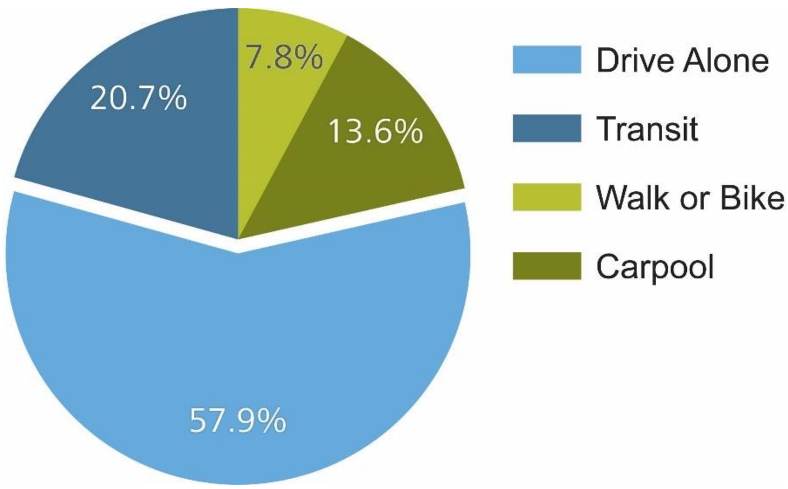
Campus

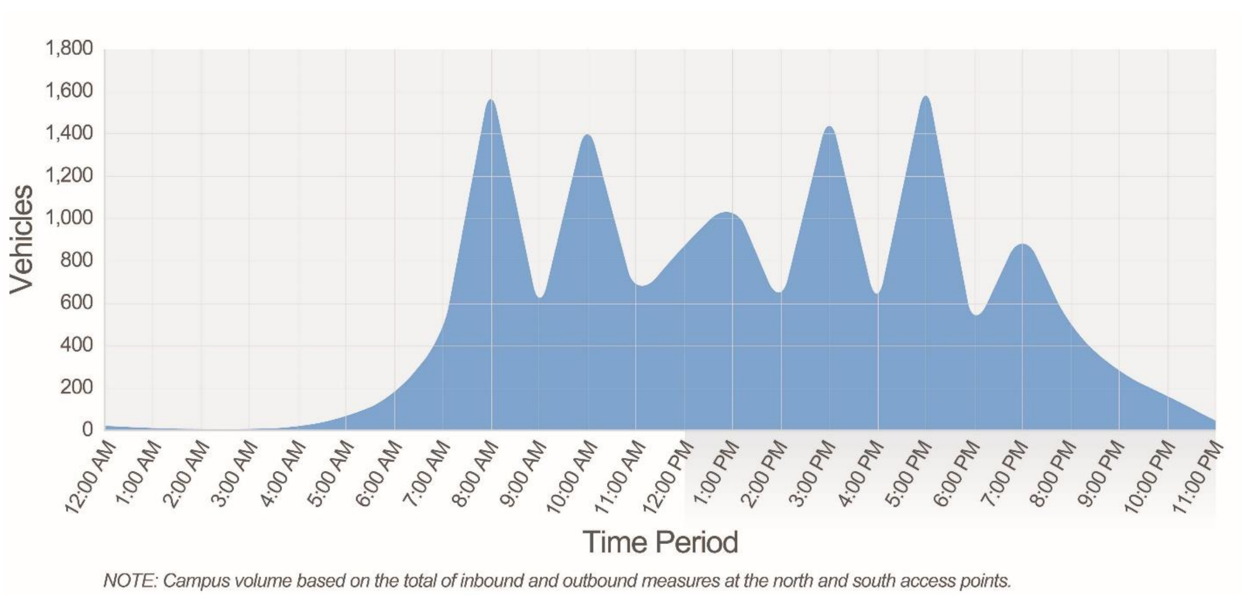
Travel to campus occurs through personal vehicles, walking and biking, as well as transit. Intercept surveys were conducted on October 11 and 12, 2016 between 10 a.m. and 1:30 p.m. to identify how students, faculty, and staff travel to and from campus and the routes travelled. Figure 6 indicates the existing mode splits for the campus. A total of approximately 450 surveys were conducted of unique respondents over the two-day period. As shown on the figure, the majority of travel to campus is currently via vehicle and mostly drive alone.

Figure 6. Existing Campus Travel Mode Splits



Traffic volumes were also collected for two-days in October 2016 along Campus Way NE (on-campus) to identify the vehicle activity levels on-campus. Figure 7 illustrates the average daily traffic volumes for the campus. As shown in the figure, peak activity occurs during the morning and evening commuter periods; however, the late morning and early afternoon volumes are comparable.

Figure 7. Weekday Two-Day Average Campus Way NE Traffic Volumes



Existing vehicle trips rates were calculated based on the October 2016 traffic volumes described above for the commuter students and Fall 2015 counts at the Husky Village driveways for the residential students. Trip generation for the campus has two components: (1) commuter-related trips and (2) campus housing trips. Commuters and residents have different trip generating characteristics since on-campus residents typically drive less given that the campus is within walking distance.

Trip generation for use in transportation impact analyses is typically estimated based on students or beds for University/College uses. Based on previous experiences with similar University projects, total on-site student FTE provides the basis for estimating commuter trip generation and total beds is the basis for estimating residential trip generation. While the Institute of Transportation Engineers' *Trip Generation Manual*, 9th Edition contains information on University/College uses, trip generation estimates based on students, local model splits and travel characteristics is recommended. The existing commuter and residential trip rates for the campus are described below.

The commuter trip rate is based on trips per student FTE and the housing trip rate is trips per bed. The existing student FTE for the campus includes 2,842 Cascadia College student FTE and 5,375 University of Washington Bothell student FTE for a total of 8,217 student FTE. This population includes 371 online students; therefore, the total on-campus population is 7,846 student FTE. There are 241 occupied beds at the existing Husky Village campus housing. Therefore, the total commuter student FTE is 7,605.

Commuter Trip Rate. Due to the number of leased facilities and the use of on-street parking, several elements were included in the calculation of the existing trip rate. Key data used to determine the commuter trip rate include:

- **Campus Traffic Counts**: Data was collected for 3-days between October 25 and 27, 2016 along 110th Avenue NE south of Beardslee Boulevard and along Campus Way NE north of SR 522 to determine the midweek average daily and peak hour traffic volumes to and from the campus.
- **Professional Building and The Village at Beardslee Crossing Traffic Counts**: Data was collected on November 17, 2016 to identify the weekday AM and PM peak hour traffic to and from the dedicated UW parking areas for the Professional Building and The Village at Beardslee Crossing.
- **NE 185th Street Intersection Counts**: Data was collected on October 19, 2016 to identify the weekday AM and PM peak hour traffic to and from Husky Hall.
- **Review of On-Street Parking:** On-street parking data in the vicinity of the campus was collected on October 11 and 19, 2016 between 10 a.m. and 3 p.m. This data was used to estimate the potential trips associated within the campus that may be parking on-street within the immediate vicinity of the campus or in Downtown Bothell. Based on a review of the available on-street parking data, approximately 65 vehicles parked on-street during the peak hour. For purposes of estimating trip generation and to accommodate for persons that may be parking outside of the corridors adjacent to campus such as in Downtown, the total existing trips were increased 5 percent.

Based on the data outlined above, weekday daily, AM peak hour, and PM peak hour trip rates were determined for commuter students. A summary of the data and the calculated trip generation rates for commuter students is provided in Appendix B. Table 3 provides a summary of the existing commuter total trips and the associated trip rate per commuter student FTE.

Table 3. Existing Weekday Commuter Trip Generation

Time Period	Total Commuter Trips[1]			Trip Rate (per Student FTE)[2]	Trip Distribution	
	In	Out	Total		In	Out
Daily	8,090	8,010	16,100	2.12	50%	50%
AM Peak Hour	1,536	276	1,812	0.24	85%	15%
PM Peak Hour	754	1,120	1,873	0.25	40%	60%

1. Based on data collected in November and October 2016 and accounts for estimated off-campus parking.
2. FTE = full-time equivalent. Online and resident students are not included. The total campus commuter student FTE as of October 2016 was 7,605.

As shown in the table, the campus commuters currently generate approximately 16,100 vehicles per day with 1,812 occurring during the AM peak hour and 1,873 occurring during the PM peak hour.

Residential Trip Rate. Student housing for the campus is currently provided by Husky Village, which has a total of 241 beds. Data was collected on October 28 and 29, 2015 to identify the average trip generation for Husky Village. A summary of the data and the calculated trip generation rates for residential students is provided in Appendix B. Table 4 provides a summary of the existing residential total trips and the associated trip rate per bed.

Table 4. Existing Weekday Residential Trip Generation

Time Period	Total Residential Trips[1,2]			Trip Rate (per bed)[3]	Trip Distribution	
	In	Out	Total		In	Out
Daily[4]	165	165	330	1.37	50%	50%
AM Peak Hour	13	10	23	0.10	57%	43%
PM Peak Hour	17	23	40	0.17	43%	57%

1. Based on observations conducted Wednesday, October 28, 2015 and Thursday, October 29, 2015 at Husky Village housing.
2. Cars observed utilizing paid parking in Husky Village were subtracted from the trip generation counts.
3. There are 241 occupied beds.
4. Daily trips estimated assuming the weekday PM peak hour traffic is 12 percent of the total daily traffic based on a review of the midweek average counts from October 2016.

As shown in the table, the campus residents currently generate approximately 330 vehicles per day with 23 occurring during the AM peak hour and 40 occurring during the PM peak hour.

Traffic Operations

Corridor operations were reviewed in the study area consistent with the City of Bothell concurrency requirements. The corridor analysis method considers weekday PM peak hour level of service (LOS) at key intersections; the study area includes all the concurrency corridors identified by the City. The corridors were analyzed using Synchro 9. This software program provides an analysis based on methodologies presented in the *Highway Capacity Manual* (HCM).

Corridor LOS is determined as a weighted average of intersection delays and total traffic volumes along the length of each potentially impacted concurrency corridor. This method is described in the Transportation Element of the City of Bothell’s Comprehensive Plan (TR-12) and is consistent with City of Bothell concurrency standards (BMC 17.03.007). The corridor standard established by the City is LOS E.

LOS is measured in average control delay per vehicle at signalized intersections and average delay on the worst-movement or approach of unsignalized intersection. Traffic operations and average vehicle delay for an intersection can be described qualitatively with a range of levels of service (LOS A through LOS F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays. Appendix C contains a detailed explanation of LOS criteria and definitions.

For existing conditions, signal timing settings were provided by the City of Bothell. A detailed intersection LOS summary and worksheets for the study intersections are included in Appendix D. The corridor LOS results are summarized in Table 5 for the existing conditions.

Table 5. Existing and Baseline Weekday PM Peak Hour Corridor LOS Summary

Corridor	LOS[1]	Corridor Delay (sec/veh)[2]
SR 524 (208th St SE/Maltby Rd) Corridor between 9th Ave SE and SR-527	D	39
SR 527/Bothell-Everett Hwy/Bothell Wy Corridor between SR-524 and SR-522	D	37
228th St SE Corridor between 4th Ave W and 39th Ave SE	C	26
39th/35th Ave SE/120th Ave NE/NE 180th St between 228th St SE and 132nd Ave NE	C	29
Beardslee Blvd/NE 195th St Corridor between NE 185th St and 120th Ave NE	D	43
SR 522 (NE Bothell Wy) Corridor between 96th Ave NE and Kaysner Wy	C	26
NE 145th St/Juanita-Woodinville Wy NE/NE 160th St between 100th Ave NE and 124th Ave NE	C	32

1. Level of service, based on 2010 *Highway Capacity Manual* methodology.
2. Average corridor delay in seconds (sec) per vehicle (veh) calculated as a weighted average of intersections delays along the length of the corridor in seconds per vehicle.

The City of Bothell has a LOS E standard for the corridors. As shown in Table 5, all the corridors currently operate at LOS D or better during the weekday PM peak hour.

Although the LOS along Beardslee Boulevard shows LOS D conditions during the weekday PM peak hour under existing conditions, it is recognized that there are long queues within the corridor. The 95th-percentile vehicle queues were reviewed at the Beardslee Boulevard/110th Avenue NE and Beardslee Boulevard/108th Avenue NE intersections. The 95th-percentile vehicle queue is the queue length that would only be exceeded 5 percent of the time. Figure 8 illustrates the Beardslee Boulevard 95th-percentile vehicle queues.

Figure 8. Existing Weekday Peak Hour Vehicle Queues

As shown on Figure 8, there are currently long queues in the eastbound direction along Beardslee Boulevard during both the weekday AM and PM peak hours. The eastbound queues back-up passed access to Husky Village located on the south side of Beardslee Boulevard.

Traffic Safety

Collision records were reviewed within the study area to document any potential traffic safety issues. The most recent summary of collision data from WSDOT is for the three-year period between January 1, 2013 and December 31, 2015.

A summary of the total and average annual number of reported collisions as well as the collisions rate at each study intersection was reviewed and provided in Appendix E. The collision rate is representative of the number of collisions per one million entering vehicles (MEV) at each intersection. Intersections with a rate greater than 1.0 collision per MEV are typically flagged for further investigation to determine whether an adverse condition exists. Intersections with an average over 10 collisions per year or an MEV over 1.0 are summarized in Table 6.

Table 6. Collision Data Summary (2013-2015)

Intersection	Collisions per prior Year			Annual Average	Collisions Per MEV[1]
	2013	2014	2015		
9th Ave SE / SR 524 / Filbert Dr	9	9	8	9	1.07
SR 527 / SR 524	24	23	27	25	1.38
SR 527 / 220th St SE	19	16	18	18	1.14
SR 527 / 228th St SE	32	36	34	34	1.89

1. MEV = Million Entering Vehicles calculated with the assumption that weekday PM peak hour traffic volumes are approximately 10 percent of weekday daily traffic volumes.

As shown in the table, 4 study intersection have collision rates over 1.0 and 3 have more than 10 collisions per year. The year-by-year comparison at the individual intersections shows that the number of collisions per year at these four intersections has been similar for the last 3-years, which typically indicates a consistent issue. A more detailed review of the collisions at each of the intersections shown in Table 6 is presented below.

- **9th Avenue SE/SR 524/Filbert Drive** – The collisions at this intersection are rear-end or left-turn related. Rear-end collision are common along congested corridors where stop-and-go conditions exist such as along SR 524. Left-turn related collisions are common at signalized intersections with high traffic volumes and permitted left-turn signal phasing.
- **SR 527/SR 524, SR 527/220th Street SE, and SR 527/228th Street SE** – Most collisions at these intersections are rear-end. As described above, rear-end collisions are common at congested signalized intersections where stop-and-go conditions exist. Improvements were completed at the SR 527/SR 524 and SR 527/228th Street SE intersections in July 2016 to address safety issues. The historical collision rates presented is reflective of older conditions and does not consider these improvements.

As traffic volumes increase, traffic safety issues could increase proportionally. Chapter 3 Impacts of No Action Alternatives (Table 8) describes planned and future potential improvements within the study area including corridor, intersection, and adaptive signal improvements at these locations. With increased capacity and improved corridor and intersection operations, it is anticipated that safety issues would decrease within the study area.

Parking

The existing on-campus total parking supply includes 2,161 spaces for commuters[4] and 131 residential parking spaces. An additional 171 stalls are provided at off-site leased locations. The combined on-campus and off-site parking spaces total 2,463 stalls. Data was collected within the on-campus, off-site, and adjacent street parking to determine Campus parking demand for commuters and residential students.

A campus-wide parking utilization study was conducted on October 11 and 19, 2016 between 10 a.m. and 3 p.m. and at 7 p.m. Observations included the campus north and south garages and surface lots as well as Husky Hall, Husky Village commuter parking, and UW assigned parking at The Village at Beardslee and the Professional Building. On-campus parking utilization is approximately 90 percent during the peak period with many of the parking lots/garages over 90 percent full. On-street parking counts were also collected along Beardslee Boulevard between 104th Avenue NE and 110th Avenue NW and NE 185th Street between 104th Avenue NW and Beardslee Boulevard. It was assumed that all the vehicles parked on-street during the peak period were associated with the campus. Parking counts indicates that peak parking demand for commuters occurred at 12 p.m. An average peak parking demand based on the two days of data was used to determine the existing campus parking rate. In addition, the overall peak parking demand was increased by 5 percent to accommodate for commuters that may be parking in areas, such as Downtown, not captured by the parking surveys.

Residential parking counts were collected at Husky Village during the same periods as commute parking data. Although residential parking demands typically peak in the evening hours, data was collected midday to provide a campus-wide peak parking demand.

Table 7 provides a summary of the peak parking demand and calculate rates for commuter and residential students.

Table 7. Existing Weekday Peak Campus Parking Demand

Population	Size[1]	Unit	Demand[2]	Rate
Commuter	7,605	Student FTE	2,327	0.31
Residential	241	Beds	103	0.43
Total Parking Demand			**2,430**	

1. FTE = full-time equivalent. Online and resident students are not included. The total on-campus commuter student FTE as of October 2016 was 7,605.
2. Parking demand based on data collection on October 11 and 19, 2016 with a 5 percent adjustment for commuter parking demand to capture parking that may be occurring off-campus on-street.

As shown in the table, the peak campus parking demand is 2,430 vehicles. Consistent with field observations, parking on-campus is full and there is some spillover that occurs onto adjacent streets.

[4] Inclusive of faculty, staff, visitors, and students.

Chapter 3. Impacts of No Action Alternatives

This section describes the future transportation conditions for the 2037 horizon year considering the No Action Alternatives – Scenario A (Baseline) and Scenario B (Allowed in PUD). The No Action Alternatives are the metric by which impacts of the Action Alternatives are be measured against.

Both No Action Alternatives reflect no changes in the on-campus vehicular and pedestrian circulation system as well as no change in campus housing (i.e., 241 student beds would remain). Scenario A considers a baseline condition with no additional development and growth in on-campus population i.e., continuation of current conditions with 7,846 student FTE. No new campus parking would be provided under Scenario A. Under Scenario B, the future campus development would be consistent with the existing PUD approvals including a student enrollment of up to 10,000 on-campus student FTE. There would be an on-campus parking supply of 4,200 to 6,600 stalls under Scenario B.

Street System

The No Action Alternatives assumes no change in campus vehicle access and circulation. A review of local and regional capital improvement programs and long-range transportation plans was conducted to determine planned funded and unfunded transportation projects that would impact the off-site study area. The review included, but was not limited to, the City of Bothell 2017 – 2022 *Six Year Transportation Improvement Program* (TIP) and Comprehensive Plan and transportation plans for Washington State Department of Transportation (WSDOT). Table 8 provides a summary of key future street system transportation projects in the study area. The table also outlines how these transportation projects were incorporated into the 2037 Baseline analysis. All the major transportation improvements serving vehicles are anticipated to be completed by 2037; however, there are several that are currently not funded. The unfunded transportation improvements are based on the City's 2035 Comprehensive Plan analysis and it is anticipated that they would be evaluated for inclusion in the TIP as traffic demands increase and other planned projects are completed. Since the forecasted traffic reflects growth enabled by these improvements, the improvements themselves have also been included in the analysis of the intersection and corridors.

Table 8. Key Street System Planned Transportation Projects

Project Description	Responsible Agency	Expected Completion Date	Funded?[1]	Assumed in Traffic Operations Analysis?[2]
228th St SE from 35th to 39th Ave SE Widening (TIP #15): Widen 228th Street SE to 4-lanes between 39th Avenue SE and west of 35th Avenue SE approximately 300-feet. Install bike lanes and sidewalks on both side and landscaping and drainage improvements. Improve the intersections of 228th Street SE with 35th and 39th Avenues SE with ADA ramps. Provide an eastbound right-turn pocket at the 228th Street SE/35th Avenue SE intersection.	City of Bothell	2022	Yes	✓
228th St SE & 29th Dr SE Traffic & Intersection Improvements (TIP #9): Install a traffic signal and improve channelization and ADA ramps at the 228th St SE/29th Dr SE intersection.	City of Bothell	2017	Yes	✓
Beardslee Blvd Widening (Campus to I-405) (TIP #14): Add an eastbound lane along Beardslee Blvd between 110th Ave NE to I-405.	City of Bothell	2019	Yes	✓
Beardslee Blvd Widening (NE 185th St to 110th Ave NE): Widen to 4- to 5-lanes and add a northbound left-turn lane at 110th Ave NE. Rechannelize the southbound right-turn lane on 110th Ave NE to provide a through/right-turn lane on Beardslee Blvd.[3]	City of Bothell	2035	No	✓

Project Description	Responsible Agency	Expected Completion Date	Funded?[1]	Assumed in Traffic Operations Analysis?[2]
Beardslee Blvd & NE 185th St Intersection Improvements (TIP #13): Provide a roundabout or a signal at this intersection with curb ramps and crosswalks.[3]	City of Bothell	2019	Yes	✓
NE 185th St Reconstruction Beardslee Blvd to Bothell Wy & Transit Center (TIP #16): Widen and improve drainage, sidewalks, curb and gutter and landscaping along NE 185th Street between Beardslee Blvd and Bothell Way including urban elements to provide a transit oriented street. Potential intersection improvements including traffic signal at the intersections with 104th and 102th Ave NE.	City of Bothell	2022	Yes	✓
SR 522, Stage 2B Improvements (TIP #17): Continuation of the SR 522 Stage 1 Project to connect to the limits of the Bothell Crossroads project at NE 180th St. The project will improve traffic mobility, transit mobility, vehicular and pedestrian safety and improve business access. Elements of the project include installation of a business access and transit (BAT) lane westbound, sidewalks, curb and gutters and a raised median to enhance traffic safety through access management. Other potential elements include street illumination and landscaping.	WSDOT	2022	Yes	✓
SR 522, Stage 3 Improvements (TIP #7): Continuation of the SR 522 Stages 1 and 2. Roadway and BAT lanes from the end of Stage 1 and 2 improvements to 83rd Pl NE. Elements include widening general purpose lanes, adding BAT lanes in each direction (including the missing EB direction of the BAT lanes from 91st Ave NE to approximately 800-feet west of the 96th Ave NE), access management, center medians, interconnection of signals, sidewalk, curb and gutters, retaining walls, street illumination, drainage, landscaping; and utility undergrounding. The total project length is approximately 4,000 linear feet.	WSDOT	2022	Yes	✓
SR 522 Stage 4 Improvements (83rd Pl NE to Wayne Curve): Install sidewalks, access management, signal prioritization and non-motorized connections.	WSDOT	2035	No	✓
SR 527/Bothell-Everett Hwy / Bothell Way Corridor Study from SR 524 to SR 522 (TIP #20): This project will study the SR 527/Bothell-Everett Hwy/Bothell Way corridor from SR 524 to SR 522 to develop a long-range plan to address capacity and congestion. This corridor contains some of the most congested intersections in Bothell. However, to develop optimum solutions, each intersection should not be addressed individually but rather with an understanding of how the entire corridor is interrelated. This study will involve alternative analyses and public involvement.	WSDOT	2017	Yes	
SR 527 (SR 524 to I-405): Widen roadway from 2 to 3-lanes southbound from SR 524 to 220th St SE.	WSDOT	2035	No	✓
SR 527 (211th St SE to north of SR 524): Add third northbound through lane between 211th St E and north of SR 524. Add a southbound-left lane at intersection of SR 524/SR 527.	WSDOT	2035	No	✓
220th St SE/SR 527 Intersection: Add an eastbound left turn lane at this intersection.	City of Bothell	2035	No	✓
214th St SE/SR 527 Intersection: Re-channelize the westbound approach to provide a through/left and through/right turn lanes.	City of Bothell	2035	No	✓

Project Description	Responsible Agency	Expected Completion Date	Funded?[1]	Assumed in Traffic Operations Analysis?[2]
Bothell Way NE Widening (Reder Way to 204th St SE): Widen to 4 or 5-lanes and provide bike lanes, curb, gutter and sidewalk improvements.	City of Bothell	2035	No	✓
Adaptive Signal Control System, Phase 1 (TIP #8): Installation of an adaptive signal control system at 9 locations in Bothell including: 4 along SR 527 from SR 524 to 228th St SE, 4 along 228th St SE near Bothell-Everett Hwy/228th St.	City of Bothell Snohomish County Everett WSDOT	2017	Yes	✓
Adaptive Signal Control System, Phase 2 (TIP #12): Install adaptive signal control system at 13 intersections in Bothell along Bothell Wy between NE 191st St and SR 522 and along SR 522 between 96th Ave NE and Campus Wy NENE.	City of Bothell Snohomish County Everett WSDOT	2018	Yes	✓
Multiway Boulevard, Phase 2 (TIP #5): Construct phase 2 of the Multiway Boulevard linking the east and west sides of Downtown Bothell across Bothell Wy from SR 522 to Reder Wy. The Multiway Boulevard consists of 4 travel lanes, a left-turn lane, 2 side medians, 2 side lanes with parking, and wide sidewalks.	City of Bothell	2018	Yes	✓
Main Street Extension (Bothell Way to 98th Ave NE): Extends the current Main Street creating an east-west connection across Bothell Way.	City of Bothell	2035	No	✓
35th Ave SE (240th St SE to 228th St SE): Widen to 3 lanes.	City of Bothell	2035	No	✓
228th Street SE Corridor Safety Improvements (SR 527 to 19th Ave SE): Install safety improvements along 228th St SE including traffic islands, channelization, and traffic signal modifications.	City of Bothell	2035	No	✓
112th Ave NE/Juanita-Woodinville Wy NE Intersection: Add southbound right-turn pocket on Juanita-Woodinville Wy.	City of Bothell	2035	No	✓
NE 160th St/124th Ave NE Intersection: Add southbound right-turn pocket	City of Bothell	2035	No	✓
240th St SE/35th Ave SE Intersection: Install a traffic signal and widen the intersection to provide left turn pockets on the eastbound and southbound approaches OR Construct a roundabout. Provide left and right turn pockets on the westbound approach.	City of Bothell	2035	No	✓
240th St SE/39th Ave SE Intersection: Install a traffic signal and add an eastbound right turn pocket OR construct a roundabout.	City of Bothell	2035	No	✓
SR 527/228th St SE Intersection: Add an eastbound left turn lanes and northbound left turn lane.	City of Bothell WSDOT	2035	No	✓
228th St SE/Fitzgerald Rd Intersection: Add an eastbound right turn pocket	City of Bothell	2035	No	✓
228th St SE/29th Drive SE Intersection: Install traffic signal and add a westbound right turn pocket	City of Bothell	2035	No	✓

Project Description	Responsible Agency	Expected Completion Date	Funded?[1]	Assumed in Traffic Operations Analysis?[2]
228th St SE/31st Ave SE Intersection: Add a westbound right turn pocket	City of Bothell	2035	No	✓
SR 524/9th Ave SE Intersection: Add a northbound left turn lane	City of Bothell WSDOT	2035	No	✓

1. "Yes" means the project is fully funded for construction, "partial" means the project has some, but not complete funding for construction, and "no" means the project does not have any construction funding.
2. A check indicates that the project was assumed in the 2037 traffic operations analysis of corridors and intersections.
3. This analysis assumes a 5-lane cross-section including a second eastbound and westbound through lane along Beardslee Boulevard between NE 185th Street and I-405 consistent with the City of Bothell's Comprehensive Plan forecasting. Construction of the eastbound lane would require expansion to the south, impacting Campus property; a sensitivity analysis is provided for conditions without the eastbound lane.
4. The analysis assumes a traffic signal at the Beardslee Boulevard/NE 185th Street intersection. It does not assume any realignment of this intersection with NE 185th Street/108th Avenue NE. Sound Transit is completing a transit corridor study for NE 185th Street, which will evaluate improvements at this location including potential realignment.

It is noted that improvements along Beardslee Boulevard between NE 185th Street and I-405 include a 5-lane cross-section (i.e., a second eastbound and westbound lane) consistent with the City's Comprehensive Plan travel demand modelling. Construction of the eastbound lane would require expansion to the south, impacting Campus property; a sensitivity analysis is provided for conditions without the eastbound lane. Improvements at the Beardslee Boulevard/NE 185th Street intersection do not assume realignment with the south leg of NE 185th Street and 108th Avenue NE; this is evaluated as part of the Campus Master Plan Alternative 3. In addition, the Beardslee Boulevard/NE 185th Street intersection is assumed to have traffic signal control consistent with the Synchro model completed for the Comprehensive Plan analysis. Further analysis is being conducted by the City of Bothell and Sound Transit as part of Sound Transit 3 (ST3) where roundabout control is also being considered.

Pedestrian and Bicycle Transportation

There are no on-campus pedestrian or bicycle improvements anticipated with the No Action Alternatives. The City of Bothell 2017 – 2022 TIP and Comprehensive Plan were reviewed to identify pedestrian and bicycle facility improvements within the off-site study area. Many of the improvements noted in Table 8 for the street system include sidewalk, bike lane, and ADA ramp improvements. Additional pedestrian and bicycle improvements in the immediate vicinity of the Campus that are not described in Table 8 are summarized in Table 9. The Campus is partnering with the City to construct the pedestrian crossing at the Beardslee Boulevard/NE 185th Street intersection. This signalized crossing will improve connectivity between Downtown and the Campus. The East Riverside Drive Trail improvement would need to be coordinated with King County and no funding if identified in the City's 2017-2022 TIP.

Table 9. Key Pedestrian and Bicycle Planned Transportation Projects

Project Description	Responsible Agency	Expected Completion Date	Funded?[1]
Pedestrian Crossing Beacons at Beardslee Blvd & NE 185th St (TIP #11): Construct a pedestrian signal, ADA ramps, and illumination in the vicinity of Beardslee Blvd and NE 185th St.	City of Bothell	2018	Yes
East Riverside Drive Trail (102nd Avenue NE to City Limits) (TIP #42): Construct a 12-foot-wide multi-use trail along the north side of East Riverside Dr within the old railroad right-of-way for approximately 8,000-feet.	City of Bothell King County	Unknown	No

1. "Yes" means the project is fully funded for construction, "partial" means the project has some, but not complete funding for construction, and "no" means the project does not have any construction funding.

Transit Service

Transit facilities on-campus are not anticipated to change because of the No Action Alternatives. As discussed previously, King County Metro, Sound Transit, and Community Transit all provide service to the campus. All the transit agencies have plans for increased service and frequency to campus. A review of existing conditions indicates that the existing transit center is inadequate to accommodate the current service; therefore, it is anticipated that under the No Action Alternatives, without improvements, these facilities would continue to be inadequate and there would be additional buses queuing outside the transit center waiting to access the bus stops.

The 2017-2022 TIP, Comprehensive Plan, and Sound Transit, King County Metro, and Community Transit plans were reviewed to determine potential transit improvements that may impact the Campus by 2037. Table 10 highlights the key transit improvements effecting the Campus and the study area.

Table 10. Key Transit Projects

Project Description	Responsible Agency	Expected Completion Date	Funded?[1]
NE 185th St Reconstruction (Beardslee Blvd to Bothell Wy) & Transit Center (TIP #16): Provide transit oriented improvements along NE 185th St (see also Table 8).	City of Bothell	2022	Yes
Transit Park and Ride (TIP #18): Site and build a 300-parking stall park and ride.	City of Bothell King County Metro	2022	Yes
I-405 Bus Rapid Transit (BRT): Establish BRT operating in the I-405 express toll system between the Cities of Lynnwood and Renton and in the I-405 high-occupancy vehicle (HOV) lanes between Renton and Tukwila. From Tukwila to Burien, BRT would operate in bus-only lanes on SR 518. BRT stations would be provided near NE 195th Street using outside flyer stops on NE 195th Street ramps and improvements would include signage, lighting, shelters and benches, off-board fare payment, and real-time bus arrival. The BRT would provide 10-minute headways and the connection to the campus would be improved.	Sound Transit	2024	Yes
145th and SR 522 BRT: Implementation of BRT along NE 145th St/SR 523 from the Link station at Interstate 5 (I-5) to SR 522, with BRT treatments continuing on SR 522 to the Campus, and with connecting service at lower frequencies to Woodinville. On NE 145th St, this project includes transit priority spot treatments, with two stations. On SR 522, the majority of the corridor through Lake Forest Park, Kenmore, and Bothell will feature Business Access Transit (BAT) lanes to downtown Bothell, and transit priority treatments on arterials to the Campus. Project elements also include an expanded transit center on the UW Bothell/CC Campus, a 300-space parking garage in Bothell, peak and off-peak headways from NE 145th St to Campus of 10 minutes, and peak and off-peak headways between the Campus and Woodinville of 20 minutes.	Sound Transit (ST3)	2024	Yes

1. "Yes" means the project is fully funded for construction, "partial" means the project has some, but not complete funding for construction, and "no" means the project does not have any construction funding.

As shown in the table, there are planned improvements to provide transit along NE 185th Street; however, the No Action Alternatives assume the transit center in its current location. Thus, while service levels may increase the No Action Alternative analysis assumes the current transit access patterns would continue.

In addition to the specific projects highlighted above, the transit agencies have indicated plans for expanded service to the Campus. These service improvements include:

- **King County Metro Connects.** This is a long-range vision adopted by King County. Service to the Campus would include a new RapidRide line providing 15-minutes headways all-day, additional service connecting to future Sound Transit LINK light rail, and all-day 15 to 30 minute headways. RapidRide is King County Metro's bus rapid transit (BRT) service.
- **Community Transit Swift.** Swift is Community Transit's BRT. Community Transit plans to have Swift service to the Campus by 2025. This service would provide 12 to 20 minute headways all-day.
- **Sound Transit BRT.** As noted in Table 10, Sound Transit is planning BRT service to the Campus. This service would be along NE 185th Street and transit enhancements would be provided along the corridor to facilitate service. It is anticipated that this service would begin by 2024.

Traffic Volumes

The components of the future traffic volumes include both background traffic growth and growth related to the campus.

Background Forecasts

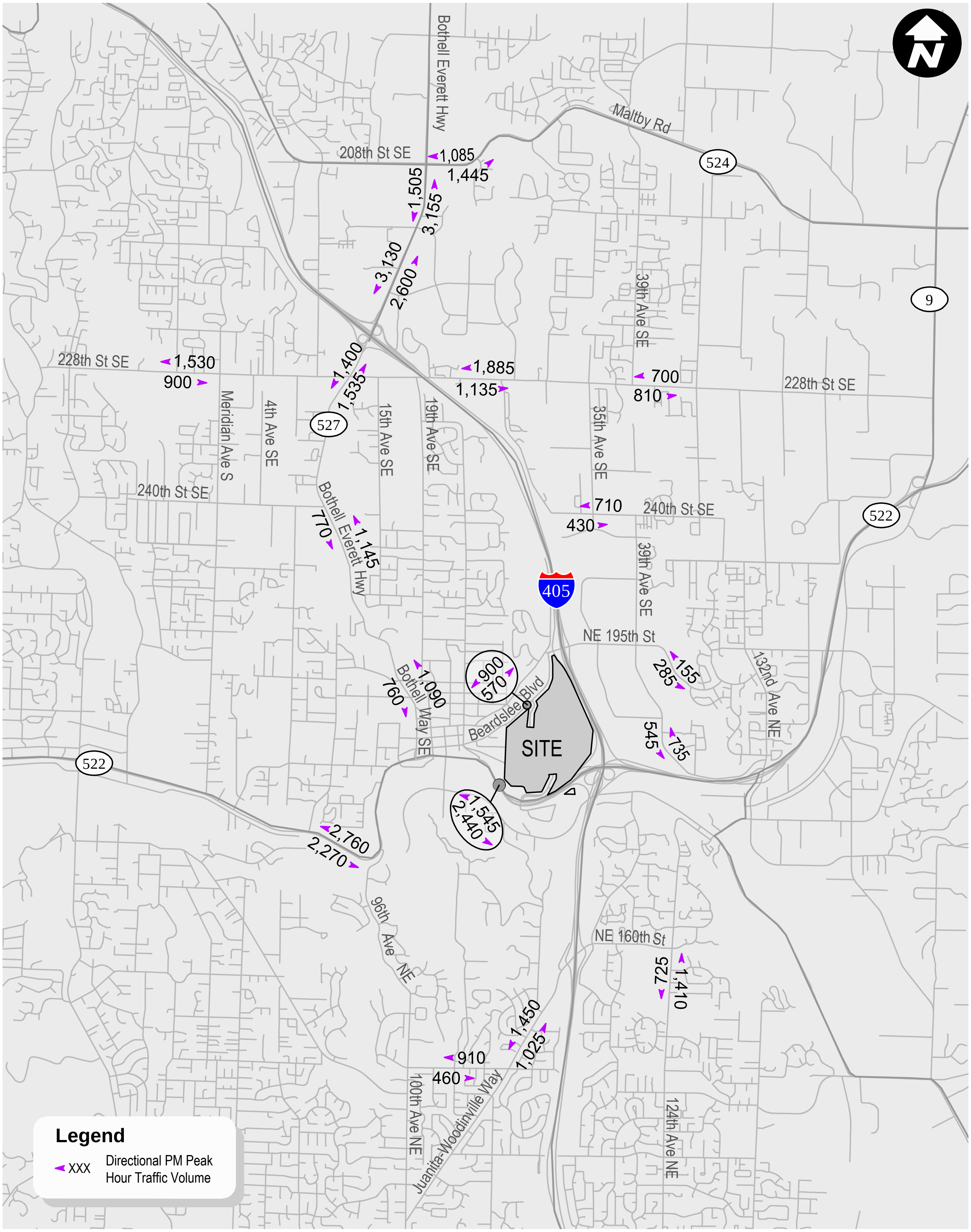
Traffic forecasts for the Scenario A 2037 baseline conditions were determined based on annual growth rates from the adopted Bothell Comprehensive Plan. A comparison of the Comprehensive Plan 2015 and 2035 intersection traffic volumes show a weighted average growth of 2 percent per year within the City[5]. The Baseline 2037 forecasts were determined by applying a 2 percent per year growth rate to the existing traffic volumes. It is noted that this forecasting method generally resulted in forecasts that were similar to or higher than the 2035 Comprehensive Plan forecasts that included Campus growth. The Scenario A 2037 weekday PM peak hour traffic volumes along the study corridors are shown on Figure 9. No Action Alternative – Scenario A turning movements for each study intersection are provided in Appendix A.

Along Beardslee Boulevard, under No Action Alternative – Scenario A conditions during the weekday peak hours, campus-related vehicle traffic would make up approximately 14 to 17 percent of the traffic volume west of 110th Avenue NE and 25 percent of the traffic east of 110th Avenue NE. These No Action Alternative – Scenario A forecasts formed the basis of the background conditions for No Action Alternative – Scenario B.

Campus Traffic

Scenario B assumes an increase in on-campus student FTE of up to 10,000 and no change in campus housing. Weekday daily, AM peak hour, and PM peak hour campus trip generation associated with Scenario B was estimated based on existing campus trip generation characteristics (see Chapter 2 Affected Environment) and expected increases in campus population. Table 11 summarizes the Scenario B estimated weekday trip generation.

[5] The City's model assumed growth in traffic from the campus; thus, the application of the growth rate provides a conservative estimate of future traffic volumes.



No Action Alternative - Scenario A 2037 Weekday PM Peak Hour Traffic Volumes

FIGURE **9**

UW Bothell / Cascadia College Campus Master Plan

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Table 11. No Action Alternative – Scenario B Estimated Weekday Trip Generation

	Population[1]	Trip Rate[3]	In	Out	Total
Daily					
Future					
Commuter	9,759 students FTE	2.12	10,345	10,345	20,690
Residential	241 beds[2]	1.37	165	165	330
Subtotal			*10,510*	*10,510*	*21,020*
Existing Trips			8,255	8,175	16,430
Net New Trips			***2,255***	***2,335***	***4,590***
AM Peak Hour					
Future					
Commuter	9,759 students FTE	0.24	1,991	351	2,342
Residential	241 beds[2]	0.10	14	10	24
Subtotal			*2,005*	*361*	*2,366*
Existing Trips			1,549	286	1,835
Net New Trips			***456***	***75***	***531***
PM Peak Hour					
Future					
Commuter	9,759 students FTE	0.25	976	1,464	2,440
Residential	241 beds[2]	0.17	18	23	41
Subtotal			*994*	*1,487*	*2,481*
Existing Trips			771	1,143	1,913
Net New Trips			***224***	***344***	***568***

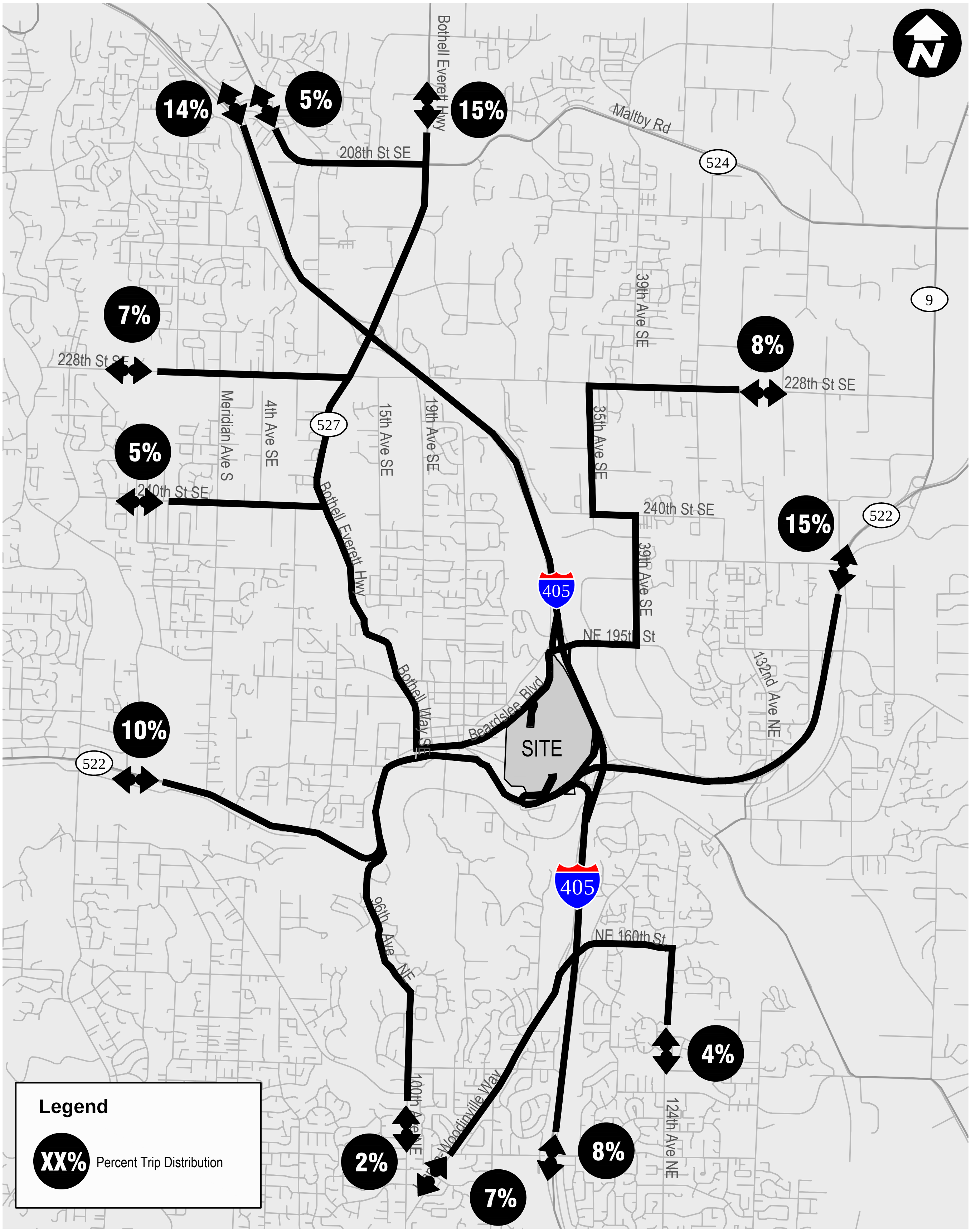
1. Represents on-campus population. Online students would not generate trips to the campus and are not included.
2. One bed is equivalent to one residential student.
3. Based on existing trip generation rates and accounts for all existing trips generated by the student FTEs including those that are currently occurring off-site.

Existing mode split assumptions is assumed to continue in the future. As shown in the table, the Scenario B would generate approximately 4,590 net new daily trips with 531 occurring during the weekday AM peak hour and 568 occurring during the weekday PM peak hour.

Campus Trip Distribution and Assignment

Scenario B net new trips were added to the Scenario A – Baseline conditions to forecast the future 2037 No Action Alternative – Scenario B conditions. Trips were distributed and assigned to the study area based on campus intercept surveys conducted on October 11 and 12, 2016 between 10 a.m. and 1:30 p.m., zip code data for the campus population (i.e., students, faculty, and staff) as well as peak period traffic volumes at the Beardslee Boulevard and SR 522 access points. Outside the immediate study area, the project trip distribution was based on existing travel patterns and zip code data for the campus population. Figure 10 shows anticipated project trip distribution within the study area. The localized trip assignment to the north and south campus access points were determined through a capacity analysis at the north end of the campus, the allocation of on-site parking, and regional travel patterns and points of origins and destinations. Appendix A provides the study intersection trip assignment. The overall trip distribution to the Campus access points would be approximately 47 percent to and from 110th Avenue NE to the north and 53 percent to and from the south via the SR 522 interchange. Current counts show a 52/48 split in traffic via the north/south access points, respectively. Figure 11 illustrates the resulting weekday PM peak hour traffic volumes. No Action Alternative – Scenario B turning movements the study intersections are provided in Appendix A.

Along Beardslee Boulevard, under No Action Alternative – Scenario B conditions during the weekday peak hours, campus-related vehicle traffic would make up a greater proportion of the traffic compared to Scenario A given the anticipated campus growth with Scenario B. The proportion of campus-related traffic would increase to approximately 19 to 22 percent of the traffic volume west of 110th Avenue NE and 25 to 28 percent of the traffic east of 110th Avenue NE, which would be up to a 5 percent increase.



Note: Local assignment with respect to the north and south campus access was determined through a capacity analysis at the north end of the campus and the allocation of on-site parking for each Alternative.

Campus Master Plan Alternative Trip Distribution

UW Bothell / Cascadia Colelge Campus Master Plan

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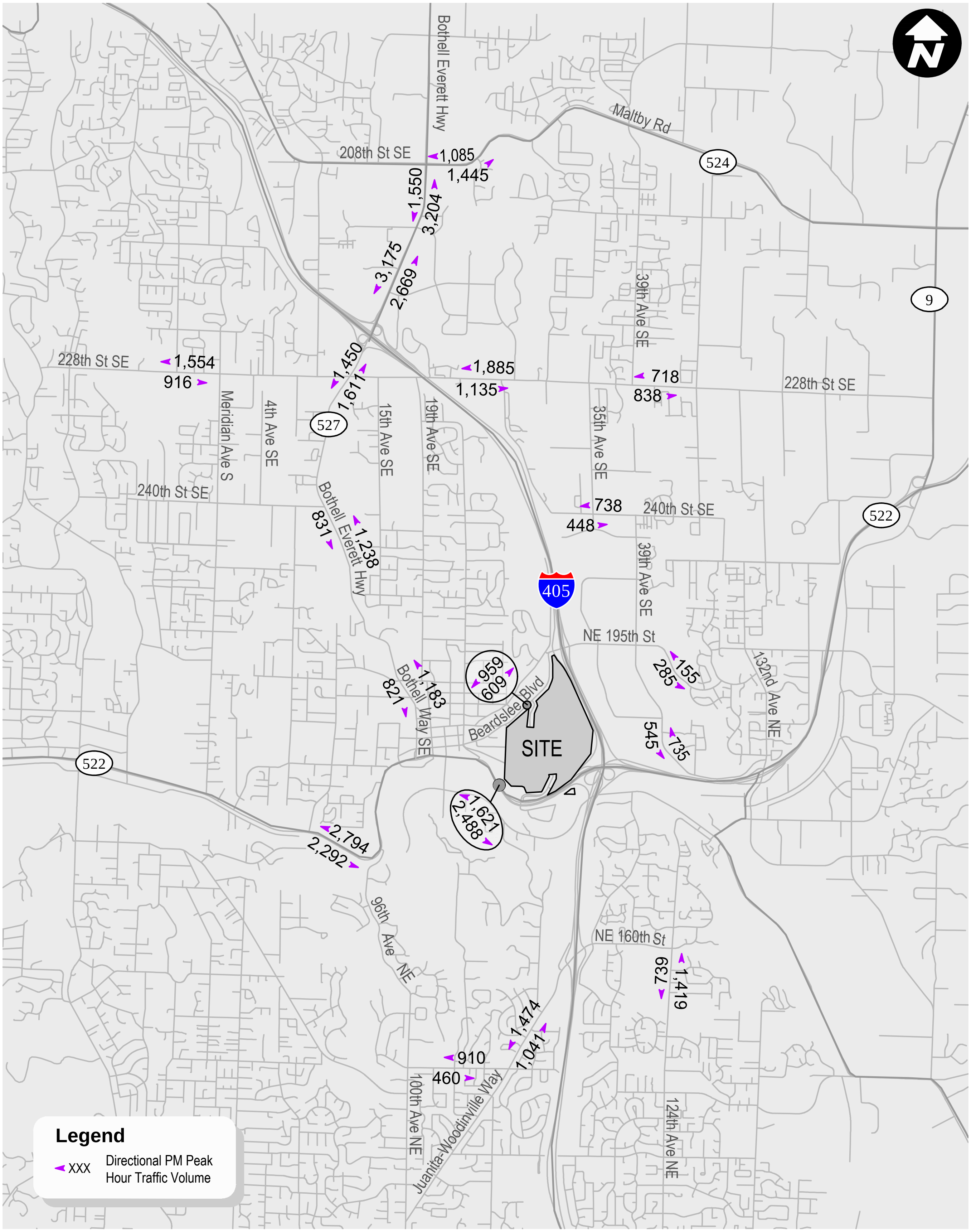
FIGURE
10



No Action Alternative - Scenario B 2037 Weekday PM Peak Hour Traffic Volumes

FIGURE **11**

UW Bothell / Cascadia College Campus Master Plan

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Traffic Operations

Corridor operations were evaluated based on the methods and assumptions described in Chapter 2 Affected Environment. Signal timing was optimized and the evaluation includes the improvements described in Table 8. A detailed intersection LOS summary and worksheets for the study intersections are included in Appendix D. Table 12 provides a summary of the No Action Alternative corridor LOS.

