November 2010

EAST GATEWAY URBAN VILLAGE

Preliminary Engineering Design Study

PREPARED FOR

CITY OF Mill Creek

PREPARED BY

Reid Middleton

728 134th Street SW, Suite 200 | Everett, WA | 98204-5322
Ph. (425) 741-3800 | Fax (425) 741-3900 | www.reidmiddleton.com

File No. 212009.012

EXECUTIVE SUMMARY

The City of Mill Creek commissioned this Preliminary Engineering Design Study of infrastructure necessary to implement the master plan for the Mill Creek East Gateway Urban Village (EGUV). The study is intended to provide guidance for those proposing land use actions within the boundary of the EGUV as a way of:

- providing greater predictability for design and approval of proposed land uses,
- advising land use applicants of current conditions at the site of the EGUV,
- ensuring continuity and compatibility in efforts to construct necessary infrastructure, and
- fostering land use applicant cooperation in the City's efforts to create a vibrant mixed-use community.

Infrastructure elements investigated in this study include interior vehicular circulation, traffic impacts, access control, storm water management, sanitary sewer service, water service, communications, natural gas, and electrical power.

The construction of the public infrastructure may be a requirement of the applicant in accordance with the developer agreement, completed by the City or an outside third party entity, or some combination. All applicants for land use applications within the EGUV are strongly encouraged to confer with the City or service purveyors prior to preparation of land use plans.

The study is divided into three sections. Summary Infrastructure Design Guidelines is a synopsis of design guidelines for each of the infrastructure elements considered in the study. Each guideline is linked to the Spine Road alignment and utility reports section of this report or to traffic reports in the appendices, all of which provide additional explanatory detail. The appendices also contain additional technical documentation generated in preparation of the stormwater management section of the utility reports.

City of Mill Creek
East Gateway Urban Village

Preliminary Engineering Design Study

November 2010

The engineering material and data contained in this report were prepared under the supervision and direction of the undersigned, whose seal as a registered professional engineer is affixed below.

Hugh Kuyper, P.E., P.L.S.
Project Principal

ReidMiddleton
728 134th Street SW, Suite 200
Everett, WA 98204
425/741-3800 (Fax 425/741-3900)
File No. 212009.012

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INTRODUCTION

This preliminary engineering design study examines public improvements to be constructed pursuant to the East Gateway Urban Village Master Plan prepared by Tiscareno Associates in 2007. The East Gateway Urban Village (EGUV) is located in the northeast corner of the City of Mill Creek, south of 132nd Street SE (SR 96), east of 35th Avenue Southeast, and west of Seattle Hill Road (Figure 1 vicinity map)

The study encompasses four primary topics:

1. Access coordination
2. Spine road alignment
3. Regional stormwater facilities
4. Utility coordination

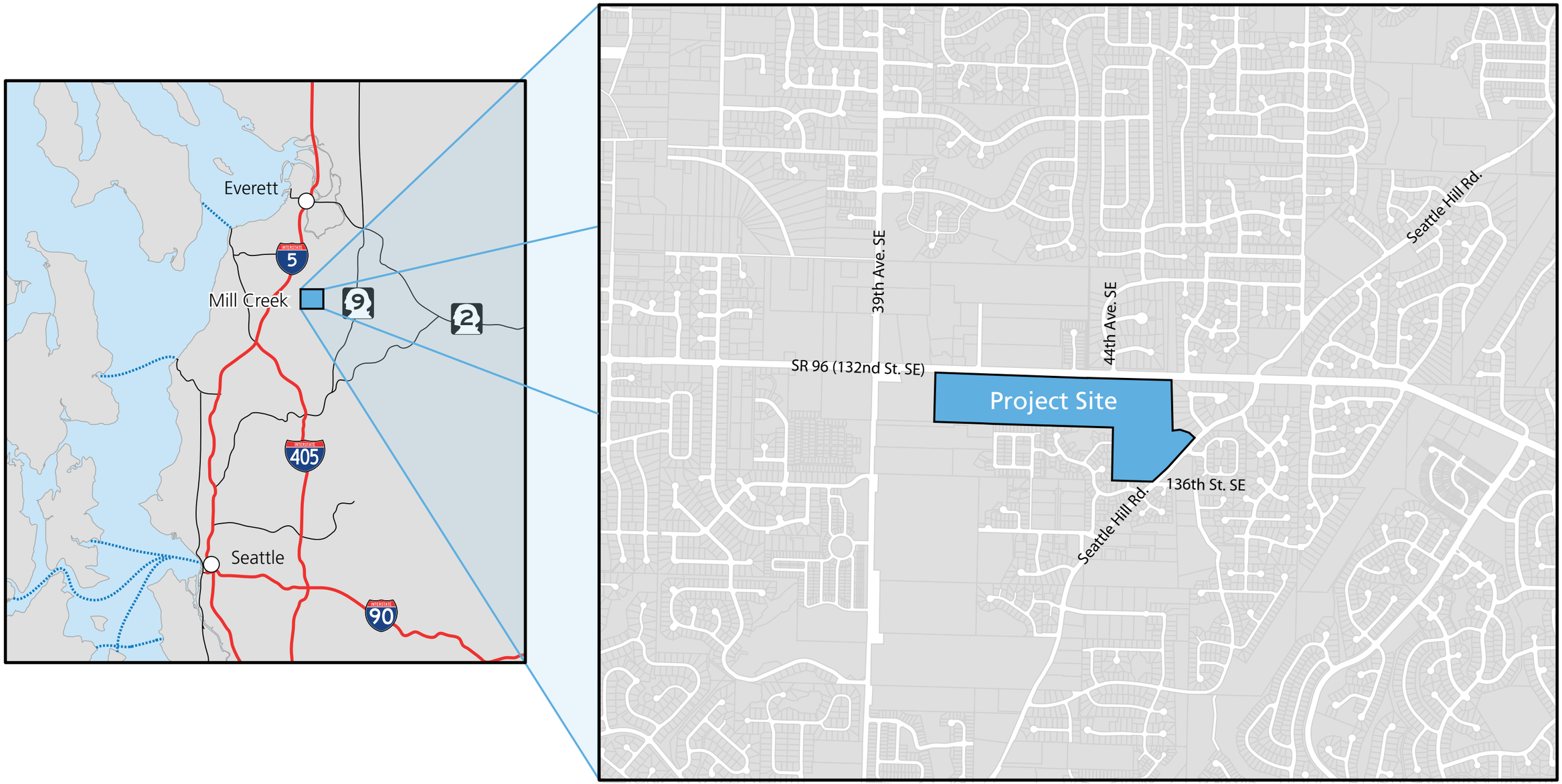
The East Gateway Master Plan Preliminary Engineering Design Study defines the spine road corridor alignment, determines access points to the surrounding road network, determines the appropriate sizing and approximate location of regional stormwater facilities, and provides information from local utility providers to provide guidance for future development of individual parcels. Additionally, the report provides guidance to land use applicants in the preparation of traffic impact analyses for future development within the East Gateway Urban Village.

The study is organized into three sections: Summary Infrastructure Design Guidelines, Spine Road Alignment and Utility Reports, and Appendices. The Summary Infrastructure Design Guidelines section is intended to provide a synopsis of infrastructure design requirements and recommendations for use by land use applicants within the boundaries of the EGUV. The summary guidelines are linked to technical documentation in either the Spine Road alignment and utilities section or to technical documentation in the Appendices that will provide additional information regarding each infrastructure element.

The report documentation frequently refers to current property owner names as a means of identifying discreet parcels of property. The property ownership map (Figure 2) provides the name of property owners at the date of this writing and provides Snohomish County Assessor tax parcel numbers for each parcel.

Reid Middleton's project team worked with City staff, other affected agencies, and land owners to compile basic information on the provision of adequate infrastructure that allows the City and property owners to move forward with a greater degree of predictability. Our approach to the project ensures that a solid foundation is laid for more detailed engineering tasks as individual property owners contribute their own efforts to making East Gateway Urban Village a vibrant and successful addition to the list of neighborhoods in the City of Mill Creek.

Note that all applicants for land use applications within the EGUV are encouraged to confer with the City or service purveyors prior to preparation of land use plans.



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EAST GATEWAY URBAN VILLAGE MASTER PLAN
City of Mill Creek

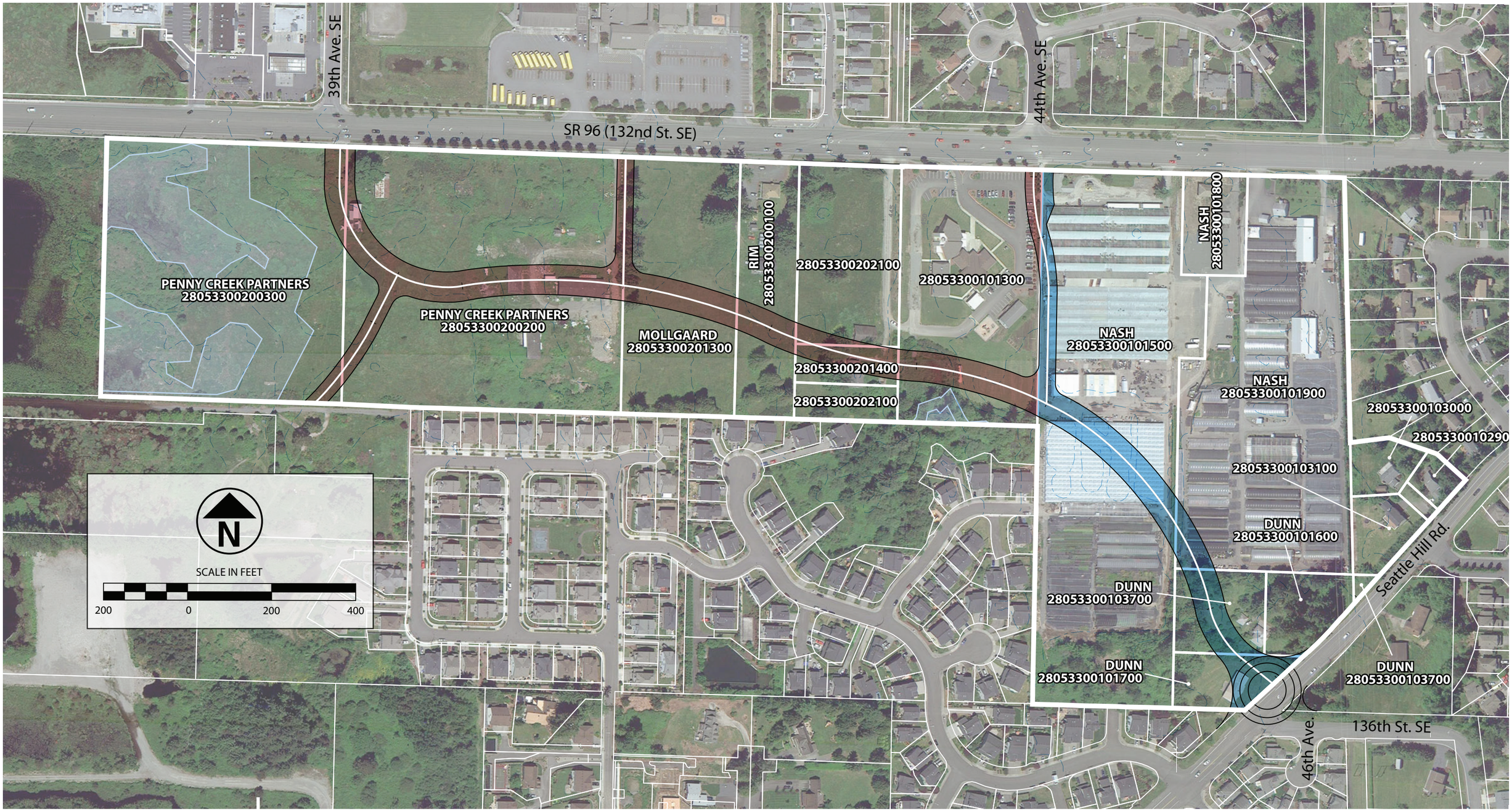
MILL CREEK EAST GATEWAY

Vicinity Map

PROJECT BACKGROUND

In 2007, Tiscareno Associates designed a master plan for a new sustainable neighborhood for the City of Mill Creek. Tiscareno Associates worked with City Planning staff and residents from the surrounding neighborhoods to create a master plan that incorporates the community's preferences and concerns and preserves the land owners' needs and goals. The East Gateway Urban Village (EGUV) master plan, adopted by the City of Mill Creek in 2008, includes 889,700 square feet of residential, office, and retail spaces and amenities, including a church, grocery store, walking trails, and passive park spaces.