Table 12. No Action Alternative 2037 Weekday PM Peak Hour Corridor LOS Summary

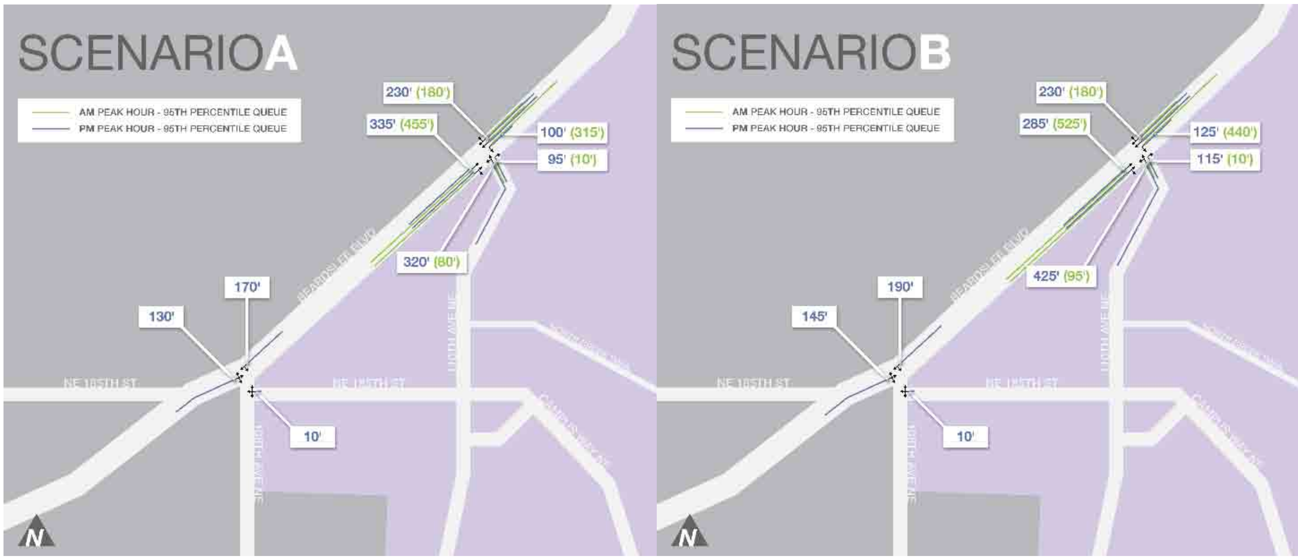
Corridor	Scenario A (Baseline)		Scenario B (Allowed in PUD)	
	LOS[1]	Corridor Delay (sec/veh)[2]	LOS[1]	Corridor Delay (sec/veh)[2]
SR 524 (208th St SE/Maltby Rd) Corridor between 9th Ave SE and SR-527	E	56	E	58
SR 527/Bothell-Everett Hwy/Bothell Wy Corridor between SR-524 and SR-522	E	60	E	62
228th St SE Corridor between 4th Ave W and 39th Ave SE	E	69	E	70
39th/35th Ave SE/120th Ave NE/NE 180th St between 228th St SE and 132nd Ave NE	E	63	E	67
Beardslee Blvd/NE 195th St Corridor between NE 185th St and 120th Ave NE[3]	E	74	E	78
SR 522 (NE Bothell Wy) Corridor between 96th Ave NE and Kaysner Wy	E	63	E	68
NE 145th St/Juanita-Woodinville Wy NE/NE 160th St between 100th Ave NE and 124th Ave NE	E	66	E	68

1. Level of service, based on 2010 *Highway Capacity Manual* methodology.
2. Average corridor delay in seconds (sec) per vehicle (veh) calculated by as a weighted average of intersections delays along the length of the corridor in seconds per vehicles.
3. The analysis assumes a second eastbound and westbound travel lane is constructed along Beardslee Boulevard resulting in 4- to 5-lanes between NE 185th Street and I-405 consistent with the City's Comprehensive Plan. The corridor LOS would be the same with or without the second eastbound lane (see the Beardslee Boulevard Improvement Sensitivity Analysis for additional detail).

As shown in Table 12, all the corridors would operate at LOS E under both Scenarios A and B meeting the City's LOS E standard.

Although the LOS along Beardslee Boulevard shows LOS E conditions during the weekday PM peak hour for the No Action Alternatives, it is recognized that there are long queues within the corridor. Consistent with existing conditions, the 95th-percentile vehicles queues were reviewed at the Beardslee Boulevard/110th Avenue NE and Beardslee Boulevard/108th Avenue NE intersections to show how the Alternatives would impact queuing within the corridor. Figure 12 illustrates a comparison of the Beardslee Boulevard campus access 95th-percentile vehicle queues.

Figure 12. No Action Alternatives 2037 Weekday Peak Hour Vehicle Queues



As shown on Figure 12, the No Action Alternative – Scenario B vehicle queues would be longer than the Scenario A queues due to campus growth. The analysis assumes the second eastbound lane along Beardslee Boulevard between NE 185th Street and 110th Avenue NE, which results in a decrease in anticipated 95th-percentile queues eastbound and minimize potential queuing impacts to adjacent intersections.

The future weekday peak hour vehicle queues under all Alternatives would impact the existing Husky Village driveway on the south side of Beardslee Boulevard. This is consistent with current peak period conditions.

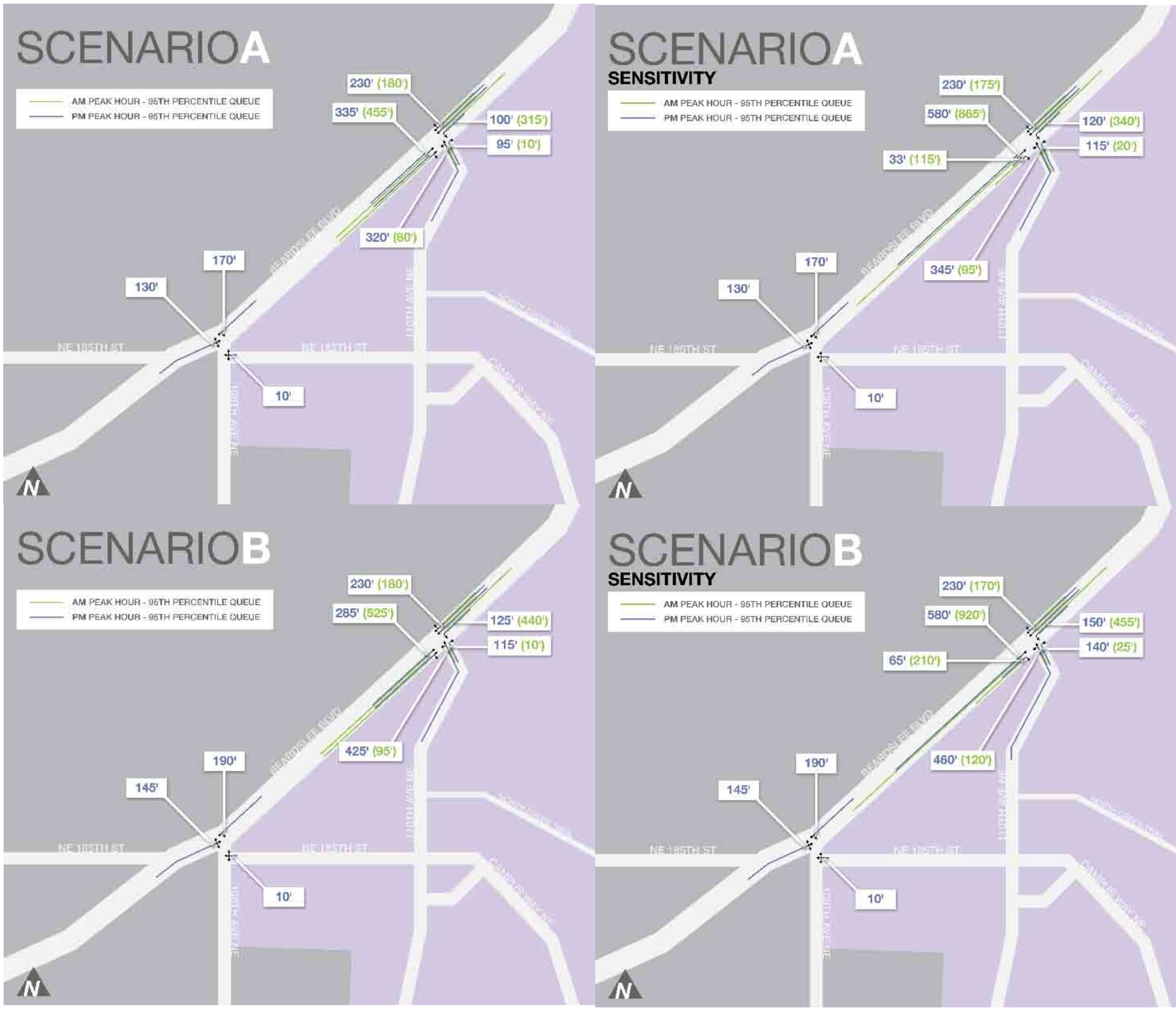
Beardslee Boulevard Improvement Sensitivity Analysis

As describe previously, the analysis assumes a second eastbound and westbound travel lane is constructed in the future along Beardslee Boulevard resulting in 4- to 5-lanes between NE 185th Street and I-405 consistent with the City's Comprehensive Plan. The following provides a sensitivity analysis showing traffic operations of the No Action Alternatives with and without the additional eastbound lane.

- **Corridor Operations**. The overall corridor operations would continue to be LOS E during the weekday PM peak hour even without the additional eastbound travel lane. The minimal change in operations is due to the weighted average delay calculation, which is influenced by the intersections along NE 195th Street that have higher traffic volumes and delay.
- **Campus Access LOS.** Without the additional eastbound travel lane, Beardslee Boulevard/110th Avenue NE overall intersection delays would increase by 1 to 2 seconds. The intersection would remain LOS B during both the weekday AM and PM peak hours.
- **Vehicle Queues.** Figure 13 illustrates the vehicles queues with and without the additional eastbound lane. As shown in the figures, vehicle queues in the eastbound direction would be approximately double without the additional eastbound travel lane and it is likely that the queues would spill back to NE 185th Street. These queues would impact travel along the corridor.

Figure 13. Comparison of No Action Alternatives 2037 Beardslee Boulevard Vehicle Queues – With and Without Additional Eastbound Lane

With Additional Eastbound Lane *Without Additional Eastbound Lane*



Traffic Safety

As traffic volumes increase, traffic safety issues could increase proportionally. Table 8, presented previously, highlights planned and future potential improvements within the study area including corridor, intersection, and adaptive signal improvements at these locations. With increased capacity and improved corridor and intersection operations, it is anticipated that safety issues would decrease within the study area.

Parking

Parking demand for Scenario A would be consistent with existing conditions since there is no change anticipated in on-campus population. The current peak parking demand is 2,430 vehicles and the parking supply considering both on-campus and off-campus leased parking supply is 2,463 stalls and is at capacity. It is anticipated that under Scenario A during peak conditions parking would continue to impact the adjacent street system consistent with current conditions and finding parking on-campus would be difficult. A parking supply of 2,800 spaces would be recommended to accommodate the current parking demand to achieve an 85 percent utilization. There are 2,161 parking stalls on-campus; therefore, to accommodate all parking on-campus and achieve an 85 percent utilization an additional 639 parking spaces would be needed.

Scenario B parking demand was determined based on the existing parking rates and projected number of commuter and residential student FTEs. Table 13 provides a summary of the resulting peak parking demand. Scenario B would provide 4,200 to 6,600 parking spaces on-campus.

Table 13. Summary of Peak Parking Demand – No Action Alternative Scenario B

	Population	Parking Rate[2]	Parking Demand
Commuter Demand	9,759 students FTE	0.31	3,030 vehicles
Residential Demand	241 beds[1]	0.43	100 vehicles
Subtotal			3,130 vehicles
Recommended Supply (at 85% Utilization)			*3,600 spaces*

1. One bed is equivalent to one residential student.
2. Based on existing parking rates and accounts for all campus parking including those that are currently occurring off-site.

The analysis assumes existing mode split assumptions continue in the future. This represents a conservative analysis as transit service to the campus is expected to increase in frequency throughout the day, including those current periods in the mid-day when frequency today is reduced.

As shown in Table 13, a parking supply of 3,600 spaces would be recommended under the No Action Alternative – Scenario B to achieve an 85 percent parking utilization on-campus incorporating the demand from off-site leases, as well as providing additional on-campus parking for the on-street demand that is currently observed. This parking supply would be 800 additional parking spaces beyond what would be needed to accommodate the current campus parking demand. With the proposed parking supply of 4,200 to 6,600 spaces, it is anticipated that the parking demand would be fully accommodated on-campus and the peak parking utilization would be approximately 48 to 75 percent. Parking utilization over 90 percent is typically considered full because it becomes more difficult to find parking; therefore, with the proposed parking supply there would be a surplus of parking on-campus.

Chapter 4. Impacts of Alternative 1

This section describes the future transportation conditions for the 2037 horizon year considering Alternative 1 – Develop Institutional Identity (Southward Growth). Alternative 1 is compared to the No Action Alternative to determine potential transportation impacts.

Consistent with No Action Alternative – Scenario B, Alternative 1 includes up to 10,000 on-campus student FTE. In addition, on-campus housing would be increased by 959 beds for a total of 1,200 on-campus beds. Existing access points to the campus are assumed to remain unchanged except for the emergency access gate on NE 185th Street, which is proposed to be relocated west. Up to 3,700 parking stalls are proposed. Figure 14 illustrates the Alternative 1 preliminary Campus Master Plan concept.

Street System

Off-site street system improvements within the study area would be consistent with the No Action Alternatives. The existing north access to campus from Beardslee Boulevard and south access to campus from SR 522 are assumed to remain unchanged under Alternative 1. The existing emergency access gate on NE 185th Street would be relocated to the west, which would result in access to the Husky Hall to be provided from the internal campus roadway system. Access between Husky Village and NE 185th Street would be closed to prevent the potential for cut-through traffic. Within the southern portion of the Campus, NE 180th Street would be realigned further south to accommodate building development and traffic calming features would be added to Campus Way NE. Campus Way NE would continue to be the main travel way through the Campus; however, the traffic calming features would encourage vehicle traffic to enter the Campus via the access closest to where they anticipate parking rather than traversing Campus Way NE from either the north or south.

The internal street system and overall vehicular circulation for the reminder of the campus would be consistent with existing conditions and the No Action Alternatives. The evaluation of Alternative 1 assumes a 5-lane section along Beardslee Boulevard between NE 185th Street and I-405 consistent with the City's Comprehensive Plan analysis. Construction of the second eastbound lane would require expansion to the south, impacting Campus property. Improvements at the Beardslee Boulevard/NE 185th Street intersection do not assume realignment with the south leg of NE 185th Street and 108th Avenue NE with Alternative 1.

Pedestrian and Bicycle Transportation

Off-site pedestrian and bicycle improvements within the study area would be consistent with the No Action Alternatives. In addition, campus pedestrian and bicycle access and internal circulation would be consistent with existing conditions and the No Action Alternatives. There would continue to be conflicts along Campus Way NE with vehicle traffic and pedestrian/ bicycle modes. Traffic calming features along Campus Way NE would help to slow down as well as discourage vehicle traffic from using this street to traverse the campus. Sidewalks and pedestrian paths would be provided between existing and proposed buildings and campus bicycle parking facilities as well as paths would be provided.

The increase in on-campus residents would likely result in additional pedestrian travel to and from Downtown Bothell. As described previously, pedestrian facilities are provided along NE 185th Street and Beardslee Boulevard, providing defined pedestrian facilities and walking routes between the campus and downtown. Pedestrians accessing the downtown would need to cross either at the 110th Avenue NE traffic signal, an unsignalized crossing at Beardslee Boulevard/NE 185th Street, or continue further into Downtown and cross at the all-way stop at the Beardslee Boulevard/Kaysner Way intersection. As noted previously, pedestrians using Valley View Road are able to use a widened roadway section. The City has not maintained the striping, so the previous shoulder striping and crosswalk at Kaysner Way are no longer delineated.

Figure 14. Alternative 1 Preliminary Campus Master Plan

Transit Service

Several transit routing options could occur in the future as the ST3 planning for the SR 522 BRT line progresses. No changes to the transit circulation patterns are proposed directly as part of the Campus Master Plan. As a result, this report contains an assessment of three potential future circulation scenarios that could occur in the future.

Existing Routing

Existing routing, layover areas, and on-site circulation could be maintained with this transit scenario. While traffic calming is proposed along Campus Way NE to improve the pedestrian environment, these measures would not limit north/south transit circulation. No improvements to the existing transit center have been defined, but it is expected that assuming buses continue to circulate on campus, some level of improvements to the existing transit center would be required to accommodate Swift and RapidRide services.

NE 185th Street Routing

Inbound and/or outbound circulation via NE 185th Street could be implemented with this transit scenario. The existing gated access at the NE 185th Street/110th Avenue NE intersection would need to be modified if transit circulation were to continue through campus. A variation of this scenario would be to widen NE 185th Street and accommodate transit service and layover functions on NE 185th Street between Beardslee Boulevard and 110th Avenue NE. The Alternative 1 land use and site development plan would not preclude use of NE 185th Street for transit use. On-going evaluations as part of ST3 will further evaluate these options. Relocating the stops to NE 185th Street would result in a minor increase in walking distance for transit riders. However, the resulting distance is still practical for riders to access all areas of campus.

Beardslee Boulevard

The Alternative 1 land use plan does not preclude the relocation and/or development of a transit center along Beardslee Boulevard along the frontage of Husky Village. Without redevelopment of Husky Village, the widening of Beardslee Blvd to accommodate 5 lanes, provisions of bike lanes, and consideration of pull-outs to accommodate bus stops and layover spaces, would compromise and eliminate much of the parking at Husky Village. In addition, for those routes that terminate or originate at the Campus, routes may need to circulate through campus or potentially continue to layover on campus. Again, the Alternative 1 land use plan does not preclude this transit circulation option; however, the widening of Beardslee Boulevard would impact the Husky Village parking supply. In addition, unless buses circulate and/or layover on campus, additional non-revenue transit travel time may be required for buses. Relocating the stop to Beardslee would result in an increase in walking distance and travel times for campus transit users. Additional pedestrian improvements would be required to better link the transit stop on Beardslee Blvd with the campus activity center. For example, an improved pedestrian connection through Husky Village would be required to avoid additional out of direction travel for walking between the campus core and the transit stop on Beardslee Boulevard.

Traffic Volumes

Alternative 1 assumes an increase in students on-campus of up to 10,000 student FTE with 1,200 additional on-campus beds. Weekday daily, AM peak hour, and PM peak hour campus trip generation associated with Alternative 1 was estimated based on existing campus trip generation characteristics (see Chapter 2 Affected Environment) and expected increases in campus population. Table 14 summarizes the Alternative 1 estimated weekday trip generation.

Table 14. Alternative 1 Estimated Weekday Trip Generation

	Population[1]	Trip Rate[3]	In	Out	Total
Daily					
Future					
Commuter	8,800 students FTE	2.12	9,330	9,330	18,660
Residential	1,200 beds[2]	1.37	820	820	1,640
Subtotal			*10,150*	*10,150*	*20,300*
Existing Trips			8,255	8,175	16,430
Net New Trips			***1,895***	***1,975***	***3,870***
AM Peak Hour					
Future					
Commuter	8,800 students FTE	0.24	1,795	317	2,112
Residential	1,200 beds[2]	0.10	68	52	120
Subtotal			*1,863*	*369*	*2,232*
Existing Trips			1,549	286	1,835
Net New Trips			***314***	***83***	***397***
PM Peak Hour					
Future					
Commuter	8,800 students FTE	0.25	880	1,320	2,200
Residential	1,200 beds[2]	0.17	88	116	204
Subtotal			*968*	*1,436*	*2,404*
Existing Trips			771	1,143	1,913
Net New Trips			***198***	***293***	***491***

1. Represents on-campus population. Online students would not generate trips to the campus and are not included.
2. One bed is equivalent to one residential student.
3. Based on existing trip generation rates and accounts for all existing trips generated by the student FTEs including those that are currently occurring off-site. As a conservative estimate of trip generation, the analysis assumes all residential units are apartment type housing consistent with the existing campus housing. The Campus Master Plan would likely provide traditional student housing (dormitory) with dining services, which would have a lower trip generation rate.

Existing mode split assumptions is assumed to continue in the future. As shown in the table, the Alternative 1 would generate approximately 3,870 net new daily trips with 397 occurring during the weekday AM peak hour and 491 occurring during the weekday PM peak hour.

The No Action Alternative – Scenario A assumes no growth in on-campus population resulting in no anticipated increase in vehicle trips. Scenario B anticipates up to 10,000 on-campus student FTE, which would increase vehicle trips to and from the campus. Table 15 provides a comparison between the No Action Alternative – Scenario B and Alternative 1 estimated weekday net new vehicle trips.

Table 15. Comparison of Scenario B and Alternative 1 Net New Weekday Trip Generation

	No Action – Scenario B[1]			Alternative 1[1]		
	In	Out	Total	In	Out	Total
Daily	2,255	2,335	4,590	1,895	1,975	3,870
AM Peak Hour	456	75	531	314	83	397
PM Peak Hour	224	344	568	198	293	491

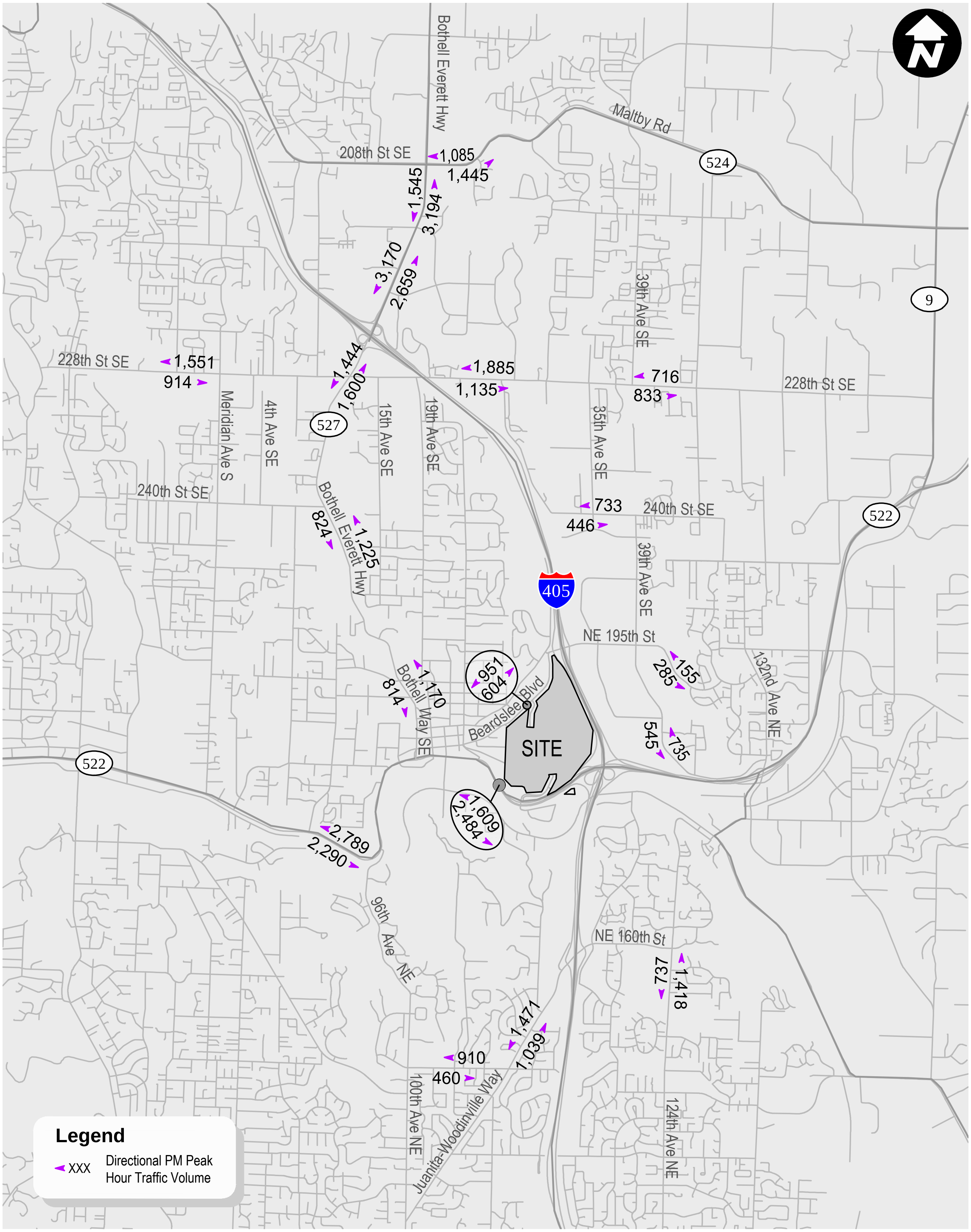
1. Net new trips based on existing trip generation rates and accounts for all existing trips generated by the student FTEs including those that are currently occurring off-site.

As shown in Table 15, Alternative 1 would generate less net new trips than Scenario B. Both Alternatives would allow for up to 10,000 student FTE on-campus; however, Alternative 1 would accommodate 1,200 beds. The accommodation of student housing on-campus reduces the overall campus vehicle trips because residential students make fewer vehicle trips since they can walk or bike to Campus buildings.

Trip Distribution and Assignment

Alternative 1 net new trips were added to the Scenario A – Baseline conditions to forecast the future 2037 Alternative 1 conditions. Trips were distributed to the study area consistent with the overall travel patterns identified for the No Action Alternative Scenario B shown on Figure 10 in Chapter 3. The localized trip assignment to the north and south campus access points were determined through a capacity analysis at the north end of the campus and the allocation of on-site parking. Approximately 50 percent of the new parking stalls under Alternative 1 would be located within structures in the southwestern portion of campus, which is assumed to be accessed via Campus Way NE at SR 522 on the south. The remaining approximately 50 percent of the new parking would be distributed near the existing north parking garage, the area south of NE 185th Street, and the west of Campus Way NE south of the existing sports fields. This parking would generally be accessed via the Beardslee Boulevard/110th Avenue NE intersection except for parking provided south of the sports fields, which depending on the specific location could be closer to the southern campus access. Trip assignment for each study intersection is provided in Appendix A. The overall trip distribution to the Campus access points was assumed to be approximately 48 percent to and from Beardslee Blvd via 110th Avenue NE and 52 percent to and from the south at Campus Way NE. Figure 15 illustrates the resulting weekday PM peak hour traffic volumes along the study corridors. Alternative 1 2037 turning movements for each study intersection are provided in Appendix A.

Along Beardslee Boulevard, under Alternative 1 conditions during the weekday peak hours, campus-related vehicle traffic would make up a greater proportion of the traffic compared to No Action Alternative – Scenario A but a lesser proportion compared to Scenario B. The proportion of campus-related traffic for Alternative 1 would be approximately 18 to 21 percent of the traffic volume west of 110th Avenue NE and 27 to 28 percent of the traffic east of 110th Avenue NE.



Alternative 1 2037 Weekday PM Peak Hour Traffic Volumes

UW Bothell / Cascadia College Campus Master Plan

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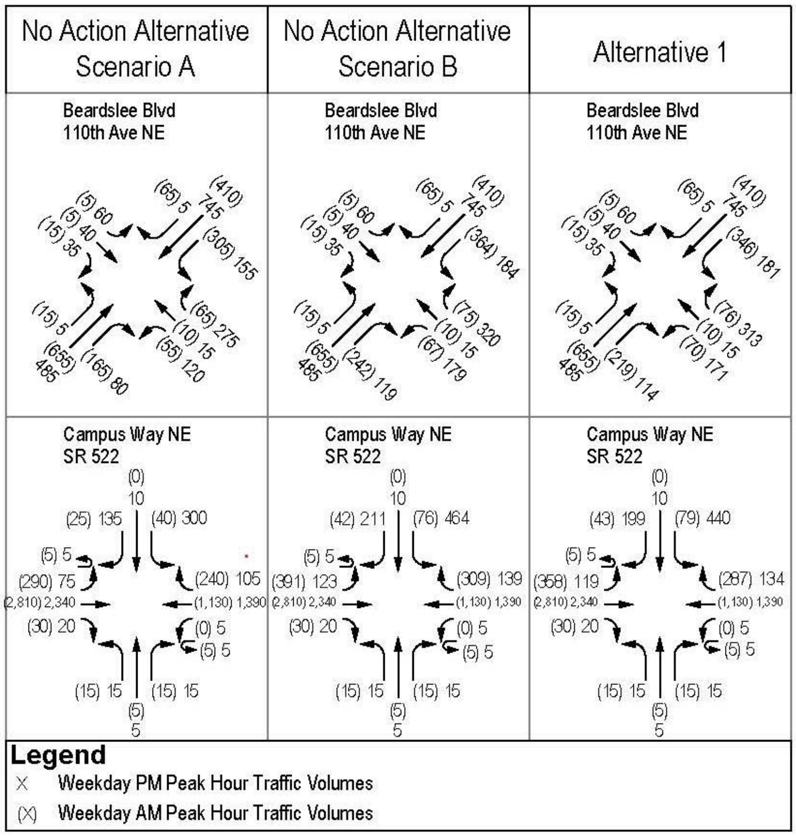
In addition to corridor analysis, the Campus site access points were also evaluated to identify the potential impacts associated with Alternative 1. Figure 16 shows a comparison of the No Action Alternatives and Alternative 1 site access turning movements for the weekday peak hours. As shown in the figure, the No Action Alternative – Scenario B and Alternative 1 would have similar traffic to and from the campus, however traffic to/from the campus under Alternative 1 is less due to an overall decrease in trip generation.

Figure 16. No Action Alternatives and Alternative 1 2037 Weekday Peak Hour Site Access Traffic Volumes



Traffic Operations

The evaluation of traffic operations for the Campus Master Plan Alternatives considers both off-site corridors and the campus access.

Corridors

Corridor operations were evaluated based on the methods and assumptions described in Chapter 2 Affected Environment. Signal timing was assumed consistent with the No Action Alternative and the evaluation includes the improvements described in Table 8. A detailed intersection LOS summary and worksheets for the study intersections are included in Appendix D. Table 16 provides a summary of the Alternative 1 corridor LOS and comparison to the No Action Alternatives.

Table 16. No Action and Alternative 1 2037 Weekday PM Peak Hour Corridor LOS Summary

Corridor	Scenario A (Baseline)		Scenario B (Allowed in PUD)		Alternative 1	
	LOS[1]	Corridor Delay (sec/veh)[2]	LOS[1]	Corridor Delay (sec/veh)[2]	LOS[1]	Corridor Delay (sec/veh)[2]
SR-524 (208th St SE/Maltby Rd) Corridor between 9th Ave SE and SR-527	E	56	E	58	E	57
SR-527/Bothell-Everett Hwy/Bothell Wy Corridor between SR-524 and SR-522	E	60	E	62	E	63
228th St SE Corridor between 4th Ave W and 39th Ave SE	E	69	E	70	E	71
39th/35th Ave SE/120th Ave NE/NE 180th St between 228th St SE and 132nd Ave NE	E	63	E	67	E	66
Beardslee Blvd/NE 195th St Corridor between NE 185th St and 120th Ave NE[3]	E	74	E	78	E	77
SR-522 (NE Bothell Wy) Corridor between 96th Ave NE and Kaysner Wy	E	63	E	68	E	67
NE 145th St/Juanita-Woodinville Wy NE/NE 160th St between 100th Ave NE and 124th Ave NE	E	66	E	68	E	68

1. Level of service, based on 2010 *Highway Capacity Manual* methodology.
2. Average corridor delay in seconds (sec) per vehicle (veh) calculated by as a weighted average of intersections delays along the length of the corridor in seconds per vehicles.
3. The analysis assumes a second eastbound and westbound travel lane is constructed along Beardslee Boulevard resulting in 4- to 5-lanes between NE 185th Street and I-405 consistent with the City's Comprehensive Plan. The corridor LOS would be the same with or without the second eastbound lane (see the Beardslee Boulevard Improvement Sensitivity Analysis for additional detail).

As shown in Table 16, all the corridors would operate at LOS E and meet the City's LOS standard under Alternative 1 2037 conditions.

Figure 17. Comparison of No Action Alternative and Alternative 1 2037 Beardslee Blvd Vehicle Queues

Although the LOS along Beardslee Boulevard shows LOS E conditions during the weekday PM peak hour for the two No Action Alternatives and Alternative 1, it is recognized that there are long queues within the corridor primarily located eastbound and westbound at the 110th Avenue NE traffic signal The 95th-percentile vehicles queues were reviewed at the Beardslee Boulevard/110th Avenue NE and Beardslee Boulevard/108th Avenue NE intersections to show how the Alternatives would impact queuing within the corridor. Figure 17 illustrates a comparison of the Beardslee Boulevard campus access 95th-percentile vehicle queues.

As shown on Figure 17, Alternative 1 would result in increased vehicles queues compared to No Action Alternative – Scenario A; however, Alternative 1 vehicles queues would be similar to or less than No Action Alternative – Scenario B. The decrease in vehicle queues with Alternative 1 is due to additional residential provided on-campus, which reduces the weekday peak hour vehicles trips to and from Campus.

The future weekday peak hour vehicle queues under all Alternatives would impact the existing Husky Village driveway on the south side of Beardslee Boulevard. This is consistent with existing peak period conditions.

Campus Access

In addition to corridor LOS and Beardslee Boulevard queues, traffic operations for the campus access intersections were also reviewed for the weekday AM and PM peak hours. Table 17 provides a summary of the weekday AM and PM peak hour intersection LOS.

Table 17. No Action and Alternative 1 2037 Weekday Peak Hour Access LOS Summary

	Scenario A (Baseline)		Scenario B (Allowed in PUD)		Alternative 1	
Access Intersection	**LOS[1]**	**Delay (sec/veh)[2]**	**LOS[1]**	**Delay (sec/veh)[2]**	**LOS[1]**	**Delay (sec/veh)[2]**
AM Peak Hour						
Beardslee Boulevard/110th Avenue NE[3]	B	15	B	19	B	17
SR 522/Campus Way NE	F	130	F	148	F	147
PM Peak Hour						
Beardslee Boulevard/110th Avenue NE[3]	B	11	B	13	B	12
SR 522/Campus Way NE	D	45	F	82	E	77

1. Level of service, based on 2010 *Highway Capacity Manual* methodology.
2. Average delay per vehicle in seconds.
3. The analysis assumes a second eastbound and westbound travel lane is constructed along Beardslee Boulevard resulting in 4- to 5-lanes between NE 185th Street and I-405 consistent with the City's Comprehensive Plan. The intersection LOS would be the same with or without the second eastbound lane (see the Beardslee Boulevard Improvement Sensitivity Analysis for additional detail).

As shown in the Table 17, Alternative 1 would increase delays at the site access intersections compared to Scenario A. A comparison of Alternative 1 to the No Action Alternative - Scenario B shows that delays would generally decrease. In addition, Alternative 1 anticipated vehicle queues at the access intersections would be the same as or slightly less than conditions with No Action Alternative – Scenario B given that traffic volumes would be similar for these Alternatives.

LOS F operations at the SR 522/Campus Way NE intersection are triggered due to the high traffic volumes along SR 522 during both the weekday AM and PM peak hours. Alternative 1 would result in less overall delay at this intersection compared to No Action Alternative – Scenario B.

Beardslee Boulevard Improvement Sensitivity Analysis

As described previously, the core analysis assumes a second eastbound and westbound travel lane is constructed in the future along Beardslee Boulevard resulting in 4- to 5-lanes between NE 185th Street and I-405 consistent with the City's Comprehensive Plan. The following provides a summary of a sensitivity analysis that was conducted focusing on the traffic operations of Alternative 1 with and without the additional eastbound lane along Beardslee Blvd from NE 185th to the existing 5 lane section, east of 112th Avenue.

- **Corridor Operations**. The overall corridor operations would continue to be LOS E during the weekday PM peak hour even without the additional eastbound travel lane. The minimal change in operations is due to the weighted average delay calculation, which is influenced by the intersections along NE 195th Street that have higher traffic volumes and delay.
- **Campus Access LOS**. Without the additional eastbound travel lane, Beardslee Boulevard/110th Avenue NE overall intersection delays would increase by 2 to 3 seconds. The intersection would remain LOS B during both the weekday AM and PM peak hours.
- **Vehicle Queues**. Figure 18 illustrates the vehicles queues with and without the additional eastbound lane. As shown in the figures, vehicle queues in the eastbound direction would be approximately double without the additional eastbound travel lane and it likely that the queues would spillback to NE 185th Street. These queues would impact travel along the corridor. It is noted that the evaluation shows similar conclusions for the No Action Alternative and these conditions would occur with or without the Campus Master Plan.

Figure 18. Comparison of Alternative 1 2037 Beardslee Boulevard Vehicle Queues – With and Without Additional Eastbound Lane

With Additional Eastbound Lane *Without Additional Eastbound Lane*

Traffic Safety

As traffic volumes increase, traffic safety issues could increase proportionally. Alternative 1 traffic volumes are anticipated to be less than No Action Alternative - Scenario B, which could result in proportionally less potentially vehicles conflicts. Table 8, presented in Chapter 3, highlights planned and future potential improvements within the study area including corridor, intersection, and adaptive signal improvements at these locations. With increased capacity and improved corridor and intersection operations, it is anticipated that safety issues would decrease within the study area.

Parking

Alternative 1 parking demand was determined based on the existing parking rates and projected commuter and residential students. Table 18 provides a summary of the resulting peak parking demand. Alternative 1 would provide up to 3,700 parking spaces on-campus.

Table 18. Summary of Peak Parking Demand – Alternative 1

	Population	Parking Rate[3]	Parking Demand
Commuter Demand	8,800 students FTE[1]	0.31	2,730
Residential Demand	1,200 beds[2]	0.43	520
Subtotal			3,250
Recommended Supply (at 85% Utilization)			*3,740 spaces*

1. Represents on-campus population. Online students would not generate trips to the campus and are not included.
2. One bed is equivalent to one residential student.
3. Based on existing parking rates and accounts for all campus parking including those that are currently occurring off-site. As a conservative estimate of parking, the analysis assumes all residential units are apartment type housing consistent with the existing campus housing. The Campus Master Plan would likely provide traditional student housing (dormitory) with dining services, which would have a lower parking rate.

The analysis assumes existing mode split assumptions continue in the future. This represents a conservative analysis as transit service to the campus is expected to increase in frequency. In addition, all residential units are apartment type housing consistent with the existing campus housing. The Campus Master Plan would likely provide traditional student housing (dormitory) with dining services, which would have a lower parking per bed ratio. Compared to the No Action Alternatives, Alternative 1 parking demand would be 820 vehicles more than No Action Alternative - Scenario A and 120 vehicles more than No Action Alternative - Scenario B.

As shown in Table 18, a parking supply of approximately 3,740 spaces would be recommended under Alternative 1 to achieve an 85 percent parking utilization on-campus. With the proposed parking supply of approximately 3,700 spaces, it is anticipated that the parking demand would be fully accommodated on-campus and the peak parking utilization would be approximately 88 percent. As discussed previously, parking utilization over 90 percent is typically considered full because it becomes more difficult to find parking; therefore, with the proposed parking supply there would be a surplus of parking on-campus.

As described in Chapter 3 Impacts of the No Action Alternatives, an additional 639 stalls are recommended on-campus to accommodate current conditions. Therefore, with Alternative 1,940 additional stalls would be needed to accommodate just the increase in parking demand due to the future growth with this alternative. The analysis assumes existing mode splits; therefore, overall parking needs could decrease with shifts in travel behavior away from drive alone.

Chapter 5. Impacts of Alternative 2

This section describes the future transportation conditions for the 2037 horizon year considering Alternative 2 – Develop the Core (Central Growth). Alternative 2 is compared to the No Action Alternatives to identify the potential transportation impacts of this Alternative.

Consistent with No Action Alternative – Scenario B, Alternative 2 includes up to 10,000 on-campus student FTE. In addition, on-campus housing would be increased by 359 beds for a total of 600 on-campus beds. Existing access points to the campus are assumed to remain unchanged. Up to 3,700 parking stalls are proposed. Figure 19 illustrates the Alternative 2 preliminary Campus Master Plan concept.

Street System

Off-site street system improvements within the study area would be consistent with the No Action Alternatives. The existing north access to campus from Beardslee Boulevard and south access to campus from SR 522 are assumed to remain unchanged under Alternative 2. NE 185th Street would be opened between Beardslee Boulevard and 110th Avenue NE to allow direct access to campus by transit or emergency vehicles; this access would remain closed to general traffic. Traffic calming measures would be provided on Campus Way NE, with Campus Way NE being a primary pedestrian and bicycle route on-campus. Vehicular traffic on campus would primarily utilize NE 180th Street and 110th Avenue NE.

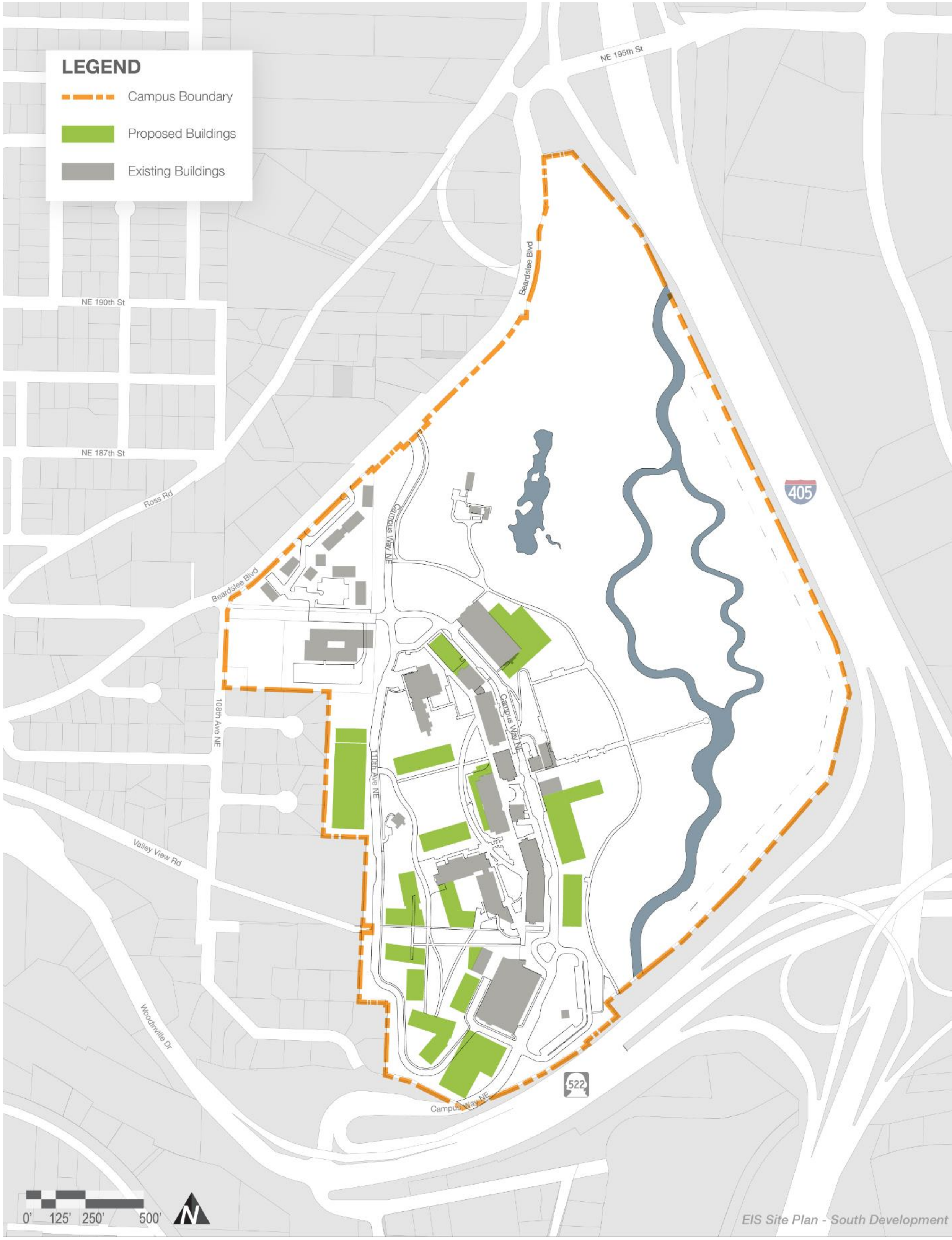
The evaluation of Alternative 2 assumes a 5-lane section along Beardslee Boulevard between NE 185th Street and I-405 consistent with the Comprehensive Plan analysis. Construction of the second eastbound lane would require expansion to the south, impacting Campus property. Improvements at the Beardslee Boulevard/NE 185th Street intersection do not assume realignment with the south leg of NE 185th Street and 108th Avenue NE with Alternative 2; however, depending transit access determined through ST3 along with the City's TIP project at Beardslee Boulevard/NE 185th Street intersection improvements would likely be needed at the Beardslee Boulevard/NE 185th Street/108th Avenue NE intersection.

Pedestrian and Bicycle Transportation

Off-site pedestrian and bicycle improvements within the study area would be consistent with the No Action Alternatives. Campus Way NE would become the primary pedestrian and bicycle route on-campus and traffic calming measures would be provided to reduce vehicular use of this street. The reduced vehicle traffic along Campus Way NE would decrease conflicts between pedestrian/bicycle and vehicle modes within this corridor. Sidewalks and pedestrian paths would be provided between existing and proposed buildings and campus bicycle parking facilities as well as paths would be provided.

The increase in on-campus residents would likely result in additional pedestrian travel to and from Downtown Bothell. As described previously, pedestrian facilities are provided along NE 185th Street and, Beardslee Boulevard, providing defined pedestrian facilities and walking routes between the campus and downtown. Pedestrians accessing the downtown would need to cross either at the 110th Avenue NE traffic signal, an unsignalized crossing at Beardslee Boulevard/NE 185th Street, or continue further into Downtown and cross at the all-way stop at the Beardslee Boulevard/Kaysner Way intersection. As noted previously, pedestrians using Valley View Road are able to use a widened roadway section. The City has not maintained the striping, so the previous shoulder striping and crosswalk at Kaysner Way are no longer delineated.

Figure 19. Alternative 2 Preliminary Campus Master Plan



Transit Service

Several transit routing options could occur in the future as the ST3 planning for the SR 522 BRT line progresses. No changes to the transit circulation patterns are proposed as part of the Campus Master Plan under this Alternative. However, consistent with the Alternative 1 analysis, an assessment of three potential future circulation scenarios are presented in the following sections.

Existing Routing

Similar to Alternative 1, existing routing, layover areas, and on-site circulation could be maintained with this transit scenario. While traffic calming is proposed along Campus Way NE to improve the pedestrian environment, these measures would not limit north/south transit circulation. No improvements to the existing transit center have been defined, but it is expected that assuming buses continue to circulate on campus, some level of improvements to the existing transit center would be required to accommodate Swift and RapidRide services.

NE 185th Street Routing

Similar to Alternative 1, inbound and/or outbound circulation via NE 185th Street could be implemented with this transit scenario. The existing gated access at the NE 185th Street/110th Avenue NE intersection would need to be modified if transit circulation were to continue through campus. A variation of this scenario would be to widen NE 185th Street and accommodate transit service and layover functions on NE 185th Street between Beardslee Blvd and 110th Avenue NE. The Alternative 2 land use and site development plan would not preclude this scenario from occurring. On-going evaluations as part of ST3 will further evaluate this option. Relocating the stops to NE 185th Street would result in a minor increase in walking distance for transit riders. However, the resulting distance is still practical for riders to access all areas of campus.

Beardslee Boulevard

The Alternative 2 land use plan does not preclude the relocation and/or development of a transit center along Beardslee Boulevard along the frontage of Husky Village. Without redevelopment of Husky Village, the widening of Beardslee Blvd to accommodate 5 lanes, provisions of bike lanes, and consideration of pull-outs to accommodate bus stops and layover spaces, would compromise and eliminate much of the parking at Husky Village. In addition, for those routes that terminate or originate at the Campus, routes may need to circulate through campus or potentially continue to layover on campus. Again, the Alternative 2 land use plan does not preclude this transit circulation option; however, the widening of Beardslee Boulevard would impact the Husky Village parking supply. In addition, unless buses circulate and/or layover on campus, additional non-revenue transit travel time may be required for buses. Relocating the stop to Beardslee Boulevard would result in an increase in walking distance and travel times for campus transit users. Additional pedestrian improvements would be required to better link the transit stop on Beardslee Boulevard with the campus activity center. For example, an improved pedestrian connection through Husky Village would be required to avoid additional out of direction travel for walking between the campus core and the transit stop on Beardslee Boulevard.

Traffic Volumes

Alternative 2 assumes an increase in on-campus students of up to 10,000 student FTE. Weekday daily, AM peak hour, and PM peak hour campus trip generation associated with Alternative 2 was estimated based on existing campus trip generation characteristics (see Chapter 2 Affected Environment) and expected increases in campus population. Table 19 summarizes the Alternative 2 estimated weekday trip generation.

Table 19. Alternative 2 Estimated Weekday Trip Generation

	Population[1]	Trip Rate[3]	In	Out	Total
Daily					
Future					
Commuter	9,400 students FTE	2.12	9,965	9,965	19,930
Residential	600 beds[2]	1.37	410	410	820
Subtotal			*10,375*	*10,375*	*20,750*
Existing Trips			8,255	8,175	16,430
Net New Trips			***2,120***	***2,200***	***4,320***
AM Peak Hour					
Future					
Commuter	9,400 students FTE	0.24	1,918	338	2,256
Residential	600 beds[2]	0.10	34	26	60
Subtotal			*1,952*	*364*	*2,316*
Existing Trips			1,549	286	1,835
Net New Trips			***403***	***78***	***481***
PM Peak Hour					
Future					
Commuter	9,400 students FTE	0.25	940	1,410	2,350
Residential	600 beds[2]	0.17	44	58	102
Subtotal			*984*	*1,468*	*2,452*
Existing Trips			771	1,143	1,913
Net New Trips			***214***	***325***	***539***

1. Represents on-campus population. Online students would not generate trips to the campus and are not included.
2. One bed is equivalent to one residential student.
3. Based on existing trip generation rates and accounts for all existing trips generated by the student FTEs including those that are currently occurring off-site. As a conservative estimate of trip generation, the analysis assumes all residential units are apartment type housing consistent with the existing campus housing. The Campus Master Plan would likely provide traditional student housing (dormitory) with dining services, which would have a lower trip generation rate.

Existing mode split assumptions is assumed to continue in the future. As shown in the table, Alternative 2 would generate approximately 4,320 net new daily trips with 481 occurring during the weekday AM peak hour and 539 occurring during the weekday PM peak hour.

The No Action Alternative – Scenario A assumes no growth in on-campus population resulting in no anticipated increase in vehicle trips. No Action Alternative - Scenario B anticipates up to 10,000 on-campus student FTE, which would increase vehicle trips to and from the campus. Table 20 provides a comparison between the Scenario B and Alternative 2 estimated weekday net new vehicle trips.

Table 20. Comparison of Scenario B and Alternative 2 Net New Weekday Trip Generation

	No Action – Scenario B[1]			Alternative 2[1]2[1]		
	In	Out	Total	In	Out	Total
Daily	2,255	2,335	4,590	2,120	2,200	4,320
AM Peak Hour	456	75	531	403	78	481
PM Peak Hour	224	344	568	214	325	539

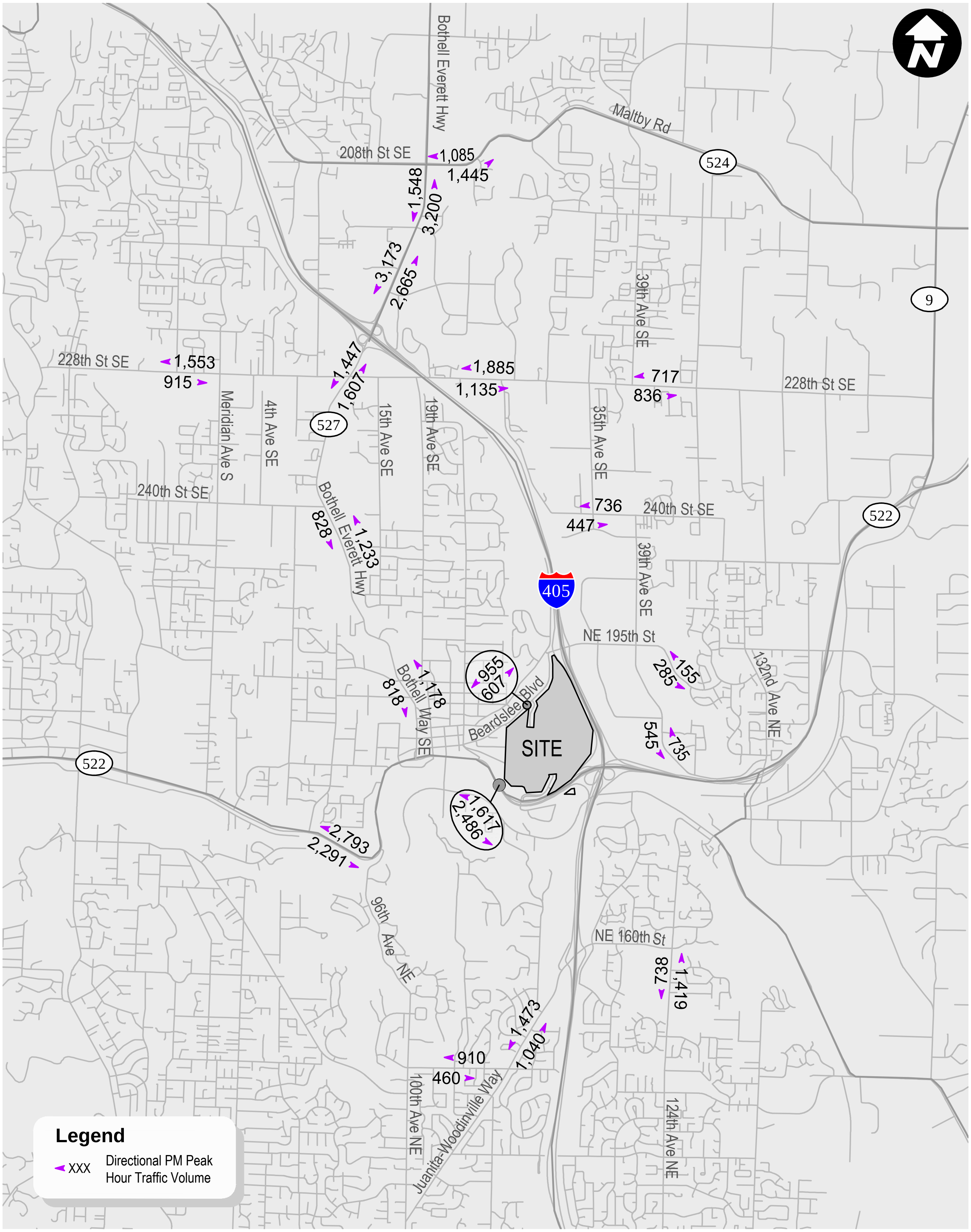
1. Net new trips based on existing trip generation rates and accounts for all existing trips generated by the student FTEs including those that are currently occurring off-site.