FIGURE 2



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City of Mill Creek

MILL CREEK EAST GATEWAY

Property Owners

SUMMARY INFRASTRUCTURE DESIGN GUIDELINES

Interior Circulation

A "Spine Road" will traverse the entire length of the EGUV site to provide internal circulation and connectivity between development parcels (Figure 3). The Spine Road will cross the south end of the Advent Lutheran Church parcel, eliminating the existing stormwater detention pond. The design capacity of the detention pond will be accounted for in construction of the proposed regional stormwater detention facility.

Additional connector streets are proposed to provide access to SR 96 and allow eventual connection to 35th Avenue SE (Figure 3). The lane geometry at the SR 96 / 44th Avenue SE intersection will require that the 44th Avenue SE connector cross over the northeast corner of the Advent Lutheran Church property.

Spine Road intersection spacing and driveway widths should be designed in accordance with this study (page 22 of Appendix B).

Traffic Impact Analysis

Traffic analyses conducted in support of land use applications within the EGUV should use the Trip Generation guidance provided in this study, including suggested modifications for consideration of pass-by trips and internal trip capture (page A1 of Appendix A).

Traffic analyses conducted in support of land use applications within the EGUV should use the Trip Distribution guidance provided in this study (page A2 of Appendix A).

Traffic mitigation fees or improvements shall be coordinated with the appropriate agencies in accordance with the developer agreement.

Access Control

Three permanent final access points onto SR 96 are proposed as part of the EGUV. The most westerly access point is the westerly terminus of the Spine Road at the 39th Avenue SE traffic signal. A second access point occurs at 44th Avenue SE, and will require construction of a new traffic signal. A third stop-controlled access point is centered on the east property line of the Penny Creek Partners parcel (Assessor Account No. 28053300200200), and will be restricted to right in / right out traffic movements only.

Lane geometry for EGUV roadway intersections with SR 96 and for a proposed roundabout at Seattle Hill Road should be designed in accordance with this study (page 14 of Appendix B).

Interconnection of traffic signals on SR 96 shall occur in conjunction with construction of SR 96 access points as set forth in this study (page 24 of Appendix B).

A proposed roundabout at Seattle Hill Road should be designed and constructed in accordance with this study (page 15 of Appendix B).

Stormwater Management

The City intends to implement a regional stormwater detention strategy for management of stormwater flows generated by the EGUV. The City will place limits on allowable total volume of stormwater discharged from each parcel as a means of ensuring that the design capacity of regional stormwater management facilities remains adequate. Applicants for land use actions within the EGUV should confer with the City of Mill Creek prior to preparation of land use plans to discuss integration of applicant obligations to manage stormwater with City efforts to implement a regional solution (see Hydraulic Analysis on page 10).

Water Service

Water is provided to the EGUV by the Silver Lake Water and Sewer District (SLWSD). Applicants for land use actions within the EGUV should confer with the SLWSD prior to preparation of land use plans to coordinate routing of water mains to optimize SLWSD service to the project area (see Water System on page 10).

Sanitary Sewer Service

Sanitary sewer service is provided to the EGUV by the Silver Lake Water and Sewer District (SLWSD). Applicants for land use actions within the EGUV should confer with the SLWSD prior to preparation of land use plans. Consulting with SLWSD providers is necessary to coordinate routing of sanitary sewer mains to potential points of connection to the SLWSD system, as depicted in this study (see Sanitary Sewer System on page 21).

Communications

Communications services are provided to the EGUV by both Frontier and Comcast. Applicants for land use actions within the EGUV should confer with these purveyors prior to preparation of land use plans. Consulting with communications providers is necessary to coordinate routing of underground conduit and placement of other communications facilities required to provide communications service to the project area (see Communications on page 24).

Electrical Power

Electrical power is provided to the EGUV by Snohomish County Public Utility District Number One (PUD). Applicants for land use actions within the EGUV should confer with PUD prior to preparation of land use plans. Consulting with PUD is necessary to coordinate routing of power lines and placement of support facilities required to provide electrical power to the project area. Puget Sound Energy (PSE) owns and maintains electrical transmission lines along the east boundary of the EGUV. Olympic Pipeline owns and maintains a natural gas pipeline adjacent to and west of the PSE transmission line corridor. Both purveyors should be consulted prior to preparation of land use plans adjacent to the transmission line and pipeline corridors (see Electricity on page 25).

Natural Gas

Natural gas is provided to the EGUV by PSE. Applicants for land use actions within the EGUV should confer with PSE prior to preparation of land use plans. Consulting with PSE is necessary to coordinate routing of gas mains and placement of other support facilities required to provide natural gas service to the project area (see Natural Gas on page 27).

SPINE ROAD ALIGNMENT AND UTILITIES REPORTS

East Gateway Urban Village Spine Road Alignment

The adopted Master Plan for the East Gateway Urban Village (EGUV) provides for a centrally-located road running through the entire site to serve all properties. That road will be referred to as the Spine Road (see Figure 3) in the remainder of this document.

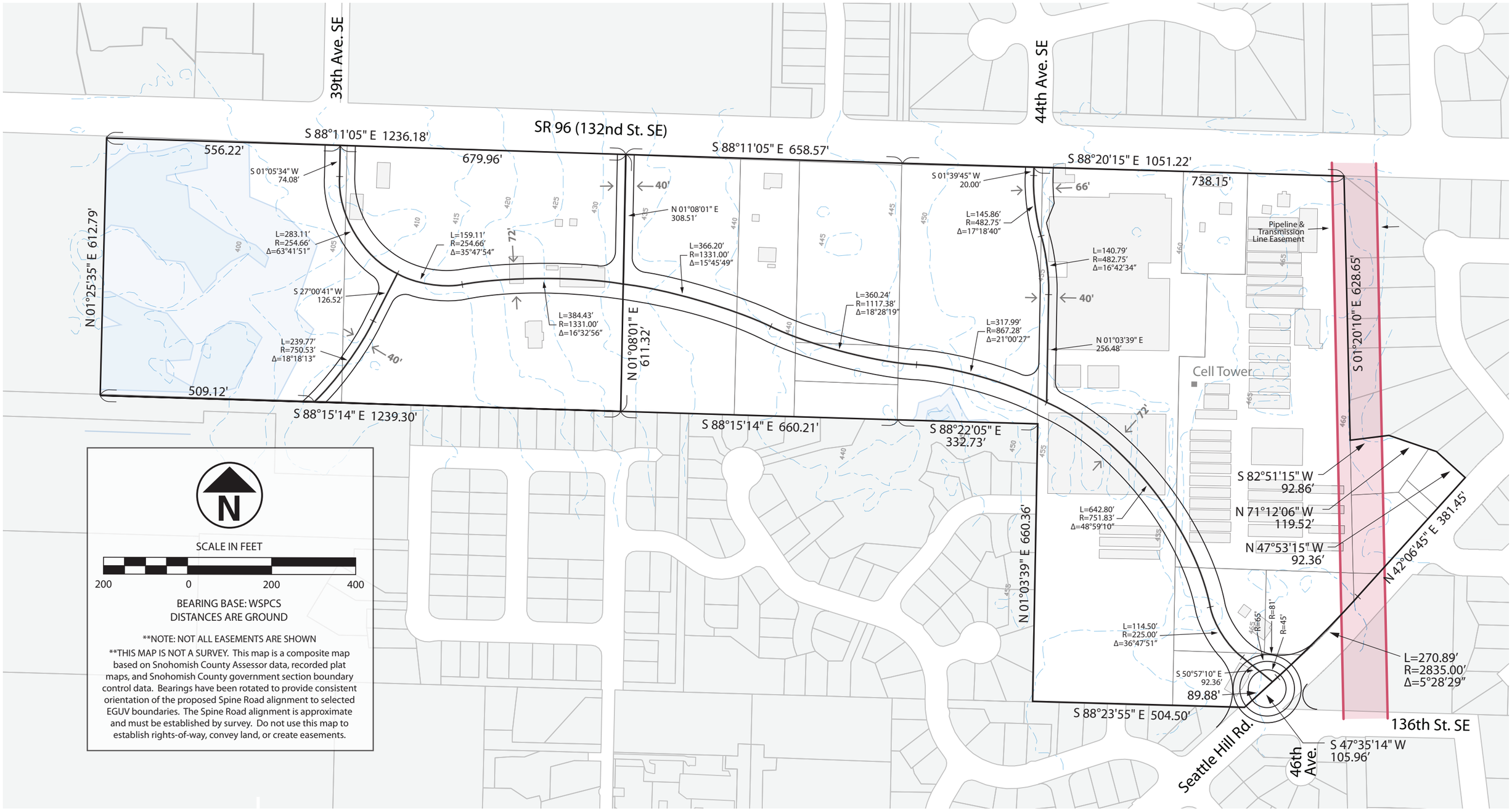
The Spine Road terminates at the west end of the EGUV at the intersection of 132nd Street SE (SR 96) with 39th Avenue SE. A new signal was activated at this intersection in September 2010. The channelization plan for the new signal anticipated the lane configuration proposed for the Spine Road at the intersection (page 14 of Appendix B). The configuration for the south leg of the intersection includes one inbound lane, one dedicated outbound left turn lane, one outbound shared left-turn/through lane, and an outbound right turn lane.

The easterly terminus of the Spine Road is located at the intersection of Seattle Hill Road with 136th Street SE, where a traffic roundabout is proposed to serve as a major entry focal point for the village (page 15 of Appendix B). This location was chosen because it is the best balance of a number of factors, including ties with the adjacent street network, best sight distance option, and amount of additional right-of-way required to implement construction.

The proposed Spine Road alignment is "fixed" at both termini, as described above, with the central portion of the alignment being fixed by mutual agreement with two property owners. The Advent Lutheran Church (Assessor Account No. 28053300101300) proposes locating the south right-of-way line of the Spine Road 100 feet north of their southwest property corner, as measured along the west property line. The line will then curve southeasterly to a location 20 feet north of their southeast property corner, as measured along their east property line.

The Spine Road right-of-way is shown as 72-feet wide along its entire length. This width is designed to accommodate two 14-foot-wide lanes (to be shared with bike traffic), curb, and gutter, 8-foot-wide parallel parking on both sides, and a 10-foot-wide sidewalk. Note, however, that the Spine Road cross section can and is expected to vary along its entire length to be compatible with and conveniently serve adjacent land uses, in accordance with the adopted EGUV design guidelines.

FIGURE 3



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City of Mill Creek

MILL CREEK EAST GATEWAY

Spine Road & Connectors Alignments

The Spine Road alignment through the 132nd Street LLC property (Assessor Account No. 28053300202100) is fixed by virtue of a proposed development plan submitted to the City for land use entitlements. The plan depicts a proposed alignment for the Spine Road that is compatible with the land owner's development plans for other portions of their property.

Alignment of the Spine Road to the east and west of the above two properties is somewhat flexible, but subject to City approval as a means of maintaining the design integrity of the urban village concept. All applicants for land use actions within the EGUV boundary should contact the City of Mill Creek in advance of plan development to discuss EGUV design guidelines and how the guidelines apply to their action.

Two road stubs between the Spine Road and SR 96 are proposed to enhance access within the village. The westerly stub is centered on the east property line of the Penny Creek Partners property (Assessor Account No. 28053300200200) and is proposed as a 40-foot right-of-way to accommodate two 12-foot lanes, curbs on both sides, and a 7-foot-wide sidewalk on the west side of the roadway.

The easterly road stub lies east of and adjacent to the Advent Lutheran Church property. The east line of the church property is coincident with the west right-of-way line of the roadway, except where it swings westerly onto the church property at the north end to align with the existing roadway at 44th Avenue SE on the north side of SR 96. The road is proposed as a 40-foot right-of-way to accommodate two 12-foot lanes, curbs on both sides, and a 7-foot-wide sidewalk on the east side of the roadway. The right-of-way widens to 66 feet at the intersection with SR 96 to accommodate required channelization (page 14 of Appendix B), which consists of one inbound lane, one outbound dedicated left turn lane, one outbound shared left-turn/through lane, and an outbound right turn lane.

A third road stub is proposed at the west end of the project and extends from a point along the south right-of-way line of the Spine Road roughly 200-feet south of the of the Spine Road/SR 96 intersection. From this point, the road generally travels in a southwest direction as a portion of a future connector to 35th Avenue SE. The referenced 200-foot dimension is critical to allow enough room for vehicle stacking at the Spine Road/SR 96 intersection and prevent blockage of northbound left turn traffic onto the Spine Road from the road stub (page 14 of Appendix B). The road is proposed as a 40-foot right-of-way to accommodate two 12-foot lanes, curbs on both sides, and a 7-foot-wide sidewalk on the east side of the roadway.

Mill Creek East Gateway Urban Village Master Plan Hydraulic Analysis

The EGUV is located in the Penny Creek drainage basin. Located generally at the top of a ridge, the site does not receive drainage from the surrounding properties. SR 96 intercepts drainage from the north; Seattle Hill road intercepts drainage at the southeast corner. The plat of Irish Woodlands, a developed residential property along the east,

drains easterly away from the site. The plats of Bluegrass Meadows and Westfield, developed residential properties to the south, drain westerly in the developed storm drainage system for the plats. The EGUV parcel is divided into two drainage subbasins. Basin A to the west contains about 31.2 acres and drains to a wetland at the west end of the site. Basin B to the east contains about 22.27 acres and generally drains towards the Plat of Bluegrass Meadows. Currently drainage flows in sheets and ill-defined swales through the existing vegetation.

This design study of the storm drainage system is focused on locating regional stormwater detention facilities for the EGUV, determining preliminary sizes for the systems, identifying a general routing for stormwater conveyance from the various parcels to the detention systems to demonstrate feasibility, and identifying space requirements for the detention system. Identifying specific drainage routing from the detention systems to the points of discharge is not included in the study and will be addressed under subsequent studies as more specific development concepts evolve.

Water quality treatment is anticipated to be addressed on individual sites. Application of Low Impact Development (LID) is anticipated to be addressed on individual sites and may be used to control storm drainage from the site, satisfy current or future regulations, or both.

Discussions with city staff established an agreement that detention ponds would occupy too much land relative to underground detention vaults, making detention vaults the preferred detention system.

The detention system sizes for the two basins is calculated using the Western Washington Hydraulic Model Version 3 (WWHM3) computer program in accordance with Washington State Department of Ecology (DOE) Stormwater Management Manual for Western Washington, 2005 edition, both of which are adopted by the City of Mill Creek Municipal Code. A summary of parcel areas and of the input parameters used in the model are presented in Tables 1 through 3. Assumptions and idealizations used in the WWHM3 include:

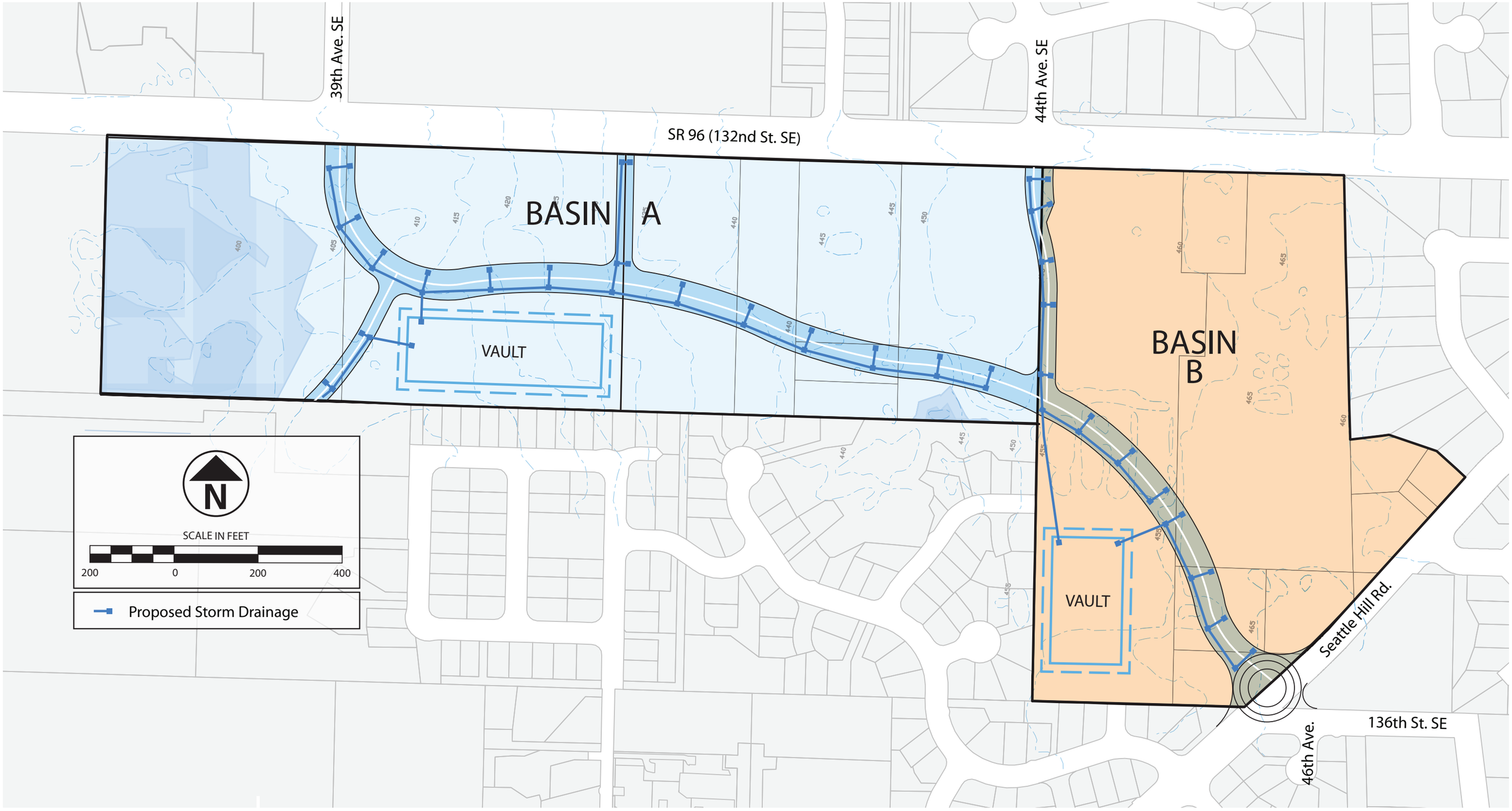
Pre-developed Conditions

1. The soil type is Alderwood gravelly sandy loam, as indicated on the soil survey maps by the U.S. Soil Conservation Service (SCS). This equates to model input parameter Type C.
2. The ground cover complex (the ground surface covering such as lawn, landscaping, pavement, roof, etc.) is forest, as required by code.

3. The slope of the site is determined from contours shown on Figure 4. For the model input parameter, these slopes equate to a "moderate" slope for Basin A and a "flat" slope for Basin B.

Developed Condition

1. The developed condition cover complex is established for the anticipated fully developed condition. Particulars for the various parcels are detailed below.
2. The 132nd Street LLC parcel developed condition cover complex is assumed to be lawn. This idealization in the computer model is required to allow the model to simulate the proper stormwater discharge for this parcel. This parcel is providing an on-site stormwater detention system (currently in design), and the result is the stormwater discharge from this parcel will generally simulate an undeveloped condition. The use of "lawn" as the developed condition is a conservative selection for cover complex.
3. The Advent Lutheran Church developed condition cover complex is assumed to be "lawn" even though it is currently developed with a building, parking, and landscape. This idealization in the computer model is required to allow the model to simulate the proper stormwater discharge for this parcel. The Advent parcel currently has a stormwater detention system that will be demolished with the development of the spine road. The city's intent is to replace the detention volume at this parcel with an equivalent volume (per earlier, less stringent code requirements) in the regional pond. Modeling the parcel in the developed condition as "lawn" provides a reasonable conservative approximation of the release rates provided by the original detention system. The modeling calculations will then calculate and include a replacement volume for the existing detention system that will be demolished.



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MILL CREEK EAST GATEWAY
Stormwater Management

4. The SE 96 Right-of-Way Buffer (35-feet wide) is assumed to remain as open space and forest.
5. The code required 20-foot perimeter buffer is assumed to be open space and modeled with a cover complex of "forest."
6. PSE/Olympic Easements are considered as open space, devoid of trees and modeled with a cover complex of "Lawn."
7. The wetlands are classified as open space and are modeled with a cover complex of "Pasture," in that no significant open water segments were identified from our field observation of the site.
8. The area set aside for park land is modeled with a cover complex of "Lawn" to accommodate limited open space and recreation areas.
9. The proposed rights-of-way are modeled as impervious.
10. The net developable area of each lot is determined by subtracting mandated pervious areas, as included in Table 1 from the gross area for each parcel. Ten percent of the net developable lot area is assumed to be landscaping and the remainder as impervious surface (buildings and pavements). The ten percent landscaping is accounted for in the cover complex for the private property parcels that will be developed.
11. There is no design contingency for the detention volume. The volume constructed will be apportioned to the parcels and additional flow control, if needed, must be accommodated on each parcel by LID measures. It is anticipated that additional stormwater detention on parcels will be discouraged.
12. The active storage depth in the detention vaults is set at 4 feet based on site topography and elevations of possible outfalls.

An inventory of surface types in the project was prepared based on City of Mill Creek EGUV Design Guidelines, Comprehensive Plan requirements, zoning requirements, and anticipated patterns of development within the project. The Pervious/Impervious Surface Areas Inventory is presented in Table 1.