As shown in Table 20, Alternative 2 would generate less net new trips than No Action Alternative - Scenario B. Both Alternatives would allow for up to 10,000 student FTE on-campus; however, Alternative 2 would accommodate 600 beds. The accommodation of student housing on-campus reduces the overall campus vehicle trips because residential students make fewer vehicle trips since they can walk or bike to Campus buildings. It is noted that Alternative 1 would generate approximately 10 to 20 percent less trips than Alternative 2 due to the provision of an additional 600 beds on-campus.

Trip Distribution and Assignment

Alternative 2 net new trips were added to the No Action Alternative - Scenario A – Baseline conditions to forecast the future 2037 Alternative 2 conditions. Trips were distributed to the study area consistent with the overall travel patterns identified for the No Action Alternative - Scenario B shown on Figure 10 in Chapter 3. The localized trip assignment to the north and south campus access points were determined through a capacity analysis at the north end of the campus and the allocation of on-site parking. Approximately 50 percent of the new parking stalls under Alternative 2 would be a standalone parking structure located south of the existing south parking garage as well as an addition to the north parking garage. The remaining approximately 50 percent of the new parking would be distributed south of NE 185th Street, east of Campus Way NE in the central campus and west of Campus Way NE south of the existing sports fields. It is anticipated that approximately 40 to 50 percent of the parking would be accessed via the Beardslee Boulevard/110th Avenue NE intersection and the remaining would be access via Campus Way NE. Trip assignment for each study intersection is provided in Appendix A. The overall trip distribution to the Campus access points would be approximately 48 percent to and from 110th Avenue NE and 52 percent to and from the south at Campus Way NE. Figure 20 illustrates the resulting weekday PM peak hour traffic volumes. Alternative 2 2037 turning movements for each study intersection are provided in Appendix A.

Along Beardslee Boulevard, under Alternative 2 conditions during the weekday peak hours, campus-related vehicle traffic would make up a greater proportion of the traffic compared to No Action Alternative – Scenario A but would be similar to conditions with Scenario B. The proportion of campus-related traffic for Alternative 1 would be approximately 19 to 22 percent of the traffic volume west of 110th Avenue NE and 28 percent of the traffic east of 110th Avenue NE.



Alternative 2 2037 Weekday PM Peak Hour Traffic Volumes

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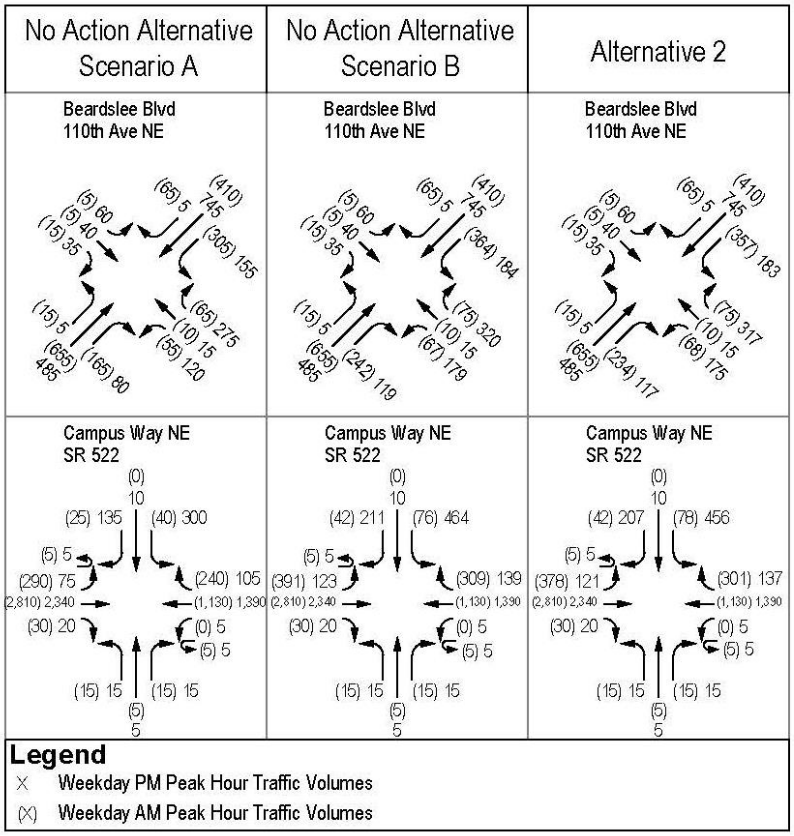
FIGURE **20**

In addition to corridor analysis, the Campus site access points were also reviewed to evaluate the ability to accommodate traffic anticipated with Alternative 2. Figure 21 shows a comparison of the No Action Alternatives and Alternative 2 site access turning movements for the weekday peak hours. As shown in the figure, the No Action Alternative – Scenario B and Alternative 2 would have similar traffic to and from the campus.

Figure 21. No Action Alternatives and Alternative 2 2037 Weekday Peak Hour Site Access Traffic Volumes



Traffic Operations

The evaluation of traffic operations for the Campus Master Plan Alternatives considers both off-site corridors and the campus access.

Corridor

Corridors operations were evaluated based on the methods and assumptions described in Chapter 2 Affected Environment. Signal timing was assumed consistent with the No Action Alternative and the evaluation includes the improvements described in Table 8. A detailed intersection LOS summary and worksheets for the study intersections are included in Appendix D. Table 21 provides a summary of the Alternative 2 corridor LOS and comparison to the No Action Alternatives.

Table 21. No Action and Alternative 2 2037 Weekday PM Peak Hour Corridor LOS Summary

Corridor	Scenario A (Baseline)		Scenario B (Allowed in PUD)		Alternative 2	
	LOS[1]	Corridor Delay (sec/veh)[2]	LOS[1]	Corridor Delay (sec/veh)[2]	LOS[1]	Corridor Delay (sec/veh)[2]
SR-524 (208th St SE/Maltby Rd) Corridor between 9th Ave SE and SR-527	E	56	E	58	E	58
SR-527/Bothell-Everett Hwy/Bothell Wy Corridor between SR-524 and SR-522	E	60	E	62	E	62
228th St SE Corridor between 4th Ave W and 39th Ave SE	E	69	E	70	E	70
39th/35th Ave SE/120th Ave NE/NE 180th St between 228th St SE and 132nd Ave NE	E	63	E	67	E	67
Beardslee Blvd/NE 195th St Corridor between NE 185th St and 120th Ave NE[3]	E	74	E	78	E	77
SR-522 (NE Bothell Wy) Corridor between 96th Ave NE and Kaysner Wy	E	63	E	68	E	68
NE 145th St/Juanita-Woodinville Wy NE/NE 160th St between 100th Ave NE and 124th Ave NE	E	66	E	68	E	68

1. Level of service, based on 2010 *Highway Capacity Manual* methodology.
2. Average corridor delay in seconds (sec) per vehicle (veh) calculated by as a weighted average of intersections delays along the length of the corridor in seconds per vehicles.
3. The analysis assumes a second eastbound and westbound travel lane is constructed along Beardslee Boulevard resulting in 4- to 5-lanes between NE 185th Street and I-405 consistent with the City's Comprehensive Plan. The corridor LOS would be the same with or without the second eastbound lane (see the Beardslee Boulevard Improvement Sensitivity Analysis for additional detail).

As shown in Table 21, all the corridors would operate at LOS E and meet the City's LOS standard under Alternative 2 2037 conditions.

Figure 22. Comparison of No Action Alternative and Alternative 2 2037 Beardslee Blvd Vehicle Queues

Although the LOS along Beardslee Boulevard shows LOS E conditions during the weekday PM peak hour for the Alternatives, it is recognized that there are long queues within the corridor. The 95th-percentile vehicle queues were reviewed at the Beardslee Boulevard/110th Avenue NE and Beardslee Boulevard/ 108th Avenue NE intersections to show how the Alternatives would impact queuing within the corridor. Figure 22 illustrates a comparison of the Beardslee Boulevard 95th-percentile vehicle queues.

As shown on Figure 22, Alternative 2 would result in increased vehicles queues compared to No Action Alternative – Scenario A; however, Alternative 2 vehicle queues would be similar to or less than No Action Alternative – Scenario B. The decrease in vehicle queues with Alternative 2 is due to additional residential provided on-campus, which reduces the weekday peak hour vehicles trips to and from Campus.

The future weekday peak hour vehicle queues under all Alternatives would impact the existing Husky Village driveway on the south side of Beardslee Boulevard. This is consistent with current peak period conditions and it is likely with Alternative 2 access to this parcel would be reconfigured. It is not anticipated that weekday peak hour vehicle queues would impact adjacent City intersections with the planned additional eastbound travel lane along Beardslee Boulevard.

Campus Access

In addition to corridor LOS, traffic operations for the campus access intersections were also reviewed for the weekday AM and PM peak hours. Table 22 provides a summary of the weekday peak hour LOS.

Table 22. No Action and Alternative 2 2037 Weekday Peak Hour Access LOS Summary

	Scenario A (Baseline)		Scenario B (Allowed in PUD)		Alternative 2	
Access Intersection	**LOS[1]**	**Delay (sec/veh)[2]**	**LOS[1]**	**Delay (sec/veh)[2]**	**LOS[1]**	**Delay (sec/veh)[2]**
AM Peak Hour						
Beardslee Boulevard/110th Avenue NE[3]	B	15	B	19	B	18
SR 522/Campus Way NE	F	130	F	148	F	145
PM Peak Hour						
Beardslee Boulevard/110th Avenue NE[3]	B	11	B	13	B	12
SR 522/Campus Way NE	D	45	F	82	F	80

1. Level of service, based on 2010 *Highway Capacity Manual* methodology.
2. Average delay per vehicle in seconds.
3. The analysis assumes a second eastbound and westbound travel lane is constructed along Beardslee Boulevard resulting in 4- to 5-lanes between NE 185th Street and I-405 consistent with the City's Comprehensive Plan. The intersection LOS would be the same with or without the second eastbound lane (see the Beardslee Boulevard Improvement Sensitivity Analysis for additional detail).

As shown in the Table 22, Alternative 2 would increase delays at the site access intersections compared to No Action Alternative - Scenario A. A comparison of Alternative 2 to the No Action Alternative - Scenario B shows that delays would generally decrease. In addition, Alternative 2 anticipated vehicle queues at the access intersections would be the same as or slightly less than conditions with No Action Alternative – Scenario B given that traffic volumes would be similar for these Alternatives.

LOS F operations at the SR 522/Campus Way NE intersection are triggered due to the high traffic volumes along SR 522 during both the weekday AM and PM peak hours. Alternative 2 would result in less overall delay at this intersection compared to Scenario B.

Beardslee Boulevard Sensitivity Analysis

The analysis of Alternative 2 conditions with and without the additional eastbound lane along Beardslee Boulevard is consistent with Alternative 1. The corridor operations and campus access intersection LOS would have minimal change; however, eastbound vehicles queues would nearly double without the eastbound lane. The vehicle queues would impact peak hour travel along the corridor and these conditions would occur with or without the Campus Master Plan. Vehicle queues are anticipated to be less with Alternative 2 compared to the No Action Alternative Scenario both with and without the additional eastbound lane.

Traffic Safety

As traffic volumes increase, traffic safety issues could increase proportionally. Alternative 2 traffic volumes are anticipated to be less than No Action Alternative - Scenario B, which could result in proportionally less potentially vehicles conflicts. Table 8, presented in Chapter 3, highlights planned and future potential improvements within the study area including corridor, intersection, and adaptive signal improvements at these locations. With increased capacity and improved corridor and intersection operations, it is anticipated that safety issues would decrease within the study area.

Parking

Alternative 2 parking demand was determined based on the existing parking rates and projected commuter and residential students. Table 23 provides a summary of the resulting peak parking demand. Alternative 2 would provide up to 3,700 parking spaces on-campus.

Table 23. Summary of Peak Parking Demand – Alternative 2

	Population	Parking Rate[3]	Parking Demand
Commuter Demand	9,400 students FTE[1]	0.31	2,910
Residential Demand	600 beds[2]	0.43	260
Subtotal			3,170
Recommended Supply (at 85% Utilization)			*3,650 spaces*

1. Represents on-campus population. Online students would not generate trips to the campus and are not included.
2. One bed is equivalent to one residential student.
3. Based on existing parking rates and accounts for all campus parking including those that are currently occurring off-site. As a conservative estimate of parking, the analysis assumes all residential units are apartment type housing consistent with the existing campus housing. The Campus Master Plan would likely provide traditional student housing (dormitory) with dining services, which would have a lower parking rate.

The analysis assumes existing mode split assumptions continue in the future. This represents a conservative analysis as transit service to the campus is expected to increase in frequency. In addition, all residential units are apartment type housing consistent with the existing campus housing. The Campus Master Plan would likely provide traditional student housing (dormitory) with dining services, which would have a lower parking per bed ratio. Compared to the No Action Alternatives, Alternative 2 parking demand would be 740 vehicles more than Scenario A and 40 vehicles more than No Action Alternative - Scenario B.

As shown in Table 23, a parking supply of approximately 3,650 spaces would be recommended under Alternative 2 to achieve an 85 percent parking utilization on-campus. With the proposed parking supply of approximately 3,700 spaces, it is anticipated that the parking demand would be fully accommodated on-campus.

As described in Chapter 3 *Impacts of the No Action Alternatives*, an additional 639 stalls are recommended on-campus to accommodate current conditions. Therefore, with Alternative 2, 850 additional stalls would be needed to accommodate just the increase in parking demand due to the future growth with this alternative. The analysis assumes existing mode splits; therefore, overall parking needs could decrease with shifts in travel behavior away from drive alone.

Chapter 6. Impacts of Alternative 3

This section describes the future transportation conditions for the 2037 horizon year considering Alternative 3 – Growth along Topography (Northward Growth). Alternative 3 is compared to the No Action Alternative to determine potential transportation impacts.

Consistent with No Action Alternative – Scenario B, Alternative 3 includes up to 10,000 on-campus student FTE. In addition, on-campus housing would be increased by 359 beds for a total of 600 on-campus beds. Existing access points to the campus are assumed to remain unchanged and a second access via Beardslee Boulevard would be provided via a realigned 108th Avenue NE. Up to 4,200 parking stalls are proposed. Figure 23 illustrates the Alternative 3 preliminary Campus Master Plan concept.

Street System

Off-site street system improvements within the study area would be consistent with the No Action Alternatives. The existing north access to campus from Beardslee Boulevard and south access to campus from SR 522 are assumed to remain unchanged under Alternative 3. A new access point would be provided via a realigned 108th Avenue NE/NE 185th Street/Beardslee Boulevard intersection. The existing NE 185th Street between 108th Avenue NE and 110th Avenue NE would be vacated and converted to campus building and open space use. In addition, Alternative 3 would realign the southern end of 110th Avenue NE eastward to enter directly into the north parking garage.

The evaluation of Alternative 3 assumes a 5-lane section along Beardslee Boulevard between NE 185th Street and I-405 consistent with the Comprehensive Plan analysis. Construction of the second eastbound lane would require expansion to the south, impacting Campus property. In addition, improvements at the Beardslee Boulevard/NE 185th Street intersection assume realignment with the south leg of NE 185th Street and 108th Avenue NE as part of Alternative 3.

Pedestrian and Bicycle Transportation

Off-site pedestrian and bicycle improvements within the study area would be consistent with the No Action Alternatives. A primary pedestrian connection would be provided through the center of the campus. Pedestrian and bicycle conflicts with vehicles would be reduced along Campus Way NE by eliminating the direct access via 110th Avenue NE and providing most parking away from the campus core. Sidewalks and pedestrian paths would be provided between existing and proposed buildings and campus bicycle parking facilities as well as paths would be provided.

The increase in on-campus residents would likely result in additional pedestrian travel to and from Downtown Bothell. As described previously, pedestrian facilities are provided along NE 185th Street and, Beardslee Boulevard, providing defined pedestrian facilities and walking routes between the campus and downtown. Pedestrians accessing the downtown would need to cross either at the 110th Avenue NE traffic signal, an unsignalized crossing at Beardslee Boulevard/NE 185th Street, or continue further into Downtown and cross at the all-way stop at the Beardslee Boulevard/Kaysner Way intersection. As noted previously, pedestrians using Valley View Road are able to use a widened roadway section. The City has not maintained the striping, so the previous shoulder striping and crosswalk at Kaysner Way are no longer delineated.

Figure 23. Alternative 3 Preliminary Campus Master Plan

Transit Service

Several transit routing options could occur in the future as the ST3 planning for the SR 522 BRT line progresses. Since no changes to the transit circulation patterns are proposed as part of the Campus Master Plan, an assessment of three potential future circulation scenarios are presented for purposes of analysis and information.

Existing Routing

With the development of this land use alternative, the existing on-site transit center would be redeveloped with campus infrastructure. Existing on-site layover areas and turnaround functionally utilizing the campus would be eliminated.

NE 185th Street Routing

Under Alternative 3, transit could utilize the revised NE 185th Street connection to access the campus and/or locate the transit center. This transit area could accommodate active stops and/or layover space and be developed in a surface lot or integrated into the grand floor of future campus buildings. If the area developed were to include layover areas, no additional off-site circulation of the buses would be required.

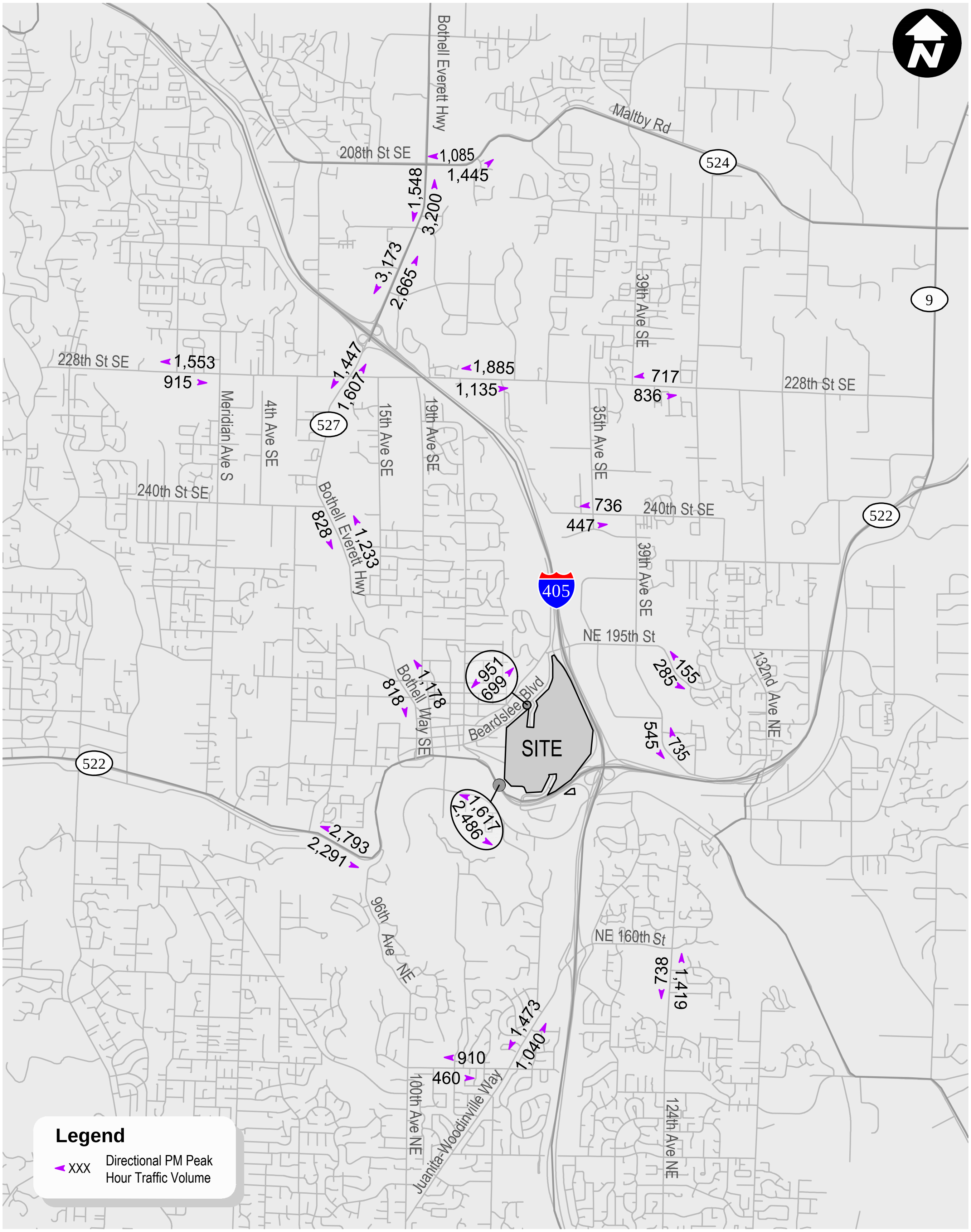
Beardslee Boulevard

Construction of the transit center along Beardslee Boulevard could be accommodated with this land use alternative. Buildings constructed along Beardslee Boulevard could be set back enough to accommodate future widening. The transit center along Beardslee Boulevard could include revenue and layover areas. If layover is not accommodated at the campus, additional public right-of-way would need to be utilized elsewhere in the City. With service that stops and starts at the Campus not circulating and/or laying over on campus, additional non-revenue transit travel time may be required for buses. On-campus circulation or turnaround would not be as feasible based on the internal infrastructure that has been identified between Beardslee Boulevard and the campus core; as shown in the Alternative 3 conceptual plans (see Figure 23).

Traffic Volumes

The weekday net new trips associated with Alternative 3 would be consistent with Alternative 2 since the on-campus student FTEs and proposed additional on-campus beds is the same. Alternatives 2 and 3 would generate approximately 4,320 net new daily trips with 481 occurring during the weekday AM peak hour and 539 occurring during the weekday PM peak hour. Trip generation would be less than the No Action Alternative – Scenario B due to the additional housing proposed.

Alternative 3 future forecasts at the study intersections would also be consistent with Alternative 2 except in the immediate vicinity of the campus where the allocation of parking on-campus would influence localized travel patterns. Approximately 38 percent of the new parking stalls under Alternative 3 would be in the southwest portion of campus, approximately 37 percent would be in the central portion of campus east and west of Campus Way NE, and approximately 25 percent of the parking would be in the northwest portion of the campus. Parking in the southwest portion of the campus would be accessed via Campus Way NE while parking in the northwest portion would be access via 108th Avenue NE. The central parking would be access via 110th Avenue NE and Campus Way NE. This analysis assumes access to parking as approximately 24 percent each at 108th and 110th Avenues NE and the 52 percent via Campus Way NE. Trip assignment for each study intersection is provided in Appendix A.



Alternative 3 2037 Weekday PM Peak Hour Traffic Volumes

FIGURE **24**

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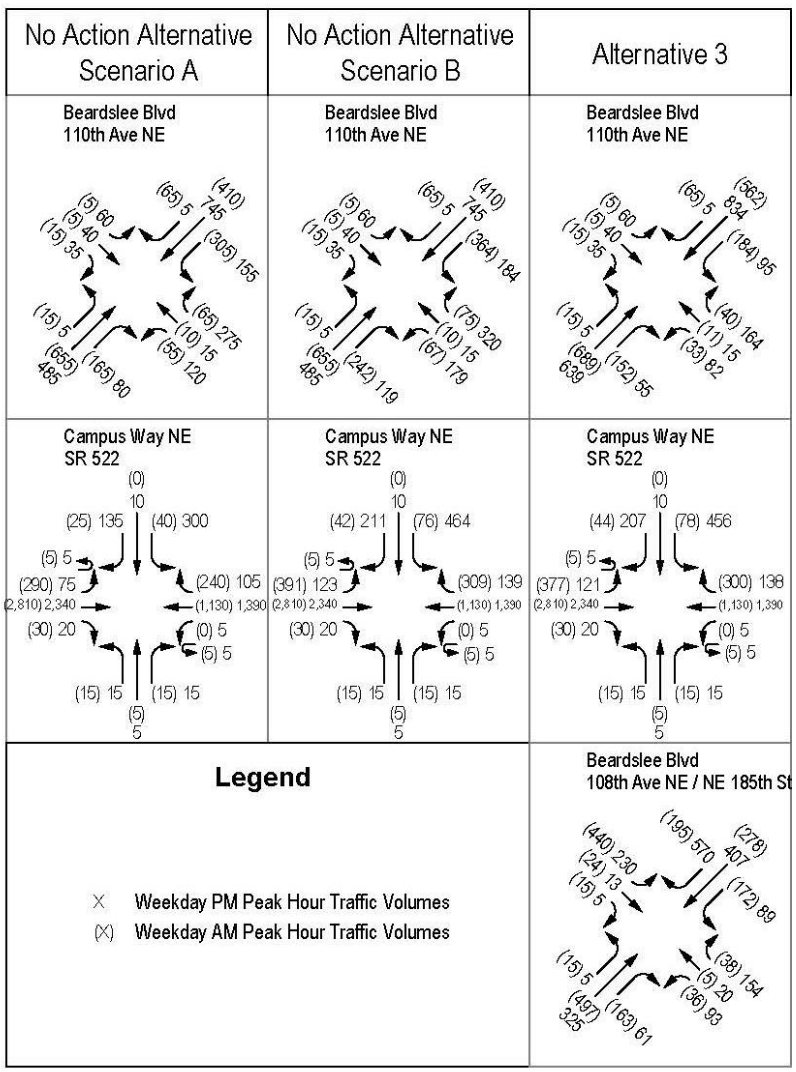
Figure 24 illustrates the resulting weekday PM peak hour 2037 traffic volumes and intersection turning movements are provided in Appendix A. Along Beardslee Boulevard, under Alternative 3 conditions during the weekday peak hours, campus-related vehicle traffic would make up a greater proportion of the traffic compared to No Action Alternative – Scenario A except with the second access point provided at Beardslee Boulevard and 108th Avenue NE the concentration of campus-related traffic immediately west of 110th Avenue NE would decrease. In addition, campus-related traffic for Alternative 3 compared to the No Action Alternative – Scenario B would be less. The proportion of campus-related traffic for Alternative 3 would be approximately 8 to 13 percent of the traffic volume west of 110th Avenue NE and 14 percent of the traffic east of 110th Avenue NE, which would be up to half of what would be anticipated with No Action Alternative – Scenario B.

In addition to corridor analysis, the Campus site access points were also reviewed to evaluate the ability to accommodate traffic anticipated with Alternative 3. Figure 25 shows a comparison of the No Action Alternatives and Alternative 3 site access turning movements for the weekday peak hours. As shown in the figure, the addition of the new site access point at 108th Avenue NE with Alternative 3 would reduce the traffic volumes to and from the Campus at the 110th Avenue NE access compared to the No Action Alternative – Scenario B.

Figure 25. No Action Alternatives and Alternative 3 2037 Weekday Peak Hour Site Access Traffic Volumes



Traffic Operations

The evaluation of traffic operations for the Campus Master Plan Alternatives considers both off-site corridors and the campus access.

Corridor

Corridor operations were evaluated based on the methods and assumptions described in Chapter 2 Affected Environment. Signal timing was assumed consistent with the No Action Alternative and the evaluation includes the improvements described in Table 8. A detailed intersection LOS summary and worksheets for the study intersections are included in Appendix D. Table 24 provides a summary of the Alternative 3 corridor LOS and comparison to the No Action Alternatives.

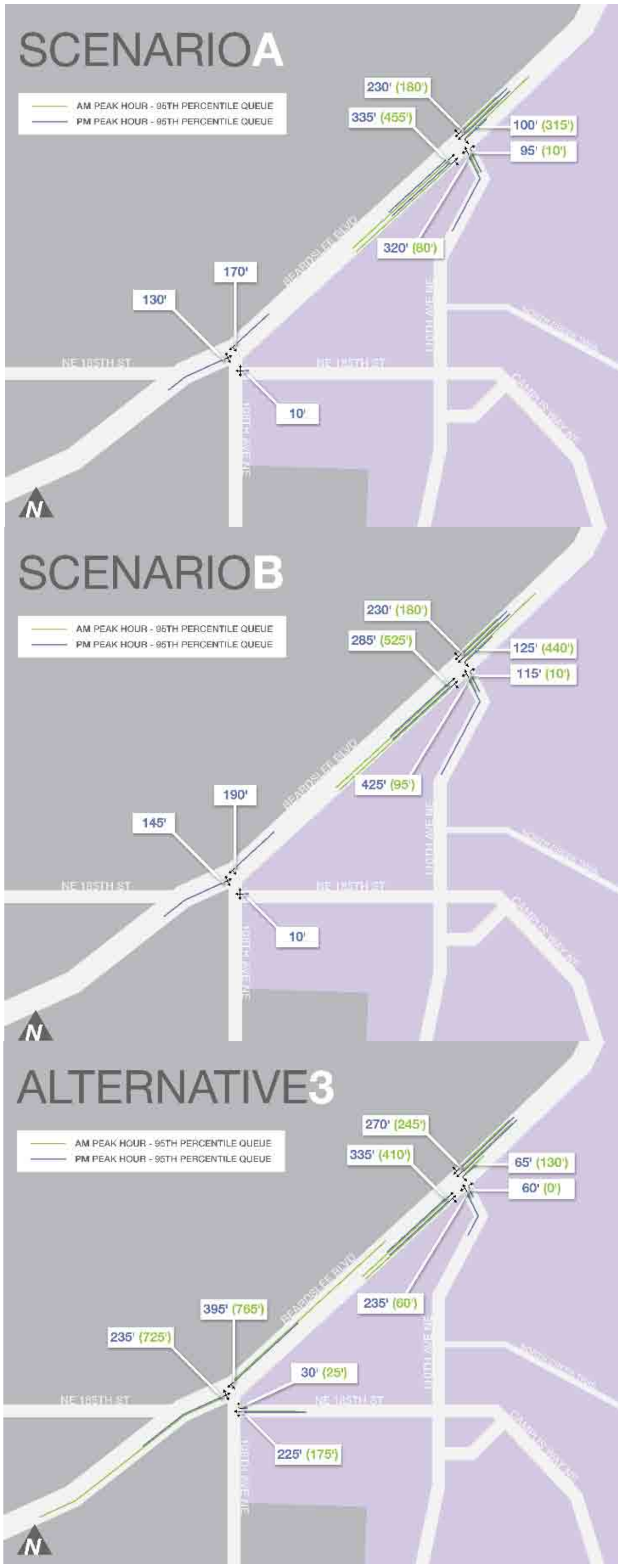
Table 24. No Action and Alternative 3 2037 Weekday PM Peak Hour Corridor LOS Summary

	Scenario A (Baseline)		Scenario B (Allowed in PUD)		Alternative 3	
Corridor	**LOS[1]**	**Corridor Delay (sec/veh)[2]**	**LOS[1]**	**Corridor Delay (sec/veh)[2]**	**LOS[1]**	**Corridor Delay (sec/veh)[2]**
SR 524 (208th St SE/Maltby Rd) Corridor between 9th Ave SE and SR-527	E	56	E	58	E	58
SR 527/Bothell-Everett Hwy/Bothell Wy Corridor between SR-524 and SR-522	E	60	E	62	E	63
228th St SE Corridor between 4th Ave W and 39th Ave SE	E	69	E	70	E	67
39th/35th Ave SE/120th Ave NE/NE 180th St between 228th St SE and 132nd Ave NE	E	63	E	67	E	67
Beardslee Blvd/NE 195th St Corridor between NE 185th St and 120th Ave NE[3]	E	75	E	78	E	77
SR 522 (NE Bothell Wy) Corridor between 96th Ave NE and Kaysner Wy	E	63	E	68	E	68
NE 145th St/Juanita-Woodinville Wy NE/NE 160th St between 100th Ave NE and 124th Ave NE	E	66	E	68	E	68

1. Level of service, based on 2010 *Highway Capacity Manual* methodology.
2. Average corridor delay in seconds (sec) per vehicle (veh) calculated by as a weighted average of intersections delays along the length of the corridor in seconds per vehicles.
3. The analysis assumes a second eastbound and westbound travel lane is constructed along Beardslee Boulevard resulting in 4- to 5-lanes between NE 185th Street and I-405 consistent with the City's Comprehensive Plan. The corridor LOS would be the same with or without the eastbound lane (see the Beardslee Boulevard Improvement Sensitivity Analysis for additional detail).

As shown in the table, all the corridors would operate at LOS E and meet the City's LOS standard under Alternative 3 2037 conditions.

Figure 26. Comparison of No Action Alternative and Alternative 3 2037 Beardslee Blvd Vehicle Queues



Although the LOS along Beardslee Boulevard shows LOS E conditions during the weekday PM peak hour for the Alternatives, it is recognized that there are long queues within the corridor. The 95th-percentile vehicle queues were reviewed at the Beardslee Boulevard/110th Avenue NE and Beardslee Boulevard/ 108th Avenue NE intersections to show how the Alternatives would impact queuing within the corridor. Figure 26 illustrates a comparison of the Beardslee Boulevard campus access 95th-percentile vehicle queues.

As shown on Figure 26, Alternative 3 would increase weekday peak hour vehicle queues, compared to the No Action Alternatives, at the Beardslee Boulevard/108th Avenue NE intersection with the proposed campus access reconfiguration such that this intersection would become a primary access point. Alternative 3 weekday peak hour vehicle queues would decrease in the eastbound and northbound directions at the Beardslee Boulevard/110th Avenue NE intersection compared to the No Action Alternatives. Access between NE 185th Street and 110th Avenue NE along Beardslee Boulevard on both the north and south sides would be impacted by vehicle during the weekday AM peak hour with Alternative 3. In addition, vehicle queues would extend beyond NE 185th Street during the weekday AM and PM peak hours.

As discussed in Chapter 3 *Impacts of the No Action Alternatives*, further analysis is being conducted as part of ST3 at the Beardslee Boulevard/NE 185th Street intersection, which could lead to alternate traffic control such as a roundabout and/or the identification of additional lanes to manage queues.

Campus Access

In addition to corridor LOS, traffic operations for the campus access intersections were also reviewed for the weekday AM and PM peak hours. Table 25 provides a summary of the weekday PM peak hour intersection LOS.

Table 25. No Action and Alternative 3 2037 Weekday Peak Hour Access LOS Summary

Access Intersection	Scenario A (Baseline)		Scenario B (Allowed in PUD)		Alternative 3	
	LOS[1]	Delay[2]	LOS[1]	Delay[2]	LOS[1]	Delay[2]
AM Peak Hour						
Beardslee Boulevard/108th Avenue NE[3]	-	-	-	-	C	23
Beardslee Boulevard/110th Avenue NE[4]	B	15	B	19	B	12
SR 522/Campus Way NE	F	130	F	148	F	145
PM Peak Hour						
Beardslee Boulevard/108th Avenue NE[3]	-	-	-	-	A	7
Beardslee Boulevard/110th Avenue NE[4]	B	11	B	13	B	11
SR 522/Campus Way NE	D	45	F	82	F	80

1. Level of service, based on 2010 *Highway Capacity Manual* methodology.
2. Average delay per vehicle in seconds.
3. Alternative 3 would realign 108th Avenue NE and create a new site access intersection.
4. The analysis assumes a second eastbound and westbound travel lane is constructed along Beardslee Boulevard resulting in 4- to 5-lanes between NE 185th Street and I-405 consistent with the City's Comprehensive Plan. The intersection LOS would be the same with or without the eastbound lane (see the Beardslee Boulevard Improvement Sensitivity Analysis for additional detail).

As shown in the Table 25, Alternative 3 would increase delays at the site access intersections compared to No Action Alternative - Scenario A. A comparison of Alternative 3 to the No Action Alternative - Scenario B shows that delays would decrease.

Compared to No Action Alternative – Scenario B, Alternative 3 vehicle queues could be longer for some movements at the Beardslee Boulevard/110th Avenue NE intersection due to the additional access point along Beardslee Boulevard and the shifting of Campus traffic to this new access point.

LOS F operations at the SR 522/Campus Way NE intersection are triggered due to the high traffic volumes along SR 522 during both the weekday AM and PM peak hours. Alternative 3 would result in less overall delay at this intersection compared to No Action Alternative - Scenario B.

Beardslee Boulevard Sensitivity Analysis

The analysis of Alternative 3 conditions with and without the additional eastbound lane along Beardslee Boulevard is consistent with Alternative 1. The corridor operations and campus access intersection LOS would have minimal change; however, eastbound vehicle queues along Beardslee Boulevard at 110th Avenue NE would nearly double without the eastbound lane. The vehicle queues would impact peak hour travel along the corridor and these conditions would occur with or without the Campus Master Plan. Vehicle queues are anticipated to be less with Alternative 3 compared to the No Action Alternative Scenario both with and without the additional eastbound lane.

Traffic Safety

As traffic volumes increase, traffic safety issues could increase proportionally. Alternative 3 traffic volumes are anticipated to be less than No Action Alternative - Scenario B, which could result in proportionally less potentially vehicles conflicts. Table 8, presented in Chapter 3, highlights planned and future potential improvements within the study area including corridor, intersection, and adaptive signal improvements at these locations. With increased capacity and improved corridor and intersection operations, it is anticipated that safety issues would decrease within the study area.

Parking

Alternative 3 parking demand would be the same as Alternative 2; however, additional parking is proposed with up to 4,200 spaces. Table 26 provides a summary of the resulting peak parking demand.

Table 26. Summary of Peak Parking Demand – Alternative 3

	Population	Parking Rate[3]	Parking Demand
Commuter Demand	9,400 students FTE[1]	0.31	2,910
Residential Demand	600 beds[2]	0.43	260
Subtotal			3,170
Recommended Supply (at 85% Utilization)			*3,650 spaces*

1. Represents on-campus population. Online students would not generate trips to the campus and are not included.
2. The number of beds is equivalent to one residential student.
3. Based on existing parking rates and accounts for all campus parking including those that are currently occurring off-site. As a conservative estimate of parking demand, the analysis assumes all residential units are apartment type housing consistent with the existing campus housing. The Campus Master Plan would likely provide traditional student housing with dining services, which would have a lower parking rate.

The analysis assumes existing mode split assumptions continue in the future. This represents a conservative analysis as transit service to the campus is expected to increase in frequency. In addition, all residential units are apartment type housing consistent with the existing campus housing. The Campus Master Plan would likely provide traditional student housing (dormitory) with dining services, which would have a lower parking per bed ratio. Compared to the No Action Alternatives, Alternative 3 parking demand would be 740 vehicles more than Scenario A and 40 vehicles more than Scenario B.

As shown in Table 26, a parking supply of approximately 3,650 spaces would be recommended under Alternative 2 to achieve an 85 percent parking utilization on-campus. With the proposed parking supply of approximately 4,200 spaces, it is anticipated that the parking demand would be fully accommodated on-campus. The peak parking utilization with 4,200 spaces would be 75 percent.

As described in Chapter 3 Impacts of the No Action Alternatives, an additional 639 stalls are recommended on-campus to accommodate current conditions. Therefore, with Alternative 3, 850 additional stalls would be needed to accommodate just the increase in parking demand due to the future growth with this alternative. The analysis assumes existing mode splits; therefore, overall parking needs could decrease with shifts in travel behavior away from drive alone.

Chapter 7. Impacts of Alternative 4

This section describes the future transportation conditions for the 2037 horizon year considering Alternative 4 – Campus Vision. Alternative 4 is compared to the No Action Alternative to determine potential transportation impacts.

Consistent with No Action Alternative – Scenario B, Alternative 4 includes up to 10,000 on-campus student FTE. In addition, on-campus housing would be increased by 959 beds for a total of 1,200 on-campus beds. Existing access points to the campus are assumed to remain unchanged and a secondary emergency vehicle access via Beardslee Boulevard would be provided via a realigned 108th Avenue NE.

Street System

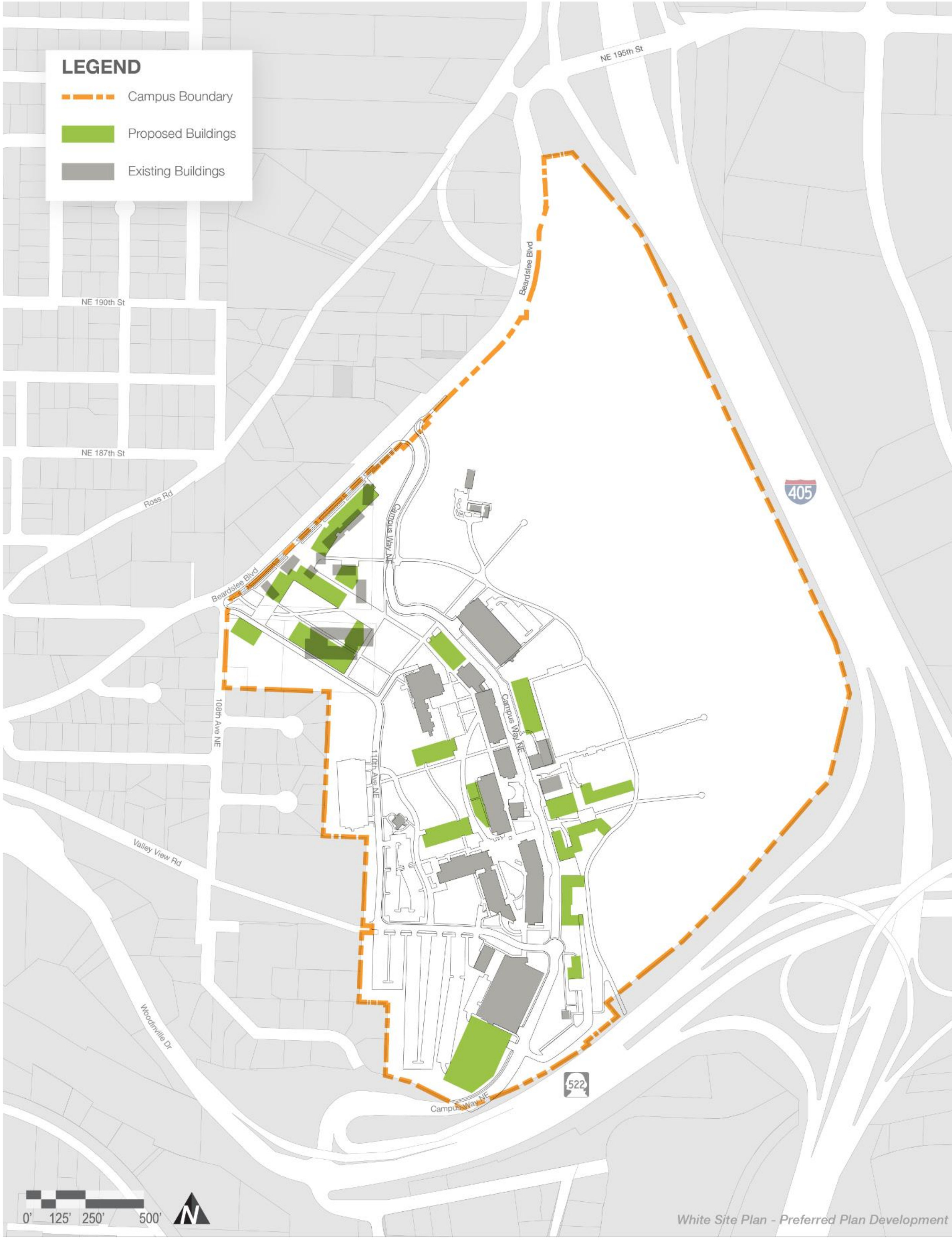
Off-site street system improvements within the study area would be consistent with the No Action Alternatives. The existing north access to campus from Beardslee Boulevard and south access to campus from SR 522 are assumed to remain unchanged under Alternative 4. A new access point would be provided via a realigned 108th Avenue NE/NE 185th Street/Beardslee Boulevard intersection; this access would be for emergency vehicle only or potentially transit depending on the outcome of future transit planning as part of ST3. The existing NE 185th Street between 108th Avenue NE and 110th Avenue NE would be vacated and converted to campus building and open space use.

Pedestrian and Bicycle Transportation

Off-site pedestrian and bicycle improvements within the study area would be consistent with the No Action Alternatives. A primary pedestrian connection would be provided through the center of the campus. There would continue to be conflicts along Campus Way NE with vehicle traffic and pedestrian/ bicycle modes. Traffic calming features along Campus Way NE would help to slow down as well as discourage vehicle traffic from using this street to traverse the campus. Sidewalks and pedestrian paths would be provided between existing and proposed buildings and campus bicycle parking facilities as well as paths would be provided. Fire and emergency access would be maintained.

The increase in on-campus residents would likely result in additional pedestrian travel to and from Downtown Bothell. As described previously, pedestrian facilities are provided along NE 185th Street and, Beardslee Boulevard, providing defined pedestrian facilities and walking routes between the campus and downtown. Pedestrians accessing the downtown would need to cross either at the 110th Avenue NE traffic signal, an unsignalized crossing at Beardslee Boulevard/NE 185th Street, or continue further into Downtown and cross at the all-way stop at the Beardslee Boulevard/Kaysner Way intersection. As noted previously, pedestrians using Valley View Road are able to use a widened roadway section. The City has not maintained the striping, so the previous shoulder striping and crosswalk at Kaysner Way are no longer delineated.

Figure 27. Alternative 4 Preliminary Campus Master Plan



Transit Service

Several transit routing options could occur in the future as the ST3 planning for the SR 522 BRT line progresses. Since no changes to the transit circulation patterns are proposed as part of the Campus Master Plan, an assessment of three potential future circulation scenarios are presented for purposes of analysis and information.

Existing Routing

With the development of Alternative 4, the existing on-site transit center would be redeveloped with campus infrastructure in the long-term. Existing on-site layover areas and turnaround functionally utilizing the campus could be eliminated.

NE 185th Street Routing

Under Alternative 4, transit could utilize the revised NE 185th Street connection to access the campus and/or locate the transit center. This transit area could accommodate active stops and/or layover space and be developed in a surface lot or integrated into the grand floor of future campus buildings. If the area developed were to include layover areas, no additional off-site circulation of the buses would be required. Buses would need to navigate the grade of NE 180th Street between 110th Avenue NE and Campus Way NE. In addition, additional bus and pedestrian conflicts would occur as the parking supply to the south would increase, resulting in additional pedestrian activity at the existing 110th Avenue NE crossing.

Beardslee Boulevard

Construction of the transit center along Beardslee Boulevard could be accommodated with this land use alternative. Buildings constructed along Beardslee Boulevard could be set back enough to accommodate future widening. The transit center along Beardslee Boulevard could include revenue and layover areas. The Alternative 4 land use plan does not preclude this transit circulation option; however, unless buses circulate and/or layover on campus, additional non-revenue transit travel time may be required for buses.

Traffic Volumes

Alternative 4 assumes an increase in students on-campus of up to 10,000 student FTE with 1,200 additional on-campus beds like Alternative 1. Consistent with Alternative 1, Alternative 4 would generate approximately 3,870 net new daily trips with 397 occurring during the weekday AM peak hour and 491 occurring during the weekday PM peak hour. Alternative 4 would generate less net new trips than Scenario B. Both No Action Alternative Scenario B and Alternative 4 would allow for up to 10,000 student FTE on-campus; however, Alternative 4 would accommodate 1,200 beds. The accommodation of student housing on-campus reduces the overall campus vehicle trips because residential students make fewer vehicle trips since they can walk or bike to Campus buildings.

Trip Distribution and Assignment

Trip distribution and assignment for Alternative 4 would be consistent with Alternative 1.

Traffic Operations

Corridor and site access operations for Alternative 4 would be consistent with Alternative 1. All the corridors would operate at LOS E and meet the City's LOS standard under Alternative 4 2037 conditions. Alternative 4 would result in increased vehicles queues compared to No Action Alternative – Scenario A; however, Alternative 4 vehicles queues would be similar to or less than No Action Alternative – Scenario B. The decrease in vehicle queues with Alternative 4 is due to additional residential provided on-campus, which reduces the weekday peak hour vehicles trips to and from Campus.

The existing Husky Village would be removed with Alternative 4, which would minimize queuing impacts to this access. It is not anticipated that weekday peak hour vehicle queues would impact adjacent City intersections with the planned additional eastbound travel lane along Beardslee Boulevard.

Similar to Alternative 1, Alternative 4 would increase delays at the site access intersections compared to Scenario A. A comparison of Alternative 4 to the No Action Alternative - Scenario B shows that delays would generally decrease. In addition, Alternative 4 anticipated vehicle queues at the access intersections would be the same as or slightly less than conditions with No Action Alternative – Scenario B given that traffic volumes would be similar for these Alternatives.

LOS F operations at the SR 522/Campus Way NE intersection are triggered due to the high traffic volumes along SR 522 during both the weekday AM and PM peak hours. Alternative 4 would result in less overall delay at this intersection compared to No Action Alternative – Scenario B.

Beardslee Boulevard Improvement Sensitivity Analysis

The analysis assumes a second eastbound travel lane along Beardslee Boulevard between NE 185th Street and 110th Avenue NE consistent with the Comprehensive Plan. Construction of this lane would require City acquisition of Campus land along the frontage. The results of the sensitivity analysis are consistent with Alternative 1.

Traffic Safety

As traffic volumes increase, traffic safety issues could increase proportionally. Alternative 4 traffic volumes are anticipated to be less than No Action Alternative - Scenario B, which could result in proportionally less potentially vehicles conflicts. Table 8, presented in Chapter 3, highlights planned and future potential improvements within the study area including corridor, intersection, and adaptive signal improvements at these locations. With increased capacity and improved corridor and intersection operations, it is anticipated that safety issues would decrease within the study area.

Parking

Alternative 4 parking demand was determined based on the existing parking rates and projected commuter and residential students. Table 27 provides a summary of the resulting peak parking demand. Alternative 4 would provide up to 4,200 parking spaces on-campus.

Table 27. Summary of Peak Parking Demand – Alternative 4

	Population	Parking Rate[3]	Parking Demand
Commuter Demand	8,800 students FTE[1]	0.31	2,730
Residential Demand	1,200 beds[2]	0.43	520
Subtotal			3,250
Recommended Supply (at 85% Utilization)			*3,740 spaces*

1. Represents on-campus population. Online students would not generate trips to the campus and are not included.
2. One bed is equivalent to one residential student.
3. Based on existing parking rates and accounts for all campus parking including those that are currently occurring off-site. As a conservative estimate of parking, the analysis assumes all residential units are apartment type housing consistent with the existing campus housing. The Campus Master Plan would likely provide traditional student housing (dormitory) with dining services, which would have a lower parking rate.

The analysis assumes existing mode split assumptions continue in the future. This represents a conservative analysis as transit service to the campus is expected to increase in frequency. In addition, all residential units are apartment type housing consistent with the existing campus housing. The Campus Master Plan would likely provide traditional student housing (dormitory) with dining services, which would have a lower parking per bed ratio. Compared to the No Action Alternatives, Alternative 4 parking demand would be 820 vehicles more than No Action Alternative - Scenario A and 120 vehicles more than No Action Alternative - Scenario B.

As shown in Table 27, a parking supply of approximately 3,740 spaces would be recommended under Alternative 4 to achieve an 85 percent parking utilization on-campus. With the proposed parking supply of up to approximately 4,200 spaces, it is anticipated that the parking demand would be fully accommodated on-campus and the peak parking utilization would be approximately 77 percent. As discussed previously, parking utilization over 90 percent is typically considered full because it becomes more difficult to find parking; therefore, with the proposed parking supply there would be a surplus of parking on-campus.

Chapter 8. Impacts of Near-Term Development

The Campus Master Plan is a long-term vision that would be developed over 20-years or more. It is anticipated that an initial phase of development would occur within a near-term horizon over the next 10-years. This section provides transportation analysis of the near-term development for the 2027 horizon year. An evaluation of transit, transportation concurrency, site access and parking are provided. The pedestrian and bicycle connectivity, and safety impacts for the near-term conditions are consistent with those identified for the build-out of the Campus Master Plan described in the evaluation of Alternatives 1, 2, 3, and 4.

The near-term evaluation assumes up to 8,739 on-campus student FTE could be accommodated. In addition, on-campus housing would be increased by 501 beds for a total of 742 on-campus beds. Existing access points to the campus are assumed to remain unchanged. Up to approximately 3,294 parking stalls are proposed (including 171 stalls off-site), representing an increase of approximately 660 stalls compared to existing.

Transit Service

In the near-term no land use changes to the north end of campus are anticipated. Changes to transit may occur due to ST3.

Traffic Volumes

Background traffic forecasts for 2027 conditions were determined based on annual growth rates from the adopted Bothell Comprehensive Plan. Consistent with the 2037 forecasting method, a 2 percent per year growth rate was applied to existing traffic volumes.

Trip generation for the near-term conditions is based on the same method described for the build-out of the Campus Master Plan. Existing mode split assumptions is assumed to continue in the future. Table 28 summarizes the near-term estimated weekday trip generation.

Table 28. Near-Term Estimated Weekday Trip Generation

	Population[1]	Trip Rate[3]	In	Out	Total
Daily					
Future					
Commuter	7,997 students FTE	2.12	8,475	8,475	16,950
Residential	742 beds[2]	1.37	510	510	1,020
Subtotal			*8,985*	*8,985*	*17,970*
Existing Trips			8,255	8,175	16,430
Net New Trips			***730***	***810***	***1,540***
AM Peak Hour					
Future					
Commuter	7,997 students FTE	0.24	1,631	288	1,919
Residential	742 beds[2]	0.10	42	32	74
Subtotal			*1,673*	*320*	*1,993*
Existing Trips			1,549	286	1,835
Net New Trips			***124***	***34***	***158***
PM Peak Hour					
Future					
Commuter	7,997 students FTE	0.25	800	1,199	1,999
Residential	742 beds[2]	0.17	54	72	126
Subtotal			*854*	*1,271*	*2,125*
Existing Trips			771	1,143	1,913
Net New Trips			***84***	***128***	***212***

1. Represents on-campus population. Online students would not generate trips to the campus and are not included.
2. One bed is equivalent to one residential student.
3. Based on existing trip generation rates and accounts for all existing trips generated by the student FTEs including those that are currently occurring off-site. The estimate does not account for potential lower trip generation rates with the proposed traditional (dormitory) housing.

As shown in the table, approximately 1,540 net new daily trips with 158 occurring during the weekday AM peak hour and 212 occurring during the weekday PM peak hour would be generated with the proposed near-term development.

Trip Distribution and Assignment

Near-term net new trips were distributed to the study area consistent with the overall travel patterns identified for the No Action Alternative Scenario B shown on Figure 10 in Chapter 3. The localized trip assignment to the north and south campus access points were determined through a capacity analysis at the north end of the campus and the allocation of on-site parking. The overall trip distribution to the Campus access points would be approximately 48 percent to and from 110th Avenue NE and 52 percent to and from the south at Campus Way NE.

The near-term project trips were added to the background 2027 forecasts to form the basis of the near-term development analysis.

Traffic Operations

The evaluation of traffic operations for the Campus Master Plan Alternatives considers both off-site corridors and the campus access.

Corridors

Corridor operations were evaluated based on the methods and assumptions described in Chapter 2 Affected Environment to verify transportation concurrency for the near-term development. Signal timing was optimized and the evaluation includes the improvements described that would occur by 2027 outlined in Table 8. A detailed intersection LOS summary and worksheets for the study intersections are included in Appendix D. Table 29 provides a summary of the near-term corridor LOS.

Table 29. Near-Term 2027 Weekday PM Peak Hour Corridor LOS Summary

Corridor	LOS[1]	Corridor Delay (sec/veh)[2]
SR-524 (208th St SE/Maltby Rd) Corridor between 9th Ave SE and SR-527	E	78
SR-527/Bothell-Everett Hwy/Bothell Wy Corridor between SR-524 and SR-522	D	45
228th St SE Corridor between 4th Ave W and 39th Ave SE	E	55
39th/35th Ave SE/120th Ave NE/NE 180th St between 228th St SE and 132nd Ave NE	D	51
Beardslee Blvd/NE 195th St Corridor between NE 185th St and 120th Ave NE[3]	D	44
SR-522 (NE Bothell Wy) Corridor between 96th Ave NE and Kaysner Wy	C	30
NE 145th St/Juanita-Woodinville Wy NE/NE 160th St between 100th Ave NE and 124th Ave NE	D	47

1. Level of service, based on 2010 *Highway Capacity Manual* methodology.
2. Average corridor delay in seconds (sec) per vehicle (veh) calculated by as a weighted average of intersections delays along the length of the corridor in seconds per vehicles.
3. The analysis does not assume improvements to provide a 5-lane cross-section between NE 185th Street and I-405; however, similar to the evaluation of the long-term conditions, the LOS is the same with or without a second eastbound lane.

As shown in Table 29, all the corridors would operate at LOS E or better and meet the City's LOS standard under near-term 2027 conditions.

Although the LOS along Beardslee Boulevard shows LOS D conditions during the weekday PM peak hour for the near-term development, it is recognized that there are long queues within the corridor. The 95th-percentile vehicles queues were reviewed at the Beardslee Boulevard/110th Avenue NE intersection to show how the near-term development would impact queuing within the corridor. These queues were compared to the No Action Alternative – Scenario A and Scenario B 2027 conditions. Table 30 provides a summary of anticipated 2027 queues.

Table 30. Near-Term 2027 Weekday PM Peak Hour 95th-Percentile Queue Summary

Movement	Storage (feet)[1]	Queue Length (feet)[2]		
		Scenario A (Baseline)	Scenario B (Allowed in PUD)	Near-Term Development
Eastbound Left-turn	115	15	15	15
Eastbound Through	1,000	480	480	480
Eastbound Right-turn	90	30	65	50
Westbound Left-turn	310	105	130	120
Westbound Through	740	480	480	480
Westbound Right-turn	125	0	0	0
Northbound Through-left	750	320	425	375
Northbound Right-turn	170	85	105	100
Southbound Left-turn	100	45	45	45
Southbound Through-right	100	40	40	40

1. Storage based on turn pocket length or nearest intersection for through movements.
2. The 95th percentile queues represents the queue length that will only be exceeded 5 percent of the time.

As shown in Table 30, all movements during Near-Term 2027 scenarios would be accommodated within the existing storage lengths. In general, queue lengths would be shortest during the Scenario A baseline, followed by the Near-Term development scenario and lastly, Scenario B.

Vehicle queues in the near-term would continue to impact the existing Husky Village driveway on the south side of Beardslee Boulevard. This is consistent with current peak period conditions. It is not anticipated that weekday peak hour vehicle queues would impact adjacent City intersections.

Campus Access

In addition to corridor LOS and Beardslee Boulevard queues, traffic operations for the campus access intersections were also reviewed for the weekday AM and PM peak hours. Impacts of the Near-Term Scenario was compared against a 2027 without the near-term development for both the No Action Alternative – Scenario A and B. Table 31 provides a summary of the weekday AM and PM peak hour intersection LOS.

Table 31. 2027 Weekday Peak Hour Access LOS Summary

Access Intersection	Scenario A (Baseline)		Scenario B (Allowed in PUD)		Near-Term Development	
	LOS[1]	Delay (sec/veh)[2]	LOS[1]	Delay (sec/veh)[2]	LOS[1]	Delay (sec/veh)[2]
AM Peak Hour						
Beardslee Boulevard/110th Avenue NE[3]	B	16	B	17	B	16
SR 522/Campus Way NE	E	61	E	79	E	67
PM Peak Hour						
Beardslee Boulevard/110th Avenue NE[3]	B	13	B	14	B	14
SR 522/Campus Way NE	C	26	E	59	C	32

1. Level of service, based on 2010 *Highway Capacity Manual* methodology.
2. Average delay per vehicle in seconds.
3. The analysis does not assume improvements to provide a 5-lane cross-section between NE 185th Street and I-405; however, similar to the evaluation of the long-term conditions, the LOS is the same with or without a second eastbound lane.

As shown in the Table 31, the near-term development would increase delays at the site access intersections compared to Scenario A. A comparison of near-term development conditions to the No Action Alternative - Scenario B shows that delays would generally decrease.

LOS E operations at the SR 522/Campus Way NE intersection are triggered due to the high traffic volumes along SR 522 during both the weekday AM peak hour. In the near-term, the growth in student FTE would result in less overall delay at this intersection compared to No Action Alternative – Scenario B in 2027.

Parking

Near-term parking demand was determined based on the existing parking rates and projected commuter and residential students. Table 32 provides a summary of the resulting peak parking demand. It is anticipated that in the near-term up to 3,294 parking spaces would be provided within campus and off-campus leased parking. The Campus is currently reviewing and planning for additional parking.

Table 32. Summary of Peak Parking Demand – Near-Term

	Population	Parking Rate[3]	Parking Demand
Commuter Demand	7,997 students FTE[1]	0.31	2,480
Residential Demand	742 beds[2]	0.43	320
Subtotal			2,800
Recommended Supply (at 85% Utilization)			*3,220 spaces*

1. Represents on-campus population. Online students would not generate trips to the campus and are not included.
2. The number of beds is equivalent to one residential student.
3. Based on existing parking rates and accounts for all campus parking including those that are currently occurring off-site.

The analysis assumes existing mode split assumptions continue in the future. This represents a conservative analysis as transit service to the campus is expected to increase in frequency. In addition, all residential units are apartment type housing consistent with the existing campus housing. The Campus Master Plan would likely provide traditional student housing (dormitory) with dining services, which would have a lower parking per bed ratio. As shown in Table 32, a parking supply of approximately 3,220 spaces would be recommended in the near-term to achieve an 85 percent parking utilization on-campus. With the proposed parking supply of approximately 3,294 spaces, it is anticipated that the parking demand would be fully accommodated on-campus and the peak parking utilization would be approximately 85 percent.

Chapter 9. Mitigation

This section presents potential mitigation measures that would offset potential impacts of the Alternatives. The Action Alternatives result in less traffic to and from the campus and traffic operations that are generally better than the No Action Alternative – Scenario B (Allowed in PUD); therefore, on this comparative basis no mitigation would be required. In addition, new traffic from development of the Alternatives would be a small percentage of the existing and projected future traffic volumes on Beardslee Boulevard and SR-522.

Transportation Management Plan

Campus Commuter Services provides transportation resources including providing of parking permits, disability parking assistance, bicycle and pedestrian access, bus route information, U-Car use and carpool support. The goal is to reduce single-occupancy vehicle (SOV) trips to the UW Bothell/Cascadia College campus. Transportation impacts would continue to be mitigated through the implementation of the Transportation Management Program (TMP) to reduce overall SOV traffic and parking needs for the campus. Specific strategies would continue to be refined annually. A DRAFT TMP is attached to this report as Appendix F. This TMP outlines a series of strategies for each of the key travel modes and programs on campus. The University and College will submit to the City a TMP annual report highlighting results of the monitoring study and providing any recommended updates to the TMP strategies.

Parking Management

It is recognized that parking on-campus is currently near full and that some parking related to the campus is occurring on streets surrounding the campus and within Downtown. The parking supply identified for Alternatives 1-4 would fully accommodate parking on-campus.

Implementation of TMP strategies and reduction in SOV travel would help reduce on-campus parking demand. These strategies could be targeted towards both residential and commuter students. The analysis of parking presented previously assumes residential housing consistent with the apartment type units provided today. The Campus Master Plan includes dining services and would likely develop more traditional university/college housing (dormitory) in both the near- and long-term. With more traditional housing, the need for auto ownership would decrease since dining and other services would be provided on-campus. In addition, parking policies could be set to limit residential student vehicle demand. It is anticipated that more traditional housing parking demand could be approximately 50 percent less than the current housing parking demand. Appendix G provides detailed calculations for the mitigated parking demand assuming traditional housing rather than apartments for some or all the proposed housing. Table 33 provides a summary of the unmitigated and mitigated parking demand for the Action Alternatives and the near-term condition assuming traditional housing parking demand is less than the existing apartment style housing.

Table 33. Summary of Unmitigated and Mitigated Peak Parking Demand

	Alternative 1 & 4		Alternative 2 & 3		Near-Term	
	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated
Commuter[1]	2,730	2,730	2,910	2,910	2,480	2,480
Apartment Residential[2]	520	260	260	-	320	60
Traditional Residential[3]	-	120	-	120	-	120
Total	**3,250**	**3,110**	**3,170**	**3,030**	**2,800**	**2,660**

1. Commuter student parking demand is based on the existing parking rate of 0.31 vehicles per commuter student FTE. This parking rate could be reduced with implementation of additional transportation demand management strategies.
2. Apartment parking demand is based on the existing parking rate of 0.43 vehicles per commuter student FTE. This parking rate could be reduced with implementation of additional transportation demand management strategies.
3. Traditional residential parking demand assumes a rate of 0.20 vehicles per student FTE. The analysis assumes 600 traditional beds.

As shown in the table, with traditional housing parking demand could be reduced by approximately 5 percent. The campus could work with the City to identify off-campus parking solutions to discourage off-campus parking.

Potential Roadway Improvements

The PUD conditions with the City of Bothell require additional street right-of-way along the Beardslee Boulevard frontage (east of 110th Avenue NE) for future dedication sufficient to accommodate final road widening, as determined by the Director of Community Development and Public Works. In addition, a 10-foot wide utility easement is required adjacent to the new right-of-way on the Campus side of Beardslee Boulevard. The agreement also notes that some of the additional right-of-way to be reserved is constrained by the existing wetland restoration which was required as part of the original campus development.

No campus development is proposed east of 110th Avenue NE, and additional campus traffic from the Alternatives will be a small percentage of existing and projected traffic volumes on Beardslee Boulevard.

Pedestrian and Bicycle Connection Improvements

The Campus is partnering with the City to construct the pedestrian crossing at the Beardslee Boulevard/NE 185th Street intersection. This signalized crossing will improve connectivity between Downtown and the Campus.
When additional campus housing is developed, the need for additional pedestrian improvements should be evaluated.

Transportation Impact Fees

Development of the campus requires payment of transportation impact fees to mitigate off-site impacts . Transportation fees are assessed based on increases in student FTE associated with the development of buildings on-campus. Impact fees would be calculated at the time of permitting for specific campus buildings.

Chapter 10. Secondary and Cumulative Impacts

Secondary and cumulative impacts on area transportation system are included in the analysis of direct impacts. In addition, there is a potential for cumulative impacts due to the combined effects of traffic being generated by development of the Campus Master Plan and construction activities on campus and in the surrounding vicinity. This potential impact could be mitigated by scheduling construction activities such that arrival and departure of construction traffic occurs outside the peak hours.

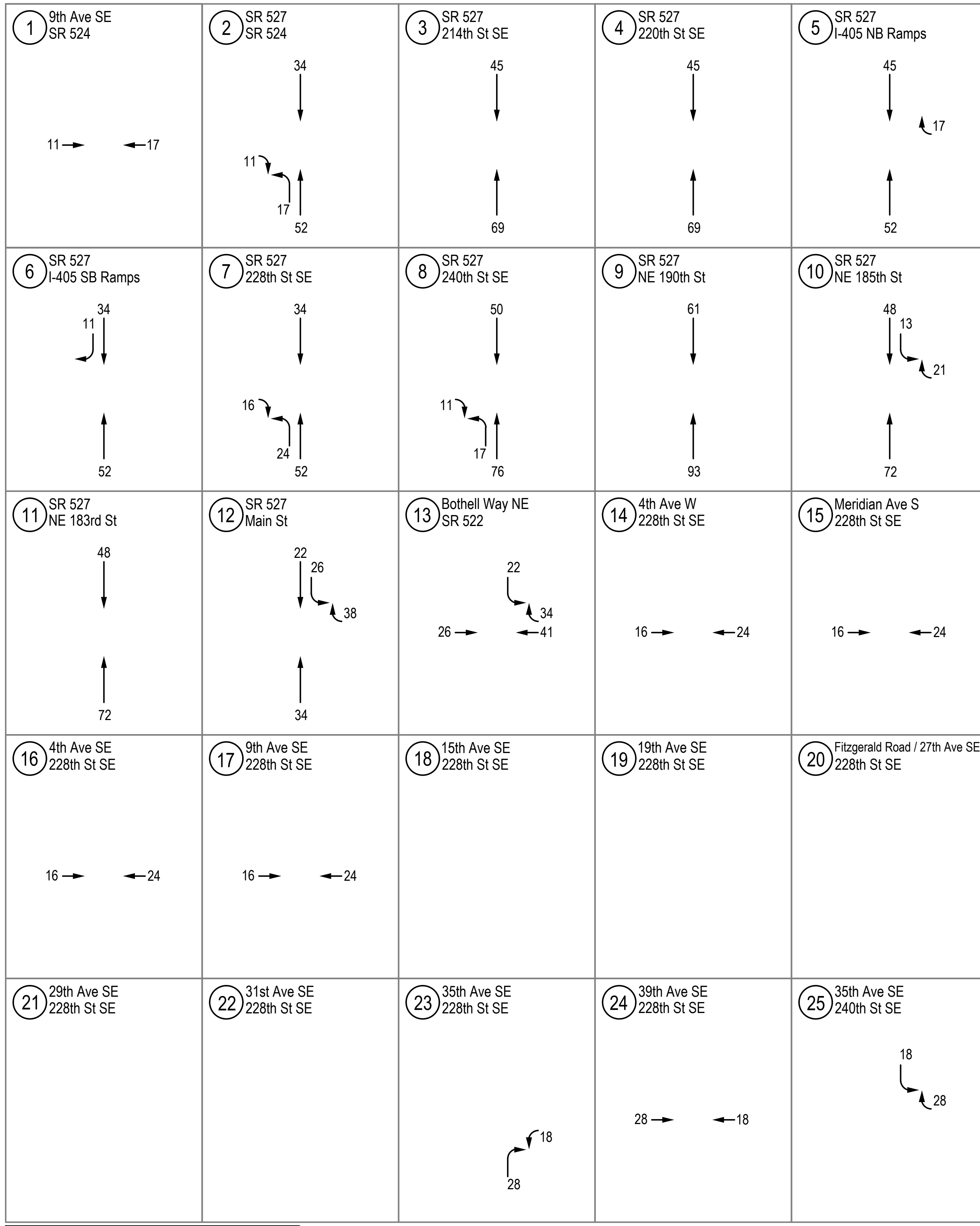
Chapter 11. Significant and Unavoidable Adverse Impacts

Development of the Campus Master Plan and increase in on-campus population to up to 10,000 student FTE by the year 2037 would result in increases in all travel modes – vehicles, transit, pedestrians, and bicycles. It is anticipated that with the proposed mitigation there would be no significant and unavoidable impacts related solely to campus growth.

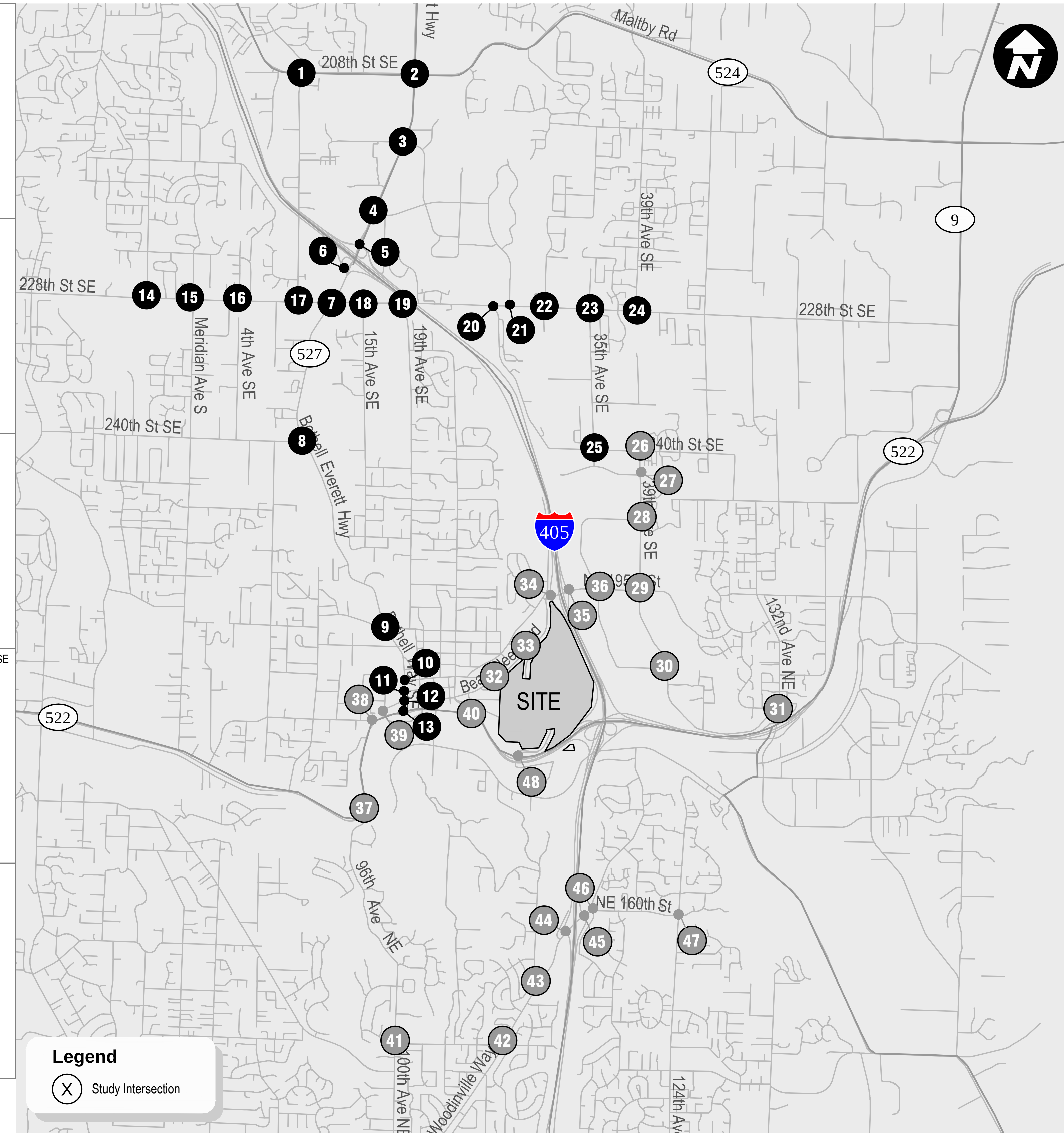
The SR 522/Campus Way NE intersection would operate at LOS F under the No Action Alternative – Scenario B and the proposed Action Alternatives 1, 2, 3, and 4, and potential improvements at this location are limited due to right-of-way constraints. This is considered a cumulative significant and unavoidable adverse impact that would likely occur with or without the proposed Campus Master Plan.

As noted in the analysis of vehicle operations, the SR 522/Campus Way NE intersection is forecasted to operate at LOS F under all No Action Alternative conditions during the weekday AM peak hour. Congestion and poor intersection operations are largely due to growth along SR 522 as shown in the evaluation of the No Action Alternative – Scenario A conditions where campus growth is limited. On-going TMP measures implemented by the Campus would reduce overall campus trip generation and reduce related impacts at this intersection.

Appendix A: Project Trip Assignment & Intersection Turning Movements



Legend
X Weekday PM Peak Hour Project Trips

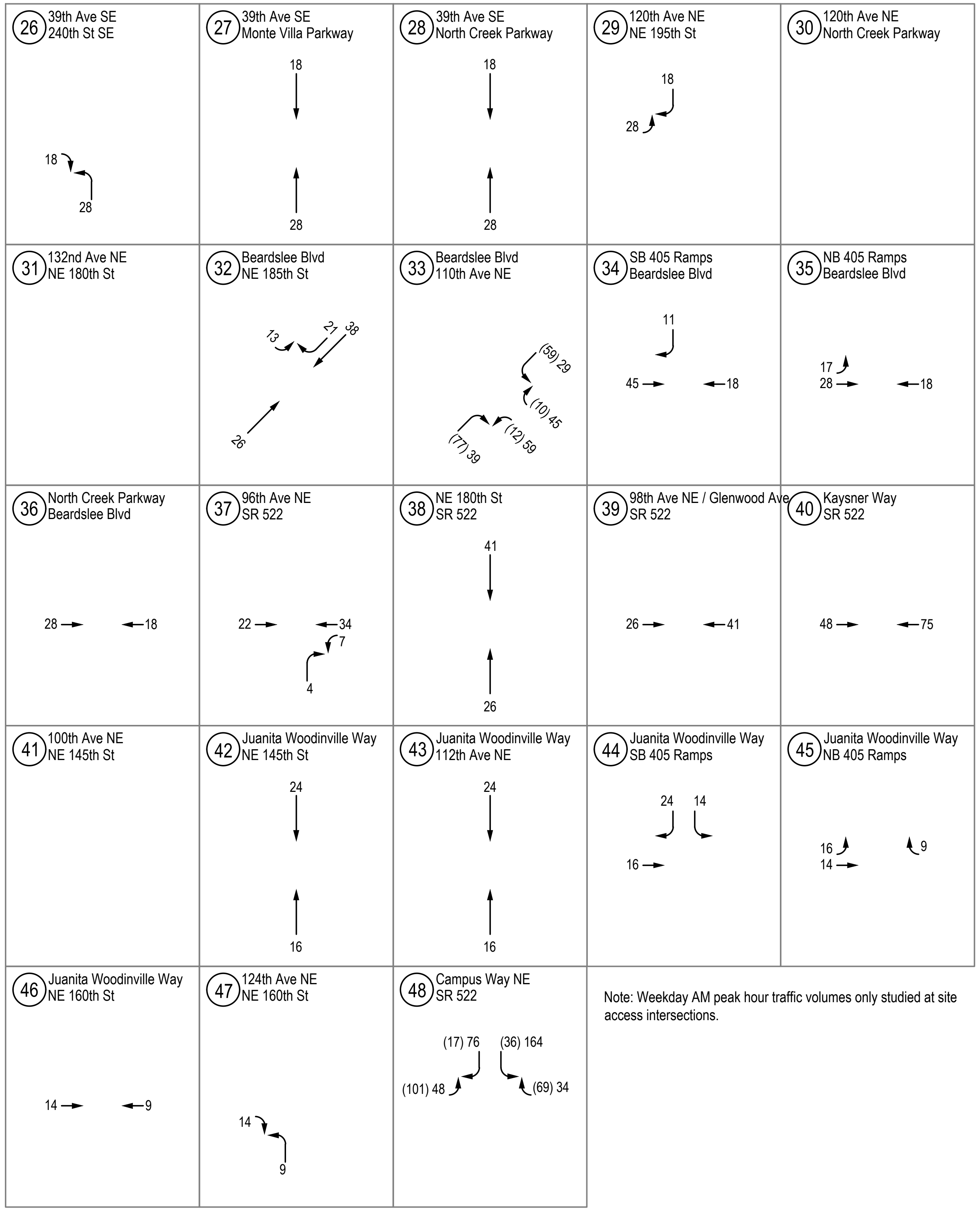


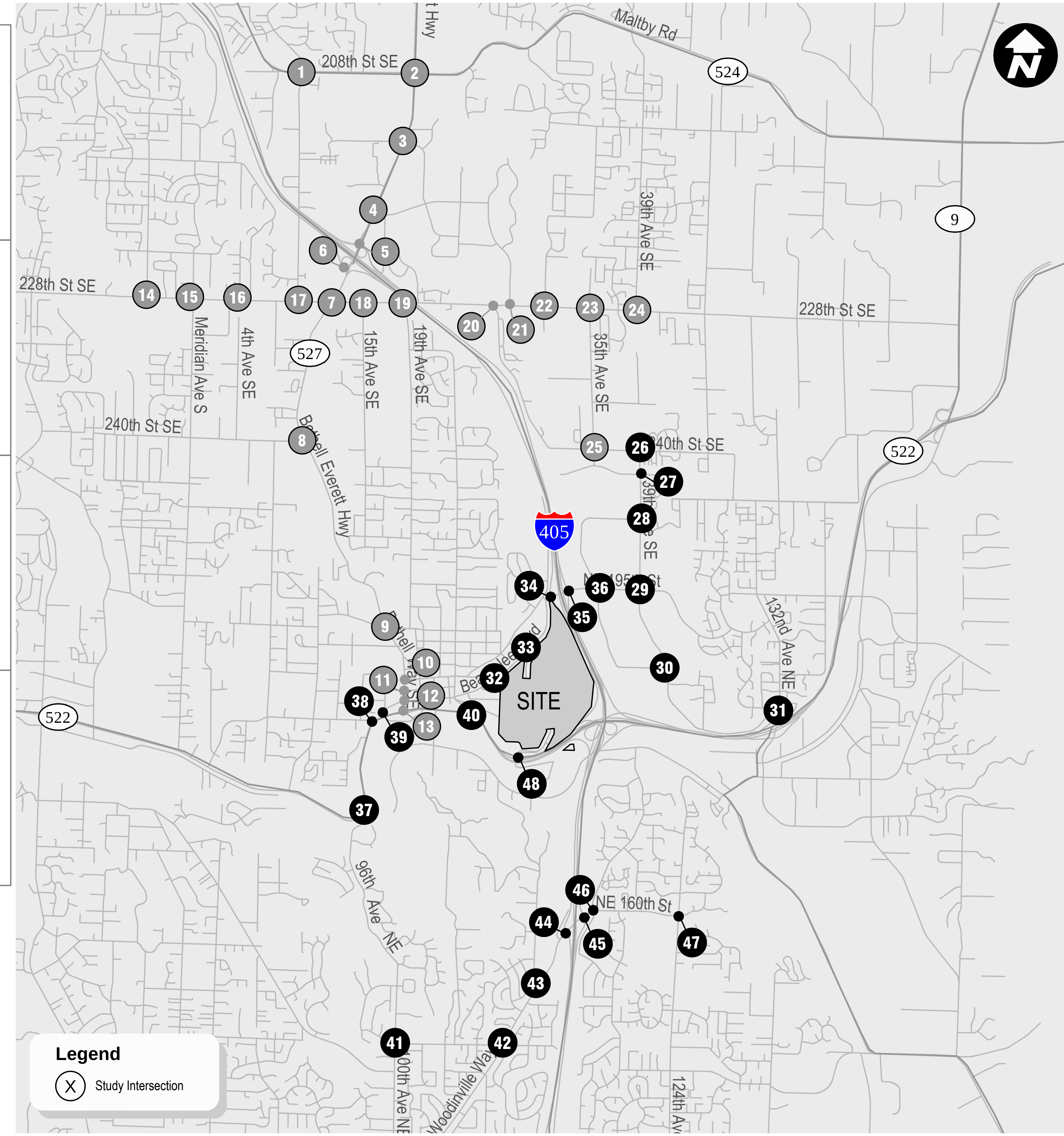
2037 No Action Scenario B Weekday PM Peak Hour Project Trips

UW Bothell / Cascadia College Campus Master Plan

APPENDIX
A-1

transpogroup WHAT TRANSPORTATION CAN BE.





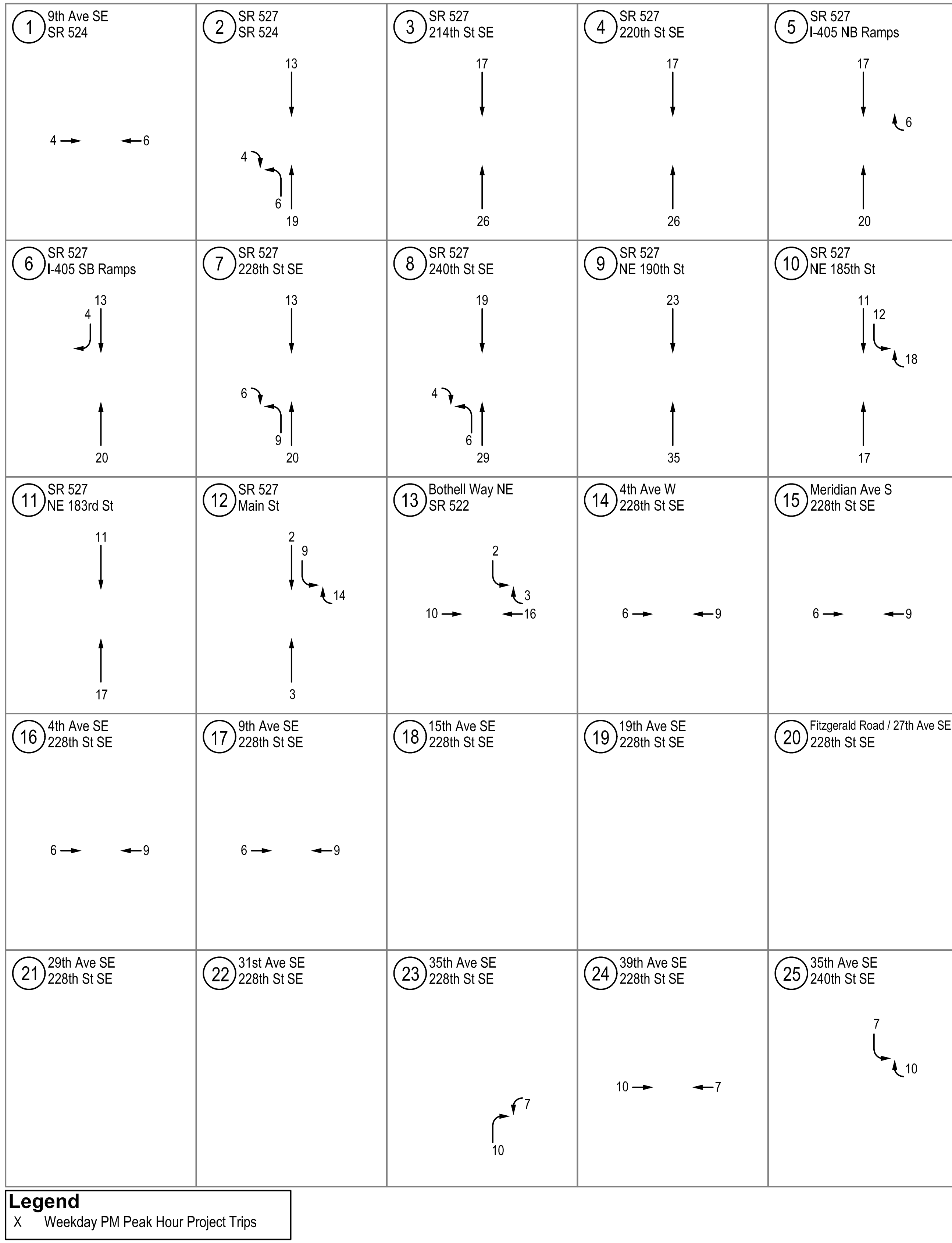
Legend
X Weekday PM Peak Hour Project Trips
(X) Weekday AM Peak Hour Project Trips

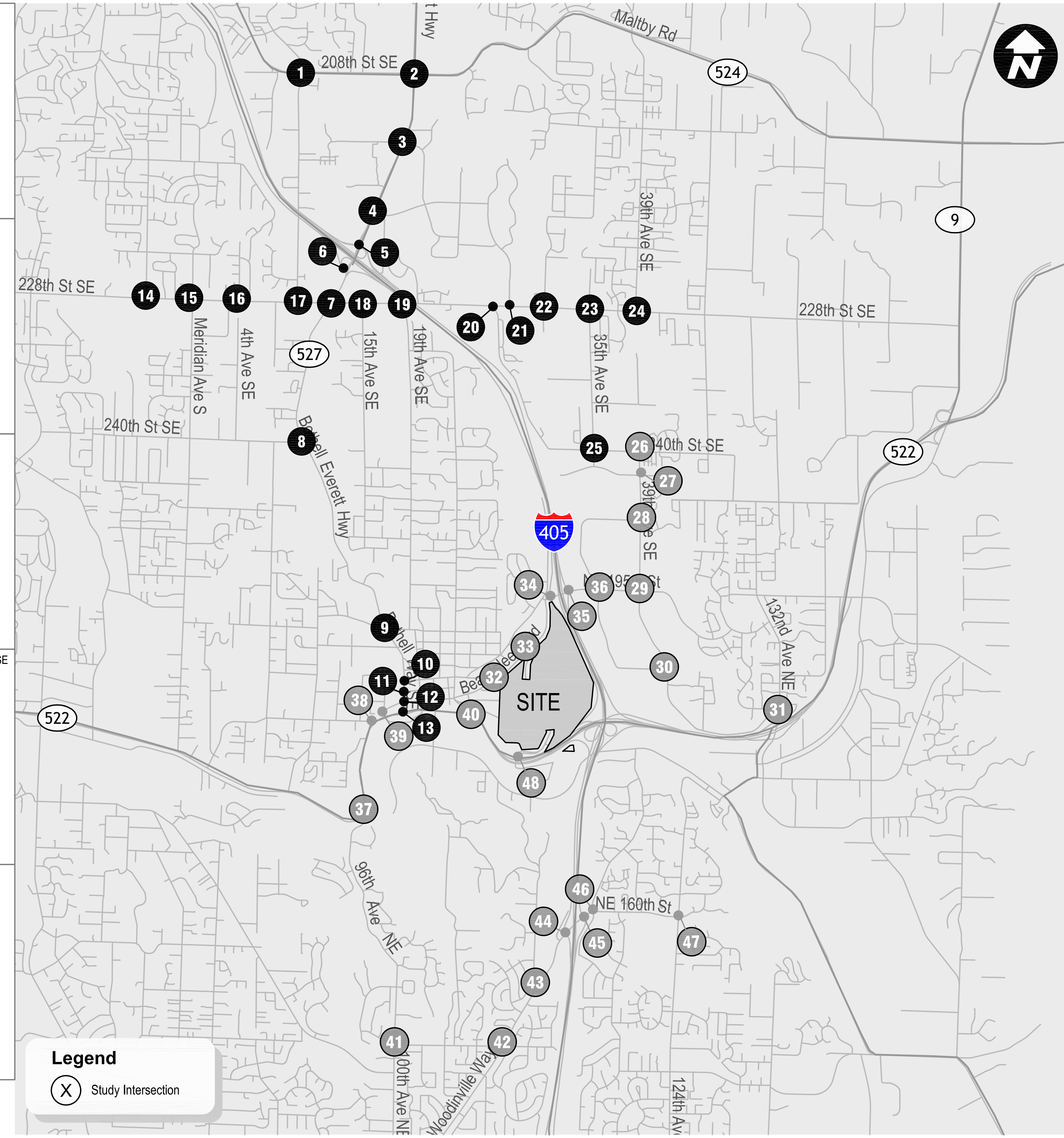
2037 No Action Scenario B Weekday Peak Hour Project Trips

UW Bothell / Cascadia College Campus Master Plan

APPENDIX
A-2

transpogroup WHAT TRANSPORTATION CAN BE.





Near Term (2027) Weekday PM Peak Hour Project Trips

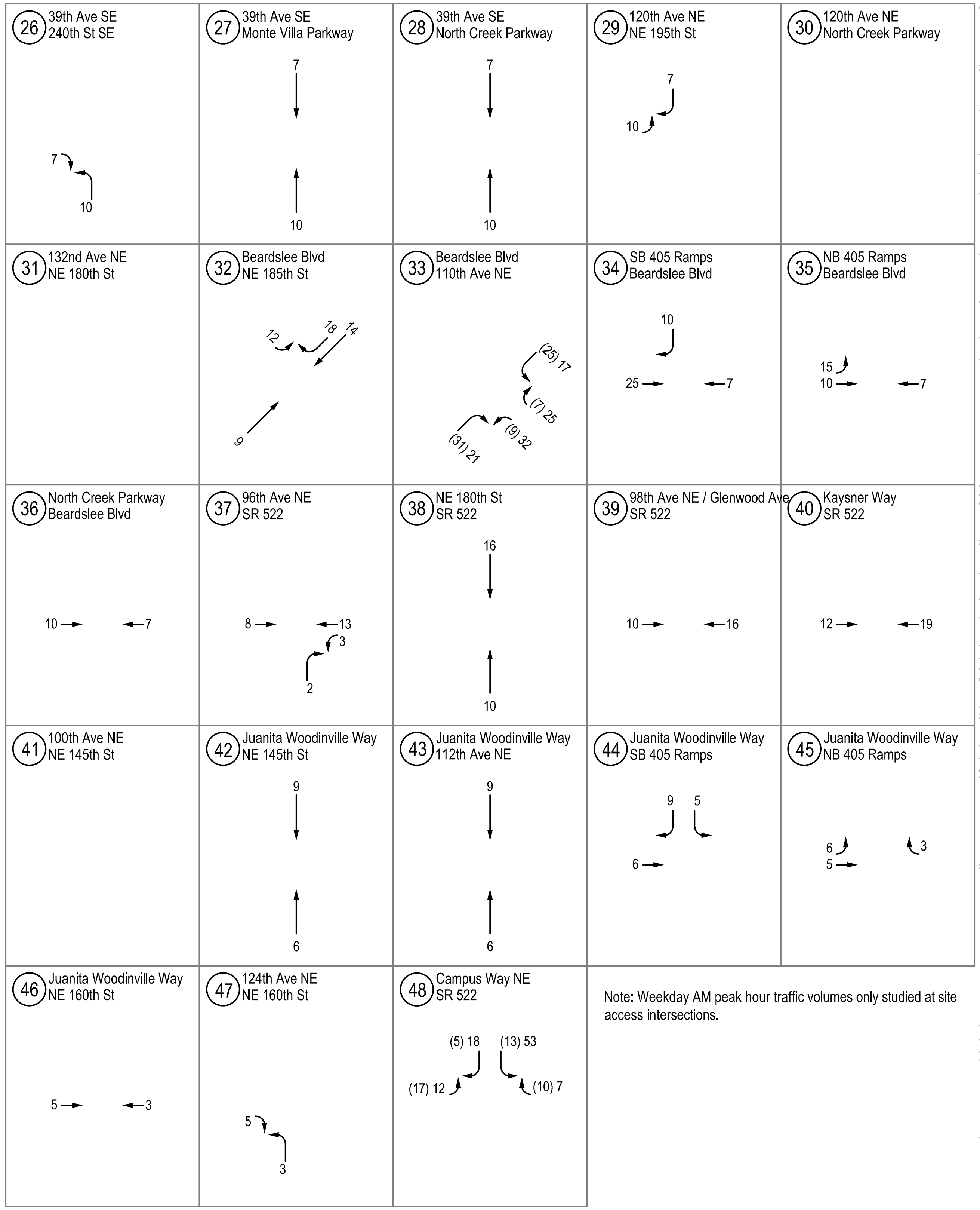
UW Bothell / Cascadia College Campus Master Plan

APPENDIX

A-3

transpogroup
WHAT TRANSPORTATION CAN BE.

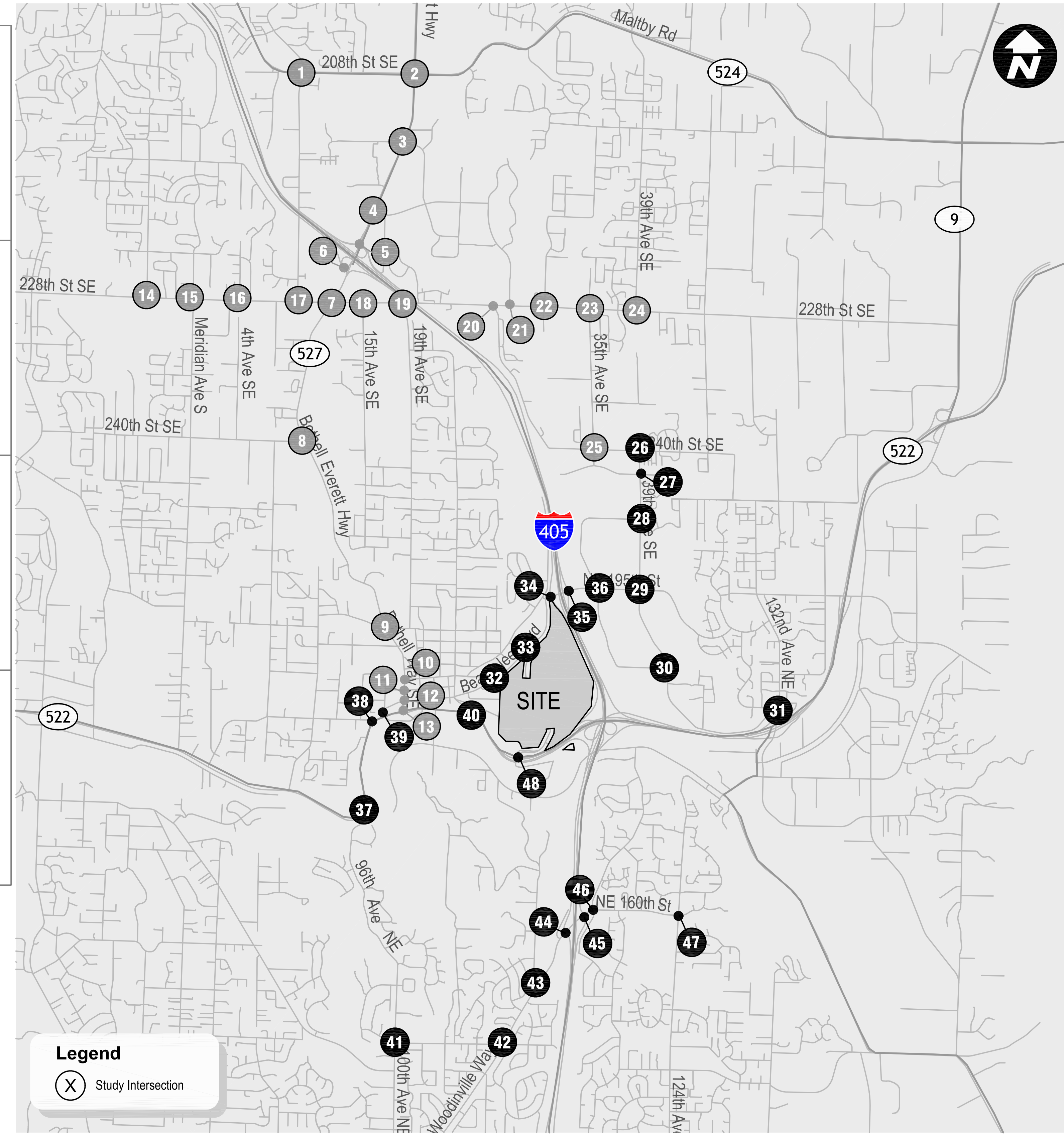
Jul 07, 2017 - 2:28pm mattt M:\16\16320.00 - UW Bothell Campus Master Plan Update\Graphics\UWB-GRAPHICS-GIS - kll.dwg Layout: Appendix A-Short Term Project Trips



Legend

X Weekday PM Peak Hour Project Trips

(X) Weekday AM Peak Hour Project Trips

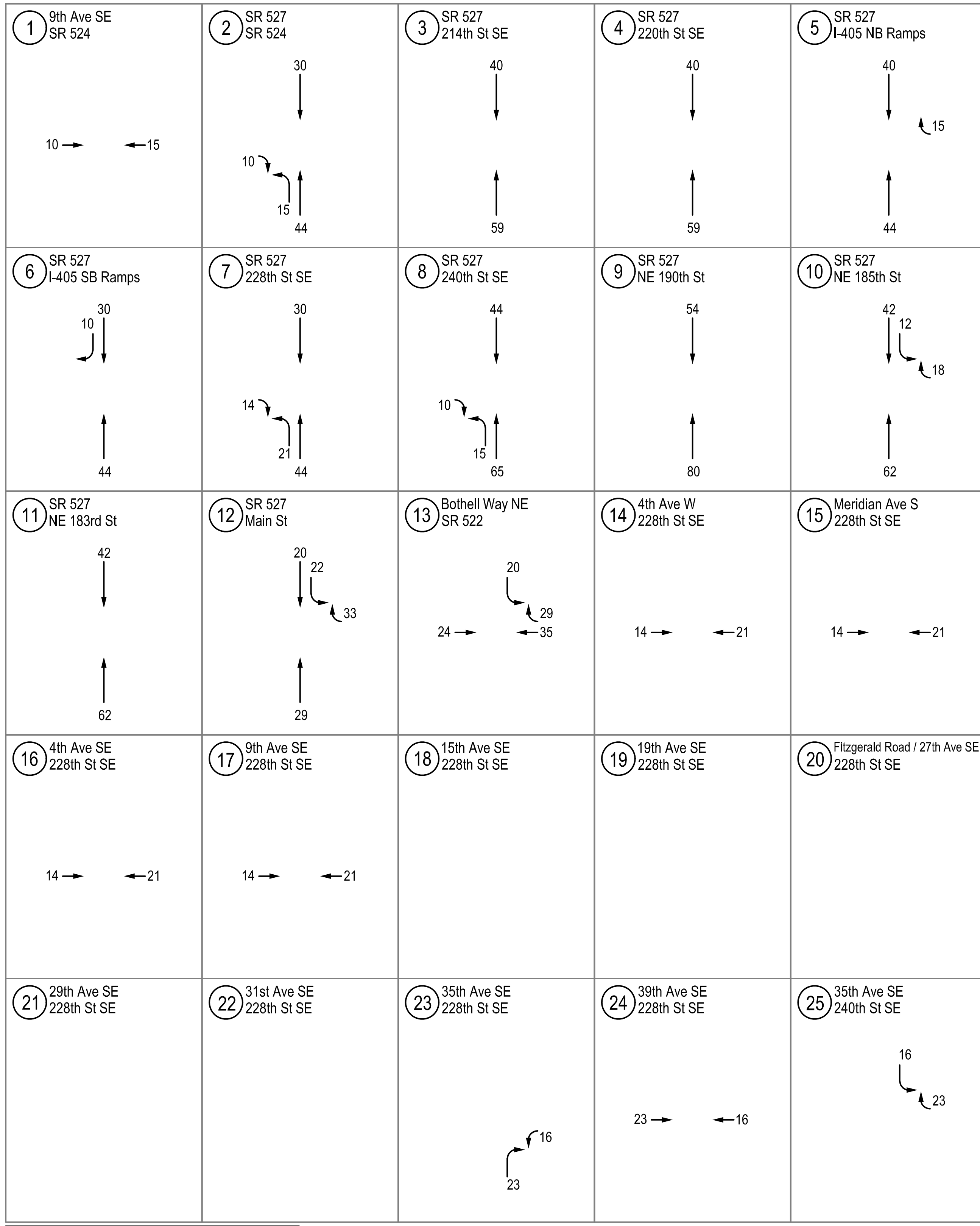


Near Term (2027) Weekday Peak Hour Project Trips

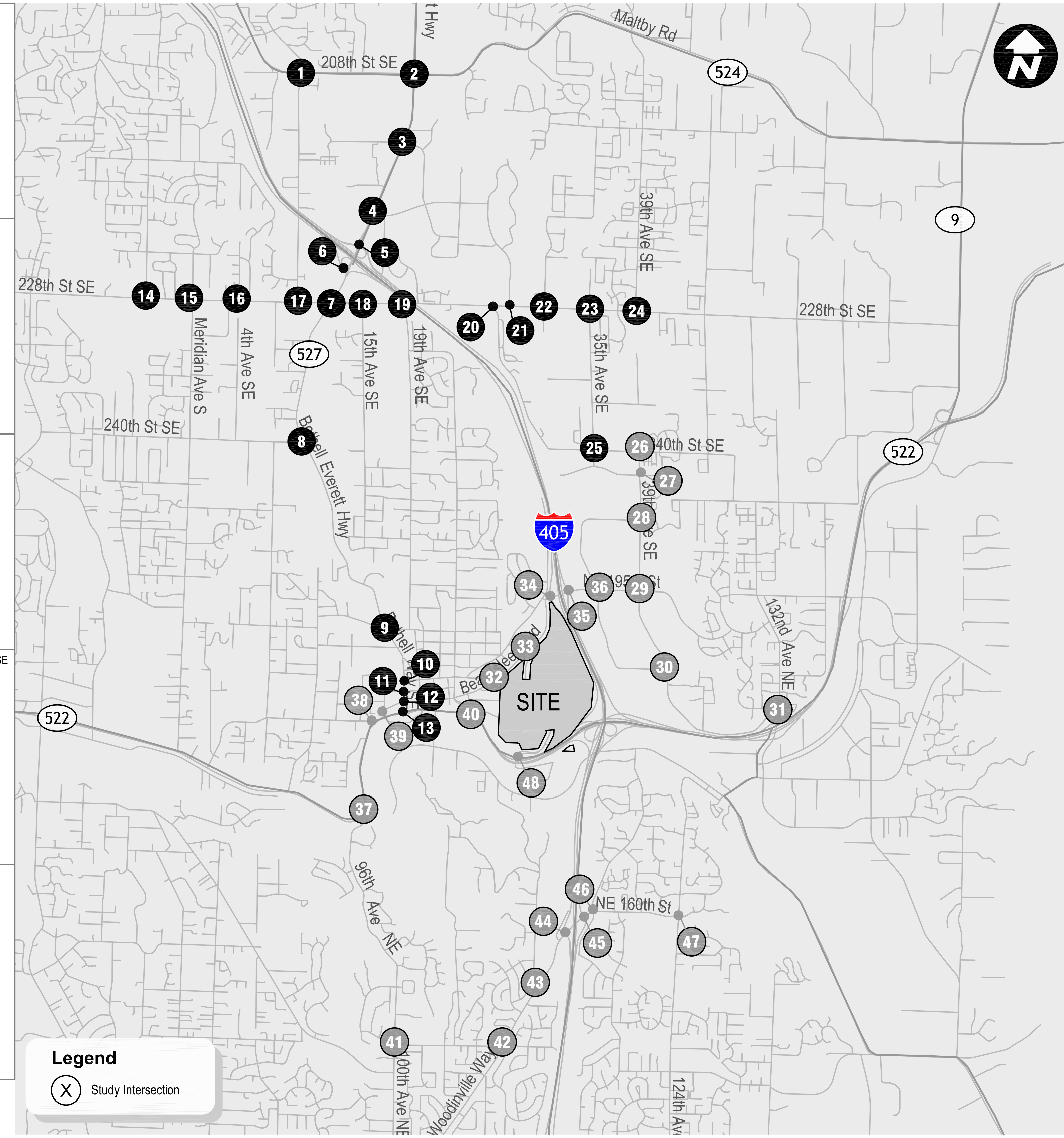
UW Bothell / Cascadia College Campus Master Plan

APPENDIX **A-4**

transpogroup WHAT TRANSPORTATION CAN BE.