Table 1. Pervious/Impervious Surfaces Inventory.

Site Element	Basin A (square feet)	Basin B (square feet)
Gross Area	1,357,484	969,963
North Half Attorney Parcel	-73,400	
SR 96 35' Buffer	-54,250	-23,800
Perimeter 20' Buffer	-29,300	-23,300
PSE/Olympic Easement		-30,600
Developed Advent Church	-144,400	
Wetland Including Buffer[1] -	267,700	-5,800
75% of 2-Acre Park		-65,340
Net Developable Including Roads	788,434	821,123
Roadway Surface	-163,600	-120,000
Net Developable Area	624,834	701,123
10% of Net Developable as Landscaping	**62,483**	**70,112**

Table 2. Calculation of Impervious Surface to Be Detained in Regional Facilities.

Gross Area	1,357,484	969,963
North Half 132nd Street LLC Parcel	-73,400	
SR 96 35' Buffer	-54,250	-23800
Perimeter 20' Buffer	-29,300	-23,300
PSE/Olympic Easement		-30,600
Developed Advent Church	-144,400	
Wetland Including Buffer[1] -	267,700	-5,800
10% of Net Developable	-62,834	-70,112
75% of 2-Acre Park		-65,340
Total Assumed Impervious	725,600	751,011

[1] Includes buffers from Sortino and Advent Lutheran Church Parcels.

Table 3. Calculation of Impervious Areas for Parcel Developable Area.

Net Developable Area	624834	701,123
10% of Net Developable as Landscaping	-62,483	-70,112
Total Assumed Impervious Area for Parcels	562,351	631,011

Tables 4 and 5 below show the correlation between the Pervious/Impervious Surface Areas Inventory and parameters used as input in the hydraulic analysis.

Table 4. Basin A Developed Condition WWHM3 Input Parameters.

Pervious	Area		Slope SCS	Soil Type	Vegetation Category
Sq.	Ft.	Acres			
SR 96 35 ft Buffer	54,250	1.25	Moderate	C	Forest
Perimeter 20 ft Buffer	29,300 0	.67	Moderate	C	Forest
North Half 132nd Street LLC Parcel	73,400 1	.68	Moderate	C	Lawn
Developed Advent Church	144,400 3.	31	Moderate	C	Lawn
Wetland incl. buffer	267,700	6.15	Moderate	C	Pasture
Landscape in Parcels	62,483	1.43	Moderate	C	Lawn
Total Pervious		**14.49**			
Impervious					
Roadways 16	3,600	3.76	Moderate		Roads
Developable Land (Total Area 562,350 sq ft = 12.91 acres)					
60 % Parking*		7.75	Moderate		Parking
40 % Building*		5.16	Flat		Roof
Total Impervious		**16.67**			
Total Basin Area		**31.16**			

* The WWHM model requires input for parking and buildings as separate parameters. The proportioning accounts for parking areas separately so they may be further analyzed for water quality treatment in a separate, optional program module. The calculations for detention are not affected by the apportionment because both areas are impervious. A reasonable apportioning is assumed for this modeling.

Table 5. Basin B Developed Condition WWHM3 Input Parameters.

Pervious	Area (Sq. Ft.)	Area (Acres)			Condition
SR 96 35' Buffer	23,800	0.55	Flat	C	Forest
Perimeter 20' Buffer	23,300 0	.53	Flat	C	Forest
Park Land	65,340	1.50	Flat	C	Lawn
PSE/Olympic Easement	30,600 0	.70	Flat	C	Lawn
Wetland Incl. Buffer	5,800 0.	13	Flat	C	Pasture
Landscape in Parcels	70,112 1	.62	Flat	C	Pasture
Total Pervious		**5.03**			
Impervious	Area (Sq. Ft.)	Area (Acres)			Condition
Roadways 12	0,000	2.75	Flat		Roads
Developable Land (Total Area 631,011 sq ft = 14.49 acres)					
40 % Parking*		5.80	Flat		Parking
60 % Building*		8.69	Flat		Roof
Total Impervious		**17.24**			
Total Basin Area		**22.27**			

* The WWHM model requires input for parking and buildings as separate parameters. The proportioning accounts for parking areas separately so they may be further analyzed for water quality treatment in a separate, optional program module. The calculations for detention are not affected by the apportionment because both areas are impervious. A reasonable apportioning is assumed for this modeling.

WHHM 3 Modeling Results

Detention volumes for Basins A and B are calculated based on the parameters and assumptions listed. The vault dimensions can be adjusted to fit site conditions with a ratio of 3 to 1 or larger preferred. An equivalent "length of flow path" ratio can be achieved with a divider wall in the vault if necessary. The land area required for the detention system should include additional area around the vault to satisfy city design requirements, such as setbacks from property lines, and preferably to allow excavation

with sloped sidewalls to minimize or eliminate the need for shoring the excavation. Table 7 presents the volumes, a possible vault length and width, and additional area around the perimeter of the vault. A depiction of possible vault locations and configurations is shown on Figure 4. See Appendix C for calculation details.

Table 6. Detention Vault Sizing Summary.

Basin	Volume		Depth	Vault	Estimated	System	System Area
Acre	Feet	Cubic Feet	Active Storage	Length x Width - ft (Rounded)	Excavation Perimeter -ft	Length x Width - ft	Square Feet
A 8	.39	365,468	4	156x470	15	186x500	93,000
B 1	0.22	445,183	4	520x175	15	550x205	112,750

Apportioning Detention Volume to Parcels

The City of Mill Creek, at the time of this writing, is exploring funding options to build a portion of the infrastructure for the EGUV, including regional stormwater management. As a way to ensure that the size of regional detention facilities described above remain adequate as individual parcel development proceeds, the City will limit the volume of stormwater generated from each parcel. Table 7 below begins with parcel sizes as recorded by the Snohomish County Assessor and subtracts the same types of mandated pervious areas listed in Table 1 to determine a maximum impervious surface coverage anticipated for each parcel. That parcel's total impervious area, as compared to total impervious area tributary to the regional stormwater detention system, is then calculated as a percentage. The parcel's percentage of the total impervious area is multiplied by the total design volume of the regional system to determine the allowable stormwater volume from the subject parcel.

Table 7. Apportioned Parcel Stormwater Detention Volumes.

Owner Parcel	Number	Total Ownership* (AC)	Right of Way (AC)	SR96 Buffer (AC)	PSE/ Olympic (AC)	Peripheral Buffer (AC)	Wetlands** (AC)	10% for landscaping (AC)	Potential Impervious (AC)	Percent of Total Impervious	Apportioned Discharge Volume[1]
Penny Creek Partners LLC	28053300200300, 28053300200200	17.34	1.87	0.98	0.00	0.38	6.15	0.80	7.17	41.69%	161,636
Bob Mollgaard	28053300201300	3.96	0.66	0.23	0.00	0.13	0.00	0.29	2.65	15.40%	59,699
Bruce S & Ye S Rim	28053300200100	1.97	0.25	0.11	0.00	0.07	0.00	0.15	1.39	8.07%	31,275
132nd Street Development LLC (south half)	28053300202100, 28053300201400	1.7	0.42	0.00	0.00	0.05	0.00	0.12	1.11	6.46%	25,048
Advent Lutheran Church, ("grandfathered" for detention)	28053300101300										
James Nash	28053300101500, 28053300101800, 28053300101900 18	.8	1.31	0.58	0.65	0.45	0.00	1.58	14.23	82.70%	302,615
Edward & Catherine Dunn	28053300101600, 28053300103700, 28053300101700 2	.73	0.70	0.00	0.06	0.18	0.00	0.18	1.61	9.38%	34,330
Jorge Martinez-Lemus & Maria Martinez	00695500003100	0.56	0.00	0.00	0.00	0.08	0.00	0.05	0.43	2.49%	9,108
Calvin & Elizabeth Carlson	00695500003000	0.45	0.00	0.00	0.00	0.09	0.00	0.04	0.33	1.91%	6,982
James Melton	00695500002900	0.23	0.00	0.00	0.00	0.09	0.00	0.01	0.13	0.75%	2,750

[1] In Cubic Feet

* Total Ownership Source: Snohomish County Assessor's website

** Penny Creek Partners Wetland includes 100' buffer, Advent Lutheran Church Wetland includes 25' buffer

Water System

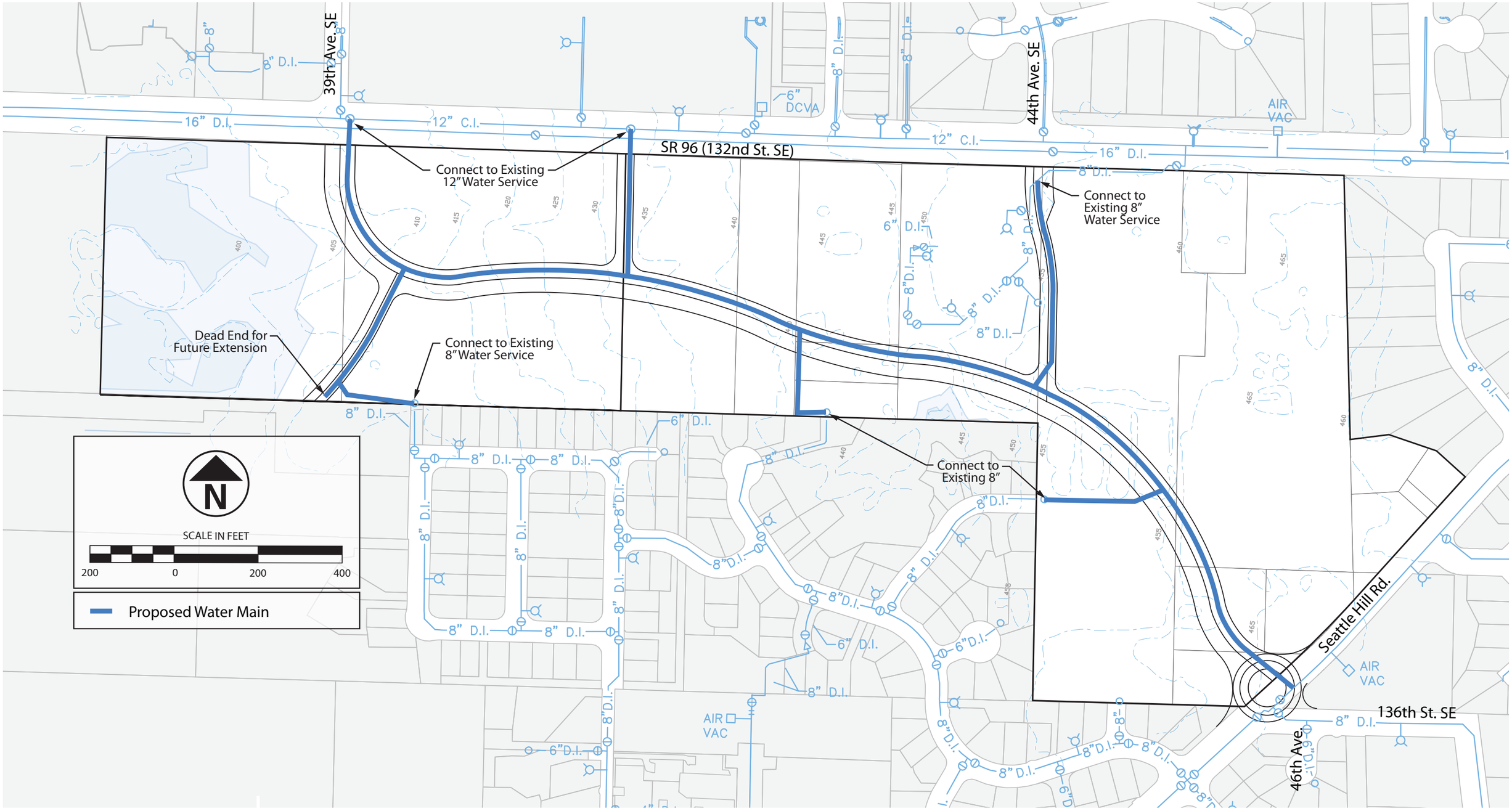
The Silver Lake Water and Sewer District (SLWSD) also provides water to the EGUV site. Figure 5 depicts water mains in the vicinity of the site and a proposed spine road route for a new water main to serve the site. SLWSD will require looping of the existing system for redundant service to users. The SWSD Capital Facilities Plan identifies a future water main extending from the EGUV site southwesterly, along a future road corridor connection to 35th Avenue. The water main extension in that vicinity is shown on Figure 5.