Legend
X Weekday PM Peak Hour Project Trips

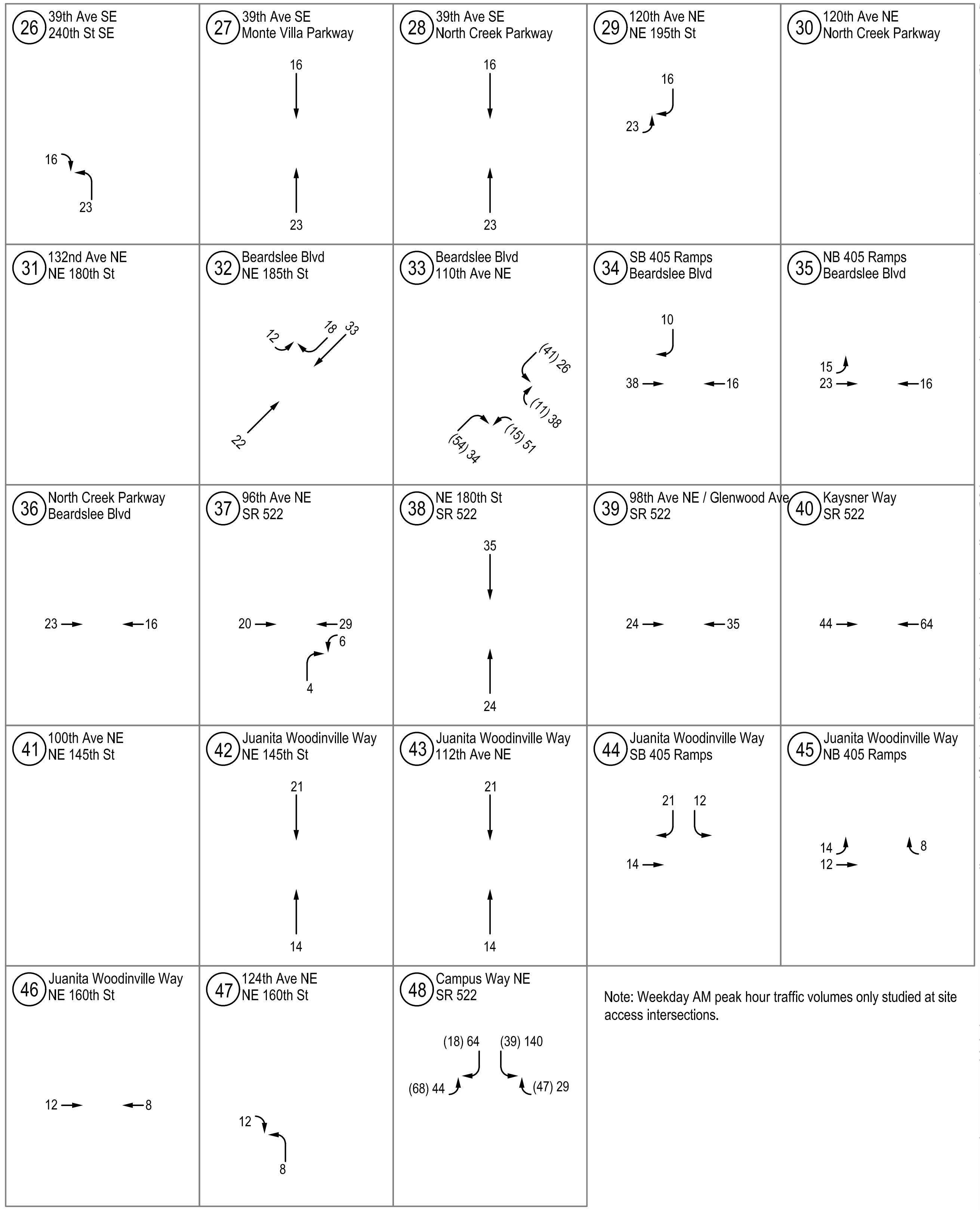


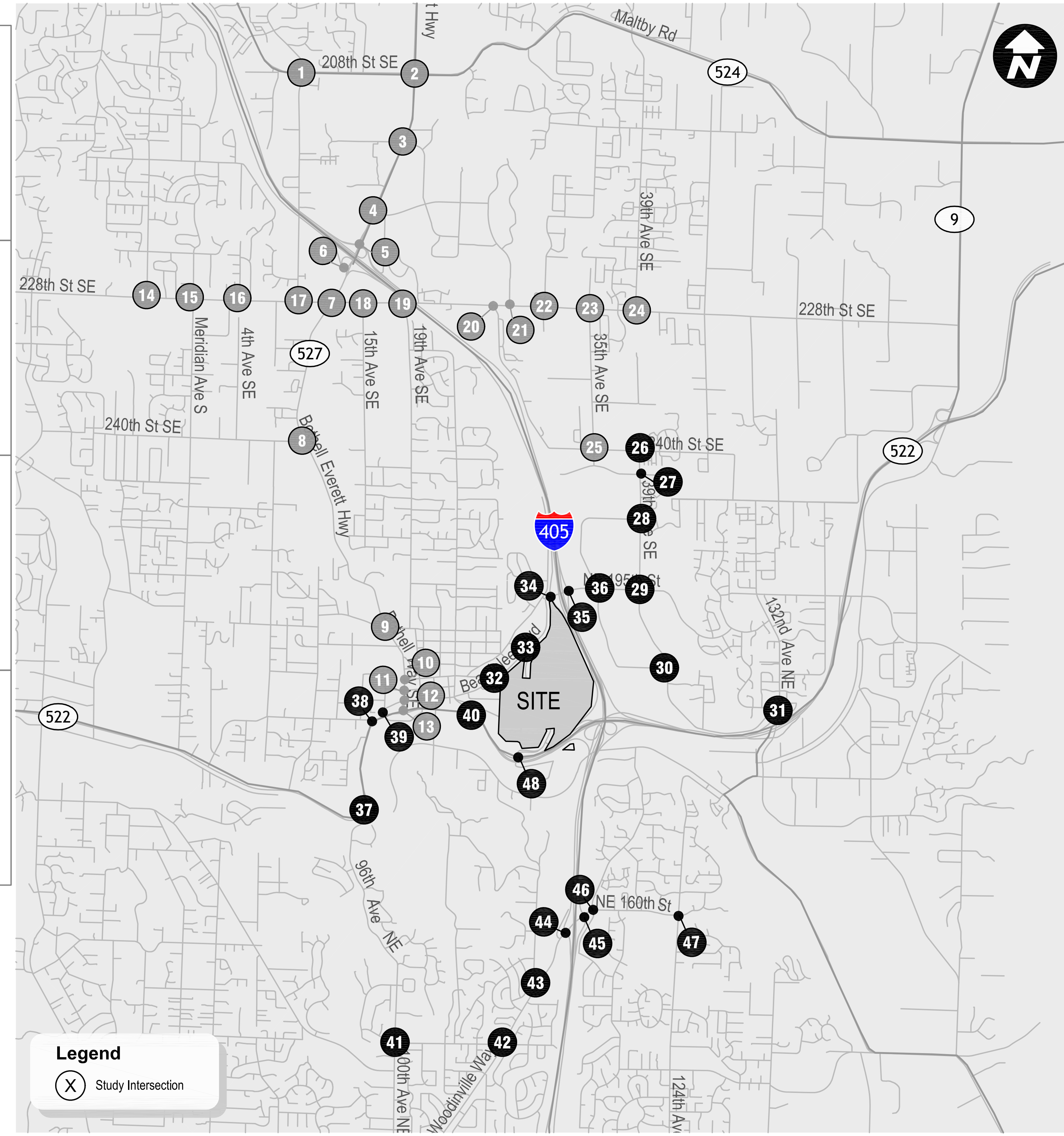
Alternative 1 Weekday PM Peak Hour Project Trips

UW Bothell / Cascadia College Campus Master Plan

APPENDIX
A-5

transpogroup WHAT TRANSPORTATION CAN BE.





Legend

X Weekday PM Peak Hour Project Trips

(X) Weekday AM Peak Hour Project Trips

Alternative 1 Weekday Peak Hour Project Trips

UW Bothell / Cascadia College Campus Master Plan

APPENDIX **A-6**

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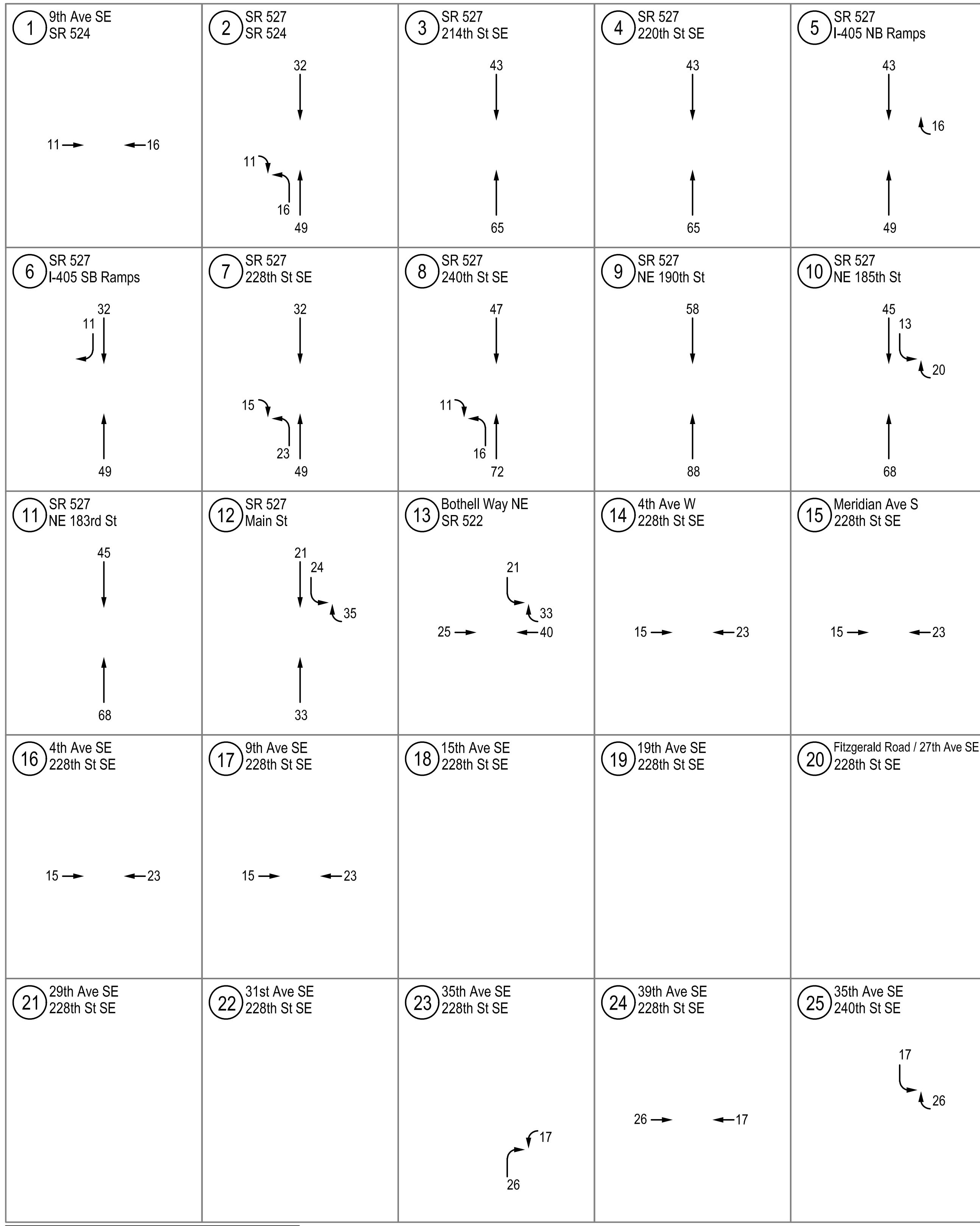
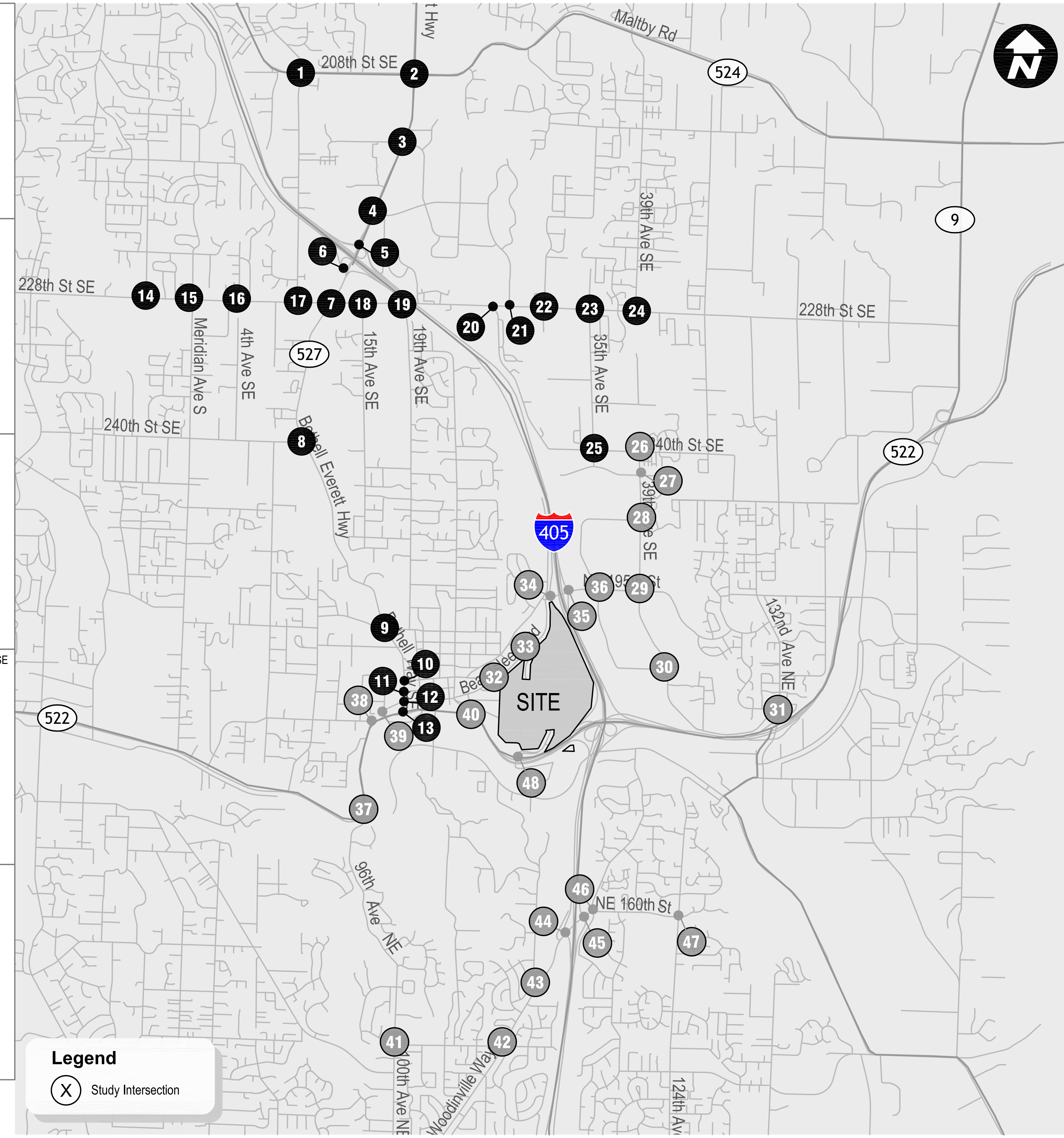


Legend
X Weekday PM Peak Hour Project Trips



Alternative 2 Weekday PM Peak Hour Project Trips

UW Bothell / Cascadia College Campus Master Plan

APPENDIX

A-7

transpogroup WHAT TRANSPORTATION CAN BE.

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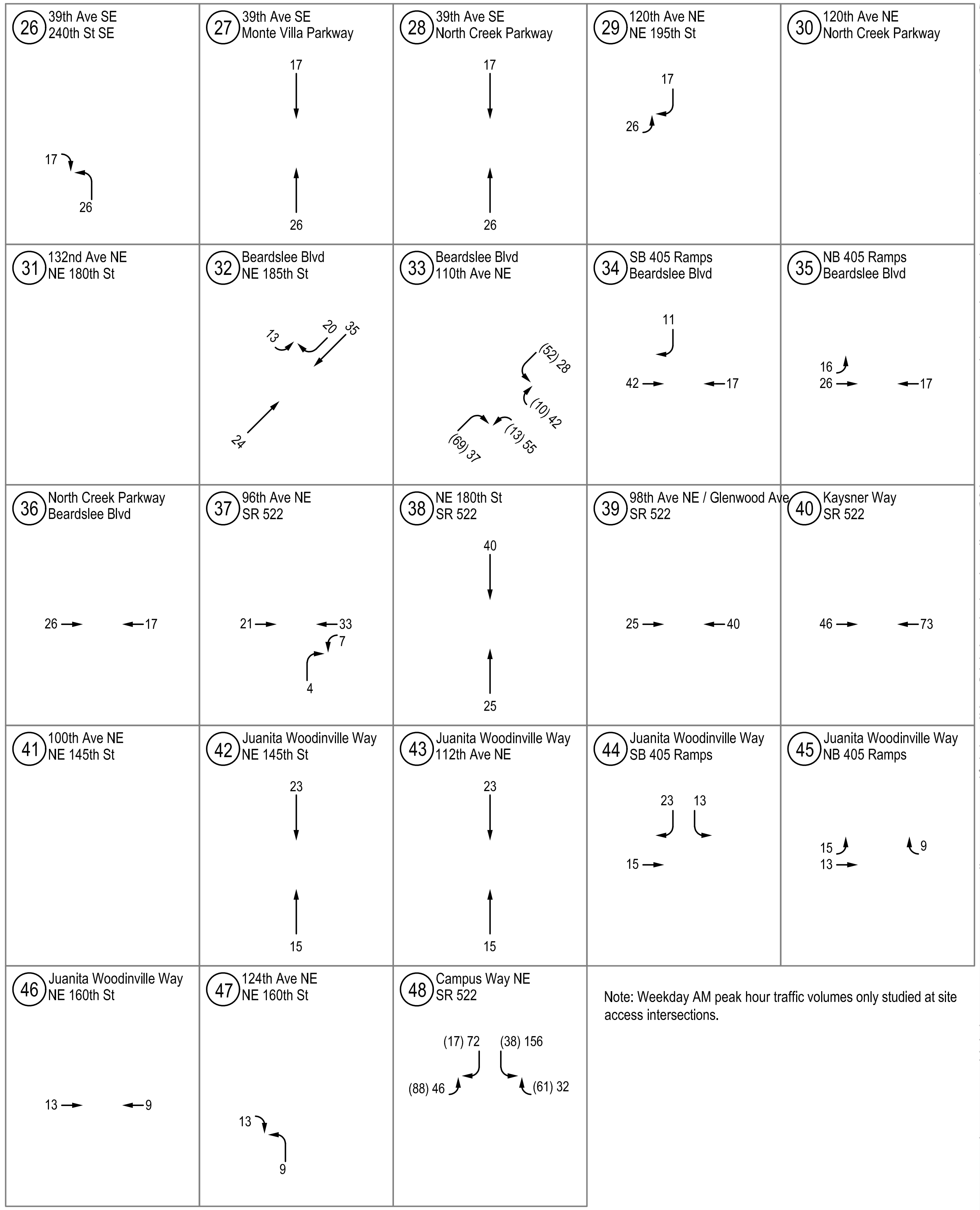
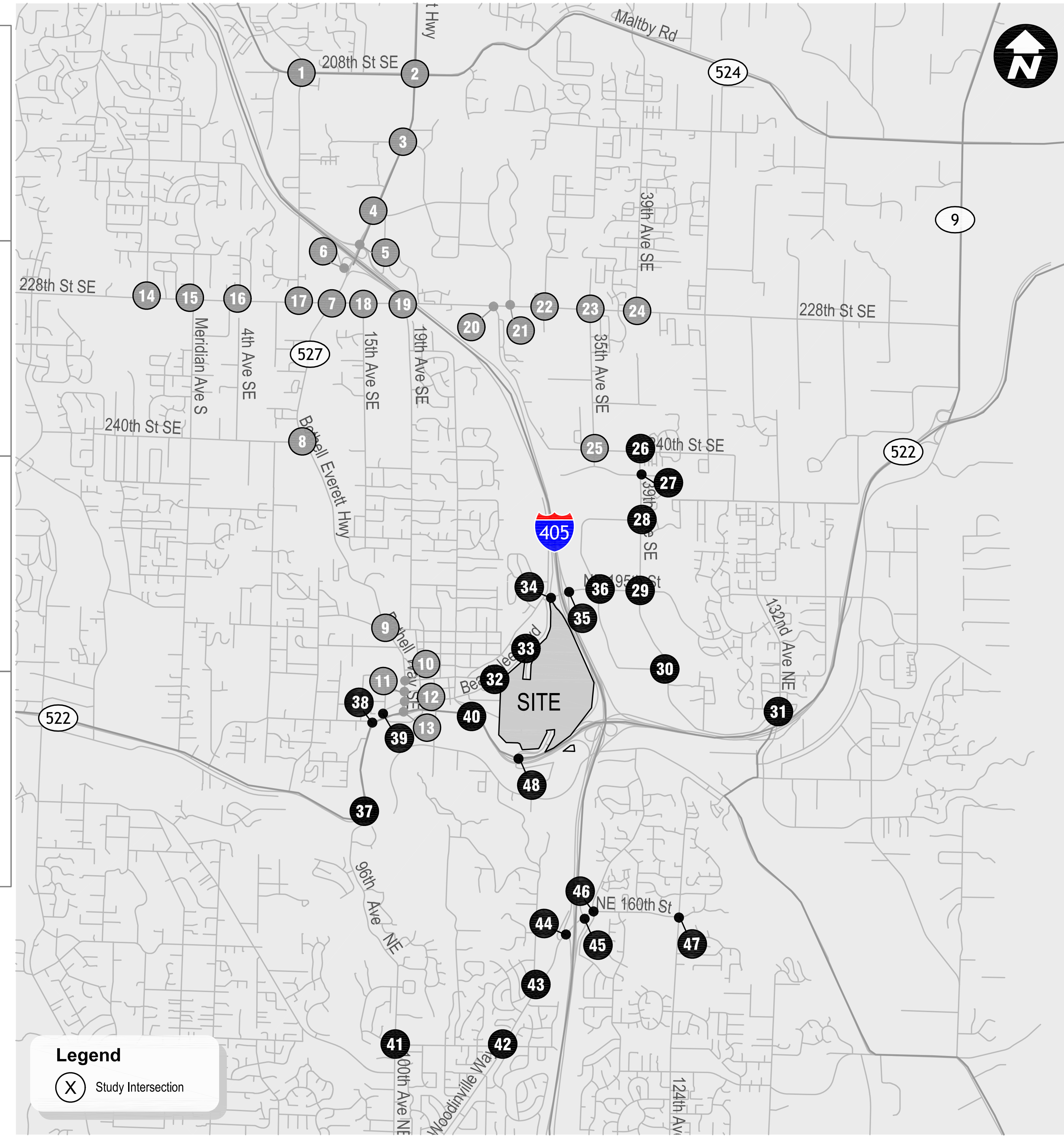


Legend
X Weekday PM Peak Hour Project Trips
(X) Weekday AM Peak Hour Project Trips



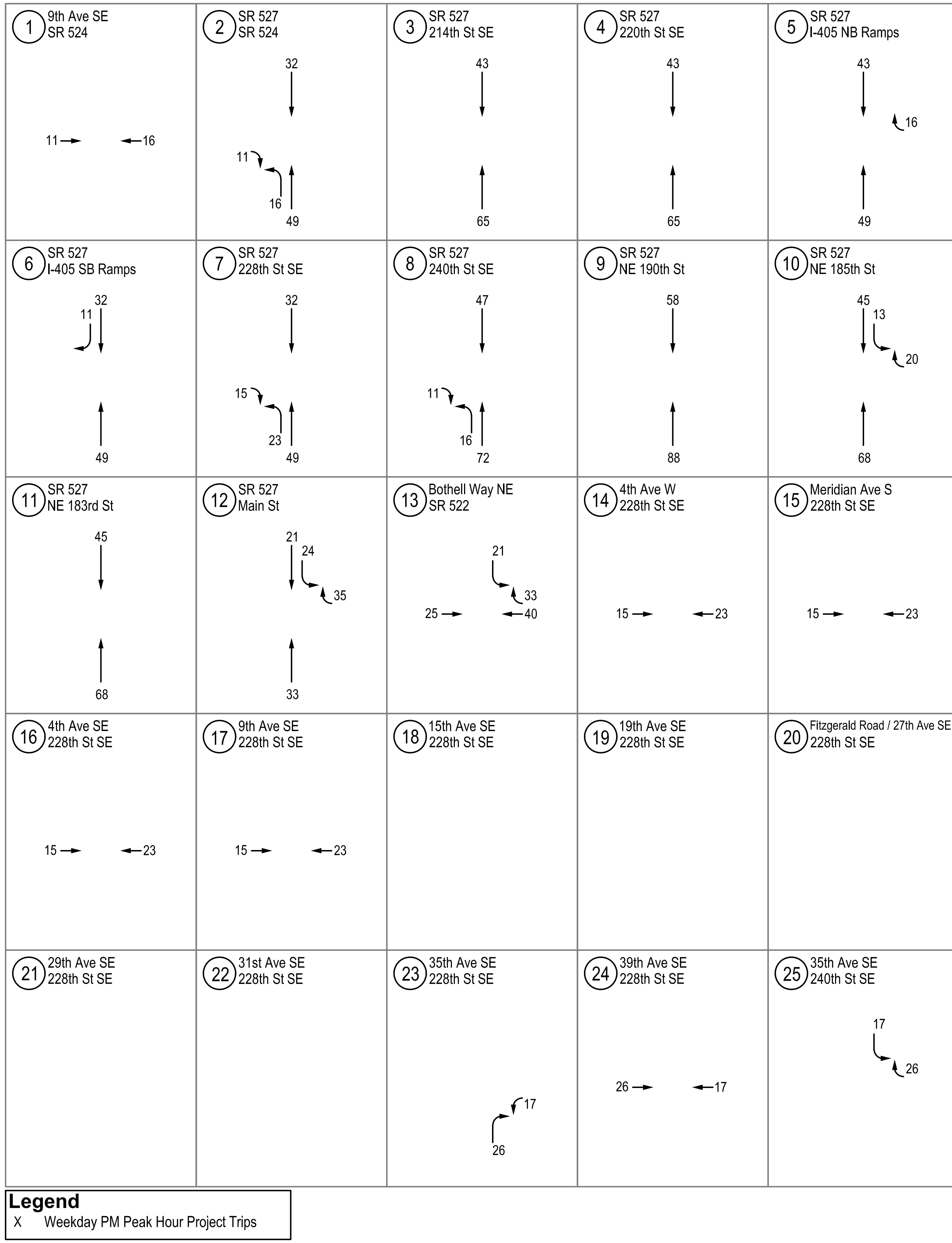
Alternative 2 Weekday Peak Hour Project Trips

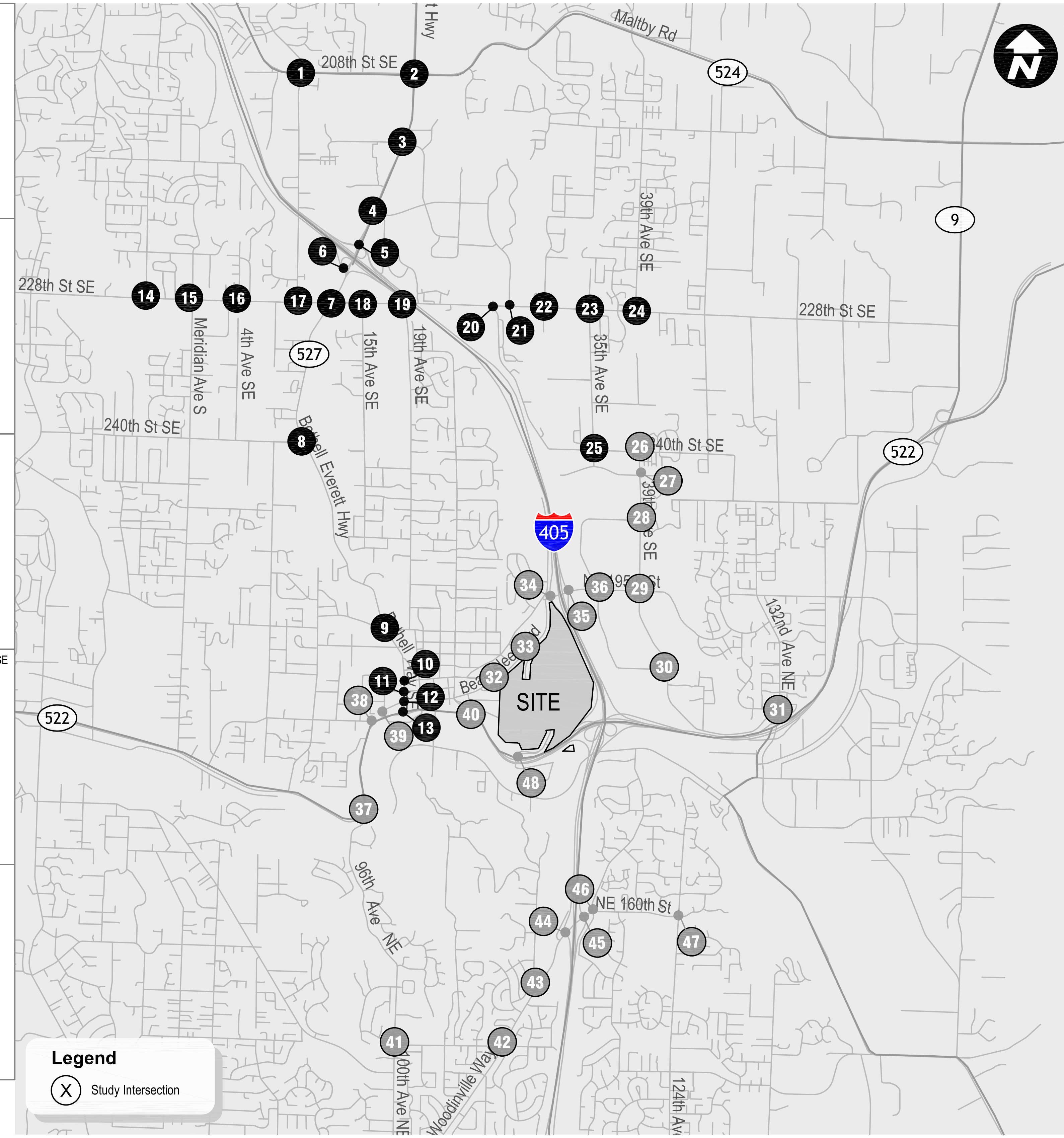
UW Bothell / Cascadia College Campus Master Plan

APPENDIX
A-8

transpogroup
WHAT TRANSPORTATION CAN BE.

Jul 07, 2017 - 2:30pm matt M:\16\16320.00 - UW Bothell Campus Master Plan Update\Graphics\UWB-GRAPHICS-GIS - kll.dwg Layout: Appendix A-Alt2-Project Trips2





Alternative 3 Weekday PM Peak Hour Project Trips

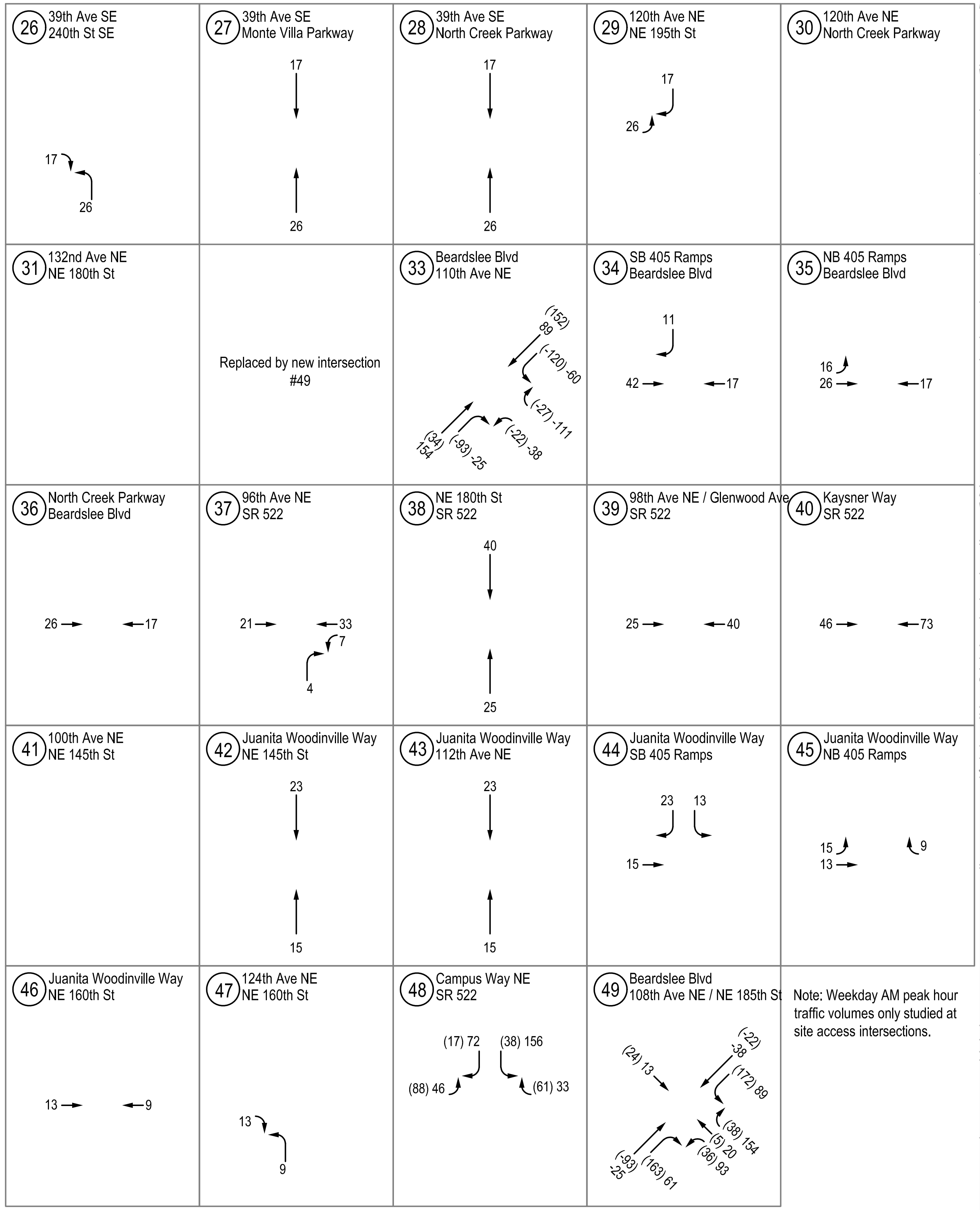
UW Bothell / Cascadia College Campus Master Plan

APPENDIX

A-9

transpogroup WHAT TRANSPORTATION CAN BE.

Jul 07, 2017 - 2:31pm matt M:\16\16320.00 - UW Bothell Campus Master Plan Update\Graphics\UWB-GRAPHICS-GIS - kll.dwg Layout: Appendix A-Alt3 Project Trips1

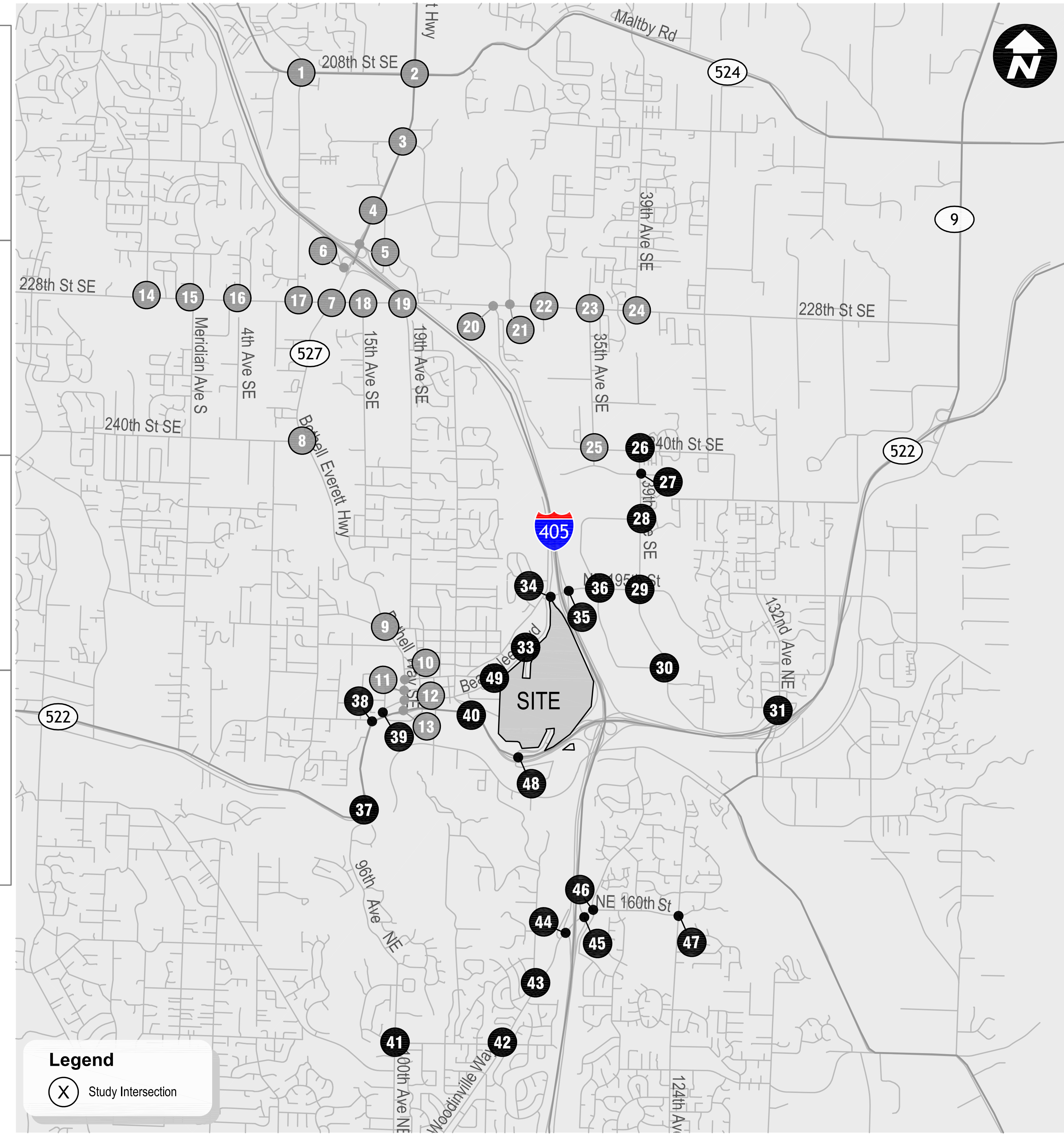


Note: Weekday AM peak hour traffic volumes only studied at site access intersections.

Legend

X Weekday PM Peak Hour Project Trips

(X) Weekday AM Peak Hour Project Trips



Alternative 3 Weekday Peak Hour Project Trips

UW Bothell / Cascadia College Campus Master Plan

APPENDIX

A-10

transpogroup WHAT TRANSPORTATION CAN BE.

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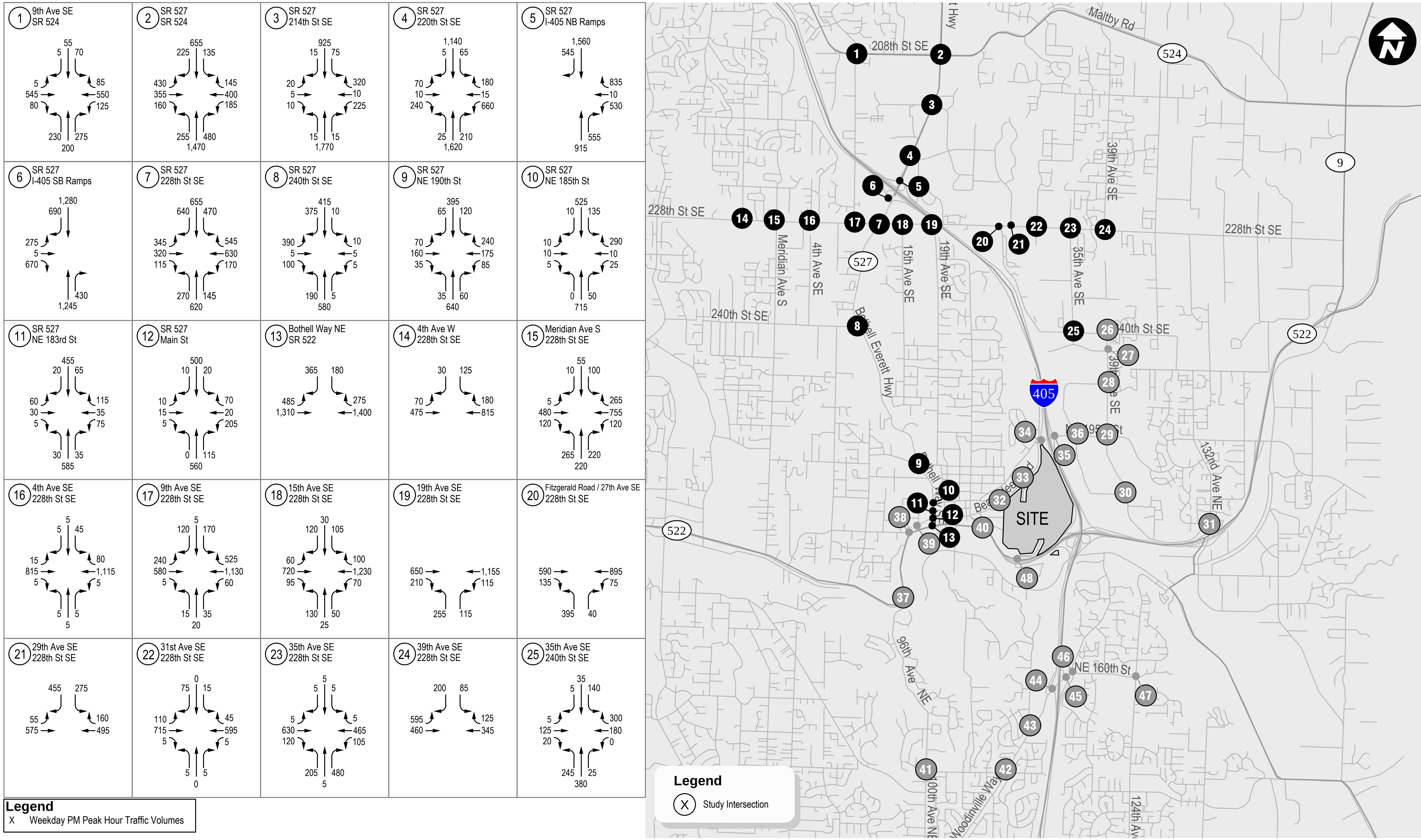
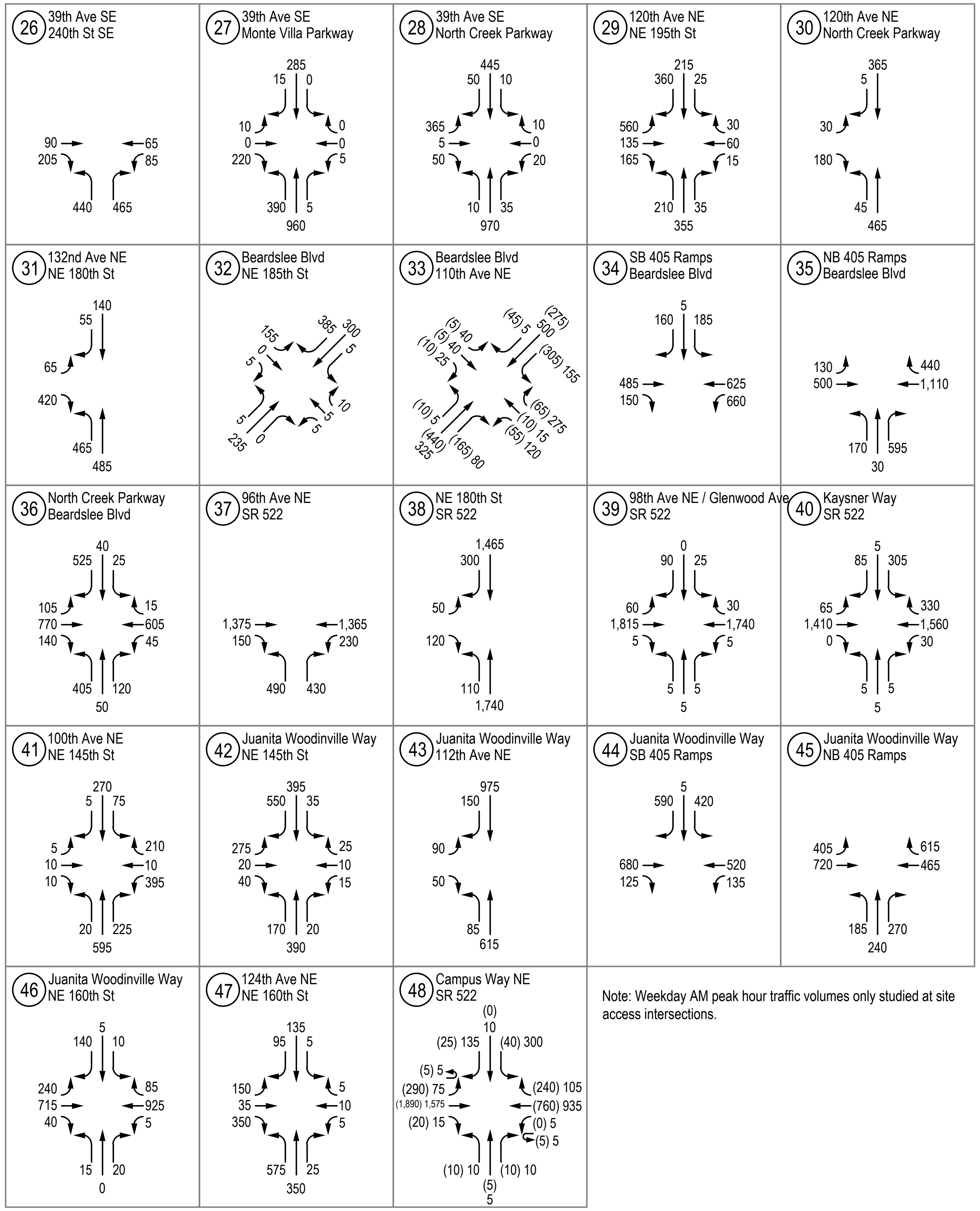


Existing Weekday PM Peak Hour Traffic Volumes

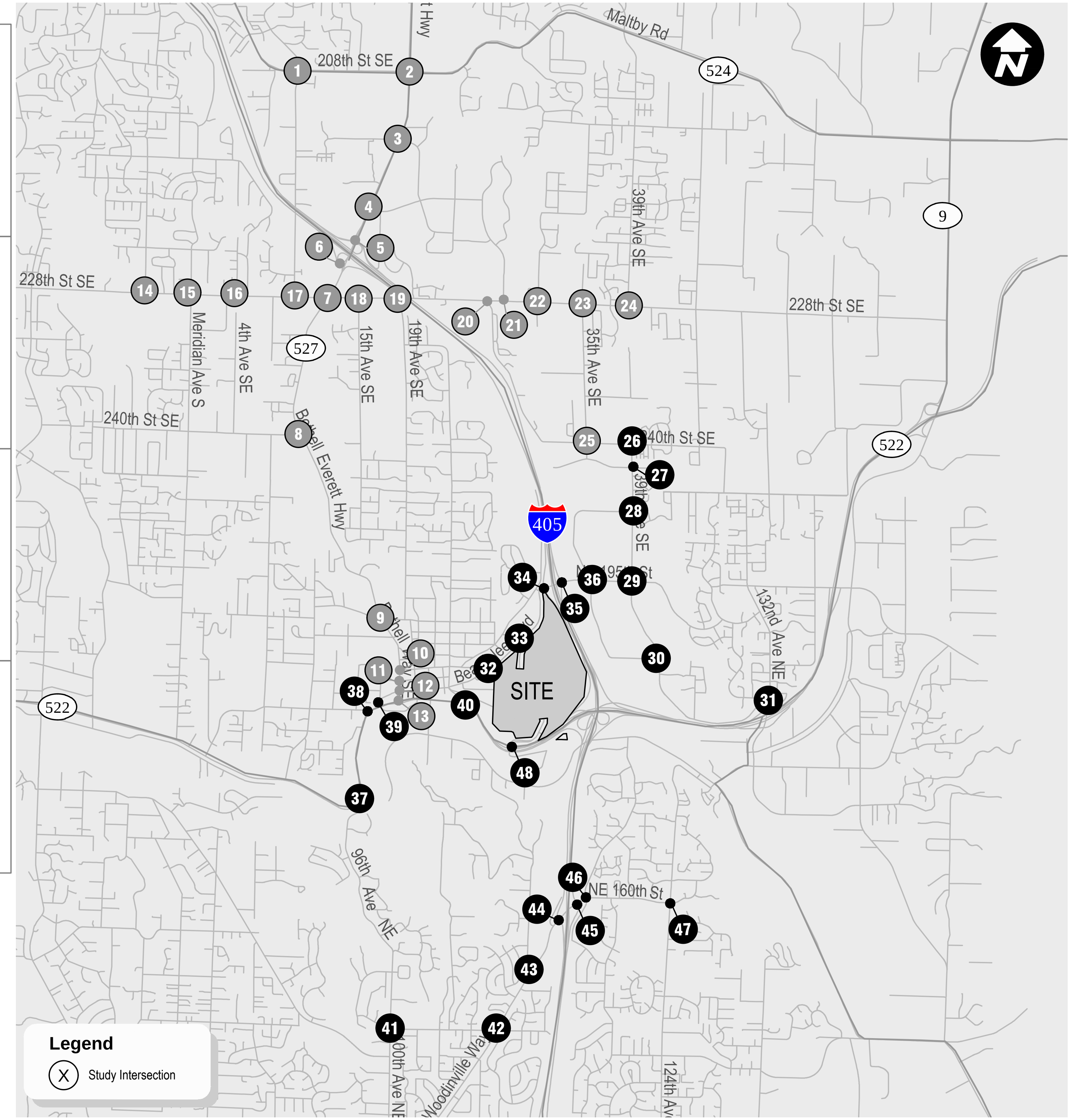
UW Bothell / Cascadia College Campus Master Plan

FIGURE **B-1**

transpogroup WHAT TRANSPORTATION CAN BE.



Note: Weekday AM peak hour traffic volumes only studied at site access intersections.



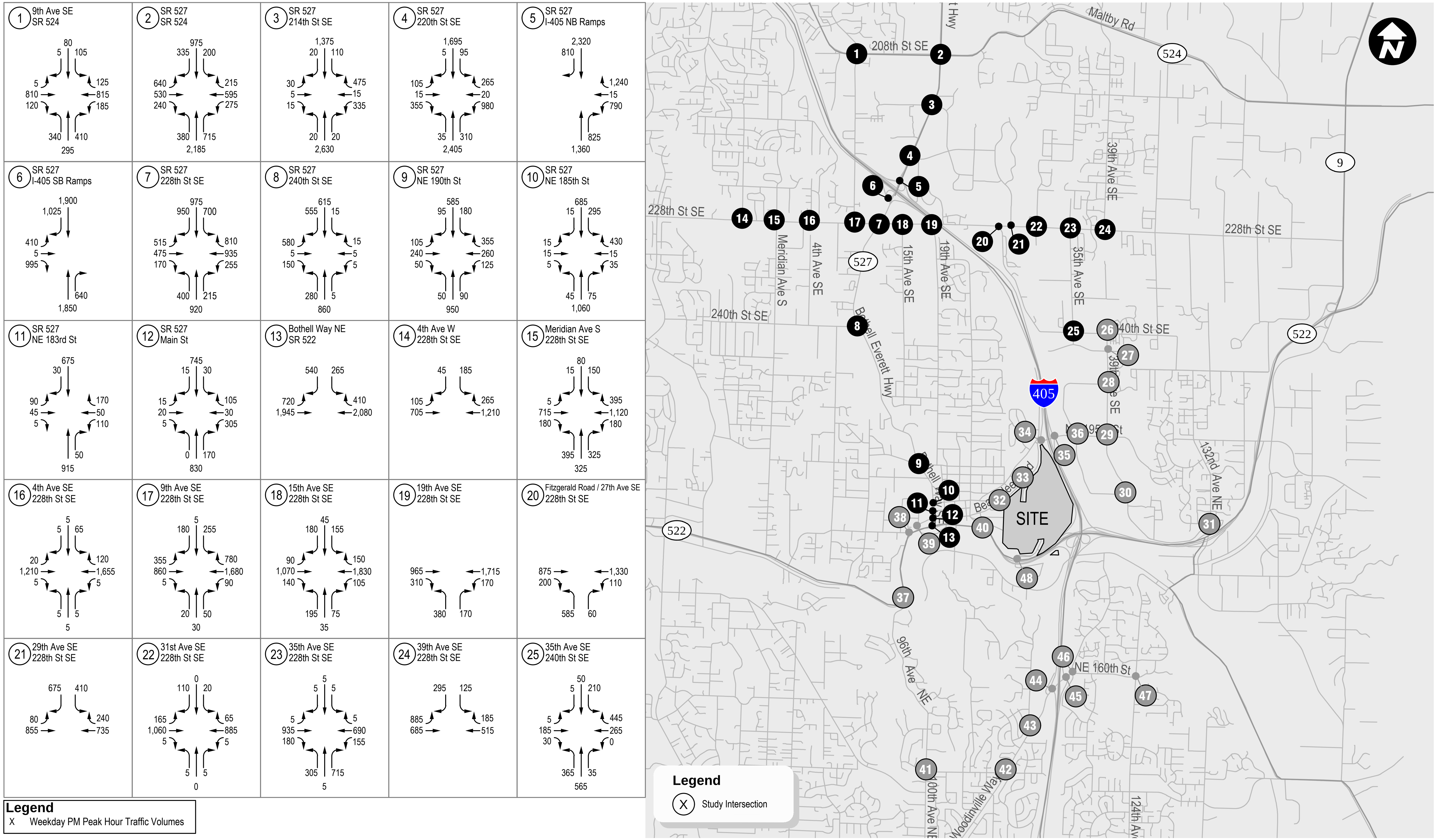
Legend
X Weekday PM Peak Hour Traffic Volumes
(X) Weekday AM Peak Hour Traffic Volumes

Existing Weekday Peak Hour Traffic Volumes

UW Bothell / Cascadia College Campus Master Plan

FIGURE
B-2

transpogroup WHAT TRANSPORTATION CAN BE.



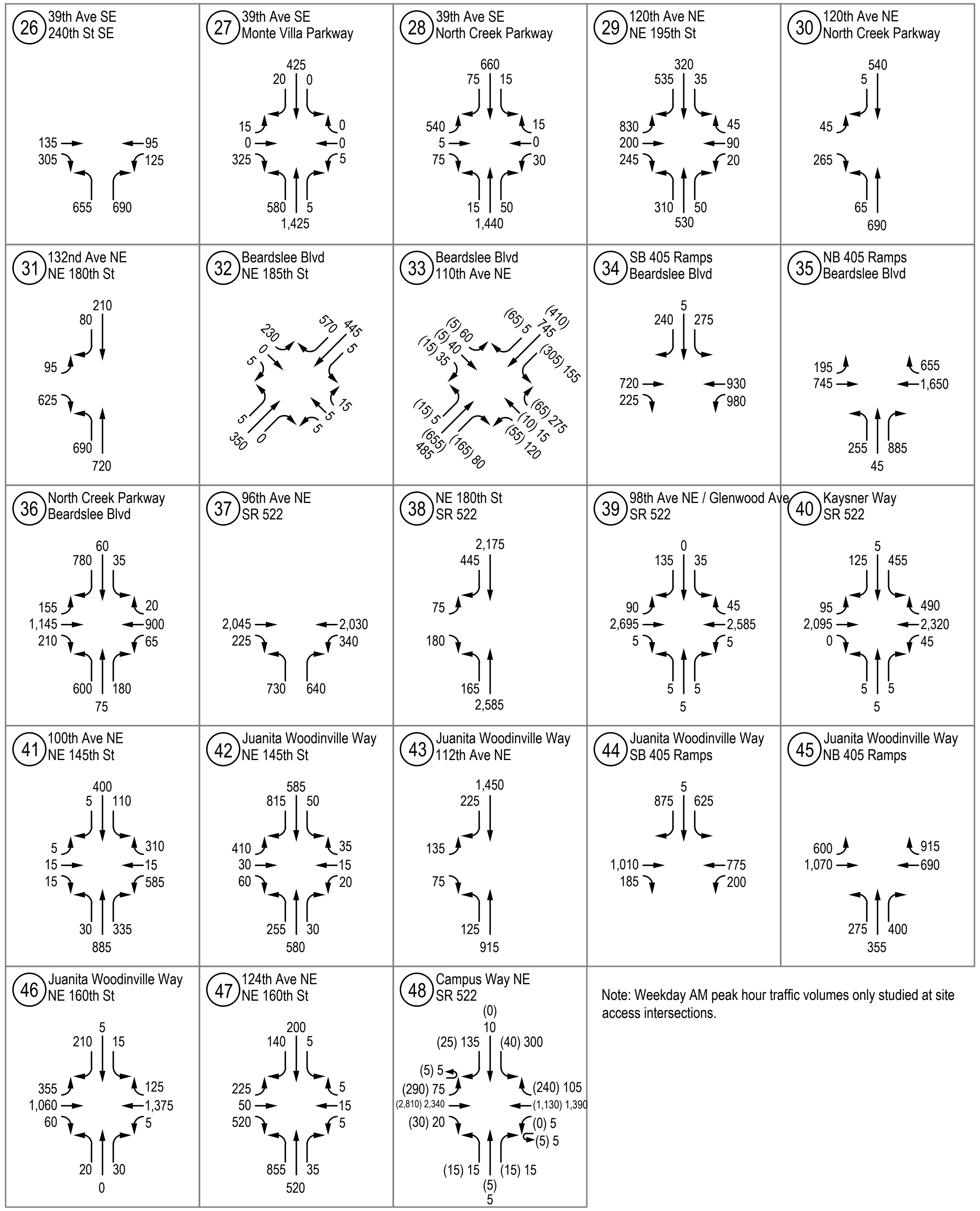
2037 No Action Scenario A Weekday PM Peak Hour Traffic Volumes

UW Bothell / Cascadia College Campus Master Plan

FIGURE
B-3

transpogroup
WHAT TRANSPORTATION CAN BE.

Mar 06, 2017 - 3:29pm DARWINL M:\16\16320.00 - UW Bothell Campus Master Plan Update\Graphics\UWB-GRAPHICS-GIS - kll.dwg Layout: APPENDIX-BASELINE

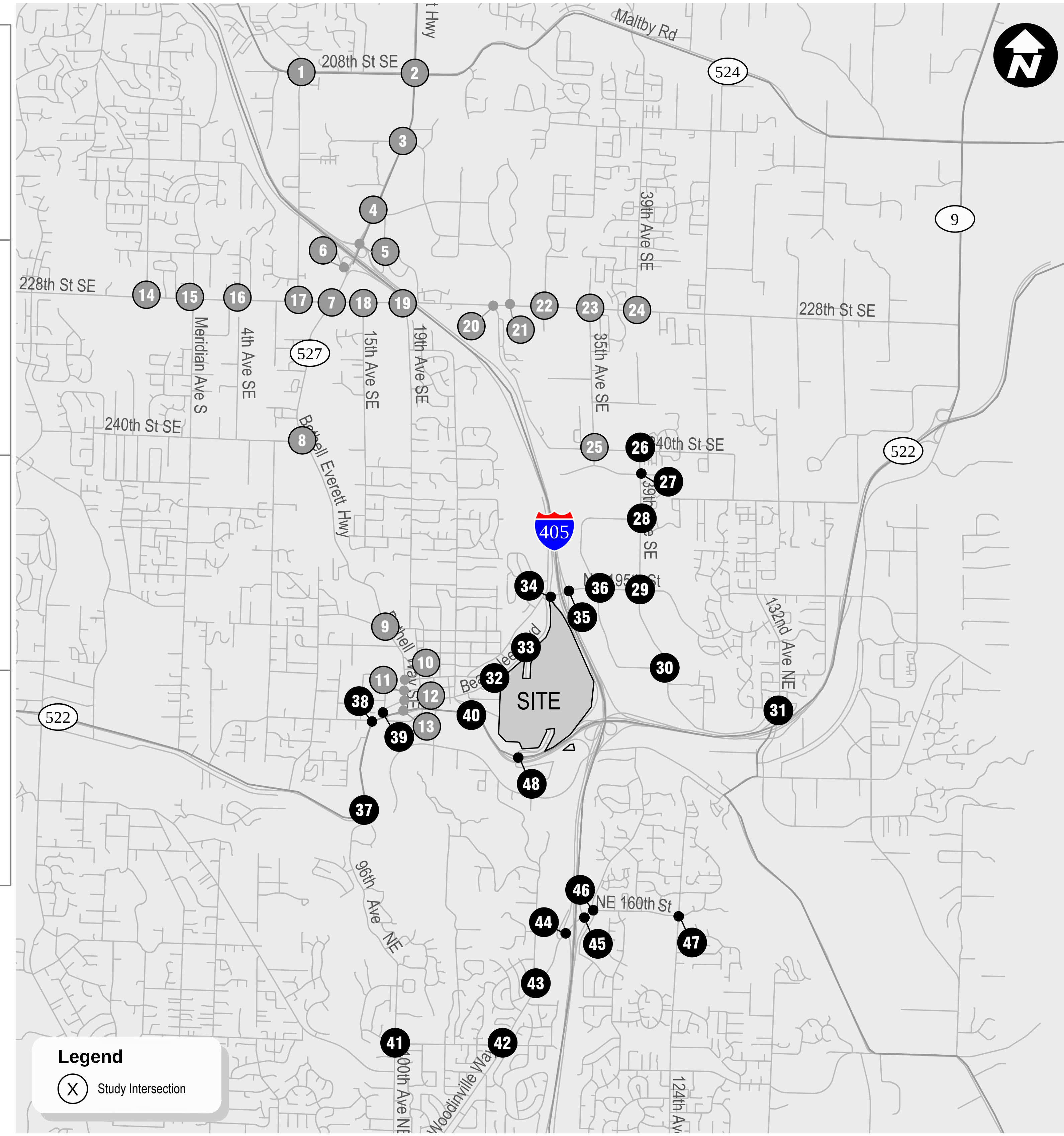


Note: Weekday AM peak hour traffic volumes only studied at site access intersections.

Legend

X Weekday PM Peak Hour Traffic Volumes

(X) Weekday AM Peak Hour Traffic Volumes



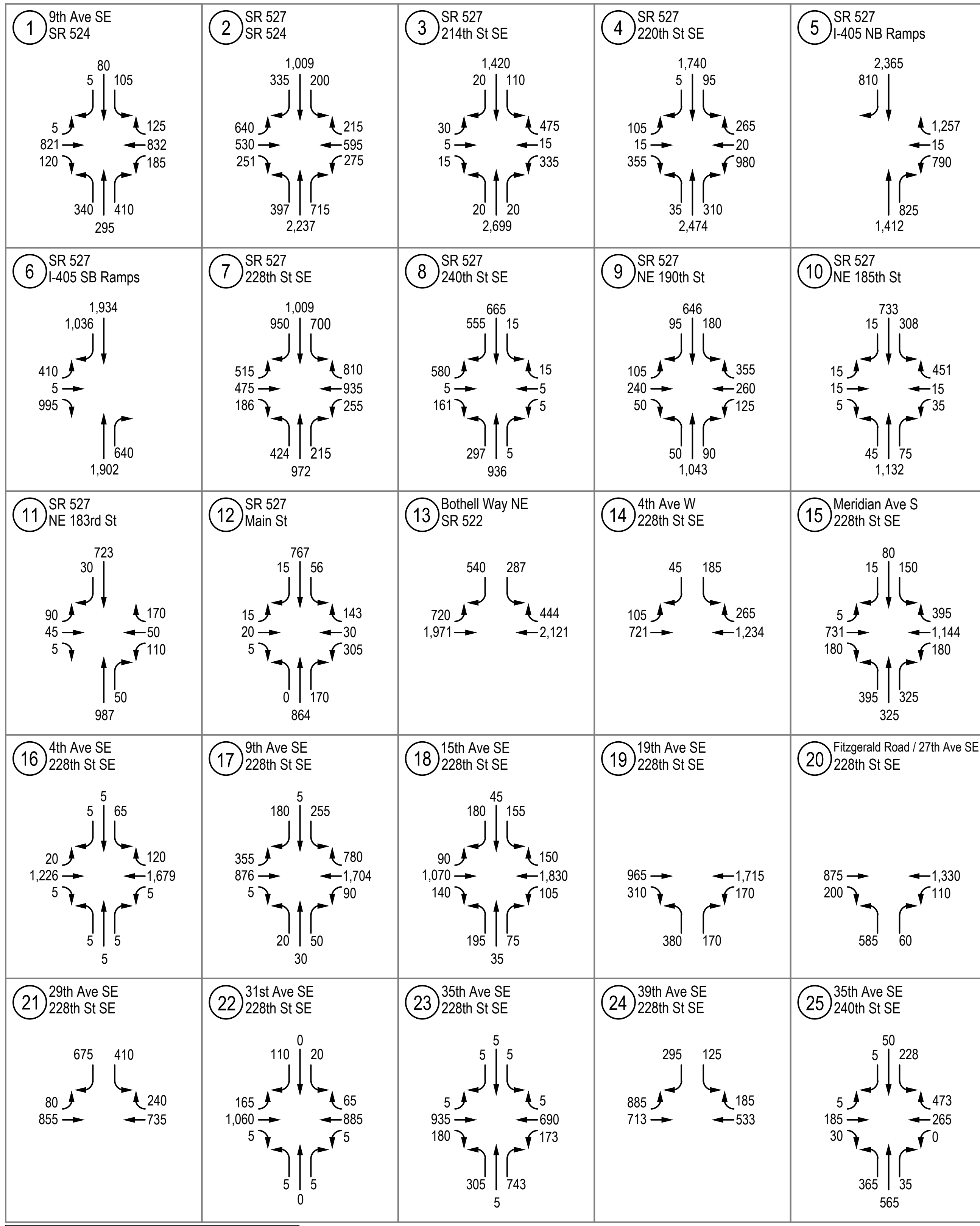
2037 No Action Scenario A Peak Hour Traffic Volumes

UW Bothell / Cascadia College Campus Master Plan

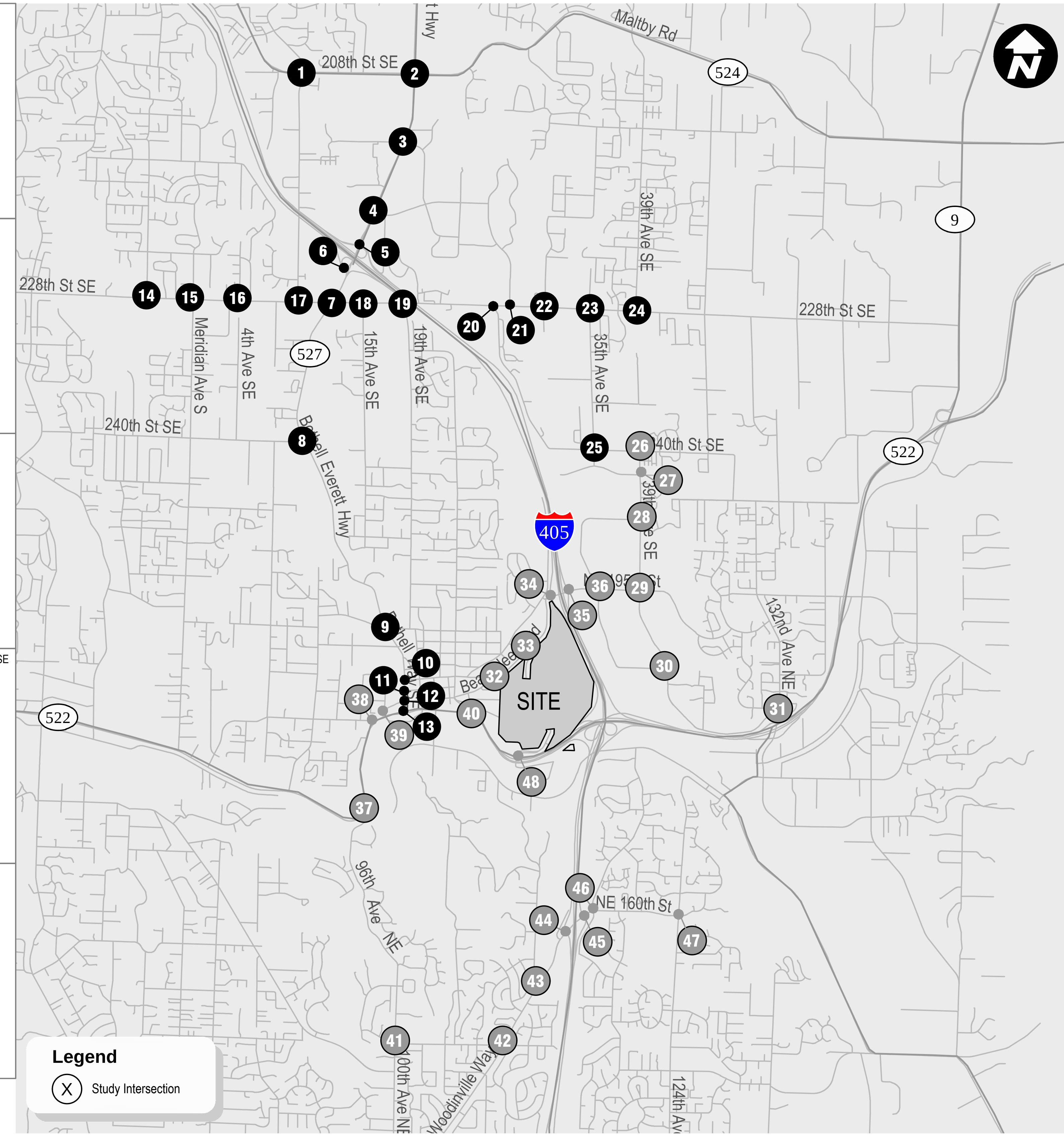
FIGURE

B-4

transpogroup WHAT TRANSPORTATION CAN BE.



Legend
X Weekday PM Peak Hour Traffic Volumes

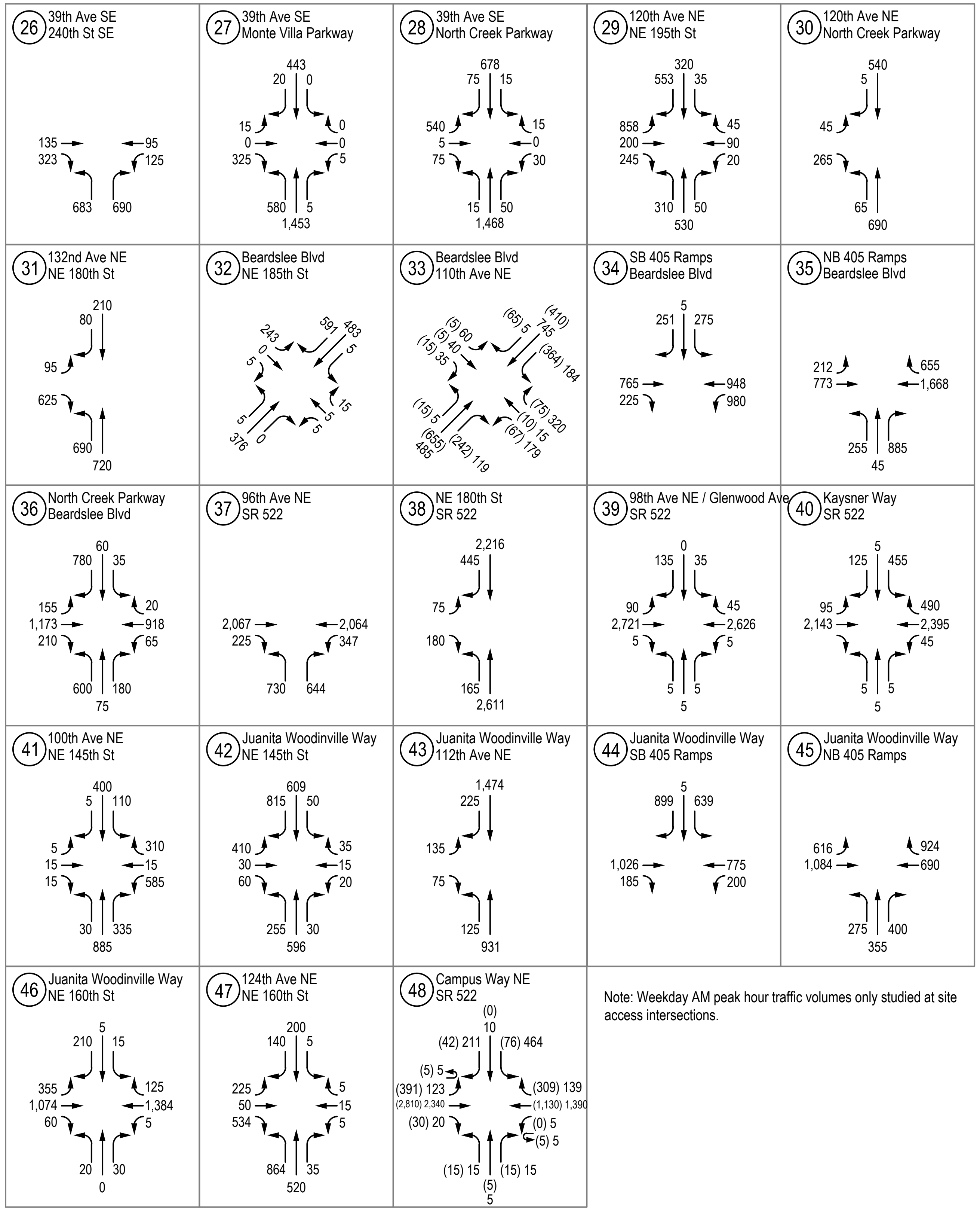


2037 No Action Scenario B Weekday PM Peak Hour Traffic Volumes

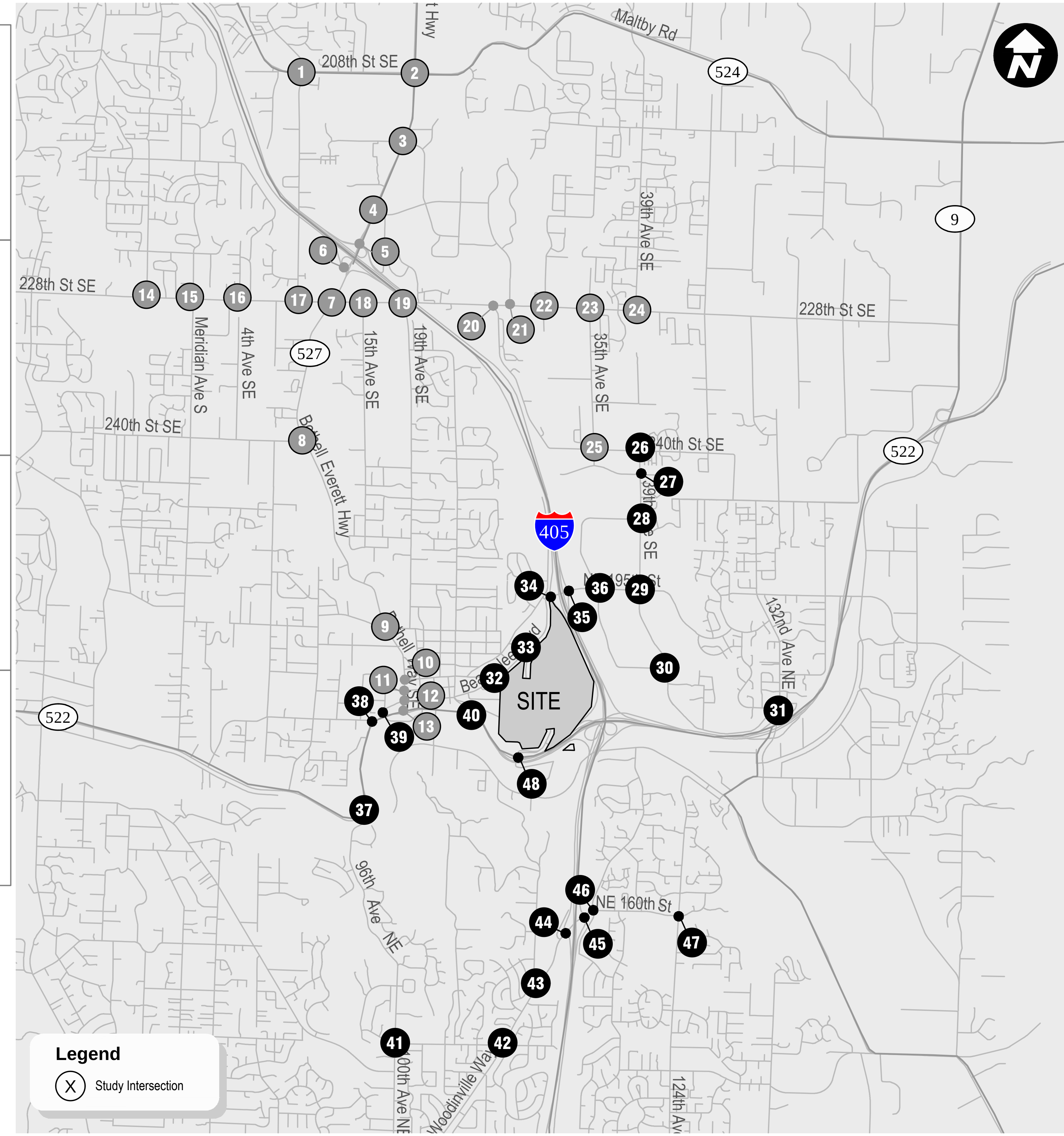
UW Bothell / Cascadia College Campus Master Plan

transpogroup WHAT TRANSPORTATION CAN BE.

FIGURE
B-5



Note: Weekday AM peak hour traffic volumes only studied at site access intersections.



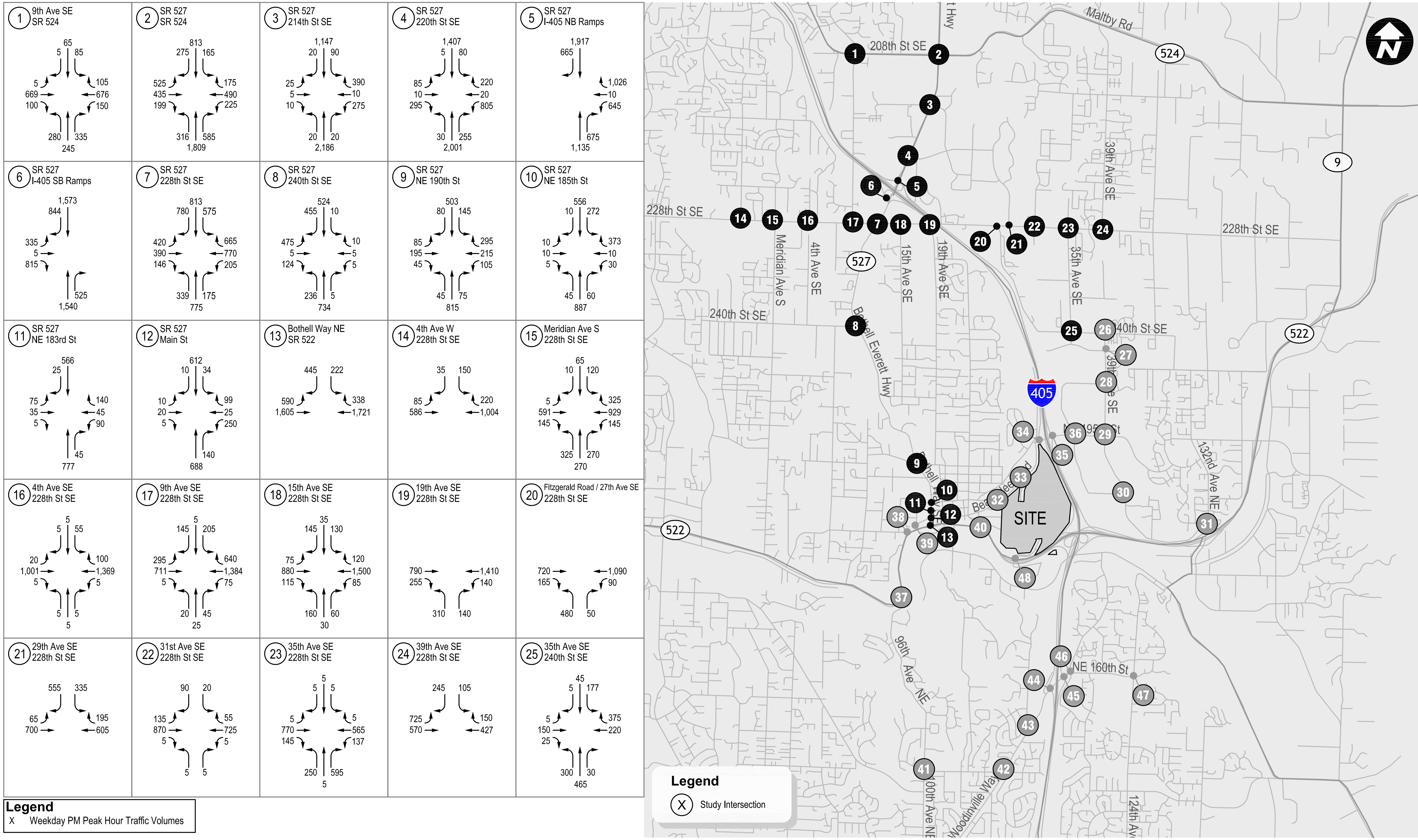
Legend
X Weekday PM Peak Hour Traffic Volumes
(X) Weekday AM Peak Hour Traffic Volumes

2037 No Action Scenario B Weekday Peak Hour Traffic Volumes

UW Bothell / Cascadia College Campus Master Plan

FIGURE
B-6

transpogroup WHAT TRANSPORTATION CAN BE.

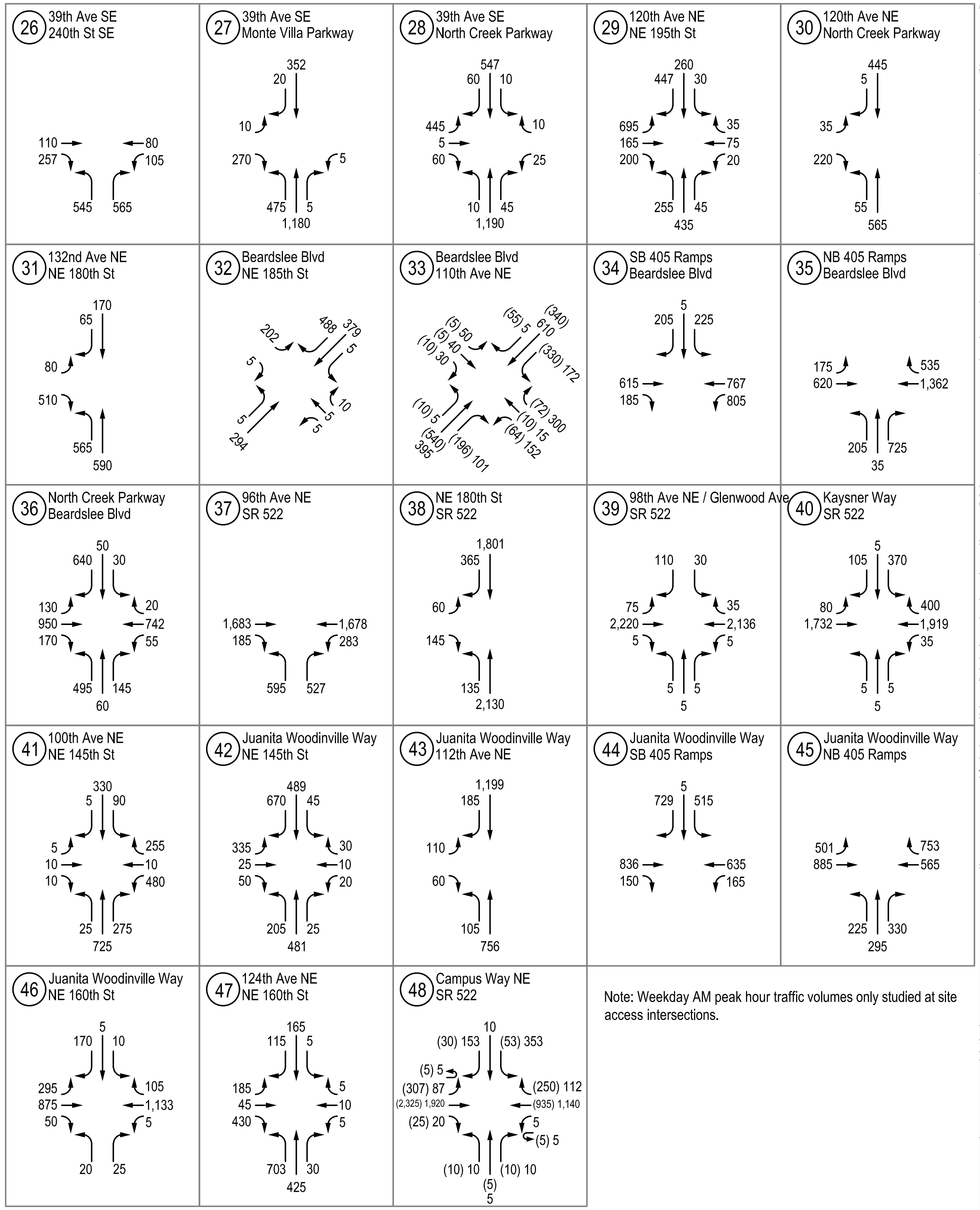


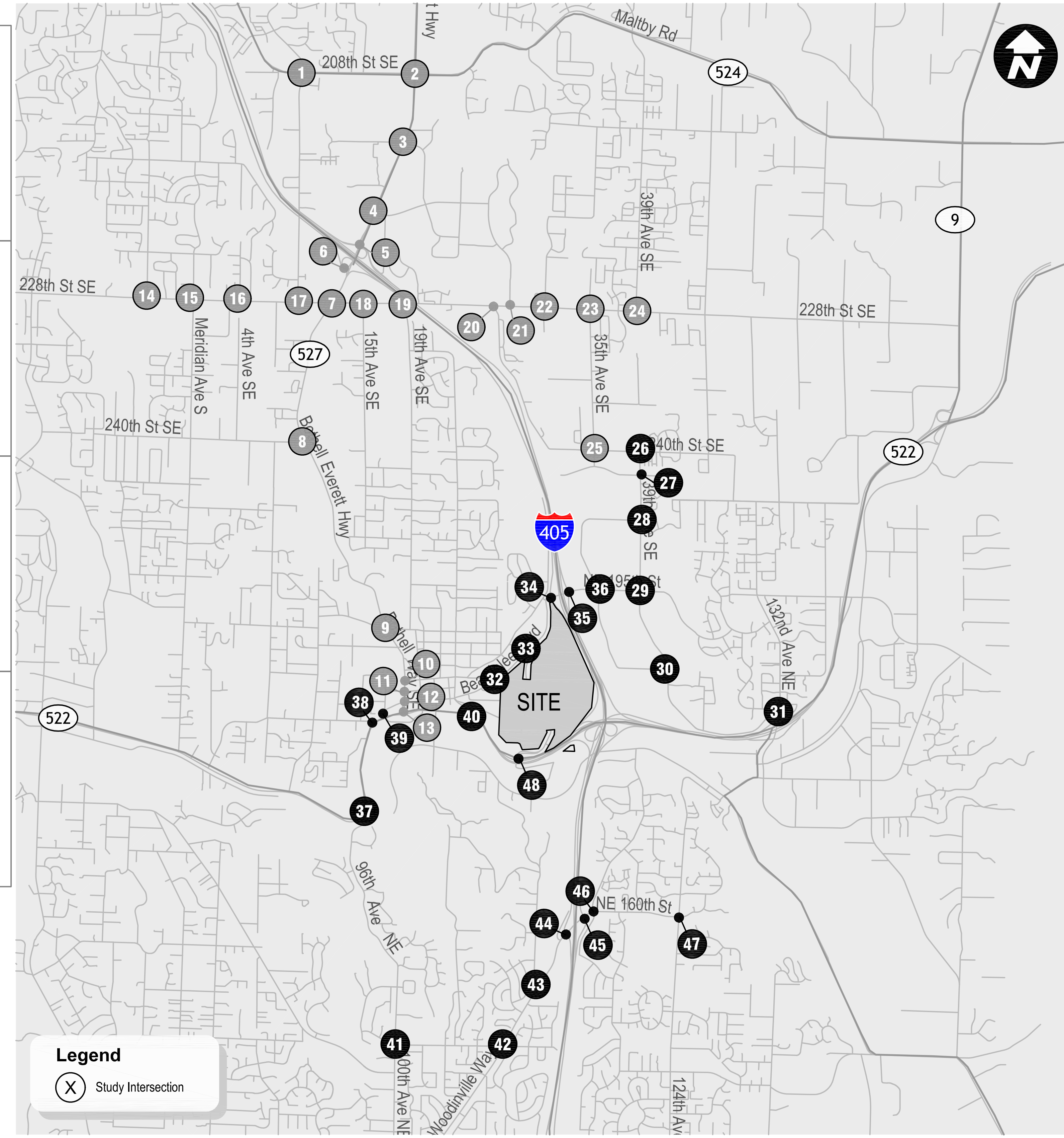
Near Term (2027) Weekday PM Peak Hour Traffic Volumes

UW Bothell / Cascadia College Campus Master Plan

FIGURE
B-7

transpogroup
WHAT TRANSPORTATION CAN BE.





Legend

X	Weekday PM Peak Hour Traffic Volumes
(X)	Weekday AM Peak Hour Traffic Volumes

Near Term (2027) Weekday Peak Hour Traffic Volumes

UW Bothell / Cascadia College Campus Master Plan

FIGURE **B-8**

transpogroup WHAT TRANSPORTATION CAN BE.

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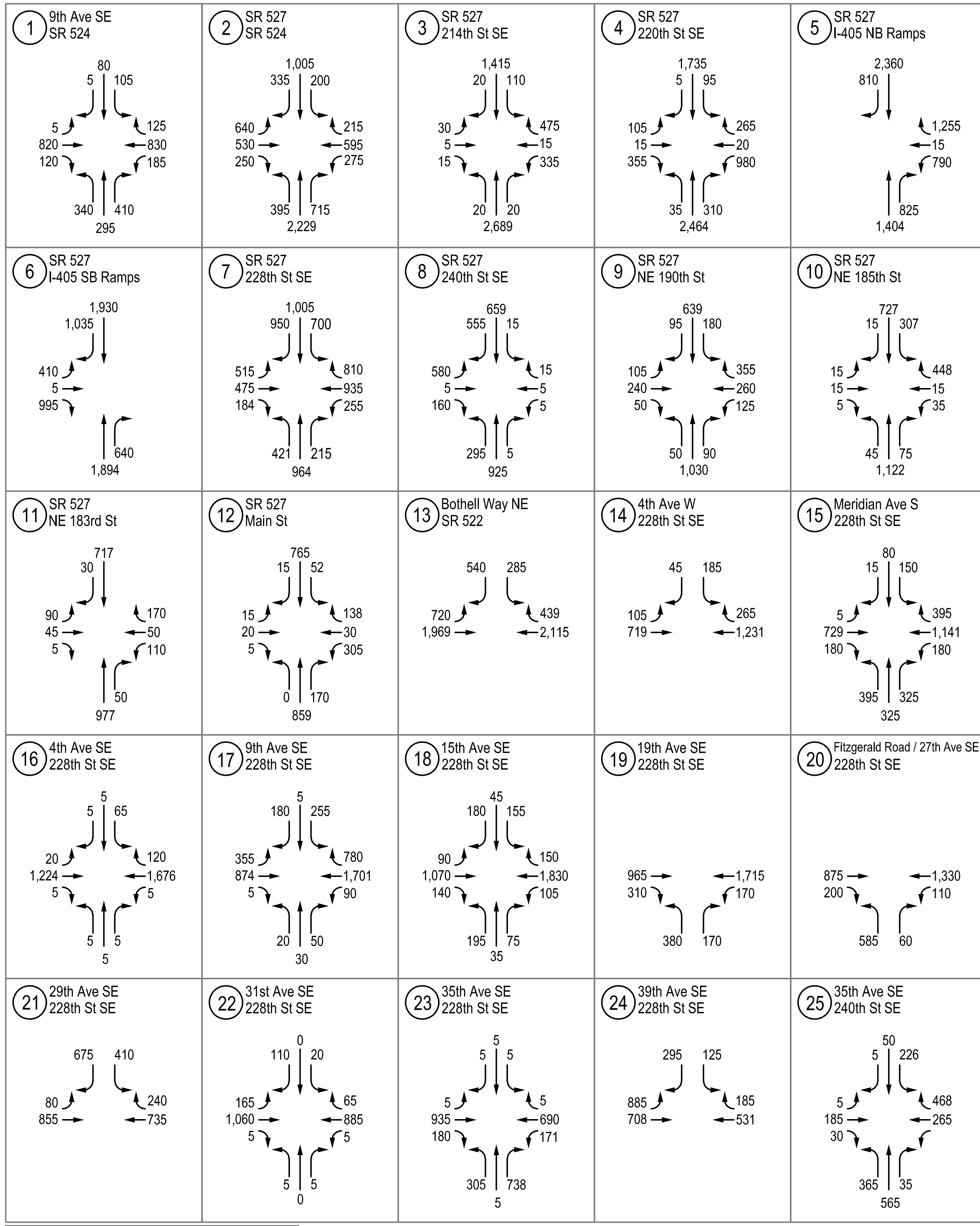
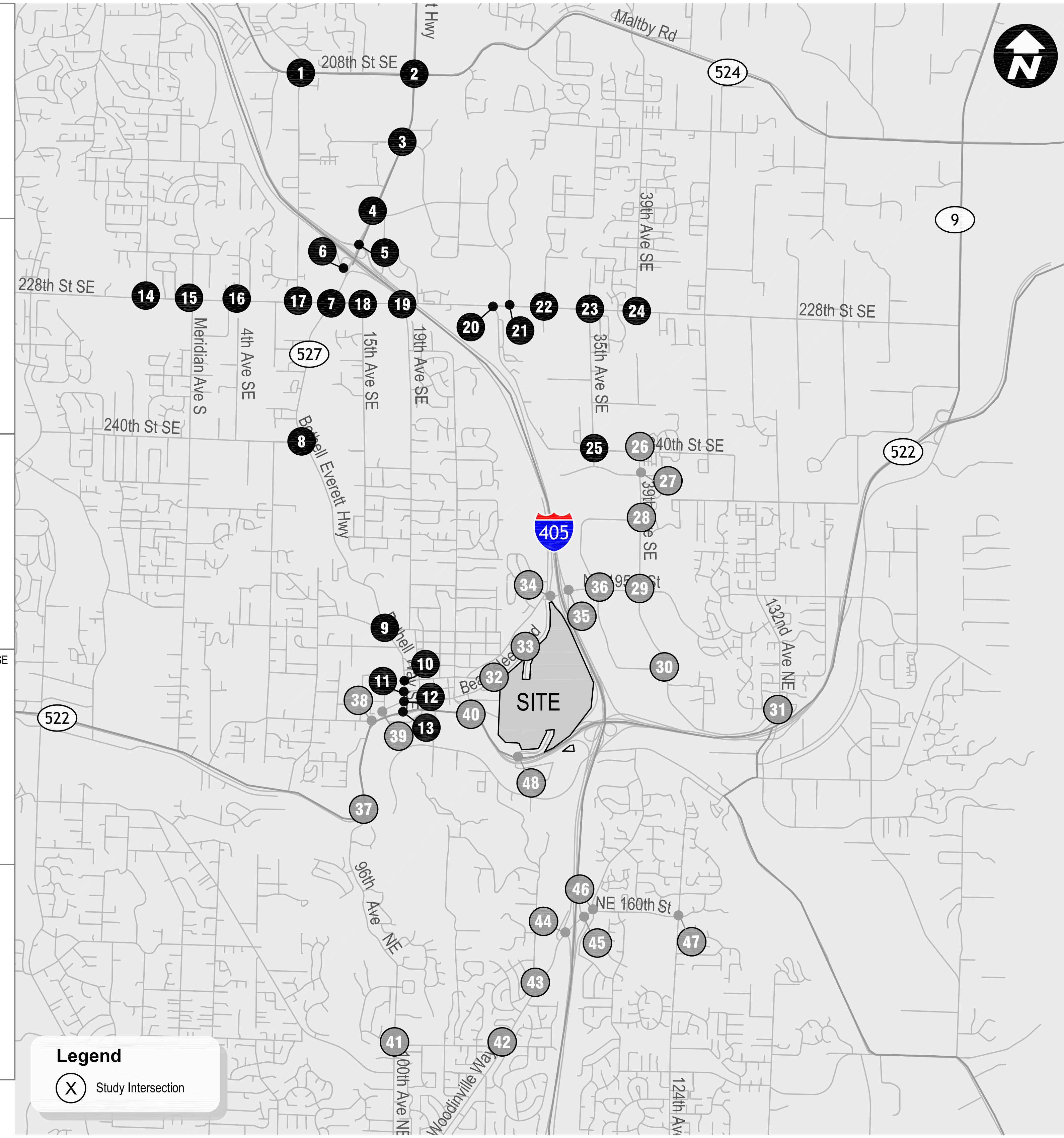


Legend
X Weekday PM Peak Hour Traffic Volumes



2037 Alternative 1 Weekday PM Peak Hour Traffic Volumes

UW Bothell / Cascadia College Campus Master Plan

FIGURE
B-9

transpogroup
WHAT TRANSPORTATION CAN BE.