All applicants for land use actions within the EGUV boundary should contact SLWSD in advance of plan development to learn of potential updates to the above information and coordinate requirements for extension of water service to their property. The contact for SLSWD is Rick Gilmore at (425) 337-3647.

Sanitary Sewer

The SLWSD provides sanitary sewer service to the Mill Creek East Gateway Urban Village. The District reports that existing downstream sewage facilities either have capacity or are scheduled for improvements that will provide the necessary capacity for the EGUV. Figure 6 depicts the existing sanitary sewer system in the vicinity of the EGUV. As shown on the figure, there are nine points of potential connection to the sanitary sewer system; five along SR 96, with the remaining four scattered along the east and south boundaries of the EGUV site. Table 8 is keyed to the potential connection points shown on Figure 6 and provides manhole surface and pipe invert elevations at the manhole for each potential point of connection, based on record drawings for the system. All elevations are NAVD 88 datum, as are the contours shown. Note that while the pipe inverts and contours provide a context for determining the service radius of each potential point of connection, they are approximate and must be field verified prior to detailed engineering.

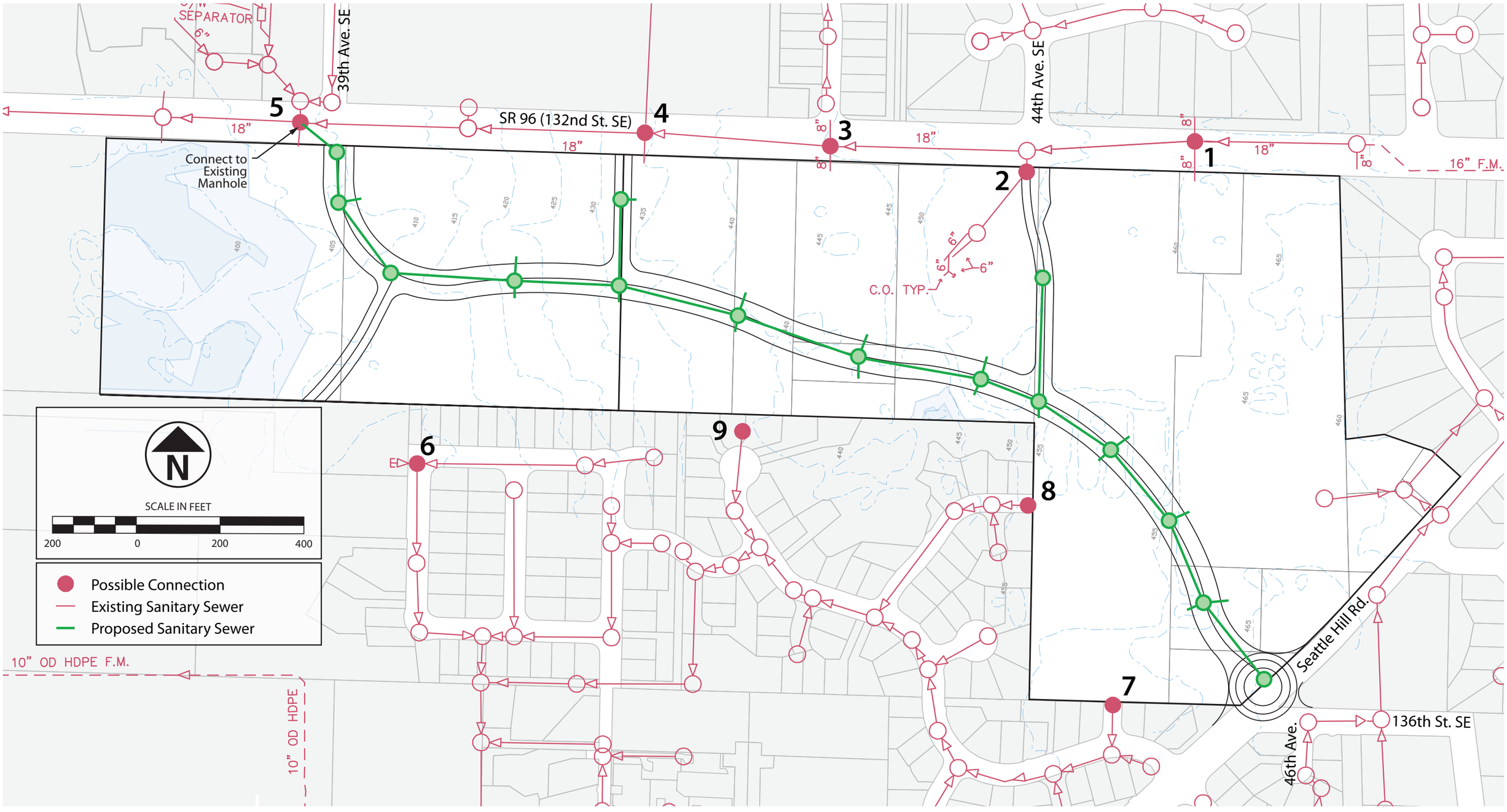
FIGURE 5



ReidMiddleton

EAST GATEWAY URBAN VILLAGE MASTER PLAN
City of Mill Creek

MILL CREEK EAST GATEWAY
Water System



ReidMiddleton

EAST GATEWAY URBAN VILLAGE MASTER PLAN
City of Mill Creek

MILL CREEK EAST GATEWAY

Sanitary Sewer

Table 8. Sewer System Pipe Data (from record drawings).

Manhole No.	MH Rim	Invert	Pipe Size	Datum	Note
1	n/a	447.15	8" PVC NG	VD 88	Side Sewer
2	447.00	441.11	8" PVC NG	VD 88	
3	n/a	434.66	8" PVC NG	VD 88	Side Sewer
4	n/a	424.46	8" PVC NG	VD 88	Side Sewer
5	n/a	405.76	8" PVC NG	VD 88	Side Sewer
6	409.95	404.47	8" PVC	NGVD 88	No SS North
7 45	6.35	448.23	8" PVC	NGVD 88 *	
8 45	0.64	441.92	8" PVC	NGVD 88 *	
9 43	7.53	429.36	8" PVC	NGVD 88 *	

* Converted number from NGVD 29 datum adding 3.66 ft to record elevation.

Figure 6 also shows a proposed route for a sewer main within the spine road right-of-way to serve the EGUV. The depth of the proposed main, with the placement of future structures requiring sewer service, will dictate whether service connections are extended to the spine road main or to one of the other potential points of connection identified.

All applicants for land use actions within the EGUV boundary should contact SLWSD in advance of plan development to learn of potential updates to the above information and coordinate requirements for extension of sanitary sewer service to their property.

Communications

Both Comcast and Frontier Communications have utilities available in the area to serve the EGUV. The typical Comcast and Frontier Communications installation involves joint use of a single trench with Snohomish County PUD. Frontier will likely need two 4-inch-diameter conduits to serve the project. Depending on the street cross-section, this joint trench usually lies within a 10-foot-wide easement directly adjoining the road right-of-way. At this time, Comcast sees no need for special facilities within the EGUV other than the provision of the referenced trench easement in which to install their conduit and cable. Frontier Communications notes that two or three "hubs" may be needed to serve the EGUV, but take up very little space (approximately 25 square feet). Frontier notes that it would be beneficial to locate hubs where maintenance vehicles can park to service the hubs without impeding traffic. The west side of the Spine Road just south of SR 96 is one suggested location.

All applicants for land use actions within the EGUV boundary should contact Comcast and Frontier Communications in advance of plan development to learn of potential updates to the above information and coordinate requirements for extension of communications service to their property. The contact for coordination of Comcast services is Art Nettles at (425) 263-5364. The point of contract for coordination of Frontier Communications services is Daniel D. Nguyen at (425) 263-4035.

Electricity

Electricity for Mill Creek EGUV is provided by Snohomish County Public Utility District Number One. EGUV is served by the PUD Cascade substation. PUD has electrical circuits on both 132nd Street NE (SR 96) and on Seattle Hill Road. From a planning perspective, the PUD prefers that electricity for the development is drawn from the circuit on 132nd, as it has more available capacity. Electrical power lines exist on the south side of 132nd Street SE that can be extended into the EGUV. However, a power pole lying within the Spine Road right-of-way at the SR 96 / 39th Avenue SE intersection will need to be relocated to accommodate the new Spine Road. The Cascade substation and the circuit on Seattle Hill Road are heavily loaded. PUD has plans in place to alleviate the problem through the construction of a new substation about 3 miles south of EGUV. This work is presently planned for year 2012 completion.

Eventually, it would be best to have a system that connects to both circuits to provide redundant service in case of system maintenance or outages. The actual system design within the development would be done by design engineers within PUD, and many factors are involved in designing the appropriate configuration.

Specific design questions and requirements concerning the line extension inside the development should be directed to the downtown Everett office of PUD. That office would prepare the design or delegate it to the proper department, depending on overall loading. The Engineering manager in the Everett office is John Gregory. His number is (425) 783-8391. His department can answer questions about specific design requirements, but overall system questions should be directed to Chris Johnson at (425) 783-4346 or by e-mail to cdjohnson@snopud.com. The PUD should be contacted once there is a clear picture of what types of businesses or electric loads are expected in the EGUV, so the appropriate system work can be initiated, if needed. The system design needs to be different if it is serving one or more large-footprint ("big-box") retailers than if the proposal is for a few small retail shops or residential uses.

All applicants for land use actions within the EGUV boundary should contact PUD in advance of plan development to learn of potential updates to the above information and coordinate requirements for extension of electrical service to their property.

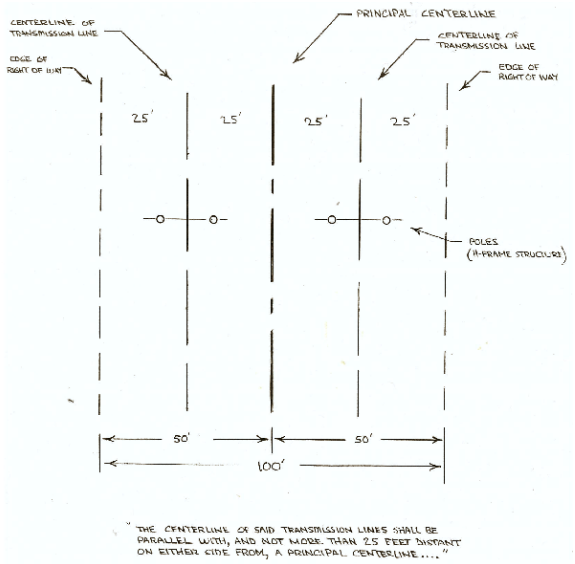
Electrical Transmission

System Overview

The PSE transmission corridor bordering the eastern edge of the development is occupied by two important regional electrical transmission lines. One, known as the Sedro-Woolley- SCL, is a 230 kV line bringing power south from Skagit County. The other, Beverly-Cottage Brook, is a 115 kV line, which is planned to be rebuilt to 230 kV in the future to bring more power from the north into King County.