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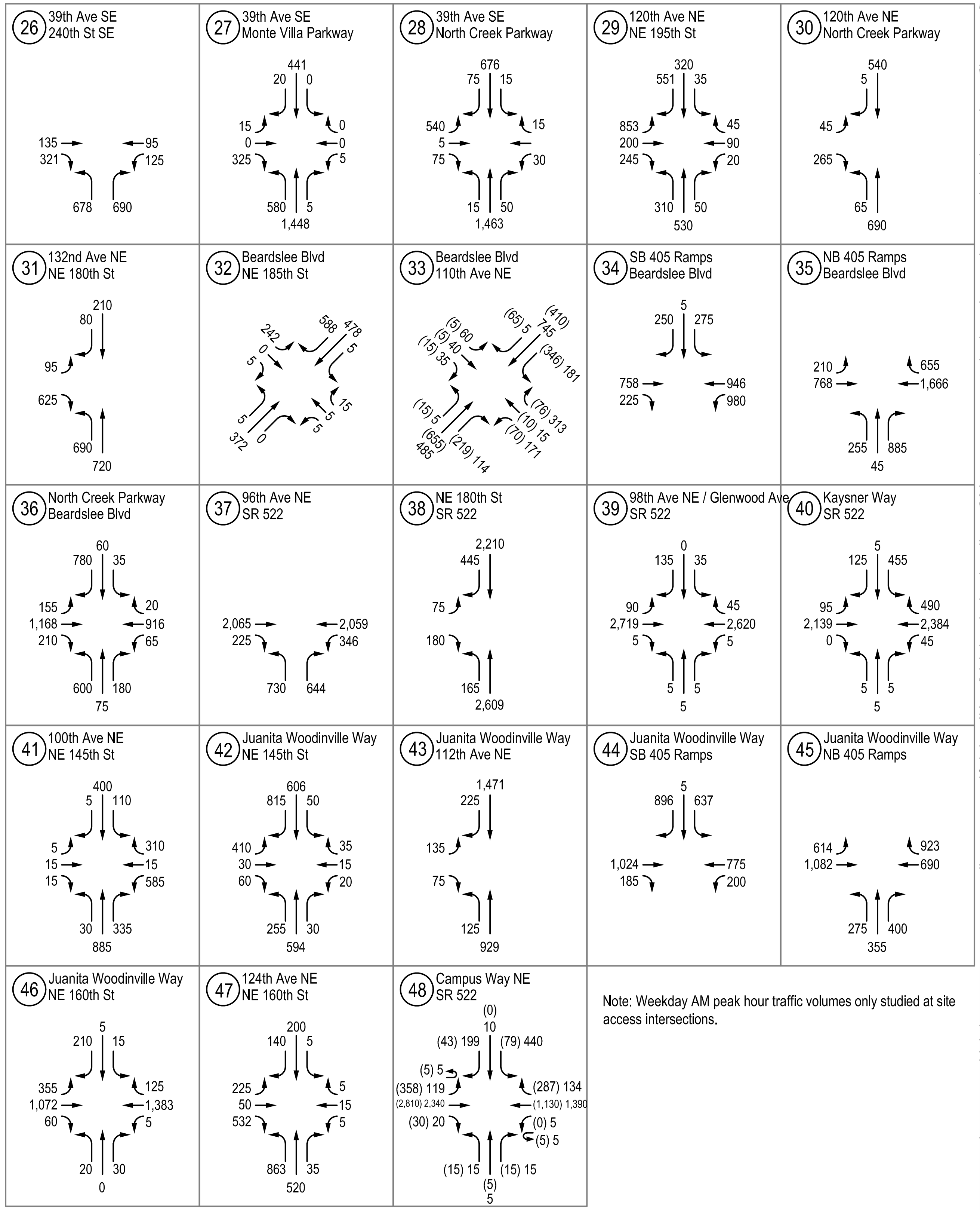
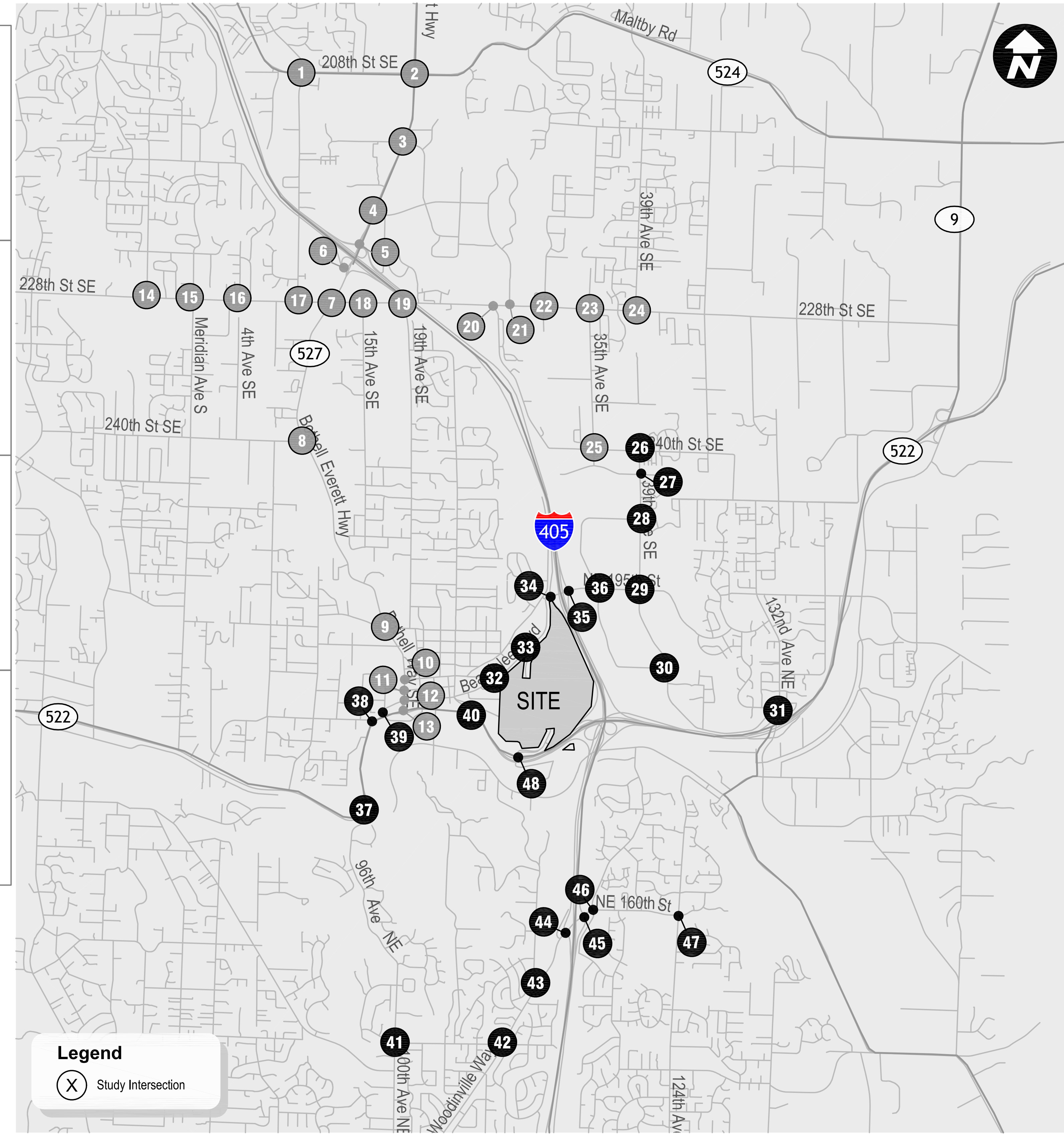




Legend

X Weekday PM Peak Hour Traffic Volumes

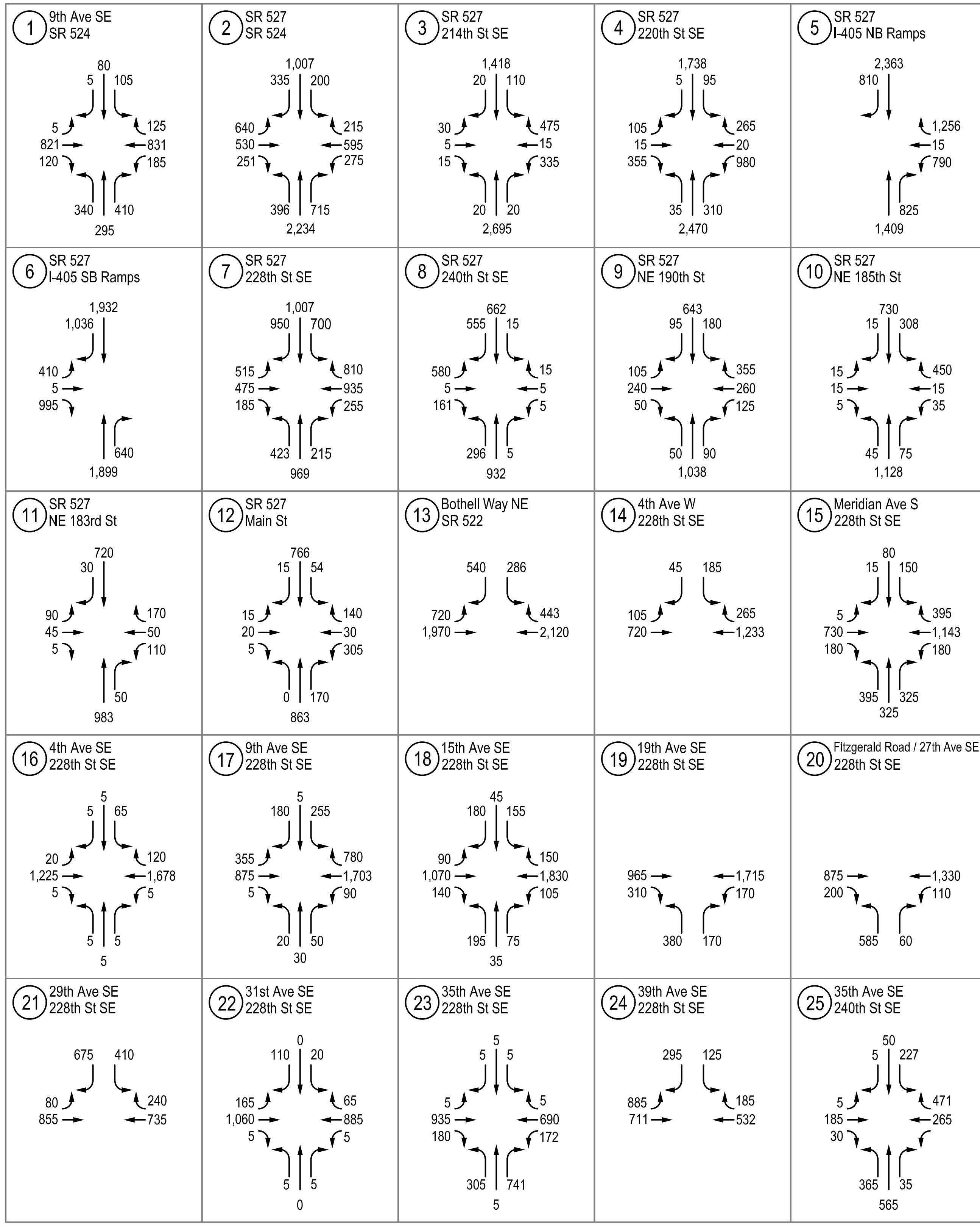
(X) Weekday AM Peak Hour Traffic Volumes

2037 Alternative 1 Weekday Peak Hour Traffic Volumes

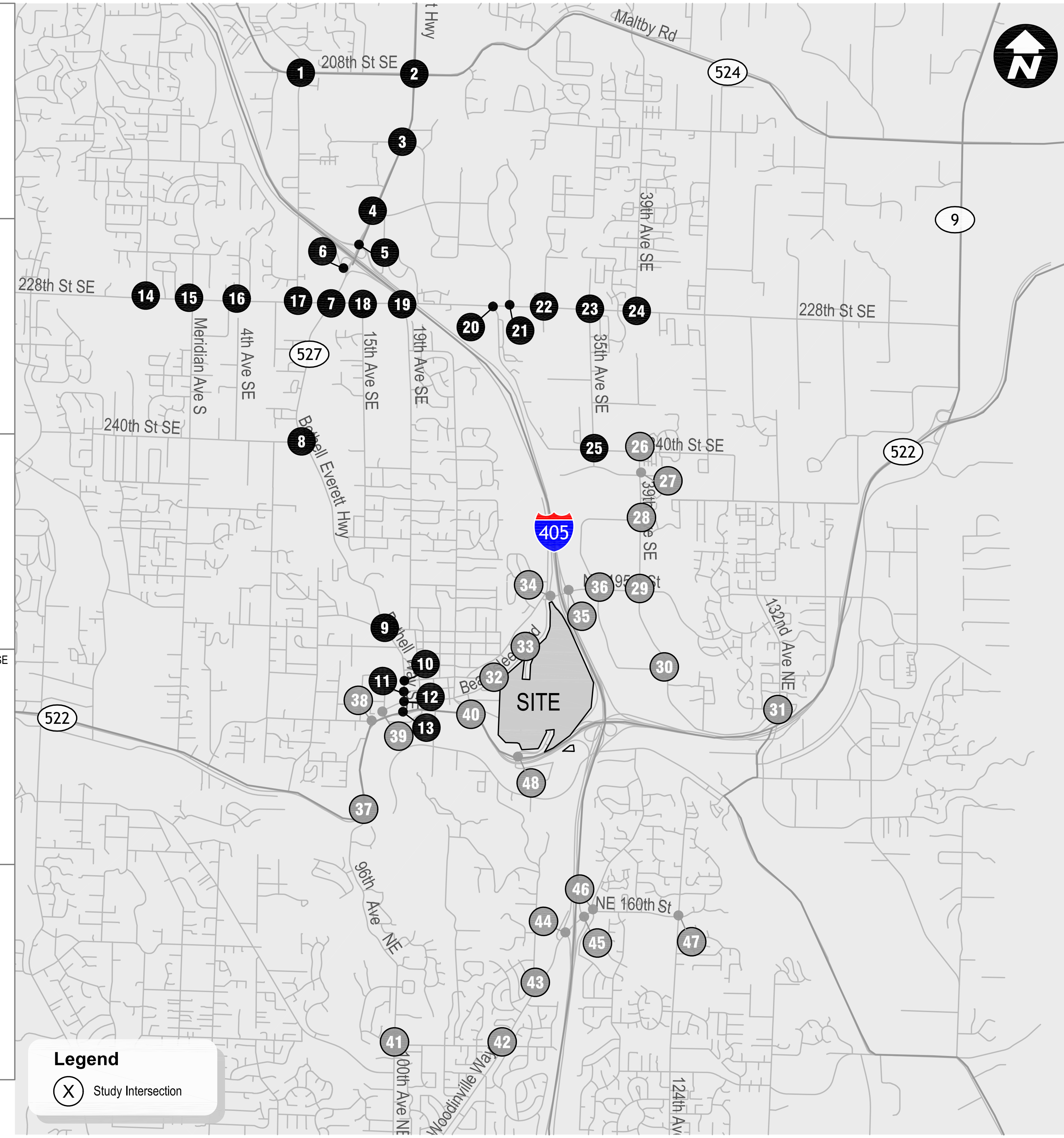
UW Bothell / Cascadia College Campus Master Plan

FIGURE **B-10**

transpogroup WHAT TRANSPORTATION CAN BE.



Legend
X Weekday PM Peak Hour Traffic Volumes



2037 Alternative 2 Weekday PM Peak Hour Traffic Volumes

UW Bothell / Cascadia College Campus Master Plan

FIGURE
B-11

transpogroup WHAT TRANSPORTATION CAN BE.

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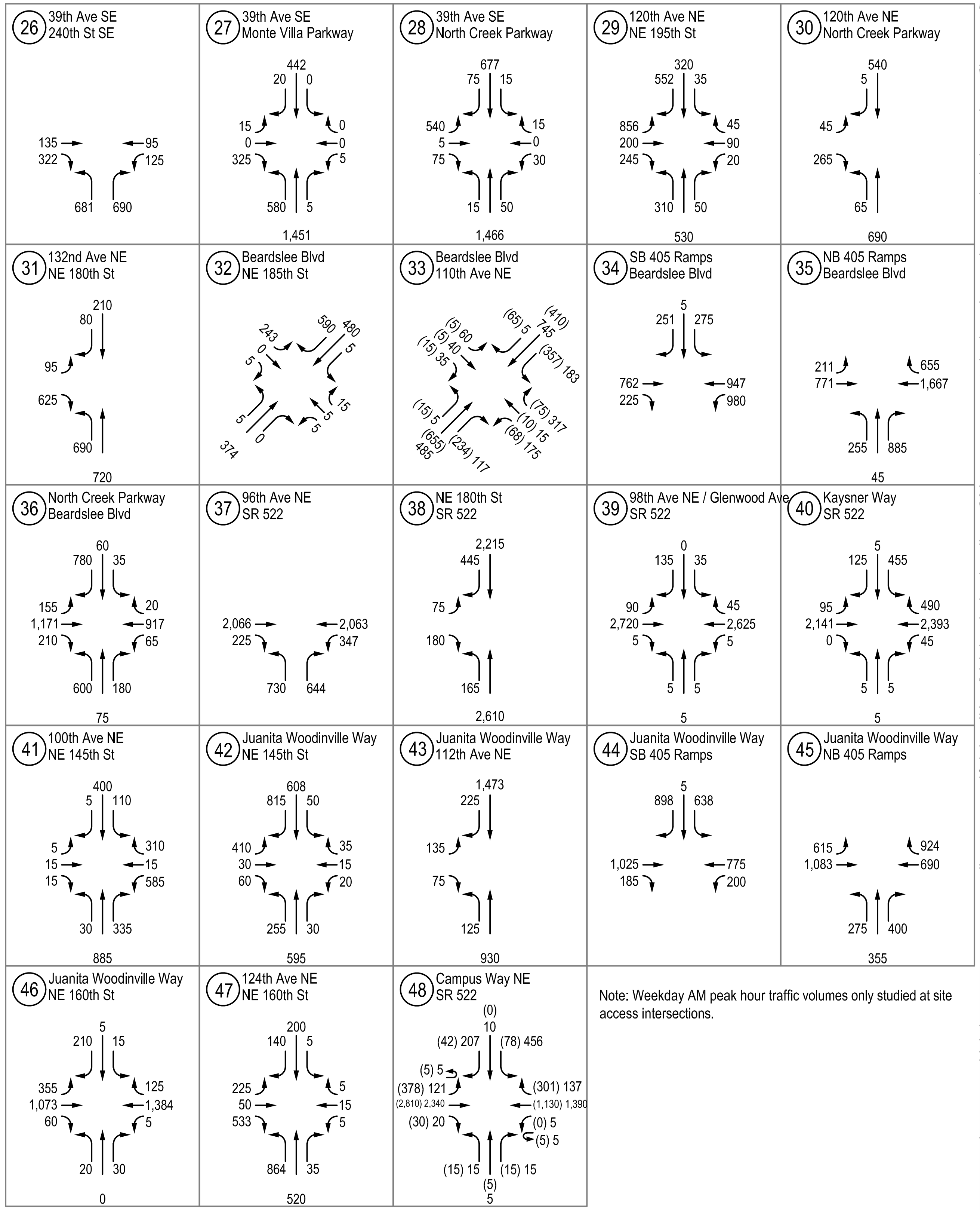
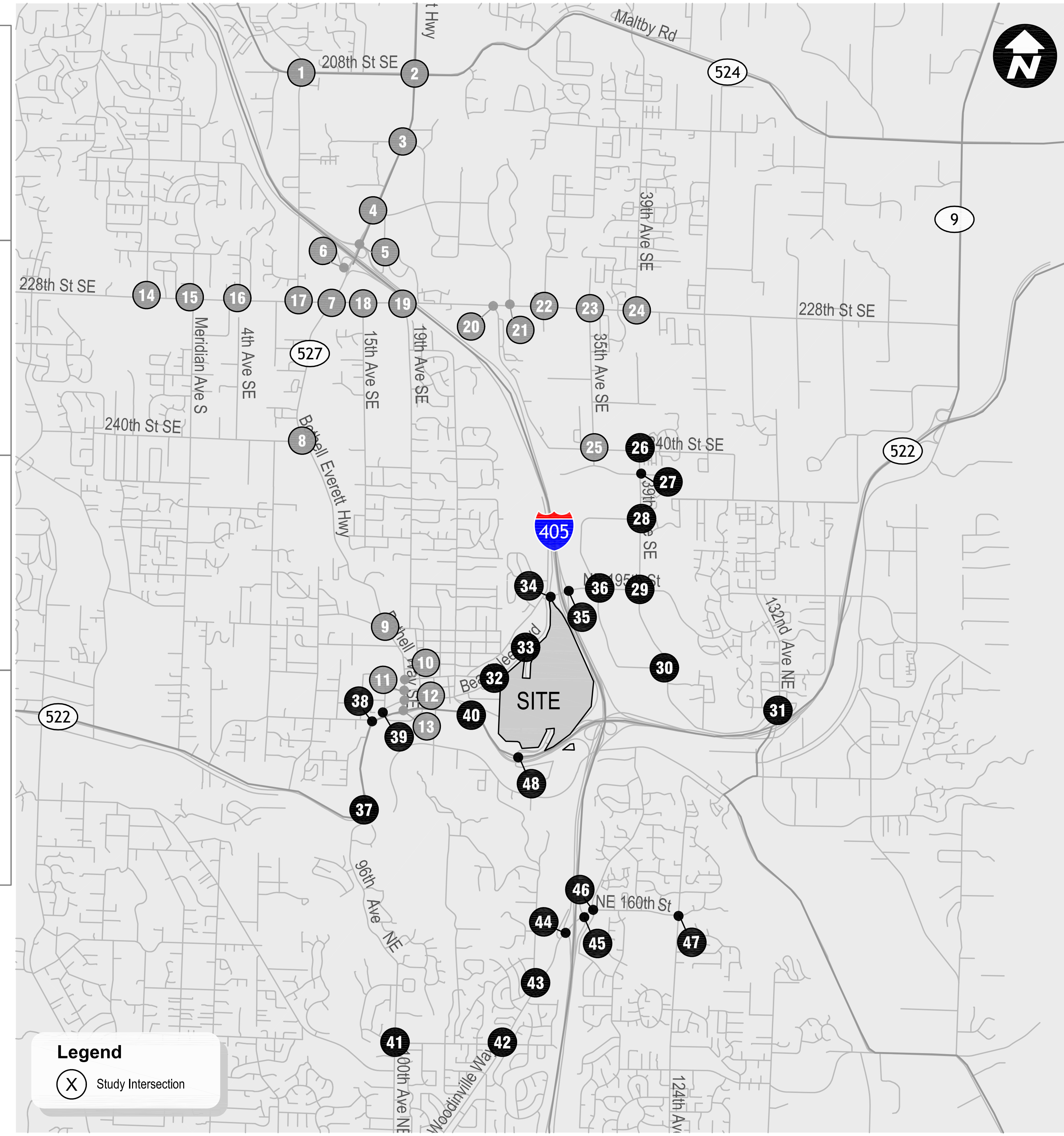


Legend
X Weekday PM Peak Hour Traffic Volumes
(X) Weekday AM Peak Hour Traffic Volumes

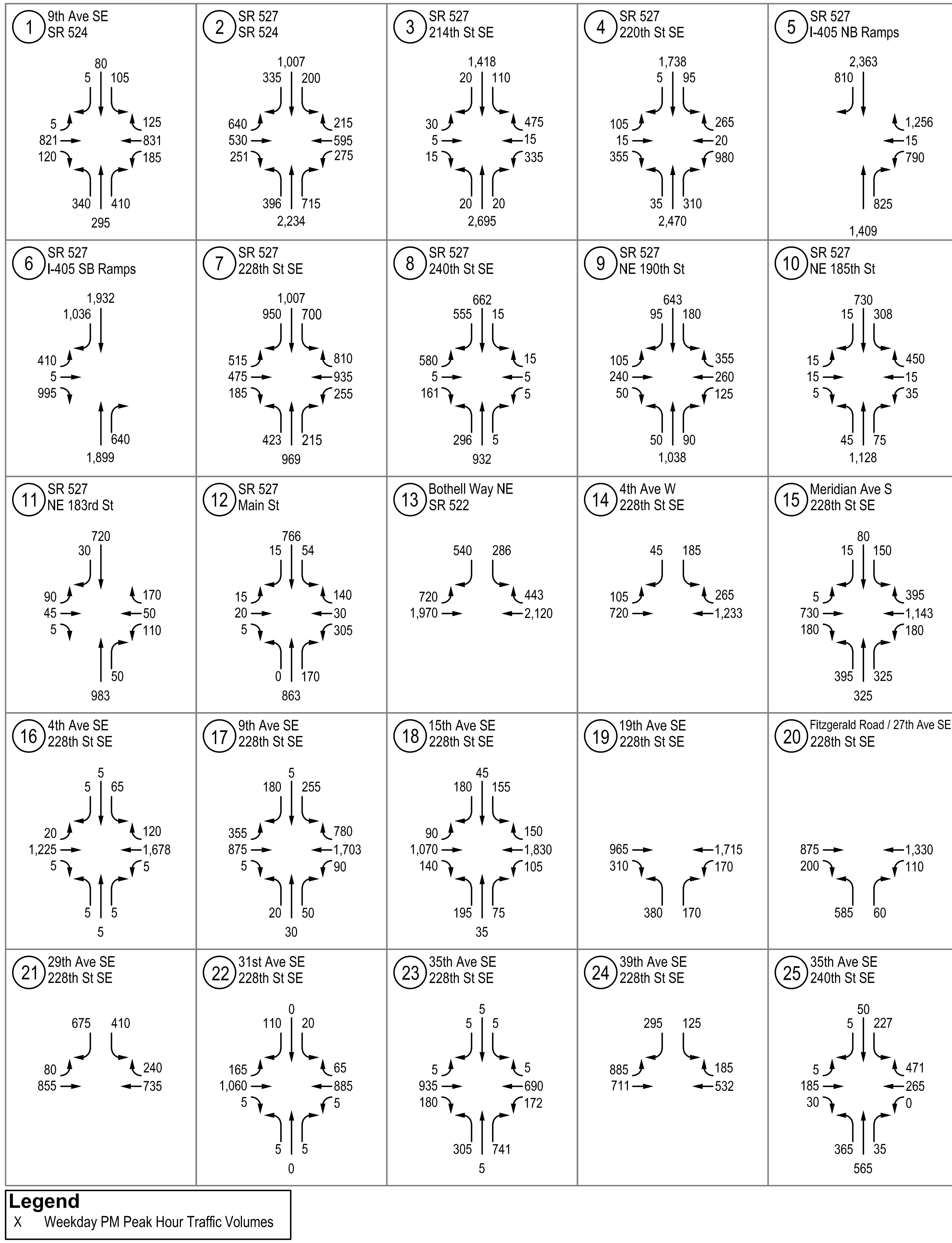


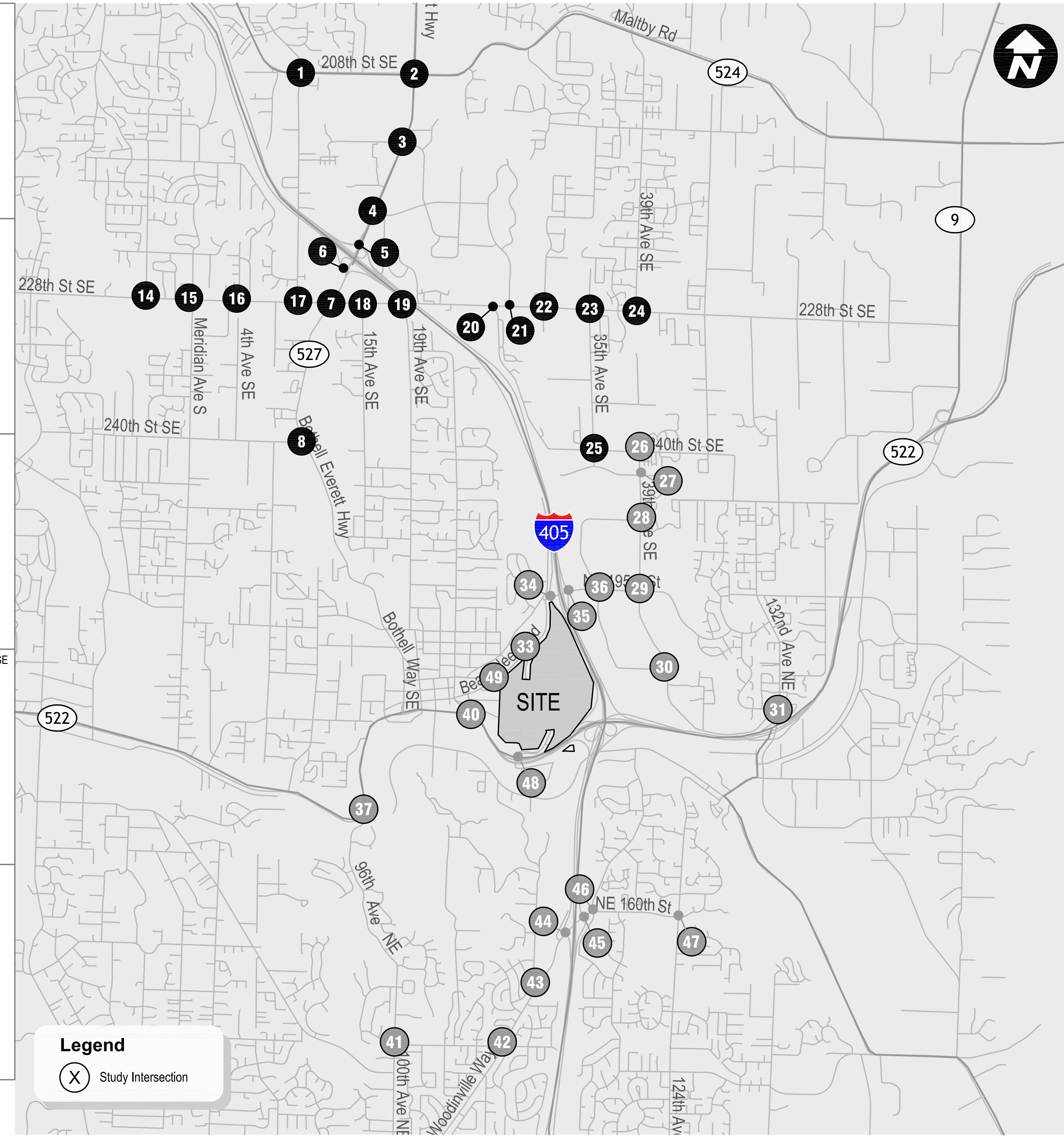
2037 Alternative 2 Weekday Peak Hour Traffic Volumes

UW Bothell / Cascadia College Campus Master Plan

FIGURE
B-12

transpogroup WHAT TRANSPORTATION CAN BE.



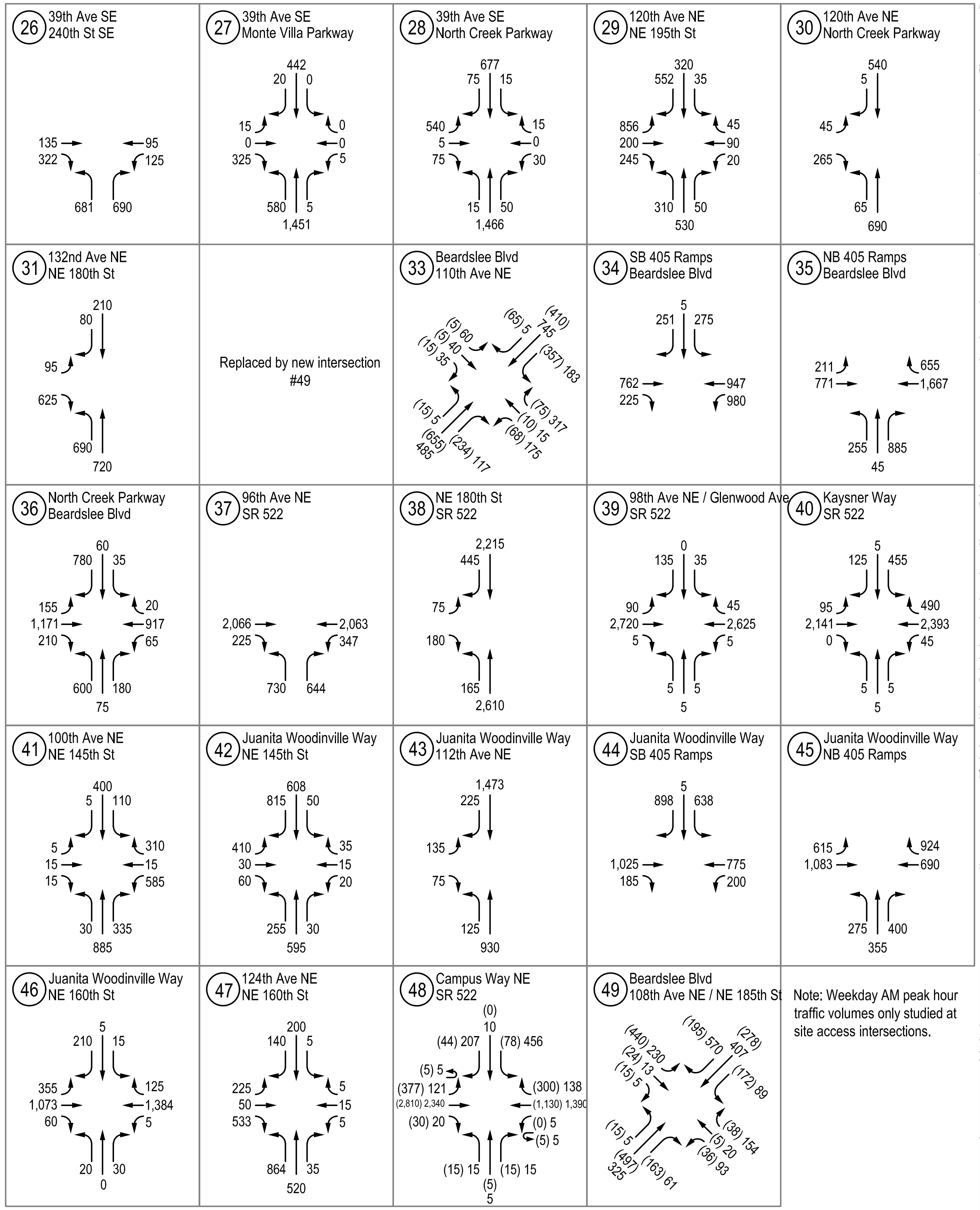


2037 Alternative 3 Weekday PM Peak Hour Traffic Volumes

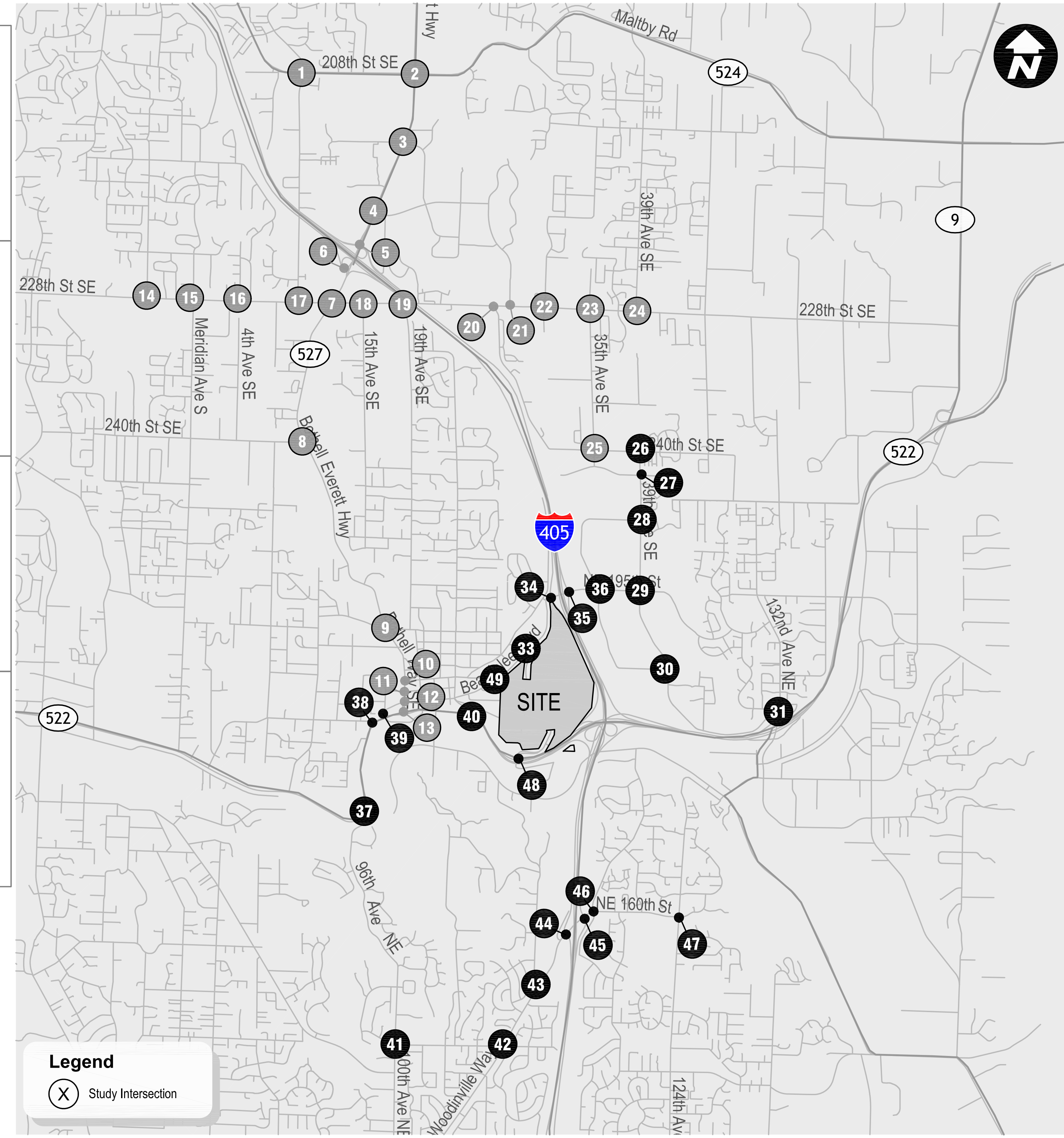
UW Bothell / Cascadia College Campus Master Plan

FIGURE
B-13

transpogroup WHAT TRANSPORTATION CAN BE.



Legend
X Weekday PM Peak Hour Traffic Volumes
(X) Weekday AM Peak Hour Traffic Volumes



2037 Alternative 3 Weekday Peak Hour Traffic Volumes

UW Bothell / Cascadia College Campus Master Plan

FIGURE
B-14

transpogroup WHAT TRANSPORTATION CAN BE.

Appendix B: Campus Trip Generation

Mid-Week Average Traffic Volumes from Tube Counts

	15-Minute Volumes			Hourly Volumes		
Time	In	Out	Total	In	Out	Total
12:00 AM	2	10	12			
12:15 AM	3	5	7			
12:30 AM	0	1	1			
12:45 AM	2	1	3	6	17	23
1:00 AM	0	2	2	5	9	14
1:15 AM	1	1	2	3	5	8
1:30 AM	2	2	4	5	6	11
1:45 AM	1	1	2	4	6	10
2:00 AM	1	1	1	5	5	10
2:15 AM	1	1	1	4	5	9
2:30 AM	1	1	2	3	4	7
2:45 AM	1	1	2	3	3	6
3:00 AM	0	1	2	3	4	7
3:15 AM	1	0	1	3	3	6
3:30 AM	2	1	2	4	3	7
3:45 AM	1	2	3	4	4	8
4:00 AM	1	1	2	5	3	8
4:15 AM	2	1	3	6	4	10
4:30 AM	4	1	5	8	5	13
4:45 AM	4	2	6	11	6	17
5:00 AM	7	5	12	17	10	27
5:15 AM	9	6	15	24	15	39
5:30 AM	9	7	16	30	20	50
5:45 AM	11	7	19	37	25	62
6:00 AM	16	10	26	46	30	76
6:15 AM	15	12	28	52	36	88
6:30 AM	31	15	46	74	44	118
6:45 AM	37	21	58	100	58	158
7:00 AM	39	20	58	122	68	190
7:15 AM	66	22	88	173	77	250
7:30 AM	88	25	113	230	88	318
7:45 AM	152	31	183	345	98	443
8:00 AM	248	44	292	555	122	677
8:15 AM	411	58	469	899	158	1057
8:30 AM	431	86	517	1242	219	1461
8:45 AM	**234**	**56**	**290**	**1324**	**244**	**1568**
9:00 AM	130	48	177	1206	247	1453
9:15 AM	109	35	144	904	225	1129
9:30 AM	107	41	148	580	179	759
9:45 AM	118	36	154	463	160	623
10:00 AM	148	58	206	481	170	651
10:15 AM	201	68	269	574	203	777
10:30 AM	270	117	387	736	279	1015
10:45 AM	247	288	536	866	532	1398
11:00 AM	101	171	272	819	644	1463
11:15 AM	79	62	141	696	639	1335
11:30 AM	62	65	127	489	586	1075
11:45 AM	87	67	154	328	365	693

Tube Count Data

	15-Minute Volumes			Hourly Volumes		
Time	In	Out	Total	In	Out	Total
12:00 PM	83	66	150	311	260	571
12:15 PM	96	71	167	328	269	597
12:30 PM	126	105	231	393	310	703
12:45 PM	183	143	325	488	385	873
1:00 PM	189	331	520	594	650	1244
1:15 PM	89	166	255	587	744	1331
1:30 PM	67	72	140	528	712	1240
1:45 PM	55	48	104	401	617	1018
2:00 PM	60	61	121	271	348	619
2:15 PM	68	78	146	250	260	510
2:30 PM	77	88	165	260	276	536
2:45 PM	119	102	221	324	329	653
3:00 PM	182	192	374	446	460	906
3:15 PM	218	350	567	596	732	1328
3:30 PM	123	217	340	641	861	1502
3:45 PM	72	87	158	594	846	1440
4:00 PM	54	95	149	466	748	1214
4:15 PM	61	79	140	309	478	787
4:30 PM	77	101	178	264	361	625
4:45 PM	73	105	178	265	379	644
5:00 PM	108	139	247	319	424	743
5:15 PM	181	214	395	439	559	998
5:30 PM	222	390	612	584	848	1432
5:45 PM	**127**	**200**	**327**	**638**	**943**	**1581**
6:00 PM	75	112	188	605	917	1522
6:15 PM	48	77	124	472	779	1251
6:30 PM	47	74	121	297	463	760
6:45 PM	38	73	111	208	336	544
7:00 PM	38	93	131	171	316	487
7:15 PM	47	98	144	170	337	507
7:30 PM	57	170	228	180	434	614
7:45 PM	80	300	381	222	661	883
8:00 PM	41	175	216	225	744	969
8:15 PM	23	73	95	201	719	920
8:30 PM	23	84	107	167	632	799
8:45 PM	16	47	64	103	379	482
9:00 PM	13	54	67	75	257	332
9:15 PM	14	40	54	67	224	291
9:30 PM	11	47	57	54	187	241
9:45 PM	20	74	94	58	214	272
10:00 PM	15	78	94	60	239	299
10:15 PM	7	30	37	52	230	282
10:30 PM	5	17	22	47	200	247
10:45 PM	3	10	13	31	136	167
11:00 PM	6	11	17	21	68	89
11:15 PM	5	5	10	19	43	62
11:30 PM	2	4	6	16	30	46
11:45 PM	4	9	13	17	29	46
Total Daily	***6,841***	***6,771***	***13,613***			

Notes: Data collected October 25-27, 2016.

Additional Off-Campus Surveys

Date 17-Nov-16

Observer:		DS		FL	
Location		Beardslee Building		Beardslee Apartment	
		Capacity	45	Capacity	62
		Initial occupancy	1	Initial occupancy	3
From	To	In	Out	In	Out
7:01	7:05	0	0	0	1
7:06	7:10	0	0	0	0
7:11	7:15	0	0	0	1
7:16	7:20	0	0	0	0
7:21	7:25	0	0	0	0
7:26	7:30	0	0	1	0
7:31	7:35	1	0	0	1
7:36	7:40	0	0	0	0
7:41	7:45	0	0	1	0
7:46	7:50	0	0	0	0
7:51	7:55	0	0	2	0
7:56	8:00	1	0	1	1
8:01	8:05	1	0	1	0
8:06	8:10	0	0	1	1
8:11	8:15	1	0	1	0
8:16	8:20	2	0	2	0
8:21	8:25	4	0	0	0
8:26	8:30	4	0	1	1
8:31	8:35	6	0	1	0
8:36	8:40	3	0	1	0
8:41	8:45	4	0	2	0
8:46	8:50	4	0	0	0
8:51	8:55	4	0	1	0
8:56	9:00	3	0	1	0

Observer:		DS		DL	
		Initial occupancy	39	Initial occupancy	27
From	To	In	Out	In	Out
16:01	16:05	2	0	0	1
16:06	16:10	0	0	0	1
16:11	16:15	0	0	0	1
16:16	16:20	0	0	0	3
16:21	16:25	0	0	0	0
16:26	16:30	0	0	0	1
16:31	16:35	0	0	0	0
16:36	16:40	0	0	0	0
16:41	16:45	0	0	0	1
16:46	16:50	0	0	0	1
16:51	16:55	0	1	2	0
16:56	17:00	0	1	0	2
17:01	17:05	0	3	2	1
17:06	17:10	1	4	3	0
17:11	17:15	1	0	0	1
17:16	17:20	3	2	2	0
17:21	17:25	3	2	2	0
17:26	17:30	1	4	0	1
17:31	17:35	3	6	1	1
17:36	17:40	2	4	0	2
17:41	17:45	3	1	0	1
17:46	17:50	0	2	1	1
17:51	17:55	2	1	2	1
17:56	18:00	0	0	1	2
		21	31	16	22

Summary of Peak Hour Traffic Counts

	Beardslee Building		Beardslee Apartment	
	In	Out	In	Out
AM Peak 8 - 9 AM	36	0	12	2
PM Peak 5 - 6 PM	19	29	14	11

Husky Village - Day 1

	Entrance 1		Entrance 2		Entrance 3		Paid Parking Stalls (Removed)		Cumulative - Day 1			
Time Period	**Inbound**	**Outbound**	**Inbound**	**Outbound**	**Inbound**	**Outbound**	**Inbound**	**Outbound**	**Inbound**	**Outbound**	**Total**	**Rolling 1 Hour**
AM Peak Hour												
7:00 - 7:15 AM	0	0	0	2	0	0	0	0	0	2	2	
7:15 - 7:30 AM	1	0	0	0	0	1	0	0	1	1	2	
7:30 - 7:45 AM	2	0	0	2	0	0	0	0	2	2	4	
7:45 - 8:00 AM	0	0	2	1	0	1	1	0	1	2	3	11
8:00 - 8:15 AM	1	0	1	0	0	1	2	0	0	1	1	10
8:15 - 8:30 AM	0	0	1	0	2	1	3	0	0	1	1	9
8:30 - 8:45 AM	0	2	3	1	2	0	2	0	3	3	6	11
8:45 - 9:00 AM	0	1	1	0	3	0	0	0	4	1	5	13
PM Peak Hour												
4:00 - 4:15 PM	0	1	1	3	0	0	0	1	1	3	4	
4:15 - 4:30 PM	0	0	3	2	0	1	1	3	2	0	2	
4:30 - 4:45 PM	1	3	2	4	0	0	0	3	3	4	7	
4:45 - 5:00 PM	0	1	2	2	1	0	0	1	3	2	5	18
5:00 - 5:15 PM	1	0	3	3	2	6	0	2	6	7	13	27
5:15 - 5:30 PM	2	0	0	2	1	1	0	1	3	2	5	30
5:30 - 5:45 PM	0	1	0	8	1	3	1	3	0	9	9	32
5:45 - 6:00 PM	2	0	0	1	3	2	1	2	4	1	5	32

Husky Village - Day 2

	Entrance 1		Entrance 2		Entrance 3		Parking Stalls (Remo		Cumulative - Day 2			
Time Period	**Inbound**	**Outbound**	**Inbound**	**Outbound**	**Inbound**	**Outbound**	**Inbound**	**Outbound**	**Inbound**	**Outbound**	**Total**	**Rolling 1 Hour**
AM Peak Hour							0	0				
7:00 - 7:15 AM	0	0	0	1	0	0	0	0	0	1	1	
7:15 - 7:30 AM	0	0	0	1	0	0	0	0	0	1	1	
7:30 - 7:45 AM	1	0	0	0	1	0	2	0	0	0	0	
7:45 - 8:00 AM	0	0	1	1	1	0	1	0	1	1	2	4
8:00 - 8:15 AM	1	1	4	1	1	2	0	1	6	3	9	12
8:15 - 8:30 AM	0	1	1	0	0	0	0	0	1	1	2	13
8:30 - 8:45 AM	2	1	5	2	3	1	4	0	6	4	10	23
8:45 - 9:00 AM	0	1	2	2	4	1	2	0	4	4	8	29
PM Peak Hour												
4:00 - 4:15 PM	0	0	4	1	2	4	0	2	6	3	9	
4:15 - 4:30 PM	1	0	1	3	0	2	2	2	0	3	3	
4:30 - 4:45 PM	0	2	4	5	0	1	0	2	4	6	10	
4:45 - 5:00 PM	0	1	1	2	1	1	0	0	2	4	6	28
5:00 - 5:15 PM	3	1	2	2	4	4	1	1	8	6	14	33
5:15 - 5:30 PM	1	0	1	6	0	5	0	1	2	10	12	42
5:30 - 5:45 PM	1	2	2	2	2	4	1	4	4	4	8	40
5:45 - 6:00 PM	2	0	4	3	0	2	0	1	6	4	10	44

	Two-Day Average			Hourly		
Time Period	Inbound	Outbound	Total	Inbound	Outbound	Total
AM Peak Hour						
7:00 - 7:15 AM	0	2	2			
7:15 - 7:30 AM	1	1	2			
7:30 - 7:45 AM	1	1	2			
7:45 - 8:00 AM	1	2	3	3	6	9
8:00 - 8:15 AM	3	2	5	6	6	12
8:15 - 8:30 AM	1	1	2	6	6	12
8:30 - 8:45 AM	5	4	9	10	9	19
8:45 - 9:00 AM	4	3	7	13	10	23
Total	16	16	32	57%	43%	
PM Peak Hour						
4:00 - 4:15 PM	4	3	7			
4:15 - 4:30 PM	1	2	3			
4:30 - 4:45 PM	4	5	9			
4:45 - 5:00 PM	3	3	6	12	13	25
5:00 - 5:15 PM	7	7	14	15	17	32
5:15 - 5:30 PM	3	6	9	17	21	38
5:30 - 5:45 PM	2	7	9	15	23	38
5:45 - 6:00 PM	5	3	8	17	23	40
Total	29	36	65	43%	57%	

UW Bothell Campus Housing Trip Generation Study - Husky Village			
	UW Bothell Campus Housing - Occupied Beds		
			Total Occupied Beds
			241
Trip Generation Rate	Inbound	Outbound	Average Trip Rate[1 2 3]
AM Peak Hour	57%	43%	0.10
PM Peak Hour	43%	57%	0.17

1. Based on observations conducted Wednesday, October 28, 2015 and Thursday, October 29, 2015 at Husky Village housing.
2. Cars observed utilizing paid parking in Husky Village were subtracted from the trip generation counts.

Existing Population

Campus Total

	Total Enrolled[1]	Online[2]	Total On-Campus[2]	Units
Cascadia College	2,842	371	2,471	student FTE
UW Bothell	5,375	NA	5,375	student FTE
Total[1]	8,217	371	7,846	student FTE

Notes:

1. Total enrolled includes online students. Data provided by Cascadia College and University of Washington Bothell November 2016.

2. Data provided by Cascadia College and UW Bothell November 2016. Cascadia College online student based on actual count and UW Bothell enrollment .

3. Population on-campus does not include online students but does include students in campus housing.

Student Housing

Husky Village (Traditional)	241	beds

Summary of On-Campus Students

Commuter Students	7,605	student FTE
Residential Students	241	student FTE
Total[1]	7,846	student FTE

Notes:

1. Population includes on-campus residents but not online students.

Existing Commuter Trip Generation

Daily

Data Source	In	Out	Total
Tube Count Data	6,840	6,770	13,610
Off-Campus Lots[1]	305	305	610
185th Counts[1]	205	205	410
On-Street/Downtown Demand[2]	740	730	1,470
Total	**8,090**	**8,010**	**16,100**

Notes:
1. Estimated assuming the weekday PM peak hour traffic is 12 percent of the total daily traffic based on a review of the midweek average counts from October 2016.

2. Assumes on-street and downtown parking demand represents 10% of what was captured for the campus based on a review of on-street parking counts.

AM Peak Hour (8-9 a.m.)

Data Source	In	Out	Total
Tube Count Data	1,324	244	1,568
Off-Campus Lots	48	2	50
185th Counts	24	5	29
On-Street/Downtown Demand[1]	140	25	165
Total	**1,536**	**276**	**1,812**

Notes:
1. Assumes on-street and downtown parking demand represents 10 percent of what was captured for the campus based on a review of on-street parking counts.

PM Peak Hour (5-6 p.m.)

Data Source	In	Out	Total
Tube Count Data	638	943	1,581
Off-Campus Lots	33	40	73
185th Counts	14	35	49
On-Street/Downtown Demand[1]	69	102	170
Total	**754**	**1,120**	**1,873**

Notes:
1. Assumes on-street and downtown parking demand represents 10 percent of what was captured for the campus based on a review of on-street parking counts.