Easements

PSE is frequently asked to provide space for facilities or buildings that are not suitable or appropriate in proximity to high-voltage transmission lines. That said, PSE is steadfast on exercising its operating rights within its transmission easements, and is unwavering on its obligation to safety, reliability, and the ability to operate and maintain its lines, and adherence to state and federal requirements. To that end, certain projects such as roads and stormwater facilities, parks, or trails can be built if reviewed by PSE and consent is granted by PSE.



One important provision in this easement is a specific prohibition of buildings in the easement area. Along the eastern border of the EGUV, PSE's easement area appears to be affected. The affected area covers the east 25 feet of parcels 1-019 and 1-016, the west 75 feet of lots 30 and 31 of the Irish Woodlands and all of parcel 1-037. In the EGUV Preferred Master Plan sketch dated 2/13/2008, there appears to be a "2-story retail/office" building planned within the corridor, landscaping, and parking. Due to safety issues and PSE's long term system plans, building(s) would not be permitted to be constructed within the easement.

More specifically, the PSE transmission right-of-way easement/corridor (Auditor File number 456846), along the east border of the development, is typical for that period (1925-1935), which is 100-feet wide, based on a central centerline. Anchors or push braces may be set outside this corridor. Where this provision does not exist, PSE has successfully established prescriptive rights for such appurtenances. It is assumed that the width on the outside of each transmission line was to be 25 feet as well. The corridor would then be 100-feet wide, measured 50 feet on each side of the principal centerline, as constructed.

Although the distance between the poles is fairly consistent at 50 feet, the individual transmission structures may be more than 25 feet from the principal centerline at any point. This does not change the intent of the grant of a 100-foot-wide corridor. The principal centerline is still the basis.

Consent

The Consent Guidelines, primarily aimed at construction within the electric transmission easements, and any additional information can be provided by PSE's Real Estate Group. For questions regarding the consent process, please contact:

Faye Ryan

Real Estate Representative - Northern Region

Puget Sound Energy

faye.ryan@pse.com

Office: (360) 766-5455

This study does not purport to mention all existing easements affecting properties in the EGUV. A thorough title search and consultation with a licensed land surveyor should be conducted prior to preparation of development plans to determine the location of all easements and how they may affect proposed development. Also note that all applicants for land use actions within the EGUV boundary should contact PSE in advance of plan development to learn of potential updates to the above information and coordinate requirements for construction adjacent to the referenced electrical transmission lines.

Natural Gas

System Overview

The EGUV is in proximity to PSE's District Regulator (DR) 2607 located at 132 Street SE and Seattle Hill Road. This DR is currently approaching its operational capacity. Depending on the development's connected loads and scheduling of connections, certain internal components of the DR may need to be upgraded at the Developer's cost.

Given the development's land use plan and probable gas loads, a 4-inch gas main would be required in and along the development's main access road. Although, to improve down system pressures and reliability in the Mill Creek area, PSE would most likely install an 8-inch gas main in the main access road from 47th Avenue SE to 39th Avenue SE. In addition, a gas main connection to Seattle Hill Road would be increased to 6 inch. The incremental costs associated with the installation of the larger diameter gas mains would be born by PSE, not the developer.

Tariffs

PSE extends natural gas distribution facilities to residential, commercial, or industrial customers based on the terms and conditions outlined in PSE's tariff Rule No. 7: Extension of Distribution Facilities, filed with the Washington State Utility Commission (UTC). Under the tariff, distribution facilities are extended based on "economic viability," comparing the cost of extending the natural gas facilities and estimating revenue during the project build-out. If the

project's economic evaluation, as determined by PSE's facility investment analysis (FIA), does not meet PSE's minimum investment criteria, the customer is required to pay a Customer Advance prior to utility infrastructure construction. Natural gas facility extensions requiring a Customer Advance will be reviewed by PSE seven years after completion of utility infrastructure. Refunds of portions of the Customer Advance based on actual customer natural gas usage will be made at that time.

The customer may request a review and refund prior to the seven year period. As buildings are completed, gas customers are identified, and reviews are requested and completed, refunds will be made up to the amount paid by the customer.

In the case of the planned EGUV, actual natural gas customers and their estimated natural gas revenues are not identifiable at this time. If the types of natural gas customers and associated loads have not been identified prior to installation of the gas main, then the full construction cost needs to be remitted to PSE prior to utility construction and will be subject to potential refund according to the terms of Rule No. 7.

Developers Agreement

To initiate the project, PSE will require completion of a Commercial Developer Agreement and appropriate natural gas Service Applications. Additionally, completion of these agreements will require a site plan and exhibits that outline potential loads, delivery pressures, and other criteria needed to perform a preliminary design and determine construction costs estimates. This agreement will also identify customer trenching, backfill, restoration requirements, and other installation requirement and standards.

Easements

Installation of gas main and or service on private property requires operating rights (easement) provided to PSE for construction and maintenance of gas facilities. For questions regarding easements, please contact:

Faye Ryan
Real Estate Representative - Northern Region
Puget Sound Energy
faye.ryan@pse.com
Office: (360) 766-5455

Construction Standards

Natural gas infrastructure installed by PSE requires that construction standards be met at all times. In new construction, where the customer provides trenching, backfill, conduits, and other construction elements, it is important to understand and plan for the main line, service, and meter construction standards. Once the project is assigned a project manager, a team of utility representatives will be available to guide and advise the developer of construction standards and coordination needs. In the interim, several documents conveying construction requirements are available at http://www.pse.com/solutions/forbuilders/Pages/Default.aspx. These documents

include Excavation Requirements for Joint Utility Mainline Trenches; Installation Requirements for Underground Services: and Installation Requirements for Gas Meter Set Assemblies.

All applicants for land use actions within the EGUV boundary should contact PSE in advance of plan development to learn of potential updates to the above information and coordinate requirements for extension of natural gas service to their property.

For questions regarding tariffs, Developers Agreement, and construction standards, please contact:

Gary Turner
Builder Relations Manager
Puget Sound Energy
Office: (425)424-6441
gary.turner@pse.com

Other PSE contacts include:

David Matulich
Municipal Liaison Manager
Office: (425) 4-6442
Cell: (425) 214-3020
david.matulich@pse.com
Dom Amor
Local Govt & Community Relations Mgr
dom.amor@pse.com
Office: 425-424-6795

PSE Customer Construction Services
1-888-321-7779 (M-F, 7 am – 5 pm)

Appendix A

EGUV Traffic Impact Analysis Guidelines, prepared by DKS Associates

11-2-10

Technical Appendix:
Developer Guidelines for Traffic Impact Analyses
City of Mill Creek
East Gateway Urban Village

This document summarizes the guidelines for conducting a traffic impact analyses for a proposed development within the City of Mill Creek East Gateway Urban Village (EGUV) with respect to trip generation, internal capture and pass-by trips, and trip distribution to and from the EGUV. The EGUV is "intended to accommodate pedestrian-oriented mixed use commercial, office, residential and public uses" that conform to the master development plan. These developer guidelines are tailored to address those land uses that comply with the vision and requirements of the EGUV.

TRIP GENERATION

The Mill Creek Municipal Code (17.19) identifies the following as principal land uses within the EGUV:

- Retail sales and services except automotive, boat, and recreational vehicle sales,
- Eating and drinking establishments (drive-through service prohibited)
- Banks, financial and professional services,
- Medium and high density residential (in low- and mid-rise buildings)
- Business and professional offices
- Personal services, dry cleaners, salons, etc.,
- Medical and dental clinics and offices,
- Parking structures,
- Commercial day care,
- Craft shops and galleries,
- Public buildings, facilities/utilities
- Transit facilities/stops,
- Hotels and motels,
- Open space, parks and plazas,
- Religious facilities
- Theaters, performing arts uses, and
- Other uses consistent with the purposes of the district.

Additionally, the designation of the EGUV as a Planned Urban Village (PUV) limits a single commercial use to a maximum ground floor area of 60,000 square feet and establishes maximum height requirements. The maximum height allowed within the EGUV is four stories (not to exceed 50 feet), except for mixed use residential buildings, which have a maximum height of five stories (not to exceed 60 feet) provided that the maximum height shall be three stories (not to exceed 35 feet) for building constructed adjacent to single-family homes.

The ITE *Trip Generation* report was utilized to establish the trip generation rates or regression equation appropriate for potential land uses within the EGUV. These rates and regression equations are summarized in Table A-1 and Table A-2.

Developers may propose trip generation rates different than those published in the ITE *Trip Generation* report if they are supported by recent studies of comparable or identical land uses and match the conditions present at the EGUV site. The City will evaluate the studies that support a different rate and make a determination of the appropriate rate to be used where more recent data supports rates different than those published by ITE.

INTERNAL CAPTURE

Internal capture refers to trips made within a multi-use development containing offices, retail and residential uses where a portion of the trips generated by one development would originate and be destined to other developments within the site, particularly where the trip can be made by walking. At full build-out, the EGUV would likely have a portion of total trips captured within the site that would not result in new vehicular trips on 132nd Street SE or Seattle Hill Road.

There is limited internal capture information from ITE. Since detailed information will not be available with respect to overall composition of the EGUV land uses, an average internal capture rate may be applied to office, retail, residential, and service land uses within the EGUV. An average internal capture rate of 25% may be applied to the trip generation volumes for the land uses identified in Tables A-1 and A-2. The average internal capture rate complies with the average internal capture rate utilized for the Mill Creek Town Center urban village, and is a conservative estimate of internal capture rates for a mixed-use development of the proposed size and density of the EGUV.

PASS-BY TRIPS

Pass-by trips are those trips into a site from vehicles that were already traveling over the roadway adjacent to the site and stop into the development as a part of their overall trip. Pass-by trips do not add new trips to the roadway adjacent to the site, but instead shift traffic from through movements to turning movements at the site driveways. Primary trips add new traffic volumes on the streets and roadway network adjacent to the development.

There is limited information available on pass-by percentages from ITE. ITE *Trip Generation Handbook* included average pass-by percentages for only twelve of the forty potential land uses summarized in Tables A-1 and A-2. The ITE average pass-by rates for the PM peak period is summarized in Table A-1 for those land uses where data is available. For other land uses, the developer may conduct independent studies that demonstrate the pass-by percentage for the land uses proposed. If no pass-by data is available either from ITE or independent studies, then no pass-by trips shall be allocated to the proposed land use and all trips shall be assigned to the roadway network as primary purpose trips. Any pass-by studies performed by the proponent shall meet the requirements in the Recommended Data Collection Procedures (Section 5.6) of the ITE *Trip Generation Handbook, 2nd Edition*.

TRIP DISTRIBUTION

Trip distribution represents the forecast of where vehicle trips go to and come from within the study area. The distribution of new trips to and from the EGUV site was developed from the Puget Sound Regional Council (PSRC) travel demand model. The proposed EGUV land use was coded into the 2020 PSRC travel demand model and the distribution of trips to and from the zone representing the EGUV area to the surround street network was used as the basis of the trip distribution for primary purpose trips to and from the EGUV site.

While the overall trip distribution to the surrounding street network is the same for all sites within the EGUV, the distribution of trips to the EGUV primary access point varies depending on the location of the individual parcel within the EGUV area. The trip distribution at access points for primary purpose trips generated by the proposed EGUV development is summarized for the following groups of parcels within the EGUV:

- Penny Creek Partners
- Mollgaard, Rim, and 132nd Street Land Development
- Advent Church
- Nash
- Dunn and east end parcels along Seattle Hill Road

Graphics showing the primary trip distribution for each of the EGUV subareas are included in Figures A-1 to A-5 at the end of the technical appendix. The trip distributions presented in Figures A-1 to A-5 should be used for assigning the PM Peak Hour primary purpose trips generated by the proposed development to the surrounding roadway network.

The pass-by trip distribution was based on the forecasted traffic volumes on 132nd Street SE from the 2020 PSRC travel demand model for those trips that were not originating from or destined to the zone representing the EGUV area. The pass-by trip distribution on 132nd Street SE is 59 percent eastbound and 41percent westbound. If any pass-by trips are calculated for the proposed site, the pass-by trips should be subtracted from the total trip generation after any reductions due to internal capture have been applies and prior to assigning the primary trips to the site.

Table A-1: PM Peak Hour Trip Generation Rate/Regression Equation, Internal Capture, and Pass-by Percentage

Land Use	ITE #	PM Peak Hour of Adj Street (4-6pm)		Distribution		Internal Capture	Pass-by Rates
		Rate/Regression	Unit	Enter	Exit		
Residential							
Apartment	220	T=0.55(x)+17.65	/Unit	65%	35%	25%	-
Low-Rise Apartment	221	Ln(T)=0.88Ln(x)+0.16	/Unit	65%	35%	25%	-
Mid-Rise Apartment (3-10 floors)	223	T=0.48(x)-11.07	/Unit	58%	42%	25%	-
Residential Condominium/Townhouse	230	Ln(T)=0.82Ln(x)+0.32	/Unit	67%	33%	25%	-
Low-Rise Residential Condominium/Townhouse	231	0.78	/Unit	58%	42%	25%	-
Lodging							
Hotel	310	0.59	/Room	53%	47%	25%	-
Motel	320	0.47	/Room	54%	46%	25%	-
Recreational							
Live Theater	441	0.02	/Seat	50%	50%	25%	-
Movie Theater w/o Matinee	443	0.07	/Seat	75%	25%	25%	-
Movie Theater w/ Matinee	444	0.07	/Seat	39%	61%	25%	-
Institutional							
Church	560	0.66	/1000 SF GFA	52%	48%	-	-
Day Care Center	565	13.18	/1000 SF GFA	47%	53%	-	-
Office							
General Office Building	710	T=1.12(x)+78.81	/1000 SF GFA	17%	83%	25%	-
Corporate Headquarters Building	714	Ln(T)=0.87Ln(x)+1.01	/1000 SF GFA	10%	90%	25%	-
Single Tenant Office Building	715	T=1.52(x)+34.88	/1000 SF GFA	15%	85%	25%	-
Medical-Dental Office Building	720	Ln(T)=0.93Ln(x)+1.47	/1000 SF GFA	27%	73%	25%	-
Research and Development Center	760	Ln(T)=0.83Ln(x)+1.06	/1000 SF GFA	15%	85%	25%	-

Trip Generation Rates/Regression and Average Pass by Rates per *ITE Trip Generation, 8th Edition*

Table A-1 (cont.): PM Peak Hour Trip Generation Rate/Regression Equation, Internal Capture, and Pass-by Percentage

Land Use	ITE #	PM Peak Hour of Adj Street (4-6pm)		Distribution		Internal Capture	Pass-by Rates
		Rate/Regression	Unit	Enter	Exit		
Retail							
Specialty Retail Center	814	T=2.40(x)+21.48	/1000 SF GLA*	44%	56%	25%	-
Hardware/Paint Store	816	T=3.31(x)+27.59	/1000 SF GFA	47%	53%	25%	-
Automobile Parts Sales	843	T=7.87(x)-14.86	/1000 SF GFA	49%	51%	25%	-
Tire Store	848	4.15	/1000 SF GFA	43%	57%	25%	28%
Supermarket	850	Ln(T)=0.79Ln(x)+3.20	/1000 SF GFA	51%	49%	25%	36%
Convenience Market (Open 24 Hours)	851	52.41	/1000 SF GFA	51%	49%	25%	61%
Convenience Market (Open 15-16 Hours)	852	34.57	/1000 SF GFA	49%	51%	25%	-
Convenience Market w/ Gasoline Pumps	853	60.61	/1000 SF GFA	50%	50%	25%	66%
Apparel Store	870	3.83	/1000 SF GFA	50%	50%	25%	-
Arts and Craft Store	879	6.21	/1000 SF GFA	46%	54%	25%	-
Pharmacy/Drugstore w/o Drive-Through Window	880	8.42	/1000 SF GFA	50%	50%	25%	53%
Pharmacy/Drugstore w/ Drive-Through Window	881	8.62	/1000 SF GFA	49%	51%	25%	49%
Furniture Store	890	0.46	/1000 SF GFA	45%	55%	25%	53%
Video Rental Store	896	Ln(T)=0.93Ln(x)+2.61	/1000 SF GFA	46%	54%	25%	-
Services							
Walk-in Bank	911	42.02	/1000 SF GFA	50%	50%	25%	-
Drive-in Bank	912	45.74	/1000 SF GFA	50%	50%	25%	47%
Quality Restaurant	931	7.49	/1000 SF GFA	67%	33%	25%	44%
High-Turnover (Sit-Down) Restaurant	932	10.92	/1000 SF GFA	61%	39%	25%	43%
Drinking Place	936	11.34	/1000 SF GFA	66%	34%	25%	-
Quick Lubrication Vehicle Shop	941	5.19	/Servicing Positions	55%	45%	25%	-
Gasoline/Service Station	944	13.87	/Vehicle Fueling Positions	50%	50%	25%	42%
Gasoline/Service Station w/ Convenience Market	945	13.38	/Vehicle Fueling Positions	50%	50%	25%	56%

Trip Generation Rates/Regression and Average Pass by Rates per *ITE Trip Generation, 8th Edition*

Table A-2: Average Weekday Daily Trip Generation Rate/Regression Equation, Internal Capture, and Pass-by Percentage

Land Use	ITE #	Average Weekday		Distribution		Internal Capture
		Rate/Regression	Unit	Enter	Exit	
Residential						
Apartment	220	T=6.01(x)+150.35	/Unit	50%	50%	25%
Low-Rise Apartment	221	T=5.12(x)+387.53	/Unit	50%	50%	25%
Mid-Rise Apartment (3-10 floors)	223	No Daily Data Available				
Residential Condominium/Townhouse	230	Ln(T)=0.85Ln(x)+2.55	/Unit	50%	50%	25%
Low-Rise Residential Condominium/Townhouse	231	No Daily Data Available				
Lodging						
Hotel	310	T=8.95(x)-373.16	/Room	50%	50%	25%
Motel	320	Ln(T)=0.92Ln(x)+2.11	/Room	50%	50%	25%
Recreational						
City Park	411	1.59	/Acre	50%	50%	-
Live Theater	441	No Daily Data Available				
Movie Theater w/o Matinee	443	1.76	/Seat	50%	50%	25%
Movie Theater w/ Matinee	444	No Daily Data Available				
Institutional						
Church	560	9.11	/1000 SF GFA	50%	50%	-
Day Care Center	565	79.26	/1000 SF GFA	50%	50%	-
Office						
General Office Building	710	Ln(T)=0.77Ln(x)+3.65	/1000 SF GFA	50%	50%	25%
Corporate Headquarters Building	714	Ln(T)=0.97Ln(x)+2.23	/1000 SF GFA	50%	50%	25%
Single Tenant Office Building	715	11.57	/1000 SF GFA	50%	50%	25%
Medical-Dental Office Building	720	T=40.89(x)-214.97	/1000 SF GFA	50%	50%	25%
Research and Development Center	760	8.11	/1000 SF GFA	50%	50%	25%

Trip Generation Rates/Regression and Average Pass by Rates per *ITE Trip Generation, 8th Edition*

Table A-2 (cont.): Average Weekday Daily Trip Generation Rate/Regression Equation, Internal Capture, and Pass-by Percentage

Land Use	ITE #	Average Weekday		Distribution		Internal Capture
		Rate/Regression	Unit	Enter	Exit	
Retail						
Specialty Retail Center	814	44.32	/1000 SF GLA*	50%	50%	25%
Hardware/Paint Store	816	51.29	/1000 SF GFA	50%	50%	25%
Automobile Parts Sales	843	T=81.02(x)-150.75	/1000 SF GFA	50%	50%	25%
Tire Store	848	24.87	/1000 SF GFA	50%	50%	25%
Supermarket	850	102.24	/1000 SF GFA	50%	50%	25%
Convenience Market (Open 24 Hours)	851	737.99	/1000 SF GFA	50%	50%	25%
Convenience Market (Open 15-16 Hours)	852	No Daily Data Available				
Convenience Market with Gasoline Pumps	853	845.6	/1000 SF GFA	50%	50%	25%
Apparel Store	870	66.4	/1000 SF GFA	50%	50%	25%
Arts and Craft Store	879	56.55	/1000 SF GFA	50%	50%	25%
Pharmacy/Drugstore w/o Drive-Through Window	880	90.06	/1000 SF GFA	50%	50%	25%
Pharmacy/Drugstore w/Drive-Through Window	881	88.16	/1000 SF GFA	50%	50%	25%
Furniture Store	890	5.06	/1000 SF GFA	50%	50%	25%
Video Rental Store	896	No Daily Data Available				
Services						
Walk-in Bank	911	156.48	/1000 SF GFA	50%	50%	25%
Drive-in Bank	912	246.49	/1000 SF GFA	50%	50%	25%
Quality Restaurant	931	89.95	/1000 SF GFA	50%	50%	25%
High-Turnover (Sit-Down) Restaurant	932	127.15	/1000 SF GFA	50%	50%	25%
Drinking Place	936	No Daily Data Available				
Quick Lubrication Vehicle Shop	941	40	/Servicing Positions	50%	50%	25%
Gasoline/Service Station	944	168.56	/Vehicle Fueling Positions	50%	50%	25%
Gasoline/Service Station w/ Convenience Market	945	162.78	/Vehicle Fueling Positions	50%	50%	25%

Trip Generation Rates/Regression and Average Pass by Rates per *ITE Trip Generation, 8th Edition*