Weekday Commuter Trip Rates

		Trip Distribution	
	Rates	**In**	**Out**
Daily	2.12	50%	50%
AM Peak Hour	0.24	85%	15%
PM Peak Hour	0.25	40%	60%

Existing Residential Trip Generation

Husky Village

	In	Trips[1,2,3] Out	Total
Daily	165	165	330
AM Peak Hour	13	10	23
PM Peak Hour	17	23	40

Notes:

1. Based on observations conducted Wednesday, October 28, 2015 and Thursday, October 29, 2015 at Husky Village housing.

2. Daily trips estimated assuming the weekday PM peak hour traffic is 12 percent of the total daily traffic based on a review of the midweek average counts from October 2016.

3. Cars observed utilizing paid parking in Husky Village were subtracted from the trip generation counts.

Weekday Residential Trip Rates

Size:	**Traditional Housing 243 occupied beds**		
	Rates	**Trip Distribution In**	**Out**
Daily	1.37	50%	50%
AM Peak Hour	0.10	57%	43%
PM Peak Hour	0.17	43%	57%

Alternative Trip Generation

		No Action Alternative - Scenario B - Allowed in PUD				Alternative 1 & 4				Alternatives 2 & 3				Near-Term			
	Trip Rate[1]	Size	Trips In	Trips Out	Trips Total	Size	Trips In	Trips Out	Trips Total	Size	Trips In	Trips Out	Trips Total	Size	Trips In	Trips Out	Trips Total
Daily																	
Future																	
Commuter	2.12	9,759 student FTE	10,345	10,345	20,690	8,800 student FTE	9,330	9,330	18,660	9,400 student FTE	9,965	9,965	19,930	7,997 student FTE	8,475	8,475	16,950
Residential	1.37	241 beds	165	165	330	1,200 beds	820	820	1,640	600 beds	410	410	820	742 beds	510	510	1,020
Subtotal			*10,510*	*10,510*	*21,020*		*10,150*	*10,150*	*20,300*		*10,375*	*10,375*	*20,750*		*8,985*	*8,985*	*17,970*
Existing Trips[2]			8,255	8,175	16,430		8,255	8,175	16,430		8,255	8,175	16,430		8,255	8,175	16,430
Net New Trips			***2,255***	***2,335***	***4,590***		***1,895***	***1,975***	***3,870***		***2,120***	***2,200***	***4,320***		***730***	***810***	***1,540***
AM Peak Hour																	
Future																	
Commuter	0.24	9,759 student FTE	1,991	351	2,342	8,800 student FTE	1,795	317	2,112	9,400 student FTE	1,918	338	2,256	7,997 student FTE	1,631	288	1,919
Residential	0.10	241 beds	14	10	24	1,200 beds	68	52	120	600 beds	34	26	60	742 beds	42	32	74
Subtotal			*2,005*	*361*	*2,366*		*1,863*	*369*	*2,232*		*1,952*	*364*	*2,316*		*1,673*	*320*	*1,993*
Existing Trips[2]			1,549	286	1,835		1,549	286	1,835		1,549	286	1,835		1,549	286	1,835
Net New Trips			***456***	***75***	***531***		***314***	***83***	***397***		***403***	***78***	***481***		***124***	***34***	***158***
PM Peak Hour																	
Future																	
Commuter	0.25	9,759 student FTE	976	1,464	2,440	8,800 student FTE	880	1,320	2,200	9,400 student FTE	940	1,410	2,350	7,997 student FTE	800	1,199	1,999
Residential	0.17	241 beds	18	23	41	1,200 beds	88	116	204	600 beds	44	58	102	742 beds	54	72	126
Subtotal			*994*	*1,487*	*2,481*		*968*	*1,436*	*2,404*		*984*	*1,468*	*2,452*		*854*	*1,271*	*2,125*
Existing Trips[2]			771	1,143	1,913		771	1,143	1,913		771	1,143	1,913		771	1,143	1,913
Net New Trips			***224***	***344***	***568***		***198***	***293***	***491***		***214***	***325***	***539***		***84***	***128***	***212***

Notes:

1. Based data collected in October 2015 for the residential trip rate and October and November 2016 for the commuter trip rate.

2. Based on data collected in October 2015 and November 2016. This accounts for trips generated at existing off-site locations, which would be reassigned the campus for the evaluation of future conditions.

Appendix C: LOS Definitions

Highway Capacity Manual 2010

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* (Transportation Research Board, 2010).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F[1]	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop and two-way stop control. All-way stop control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F[1]	>50

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

Highway Capacity Manual, 2000

Signalized intersection level of service (LOS) is defined in terms of the average total vehicle delay of all movements through an intersection. Vehicle delay is a method of quantifying several intangible factors, including driver discomfort, frustration, and lost travel time. Specifically, LOS criteria are stated in terms of average delay per vehicle during a specified time period (for example, the PM peak hour). Vehicle delay is a complex measure based on many variables, including signal phasing (i.e., progression of movements through the intersection), signal cycle length, and traffic volumes with respect to intersection capacity. Table 1 shows LOS criteria for signalized intersections, as described in the *Highway Capacity Manual* (Transportation Research Board, Special Report 209, 2000).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (sec/veh)	General Description (Signalized Intersections)
A	≤10	Free Flow
B	>10 - 20	Stable Flow (slight delays)
C	>20 - 35	Stable flow (acceptable delays)
D	>35 - 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 - 80	Unstable flow (intolerable delay)
F	>80	Forced flow (jammed)

Source: *Highway Capacity Manual*, Transportation Research Board, Special Report 209, 2000.

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop-controlled and two-way stop-controlled. All-way, stop-controlled intersection LOS is expressed in terms of the average vehicle delay of all of the movements, much like that of a signalized intersection. Two-way, stop-controlled intersection LOS is defined in terms of the average vehicle delay of an individual movement(s). This is because the performance of a two-way, stop-controlled intersection is more closely reflected in terms of its individual movements, rather than its performance overall. For this reason, LOS for a two-way, stop-controlled intersection is defined in terms of its individual movements. With this in mind, total average vehicle delay (i.e., average delay of all movements) for a two-way, stop-controlled intersection should be viewed with discretion. Table 2 shows LOS criteria for unsignalized intersections (both all-way and two-way, stop-controlled).

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (sec/veh)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

Source: *Highway Capacity Manual*, Transportation Research Board, Special Report 209, 2000.

Appendix D: LOS Summary & Worksheets*

*Detailed LOS worksheets are available upon request.

AM Peak Hour Operations Summary - With Eastbound Lane

		Existing		No Action Scenario A		No Action Scenario B		Near Term (2027)		Alt 1		Alt 2		Alt 3	
Int	Description	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
33	110th/Beardslee	B	13.9	B	14.7	B	18.5	B	14.8	B	17.2	B	18.1	B	11.9
48	Campus Way/522	C	28.9	F	130.1	F	148.2	E	66.7	F	146.8	F	145.1	F	144.9
49	108th/Beardslee													C	23.2

AM Peak Hour Operations Summary - Without Eastbound Lane

		Existing		No Action Scenario A		No Action Scenario B		Near Term (2027)		Alt 1		Alt 2		Alt 3	
Int	**Description**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**
33	**110th/Beardslee**	B	13.9	B	17	C	21.2	B	15.8	B	19.6	C	20.5	B	13.2
48	**Campus Way/522**	C	28.9	F	130.1	F	148.2	E	66.7	F	146.8	F	145.1	F	144.9
49	**108th/Beardslee**													C	23.2

PM Peak Hour Operations Summary - With Eastbound Lane

Corridor	INT ID	Description	Existing			No Action Scenario A			No Action Scenario B			Near Term (2027)			Alt 1			Alt 2 (Core)			Alt 3 (Growth)		
			LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV
SR 524	1	9th Ave SE / SR 524 / Filbert Dr	D	39.2	2,225	D	41.6	3,295	D	42.1	3,323	E	68	2,720	D	42.1	3,320	D	42.1	3,322	D	42.1	3,322
	2	SR 527 / SR 524	D	39	4,895	E	63	7,285	E	64.4	7,399	F	82.7	6,012	E	64.2	7,384	E	64.4	7,393	E	64.4	7,393
SR 527	2	SR 527 / SR 524	D	39	4,895	E	63	7,285	E	64.4	7,399	F	82.7	6,012	E	64.2	7,384	E	64.4	7,393	E	64.4	7,393
	3	SR 527 / 214th St SE	D	40.6	3,405	C	30.2	5,050	C	31.3	5,164	D	42.2	4,198	C	31.4	5,149	C	31.4	5,158	C	31.4	5,158
	4	SR 527 / 220th St SE	E[1]	73.2	4,240	F[1]	101.3	6,285	F[1]	102.8	6,399	E[1]	58.7	5,213	F[1]	102.3	6,384	F[1]	102.7	6,393	F[1]	102.7	6,393
	5	SR 527 / I-405 NB Ramps	D	35.9	4,950	F	110.9	7,360	F	118.1	7,474	E	64.6	6,073	F	122.3	7,459	F	117.9	7,468	F	122.6	7,468
	6	SR 527 / I-405 SB Ramps	A	7.8	4,595	A	6.9	6,825	A	6.8	6,922	A	9.4	5,637	B	10.6	6,909	A	6.8	6,917	B	10.7	6,917
	7	SR 527 / 228th St SE	E[1]	76.8	4,925	F	96.2	7,320	F	93.4	7,446	E	59.4	6,053	F	97.6	7,429	F	91.7	7,439	F	98	7,439
	8	SR 527 / 240th St SE	C	34.1	2,090	D	49.9	3,090	D	50.6	3,244	D	47.2	2,588	D	50.5	3,224	D	50.5	3,236	D	50.5	3,236
	9	SR 527 / NE 190th St	C[1]	23	2,080	D	49.6	3,085	D	49.8	3,239	D	52.4	2,603	D	49.8	3,219	D	49.8	3,231	D	49.8	3,231
	10	SR 527 / NE 185th St	B	14.7	1,785	C	24.4	2,690	C	34.1	2,844	B	13.4	2,268	C	32.3	2,824	C	33.4	2,836	C	33.4	2,836
	11	SR 527 / NE 183rd St	B[1]	12	1,510	A	6.6	2,140	A	6.4	2,260	A	6.6	1,803	A	6.4	2,244	A	6.4	2,253	A	6.4	2,253
	12	SR 527 / Main St	B	10.8	1,530	B	15.9	2,270	B	10.2	2,390	A	9.1	1,893	A	9.9	2,374	A	9.9	2,383	A	9.9	2,383
	13	SR 527 / SR 522	C[1]	29.9	4,015	E[1]	55.8	5,960	E[1]	62.5	6,083	C[1]	23.7	4,921	E[1]	61.7	6,068	E[1]	62.3	6,079	E[1]	62.2	6,079
228th St SE	14	228TH ST SE / 4TH AVE W	A	3.5	1,695	B	12.9	2,515	C	26.7	2,555	C	23.5	2,080	C	26.8	2,550	C	26.7	2,553	C	26.7	2,553
	15	228TH ST SE / MERIDIAN AVE S	B	16.9	2,615	C	30.2	3,885	C	31.1	3,925	C	20.2	3,200	C	30.9	3,920	C	31	3,923	C	31	3,923
	16	228TH ST SE / 4TH AVE SE	A[1]	5.8	2,105	A	7.8	3,105	A	7.8	3,145	A	7.1	2,580	A	7.8	3,140	A	7.8	3,143	A	7.8	3,143
	17	228TH ST SE / 9TH AVE SE	C	21.8	2,905	F	120.7	4,310	F	123.4	4,350	E	55.5	3,555	F	123.1	4,345	F	123.3	4,348	F	123.3	4,348
	7	SR 527 / 228th St SE	E[1]	76.8	4,925	F	96.2	7,320	F	93.4	7,446	E	59.4	6,053	F	97.6	7,429	F	91.7	7,439	F	98	7,439
	18	228TH ST SE / 15TH AVE SE	B	17.6	2,735	E	80.4	4,070	F	80.2	4,070	E	58.3	3,335	F	80.2	4,070	F	80.2	4,070	D	37.2	4,070
	19	228TH ST SE / 19TH AVE SE	B[1]	18.5	2,500	E[1]	78.8	3,710	E[1]	78.8	3,710	C[1]	34.2	3,045	E[1]	78.8	3,710	E[1]	78.8	3,710	E[1]	78.8	3,710
	20	228TH ST SE / FITZGERALD RD	C	20.7	2,130	E[1]	72	3,160	E[1]	72.1	3,160	D[1]	35.9	2,595	E[1]	72.1	3,160	E[1]	72.1	3,160	E[1]	72.1	3,160
	21	228TH ST SE / 29TH AVE SE	B	19.8	2,015	E	58.5	2,995	E	58.5	2,995	F	241.1	2,455	E	58.5	2,995	E	58.5	2,995	E	58.5	2,995
	22	228TH ST SE / 31ST AVE SE	A[1]	9.2	1,575	B	17.5	2,325	B	17.5	2,325	B	12,6	1,915	B	17.5	2,325	B	17.5	2,325	B	17.5	2,325
	23	228TH ST SE / 35TH AVE SE	C[1]	25.1	2,035	E	78.9	3,010	F	85.5	3,056	E	71.1	2,492	F	85	3,049	F	84.7	3,053	F	84.7	3,053
	24	228TH ST SE / 39TH AVE SE	C[1]	21.1	1,810	F	101.3	2,690	F	103.4	2,736	D	50.5	2,222	F	103.3	2,729	F	103.3	2,733	F	103.3	2,733
35th Ave SE / 39th Ave SE / 120th Ave NE	23	228TH ST SE / 35TH AVE SE	C[1]	25.1	2,035	E	78.9	3,010	F	85.5	3,056	E	71.1	2,492	F	85	3,049	F	84.7	3,053	F	84.7	3,053
	24	228TH ST SE / 39TH AVE SE	B[1]	21.1	1,810	F	101.3	2,690	F	103.4	2,736	D	50.5	2,222	F	103.3	2,729	F	103.3	2,733	F	103.3	2,733
	25	35TH AVE SE/ 240TH ST SE	D	31	1,460	C	26.9	2,160	C	32.4	2,206	F	78.5	1,797	C	31.4	2,199	C	32	2,203	C	31.8	2,203
	26	39TH AVE SE / 240TH ST SE	C	22.2	1,350	B	12.7	2,005	B	13.5	2,051	F	51	1,662	B	13.4	2,044	B	13.5	2,048	B	13.4	2,048
	27	39TH AVE SE / MONTE VILLA PARKWAY	A	4.1	1,890	B	15.9	2,800	B	15.7	2,846	A	6	2,317	B	15.8	2,839	B	15.7	2,843	B	15.7	2,843
	28	39TH AVE SE / N CREEK PARKWAY	B	15.1	1,970	C	31.4	2,920	C	32.1	2,966	B	19.2	2,407	C	31.7	2,959	C	31.7	2,963	C	31.7	2,963
	29	120TH AVE NE / NE 195TH ST	F	95.5	2,165	F	171.3	3,210	F	184.2	3,256	F	103.6	2,662	F	182	3,249	F	183.5	3,253	F	183.5	3,253
	30	120TH AVE NE / N CREEK PARKWAY S	A	2.9	1,090	A	4.3	1,610	A	4.3	1,610	A	3.3	1,325	A	4.3	1,610	A	4.3	1,610	A	4.3	1,610
	31	NE 180TH ST / 132ND AVE NE	C[1]	23.4	1,630	E[1]	65.5	2,420	E[1]	64.6	2,420	D[1]	49.9	1,980	E[1]	64.6	2,420	E[1]	64.6	2,420	E[1]	64.6	2,420
Beardslee Boulevard	32	NE 185TH ST / BEARDSLEE BLVD	A	5.5	1,110	B	11.4	1,635	B	11.8	1,733	B	10.9	1,398	B	11.7	1,720	B	11.8	1,727	A	7.1	1,972
	33	110TH AVE NE / BEARDSLEE BLVD	C	29.9	1,585	B	11.2	2,020	B	12.5	2,192	B	12.4	1,875	B	12.2	2,169	B	12.4	2,182	B	10.7	2,029
	34	NE 195TH ST / SB 405 RAMPS	C	24.7	2,270	D	35.9	3,375	D	38	3,449	C	24.3	2,807	D	37.8	3,439	D	38	3,445	D	38	3,445
	35	NE 195TH ST / NB 405 RAMPS	C	27	2,975	F	82.5	4,430	F	87	4,493	D	42	3,657	F	86.7	4,484	F	86.8	4,489	F	86.8	4,489
	36	NE 195TH ST / N CREEK PARKWAY N	D	39	2,845	E	76.9	4,225	E	78.6	4,271	D	45.3	3,487	E	78.2	4,264	E	78.4	4,268	E	78.4	4,268
	29	120TH AVE NE / NE 195TH ST	F	95.5	2,165	F	171.3	3,210	F	184.2	3,256	F	103.6	2,662	F	182	3,249	F	183.5	3,253	F	183.5	3,253
SR 522	37	SR 522 / 96TH AVE NE	C	29.9	4,040	E[1]	74.4	6,010	E[1]	77	6,077	D[1]	38	4,951	E[1]	76.8	6,069	E[1]	76.9	6,075	E[1]	76.9	6,075
	38	SR 522 / NE 180TH ST	B[1]	14.5	3,785	E	68.6	5,625	E	72.8	5,692	B	17.8	4,636	E	72.2	5,684	E	72.7	5,690	E	72.7	5,690
	39	SR 522 / 98TH AVE NE / GLENWOOD	B	10.5	3,785	B	14.9	5,610	B	16.3	5,677	B	17.9	4,631	B	16.1	5,669	B	16.3	5,675	B	16.3	5,675
	13	SR 527 / SR 522	C[1]	29.9	4,015	E[1]	55.8	5,960	E[1]	62.5	6,083	C[1]	23.7	4,921	E[1]	61.7	6,068	E[1]	62.3	6,079	E[1]	62.2	6,079
	40	SR 522 / KAYSNER WAY	D	41.9	3,805	F	100.9	5,645	F	109.2	5,768	D	53.4	4,661	F	107.9	5,753	F	109	5,764	F	109	5,764
NE 145th St / NE 160th St	41	NE 145TH ST / 100TH AVE NE	D	46.1	1,830	E	69.4	2,710	E	69.4	2,710	D	43.2	2,220	E	69.4	2,710	E	69.4	2,710	E	69.4	2,710
	42	NE 145TH ST / JUANITA WOODINVILLE WAY	C	31.8	1,945	E	109.4	2,885	F	116.6	2,925	E	63	2,385	F	116.6	2,920	F	116.6	2,923	F	116.6	2,923
	43	JUANITA WOODINVILLE WAY / 112TH AVE NE	C[1]	24.8	1,965	E[1]	55.9	2,925	E[1]	58.6	2,965	D[1]	48	2,415	E[1]	58	2,960	E[1]	58.5	2,963	E[1]	58.5	2,963
	44	SB 405 RAMPS / JUANITA WOODINVILLE WAY	E	61.6	2,475	E	62.1	3,675	E	66.2	3,729	D	40.2	3,035	E	65.6	3,722	E	66	3,726	E	66	3,726
	45	NB 405 RAMPS / JUANITA WOODINVILLE WAY	C	23.4	2,900	E	55.5	4,305	E	57.3	4,344	D	45.9	3,554	E	55.6	4,339	E	55.8	4,342	E	55.8	4,342
	46	NE 160TH ST / 116TH AVE NE / JUANITA WOOD WAY	A	7.1	2,200	F	53.9	3,260	F	53.7	3,283	E	55.2	2,693	F	53.7	3,280	F	53.7	3,282	F	53.7	3,282
	47	NE 160TH ST / 124TH AVE NE	C	26.8	1,740	E	59	2,575	E	62.7	2,598	D	35.9	2,123	E	62.2	2,595	E	62.4	2,597	E	62.4	2,597

	INT ID	Description	LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV
	48	SR 522 / Campus Way NE	C	20.8		D	44.5		F	82.4		C	32		E	77.1		F	80.4		F	80.4	
	49	New Access / Beardslee																			A	7.1	

Operations were based on HCM 2010 Methodology unless noted. For two-way stop controlled intersections, the average delay per vehicle was reported rather than the worst approach/movement consistent with previous work in the City of Bothell.

1. Analyzed with HCM 2000 metholody due to incompatible configuration or signal timing parameters with HCM 2010.
2. In Alternative 3, intersection 32 would be reconfigured to be a four leg intersection with 108th Avenue NE and become intersection #49.

PM Peak Hour Operations Summary - Without Eastbound Lane

Corridor	INT ID	Description	Near Term (2027)			Alt 1			Alt 2 (Core)			Alt 3 (Growth)		
			LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV	LOS	Delay	TEV
SR 524	1	9th Ave SE / SR 524 / Filbert Dr	E	68	2,720	D	42.1	3,320	D	42.1	3,322	D	42.1	3,322
	2	SR 527 / SR 524	F	82.7	6,012	E	64.2	7,384	E	64.4	7,393	E	64.4	7,393
SR 527	2	SR 527 / SR 524	F	82.7	6,012	E	64.2	7,384	E	64.4	7,393	E	64.4	7,393
	3	SR 527 / 214th St SE	D	42.2	4,198	C	31.4	5,149	C	31.4	5,158	C	31.4	5,158
	4	SR 527 / 220th St SE	E[1]	58.7	5,213	F[1]	102.3	6,384	F[1]	102.7	6,393	F[1]	102.7	6,393
	5	SR 527 / I-405 NB Ramps	E	64.6	6,073	F	122.3	7,459	F	117.9	7,468	F	122.6	7,468
	6	SR 527 / I-405 SB Ramps	A	9.4	5,637	B	10.6	6,909	A	6.8	6,917	B	10.7	6,917
	7	SR 527 / 228th St SE	E	59.4	6,053	F	97.6	7,429	F	91.7	7,439	F	98	7,439
	8	SR 527 / 240th St SE	D	47.2	2,588	D	50.5	3,224	D	50.5	3,236	D	50.5	3,236
	9	SR 527 / NE 190th St	D	52.4	2,603	D	49.8	3,219	D	49.8	3,231	D	49.8	3,231
	10	SR 527 / NE 185th St	B	13.4	2,268	C	32.3	2,824	C	33.4	2,836	C	33.4	2,836
	11	SR 527 / NE 183rd St	A	6.6	1,803	A	6.4	2,244	A	6.4	2,253	A	6.4	2,253
	12	SR 527 / Main St	A	9.1	1,893	A	9.9	2,374	A	9.9	2,383	A	9.9	2,383
	13	SR 527 / SR 522	C[1]	23.7	4,921	E[1]	61.7	6,068	E[1]	62.3	6,079	E[1]	62.2	6,079
228th St SE	14	228TH ST SE / 4TH AVE W	C	23.5	2,080	C	26.8	2,550	C	26.7	2,553	C	26.7	2,553
	15	228TH ST SE / MERIDIAN AVE S	C	20.2	3,200	C	30.9	3,920	C	31	3,923	C	31	3,923
	16	228TH ST SE / 4TH AVE SE	A	7.1	2,580	A	7.8	3,140	A	7.8	3,143	A	7.8	3,143
	17	228TH ST SE / 9TH AVE SE	E	55.5	3,555	F	123.1	4,345	F	123.3	4,348	F	123.3	4,348
	7	SR 527 / 228th St SE	E	59.4	6,053	F	97.6	7,429	F	91.7	7,439	F	98	7,439
	18	228TH ST SE / 15TH AVE SE	E	58.3	3,335	F	80.2	4,070	F	80.2	4,070	D	37.2	4,070
	19	228TH ST SE / 19TH AVE SE	C[1]	34.2	3,045	E[1]	78.8	3,710	E[1]	78.8	3,710	E[1]	78.8	3,710
	20	228TH ST SE / FITZGERALD RD	D[1]	35.9	2,595	E[1]	72.1	3,160	E[1]	72.1	3,160	E[1]	72.1	3,160
	21	228TH ST SE / 29TH AVE SE	F	241.1	2,455	E	58.5	2,995	E	58.5	2,995	E	58.5	2,995
	22	228TH ST SE / 31ST AVE SE	B	12,6	1,915	B	17.5	2,325	B	17.5	2,325	B	17.5	2,325
	23	228TH ST SE / 35TH AVE SE	E	71.1	2,492	F	85	3,049	F	84.7	3,053	F	84.7	3,053
	24	228TH ST SE / 39TH AVE SE	D	50.5	2,222	F	103.3	2,729	F	103.3	2,733	F	103.3	2,733
35th Ave SE / 39th Ave SE / 120th Ave NE	23	228TH ST SE / 35TH AVE SE	E	71.1	2,492	F	85	3,049	F	84.7	3,053	F	84.7	3,053
	24	228TH ST SE / 39TH AVE SE	D	50.5	2,222	F	103.3	2,729	F	103.3	2,733	F	103.3	2,733
	25	35TH AVE SE/ 240TH ST SE	F	78.5	1,797	C	31.4	2,199	C	32	2,203	C	31.8	2,203
	26	39TH AVE SE / 240TH ST SE	F	51	1,662	B	13.4	2,044	B	13.5	2,048	B	13.4	2,048
	27	39TH AVE SE / MONTE VILLA PARKWAY	A	6	2,317	B	15.8	2,839	B	15.7	2,843	B	15.7	2,843
	28	39TH AVE SE / N CREEK PARKWAY	B	19.2	2,407	C	31.7	2,959	C	31.7	2,963	C	31.7	2,963
	29	120TH AVE NE / NE 195TH ST	F	103.6	2,662	F	182	3,249	F	183.5	3,253	F	183.5	3,253
	30	120TH AVE NE / N CREEK PARKWAY S	A	3.3	1,325	A	4.3	1,610	A	4.3	1,610	A	4.3	1,610
	31	NE 180TH ST / 132ND AVE NE	D[1]	49.9	1,980	E[1]	64.6	2,420	E[1]	64.6	2,420	E[1]	64.6	2,420
Beardslee Boulevard	32	NE 185TH ST / BEARDSLEE BLVD	B	10.9	1,398	B	11.8	1,720	B	11.8	1,727	A	7.1	1,972
	33	110TH AVE NE / BEARDSLEE BLVD	B	13.8	1,875	B	14.6	2,169	B	14.8	2,182	B	13	2,029
	34	NE 195TH ST / SB 405 RAMPS	C	24.3	2,807	D	37.8	3,439	D	38	3,445	D	38	3,445
	35	NE 195TH ST / NB 405 RAMPS	D	42	3,657	F	86.7	4,484	F	86.8	4,489	F	86.8	4,489
	36	NE 195TH ST / N CREEK PARKWAY N	D	45.3	3,487	E	78.2	4,264	E	78.4	4,268	E	78.4	4,268
	29	120TH AVE NE / NE 195TH ST	F	103.6	2,662	F	182	3,249	F	183.5	3,253	F	183.5	3,253
SR 522	37	SR 522 / 96TH AVE NE	D[1]	38	4,951	E[1]	76.8	6,069	E[1]	76.9	6,075	E[1]	76.9	6,075
	38	SR 522 / NE 180TH ST	B	17.8	4,636	E	72.2	5,684	E	72.7	5,690	E	72.7	5,690
	39	SR 522 / 98TH AVE NE / GLENWOOD	B	17.9	4,631	B	16.1	5,669	B	16.3	5,675	B	16.3	5,675
	13	SR 527 / SR 522	C[1]	23.7	4,921	E[1]	61.7	6,068	E[1]	62.3	6,079	E[1]	62.2	6,079
	40	SR 522 / KAYSNER WAY	D	53.4	4,661	F	107.9	5,753	F	109	5,764	F	109	5,764
NE 145th St / NE 160th St	41	NE 145TH ST / 100TH AVE NE	D	43.2	2,220	E	69.4	2,710	E	69.4	2,710	E	69.4	2,710
	42	NE 145TH ST / JUANITA WOODINVILLE WAY	E	63	2,385	F	116.6	2,920	F	116.6	2,923	F	116.6	2,923
	43	JUANITA WOODINVILLE WAY / 112TH AVE NE	D[1]	48	2,415	E[1]	58	2,960	E[1]	58.5	2,963	E[1]	58.5	2,963
	44	SB 405 RAMPS / JUANITA WOODINVILLE WAY	D	40.2	3,035	E	65.6	3,722	E	66	3,726	E	66	3,726
	45	NB 405 RAMPS / JUANITA WOODINVILLE WAY	D	45.9	3,554	E	55.6	4,339	E	55.8	4,342	E	55.8	4,342
	46	NE 160TH ST / 116TH AVE NE / JUANITA WOOD WAY	E	55.2	2,693	F	53.7	3,280	F	53.7	3,282	F	53.7	3,282
	47	NE 160TH ST / 124TH AVE NE	D	35.9	2,123	E	62.2	2,595	E	62.4	2,597	E	62.4	2,597

	48	SR 522 / Campus Way NE	C	32		E	77.1		F	80.4		F	80.4	
	49	New Access / Beardslee										A	7.1	

Operations were based on HCM 2010 Methodology unless noted. For two-way stop controlled intersections, the average delay per vehicle was reported rather than the worst approach/movement consistent with previous work in the City of Bothell.

1. Analyzed with HCM 2000 methology due to incompatible configuration or signal timing parameters with HCM 2010.
2. In Alternative 3, intersection 32 would be reconfigured to be a four leg intersection with 108th Avenue NE and become intersection #49.

Appendix E: Collision Summary

Collision Summary

Int No.	Description	2013	2014	2015	Total	Average	Annual Volume (vehicles)	Collisions Per MEV
1	9th Ave SE / SR 524 / Filbert Dr	9	9	8	26	8.7	8,121,250	1.07
2	SR 527 / SR 524	24	23	27	74	24.7	17,866,750	1.38
3	SR 527 / 214th St SE	10	4	10	24	8.0	12,428,250	0.64
4	SR 527 / 220th St SE	19	16	18	53	17.7	15,476,000	1.14
5	SR 527 / I-405 NB Ramps	3	7	5	15	5.0	18,067,500	0.28
6	SR 527 / I-405 SB Ramps	7	9	7	23	7.7	16,771,750	0.46
7	SR 527 / 228th St SE	32	36	34	102	34.0	17,976,250	1.89
8	SR 527 / 240th St SE	6	2	4	12	4.0	7,628,500	0.52
9	SR 527 / NE 190th St	3	3	3	9	3.0	7,592,000	0.40
10	SR 527 / NE 185th St	0	1	3	4	1.3	6,515,250	0.20
11	SR 527 / NE 183rd St	5	4	5	14	4.7	5,511,500	0.85
12	SR 527 / Main St	0	2	1	3	1.0	5,584,500	0.18
13	SR 527 / SR 522	2	3	2	7	2.3	14,654,750	0.16
14	228TH ST SE / 4TH AVE W	1	2	2	5	1.7	6,186,750	0.27
15	228TH ST SE / MERIDIAN AVE S	10	2	5	17	5.7	9,544,750	0.59
16	228TH ST SE / 4TH AVE SE	3	1	3	7	2.3	7,683,250	0.30
17	228TH ST SE / 9TH AVE SE	4	8	8	20	6.7	10,603,250	0.63
18	228TH ST SE / 15TH AVE SE	4	5	9	18	6.0	9,982,750	0.60
19	228TH ST SE / 19TH AVE SE	3	2	3	8	2.7	9,125,000	0.29
20	228TH ST SE / FITZGERALD RD / 27th ave	2	1	1	4	1.3	7,774,500	0.17
21	228TH ST SE / 29TH AVE SE	0	0	1	1	0.3	7,354,750	0.05
22	228TH ST SE / 31ST AVE SE	1	0	3	4	1.3	5,748,750	0.23
23	228TH ST SE / 35TH AVE SE	0	1	1	2	0.7	7,427,750	0.09
24	228TH ST SE / 39TH AVE SE	1	1	1	3	1.0	6,606,500	0.15
25	35TH AVE SE/ 240TH ST SE	1	0	2	3	1.0	5,329,000	0.19
26	39TH AVE SE / 240TH ST SE	2	0	0	2	0.7	4,927,500	0.14
27	39TH AVE SE / MONTE VILLA PARKWAY	1	0	0	1	0.3	6,898,500	0.05
28	39TH AVE SE / N CREEK PARKWAY	0	1	0	1	0.3	7,190,500	0.05
29	120TH AVE NE / NE 195TH ST	2	1	2	5	1.7	7,902,250	0.21
30	120TH AVE NE / N CREEK PARKWAY S	0	0	0	0	0.0	3,978,500	0.00
31	NE 180TH ST / 132ND AVE NE	3	0	6	9	3.0	5,949,500	0.50

Collision Summary								
Int No.	Description	2013	2014	2015	Total	Average	Annual Volume (vehicles)	Collisions Per MEV
32	NE 185TH ST / BEARDSLEE BLVD	0	3	2	5	1.7	4,051,500	0.41
33	110TH AVE NE / BEARDSLEE BLVD	0	4	4	8	2.7	5,785,250	0.46
34	NE 195TH ST / SB 405 RAMPS	2	5	6	13	4.3	8,285,500	0.52
35	NE 195TH ST / NB 405 RAMPS	10	5	5	20	6.7	10,858,750	0.61
36	NE 195TH ST / N CREEK PARKWAY N	2	4	5	11	3.7	10,384,250	0.35
37	SR 522 / 96TH AVE NE	5	5	12	22	7.3	14,735,050	0.50
38	SR 522 / NE 180TH ST	0	0	3	3	1.0	13,829,850	0.07
39	SR 522 / 98TH AVE NE / GLENWOOD	5	2	3	10	3.3	13,793,350	0.24
40	SR 522 / KAYSNER WAY	5	4	5	14	4.7	13,851,750	0.34
41	NE 145TH ST / 100TH AVE NE	3	4	5	12	4.0	6,679,500	0.60
42	NE 145TH ST / JUANITA WOODINVILLE WAY	6	5	5	16	5.3	7,099,250	0.75
43	JUANITA WOODINVILLE WAY / 112TH AVE NE	0	1	2	3	1.0	7,172,250	0.14
44	SB 405 RAMPS / JUANITA WOODINVILLE WAY	2	1	4	7	2.3	9,033,750	0.26
45	NB 405 RAMPS / JUANITA WOODINVILLE WAY	8	9	11	28	9.3	10,585,000	0.88
46	NE 160TH ST / 116TH AVE NE / JUANITA WOOD WAY	8	5	3	16	5.3	8,030,000	0.66
47	NE 160TH ST / 124TH AVE NE	3	1	0	4	1.3	6,351,000	0.21

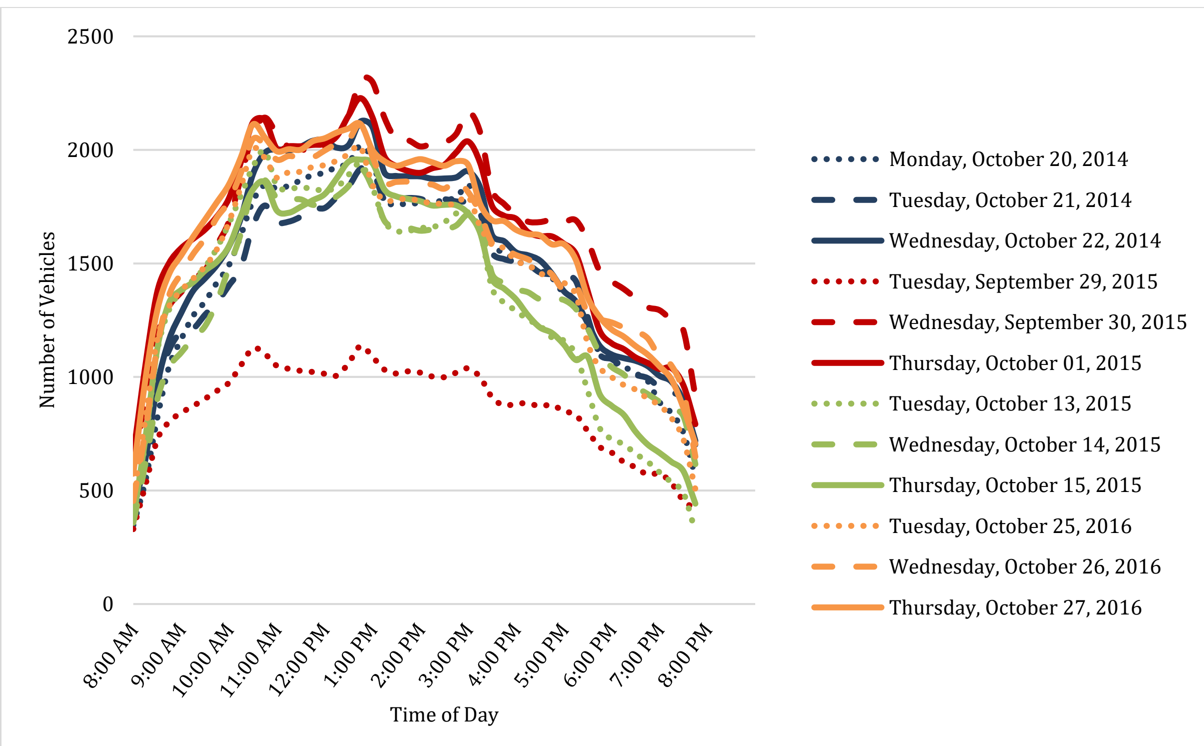
Appendix F: Draft Transportation Management Program

University of Washington/Cascadia College Transportation Management Plan

Background

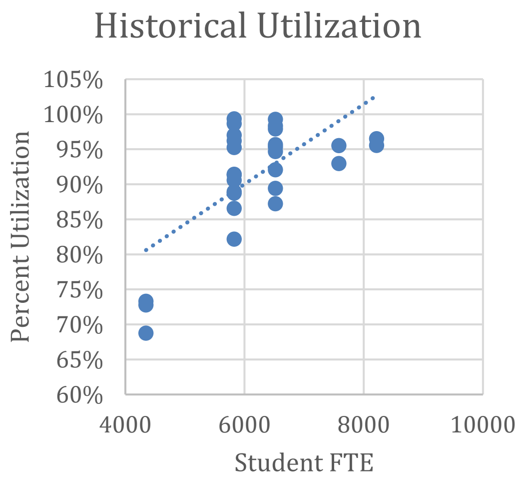
The following outlines the key elements of the University of Washington (UW Bothell)/Cascadia College (CC) Transportation Management Plan (TMP). The 2017 Campus Master Plan and associated Environmental Impact Statement (EIS) assumed the current mode split assumptions for purposes of the impact analysis and identification of mitigation. As such, the primary goal of this plan is to not exceed the existing single occupancy vehicle (SOV) mode split for students, faculty, and staff. However, as noted below, the Campus will continue to engage with the community in proactive outreach addressing transportation issues as they arise and coordinate with the City and transit agencies to improve transit service in the area, resulting in a decrease in the SOV trip rate. This will minimize and/or reduce impacts to the street system and neighborhoods surrounding the campus. Figure A illustrates hourly on-campus vehicles trips collected in 2014, 2015, and 2016.

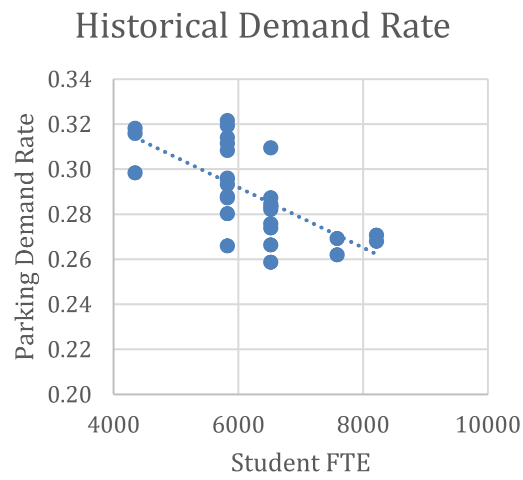
Figure A: Vehicles on Campus 2014, 2015, and 2016



The increase in vehicle trips is generally related to increased student enrollment. Figure B shows the historical parking utilization and demand rate for the Campus. The individual points shown on both of the graphs represent a calculation from data collected on an annual basis. While the overall student FTE count and the overall parking utilization have increased (see Figure B), the parking demand rate per student has been steadily decreasing. This reduction in parking rate may be due to factors such as increased utilization making it more difficult to find parking, changes to on-site parking costs, increased transit use with adjustments to the U-PASS program, or off-campus congestion resulting in a shift from SOV to carpooling or transit.

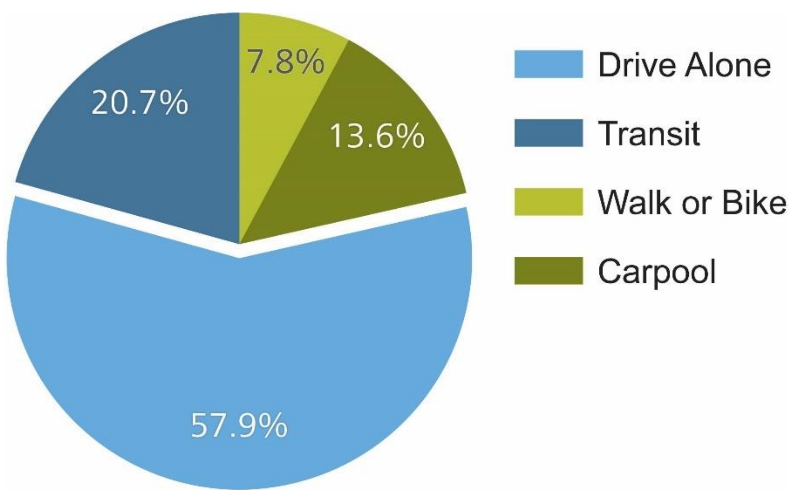
Figure B: Historical Parking Utilization and Demand Rate





Travel to campus occurs through personal vehicles, walking and biking, as well as transit. Intercept surveys were conducted on October 11 and 12, 2016 between 10 a.m. and 1:30 p.m. at multiple locations throughout the campus, capturing both the UW Bothell and CC population. A total of 450 surveys were conducted over the course of two days. Figure C indicates the existing mode splits for the campus. As shown in Figure C, most of the travel to campus is currently via vehicle with a drive alone rate of 57.9%.

Figure C: Existing Campus Travel Mode Splits



There are seven programmatic components of the TMP, each one focusing on key elements of the transportation system and provides strategies to support the success of the overall TMP program. These are strategies that may be implemented one at a time, or in combination with other strategies. The Campus may choose among these strategies or potentially other, yet to be identified strategies, as a way of limiting SOV trips and encouraging the use of multimodal transportation options. Ongoing monitoring and reporting the trip generation, parking demand rates, and mode split surveys will inform what strategies are developed. Given the primary mode of travel, some strategies identified below are anticipated to have greater effect to the transportation demands on-campus than others.

The seven programmatic elements include:

1. Transit
2. Shared-Use Transportation
3. Parking Management
4. Bicycle
5. Pedestrian
6. Marketing and Education
7. Institutional Policies

Transit

The transit component of the TMP identifies strategies to increase utilization of transit by the Campus community. A frequent, reliable and integrated transit network gives passengers the flexibility to travel to campus from locations throughout the region, providing convenient and reliable travel options other than driving alone.

King County Metro, Sound Transit, and Community Transit provide service to campus. There are currently approximately 250 inbound and 250 outbound transit trips to and from the campus on weekdays. Transit service is anticipated to increase in the future through new bus rapid transit (BRT) lines for all three transit agencies. With increases in the future due to the implementation of ST-3, SWIFT service provided by Community Transit and Rapid Ride service provided by King County Metro, frequency and reliability will be increasing in the future. This will have a positive impact on the population pursuing transit.

POTENTIAL TRANSIT IMPROVEMENT STRATEGIES

Transit Strategies	Currently Implemented
Monitor and provide on-going transit subsidies through programs such as the U-PASS.	Yes
Work with partner agencies to enhance transit service between the Campus, other University of Washington locations, and population and work centers.	
Work with partner agencies to improve transit speed and reliability along major bus corridors including Beardslee Boulevard and I-405. For example, UW Bothell or CC could partner on TIB grant requests.	
Work with partner agencies to improve multimodal access to future RapidRide and SWIFT stations.	
Review the location and usage of on-site amenities and consider additional shelters as needed.	Yes

Shared-Use Transportation

Shared-use transportation includes a range of methods for providing flexible travel options through the sharing of transportation resources including cars and bikes. Shared-use mobility options are expanding and emerging including transportation network companies (TNCs) like Lyft and Uber and bike share which may make it easier to not own a vehicle. In addition, autonomous vehicles can greatly enhance safety for all modes.

The Campus, in coordination with the transit agencies, helps facilitate carpools and vanpools to and from campus. For example, a regional ride match service allows students, faculty and staff to receive a list of potential commuters who live nearby, with organization of carpools up to the individual. Carpooling is also encouraged through the U-PASS program by offering discounted parking on campus.

Vanpools are more formalized and are coordinated through the local transit agencies, with vans operated by the participants. Vanpools are also subsidized for commuters who live three or more miles from campus. Vanpool rates vary by size of van and distance traveled and are determined by the transit agency who owns the van. Participants are able to park free of charge in the general stalls of Campus permit lots.

POTENTIAL SHARED-USE TRANSPORTATION STRATEGIES

Shared-use Strategies	Currently Implemented
Develop/enhance partnerships with shared-use transportation companies such as Car2Go and Zipcar, providing discounted memberships to students, faculty and staff.	Yes
Utilize new technologies to increase ease of forming, maintaining and tracking carpools and vanpools	Yes
Partner with transit agencies to focus increased vanpool recruitment efforts in geographic areas currently not well served by transit, as well as retention and support efforts for existing vanpools.	
Support the expansion of mobility options such as transportation network companies, car-share, bike-share, taxis, and other shared-use service providers with priorities for connecting the campus and/or downtown Bothell to transit hubs like the proposed RapidRide or SWIFT stations.	

Parking Management

The Campus manages its parking supply in a variety of ways to reduce SOV travel. Paid parking is an important tool used to reduce demand, manage operations, and fund transportation options. Parking resources are managed holistically on a campus-wide basis. Students, faculty and staff purchase parking permits or pay on a pay-per-use basis, depending on what best meets their needs. Parking is also available for daily users and visitors with payment at pay stations.

POTENTIAL PARKING MANAGEMENT IMPROVEMENT STRATEGIES

Parking Management Strategies	Currently Implemented
Review parking pricing options to discourage the use of SOV's.	Yes
Implement residential parking policies to discourage vehicle ownership.	
Implement more time restricted parking on-city streets within the campus vicinity. This coupled with active enforcement by City of Bothell staff in these areas would minimize parking impacts in the downtown core.	
Implement additional Restricted Parking Zones (RPZ) and Time Restrictions.	

Bicycle

Approximately 8 percent of the survey respondents indicated biking or walking was the primary mode of travel to the campus. While this is not a large percentage of the population, it is an important mode to accommodate and encourage increased rates in the future.

POTENTIAL BICYCLE IMPROVEMENT STRATEGIES

Bicycle Strategies	Currently Implemented
Plan a comprehensive on-campus bicycle network that provides desirable bicycle facilities while reducing conflicts with other modes, enhancing the pedestrian experience throughout campus.	Yes
Conduct additional outreach to identify key barriers to improving the bicycle commuter experience.	
Provide on-campus amenities such as bike racks, bike shelters, and shower facilities.	Yes
Continually assess the adequacy of the bike facility with each future development and increase the bike parking supply along with the student FTE capacity.	
Consider integrating programs (like future bike share and secure bike parking) into a subsidy program and work with partner agencies to expand these mobility options with connections to transit hubs and other campus destinations.	

Pedestrian

Although the walking mode split only constitutes 8 percent of the population surveyed, it is critical to maintaining a strong connection to the downtown core. The importance of these connections increases with the increase in student housing included in the Campus Master Plan.

POTENTIAL PEDESTRIAN IMPROVEMENT STRATEGIES

Pedestrian Strategies	Currently Implemented
Protect and improve upon the pedestrian-oriented campus. Make all transportation choices, policies and improvements supportive of the pedestrian environment and experience.	Yes
Work to enhance the quality and security of campus pathways through maintenance of paths, quality lighting, signage and wayfinding, and other investments.	Yes
Coordinate with the City to identify improvements to the City's pedestrian network such as repairing damaged sidewalks, restriping travel corridors and crosswalks, improving safety at crossings, removing ADA barriers, improving lighting, etc.	
Improve wayfinding to and from Campus and transportation destinations.	
Work with the City and transit agencies to improve sidewalks, transit stops, and other pedestrian amenities near transit services.	
Maintain easy-to-understand and well-signed or mapped ADA accessible routes through construction zones.	Yes

Marketing and Education

Marketing and education is essential for encouraging and supporting travel behavior choices that help the Campus meet its SOV goals. The Campus participates in a number of marketing programs to inform students, staff, and faculty of commuting options.

POTENTIAL MARKETING AND EDUCATION STRATEGIES

Marketing and Education Strategies	Currently Implemented
Focus efforts on new employees, new students, people who are moving residence and people whose transportation options have changed.	
Provide information about biking, walking, carpooling and telecommuting.	Yes
Provide and market personal commute planning services.	
Encourage participation in national multimodal transportation days (i.e., bike to work day, take transit to work day, etc.)	Yes
Improve transit information to off-campus sites where Campus employees work.	Yes
Encourage the use of transit by visitors to campus.	
Encourage multi-modal trip chaining such as train-bus or bus-bike commutes.	

Institutional Policies

The Campus can modify and implement institutional policies that promote different modes of travel and/or reduce vehicle trips on the transportation network. While the other TMP elements provide transportation choices, institutional policies are another means by which these measures can be implemented or supported at all levels of the UW Bothell and CC leadership.

POTENTIAL INSTITUTIONAL POLICY IMPROVEMENT STRATEGIES

Institutional Policy Strategies	Currently Implemented
Communicate policies and promote telecommuting, flex-time, compressed workweeks and other techniques that reduce peak-period travel.	Yes
Manage class schedules to reduce peak-period travel demand.	
Increase the amount of online courses	

Reporting and Monitoring

Annual reports will be prepared by the Campus. The reports will include the following performance metrics:

- **Parking demand and utilization.** The report will include on-campus, on-street, and off-site lots associated with off-campus leased parking. Information will be summarized for each of the areas separately and combined (see Figure B).
- **Traffic volumes.** Hourly traffic counts at the north and south entry points will be conducted. Information will be presented in graphical and tabular form, comparing existing data with historical values (see Figure A).
- **Parking rate.** Parking rates will be calculated based on the observed traffic volumes and on-campus FTE information (Figure B).
- **Mode split.** Mode split information will be collected for faculty, student, and staff members utilizing intercept surveys or online surveys (See Figure C).

The above information will be collected following the first three weeks of the fall semester on an annual basis.

The Campus is committed to working with their agency partners and community members through a Campus Town Community Committee (or subsequent name). This committee would meet a minimum of two times a year or as the need arises. The committee would be comprised of City staff, Campus staff, and community members. As dictated by the topics, King County Metro, Sound Transit, Community Transit and/or WSDOT staff would be invited. The results of the annual surveys would be provided to City staff and members of this committee.

Appendix G: Mitigated Parking Demand

Alternative Peak Parking Demand - Mitigated

	Parking Rate[1]	No Action Alternative - Scenario B - Allowed in PUD		Alternaritve 1		Alternative 2		Alternative 3		Alternaritve 4		Near-Term	
		Size	Total	Size	Total	Size	Total	Size	Total	Size	Total	Size	Total
Commuter	0.31	9,759 student FTE	3,030	8,800 student FTE	2,730	9,400 student FTE	2,910	9,400 student FTE	2,910	8,800 student FTE	2,730	7,997 student FTE	2,480
Apartment Residential	0.43	241 beds	100	600 beds	260	0 beds	-	0 beds	-	600 beds	260	142 beds	60
Traditional Residential	0.20	0 beds	-	600 beds	120	600 beds	120	600 beds	120	600 beds	120	600 beds	120
Subtotal			*3,130*		*3,110*		*3,030*		*3,030*		*3,110*		*2,660*
Proposed Maximum Supply			6,600		3,700		3,700		4,200		4,200		3,074
Surplus Supply			***3,470***		***590***		***670***		***1,170***		***1,090***		***414***

Notes:

1. Based data collected in October 2016 and assumes parking rate would be 0.20 for traditional housing.