Figure A-1: PM Peak Hour Primary Trip Distribution - Penny Creek Partner parcels

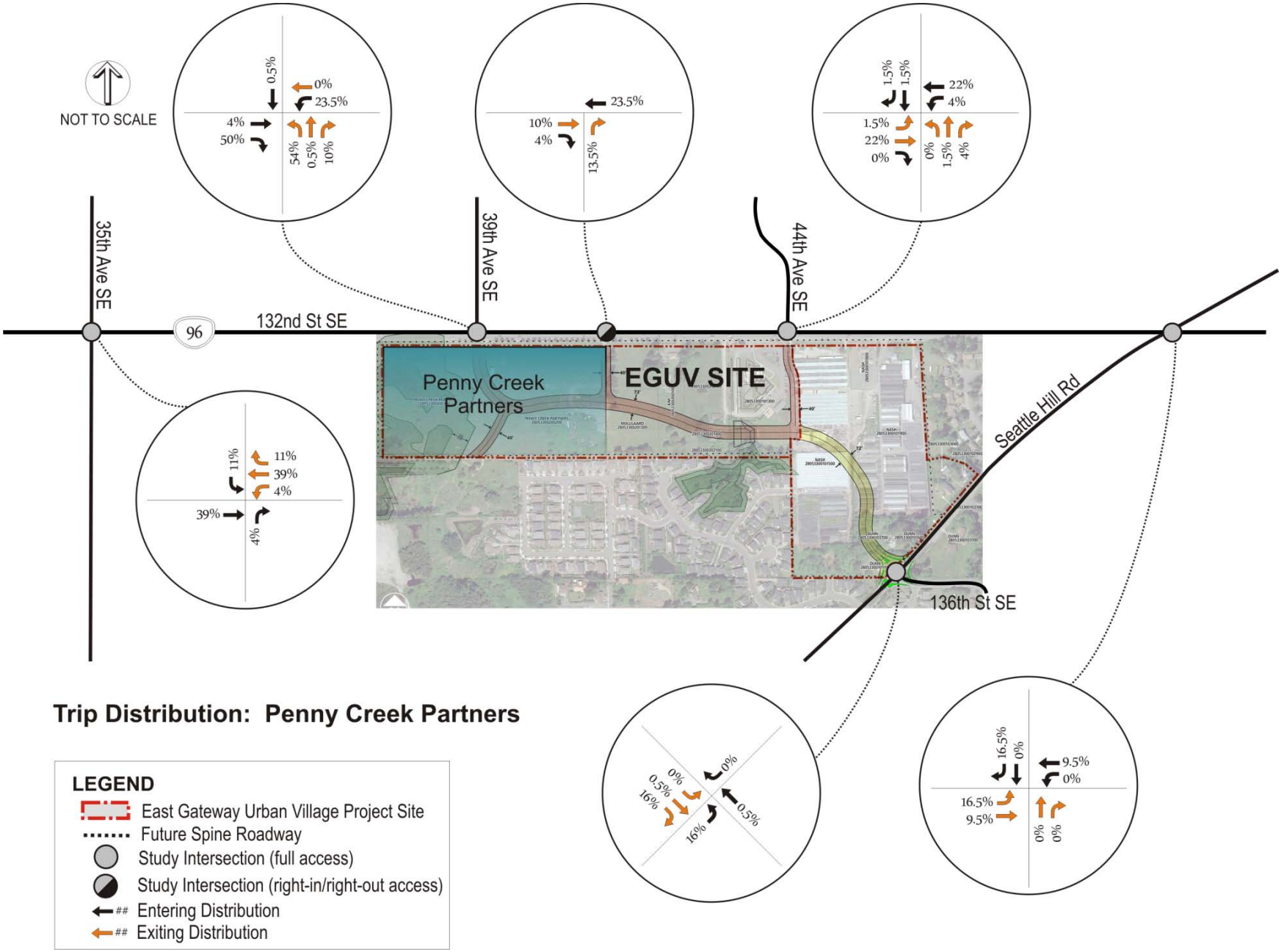
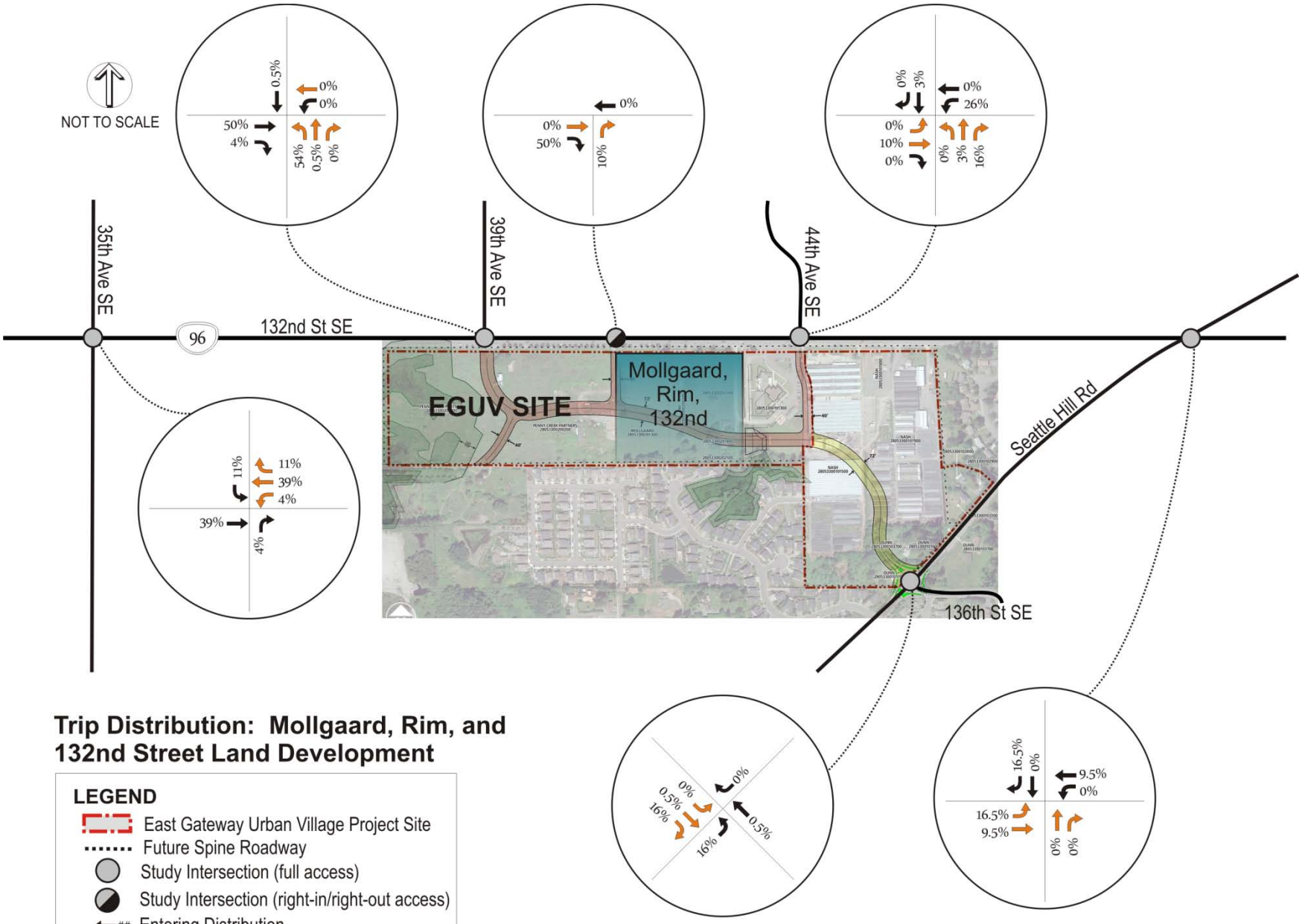


Figure A-2: PM Peak Hour Primary Trip Distribution - Mollgaard, Rim, and 132nd Street Land Development parcels



Trip Distribution: Mollgaard, Rim, and 132nd Street Land Development

LEGEND

- East Gateway Urban Village Project Site
- Future Spine Roadway
- Study Intersection (full access)
- Study Intersection (right-in/right-out access)
- ## Entering Distribution
- ## Exiting Distribution

Figure A-3: PM Peak Hour Primary Trip Distribution - Advent Lutheran Church parcels

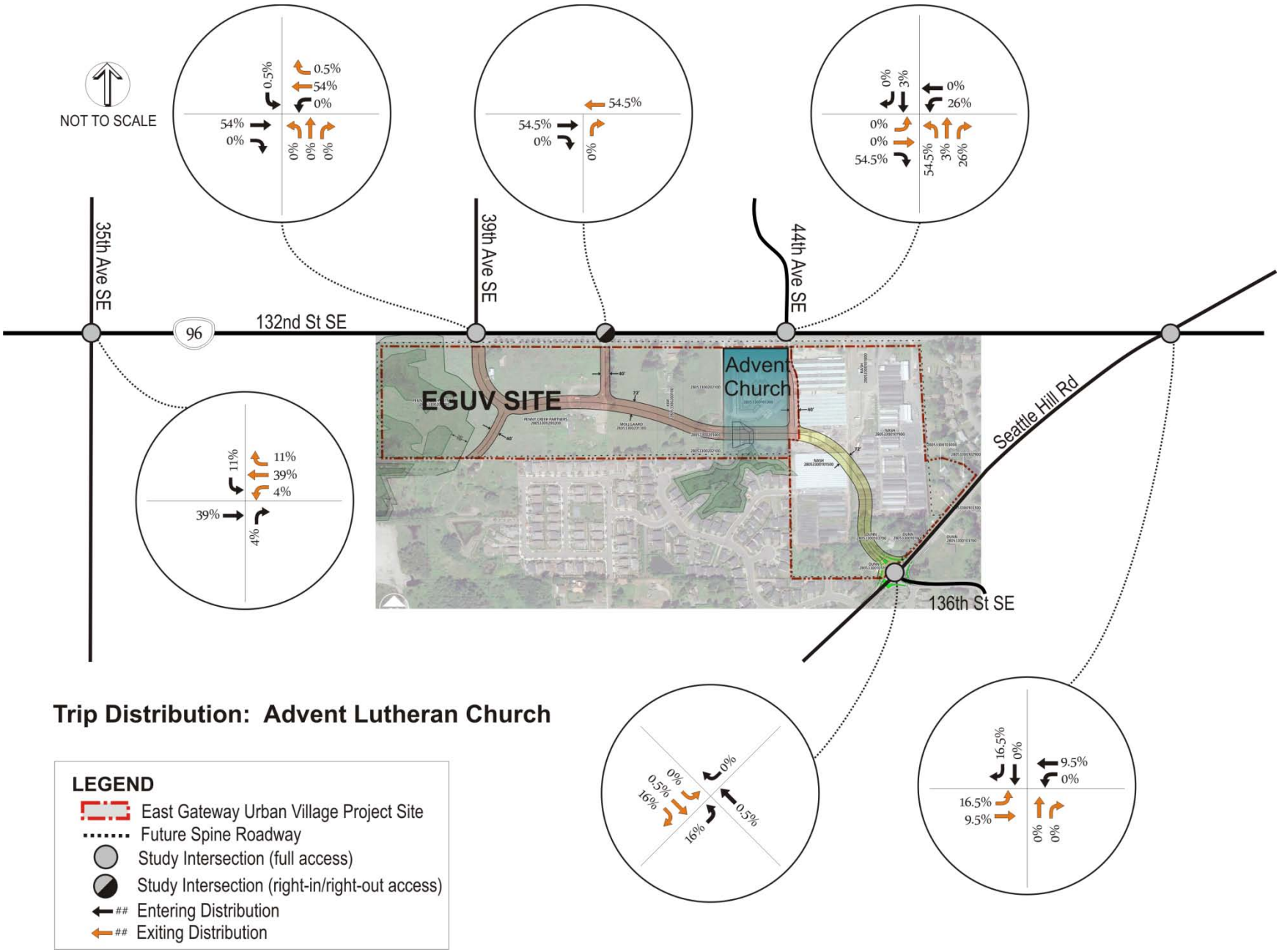
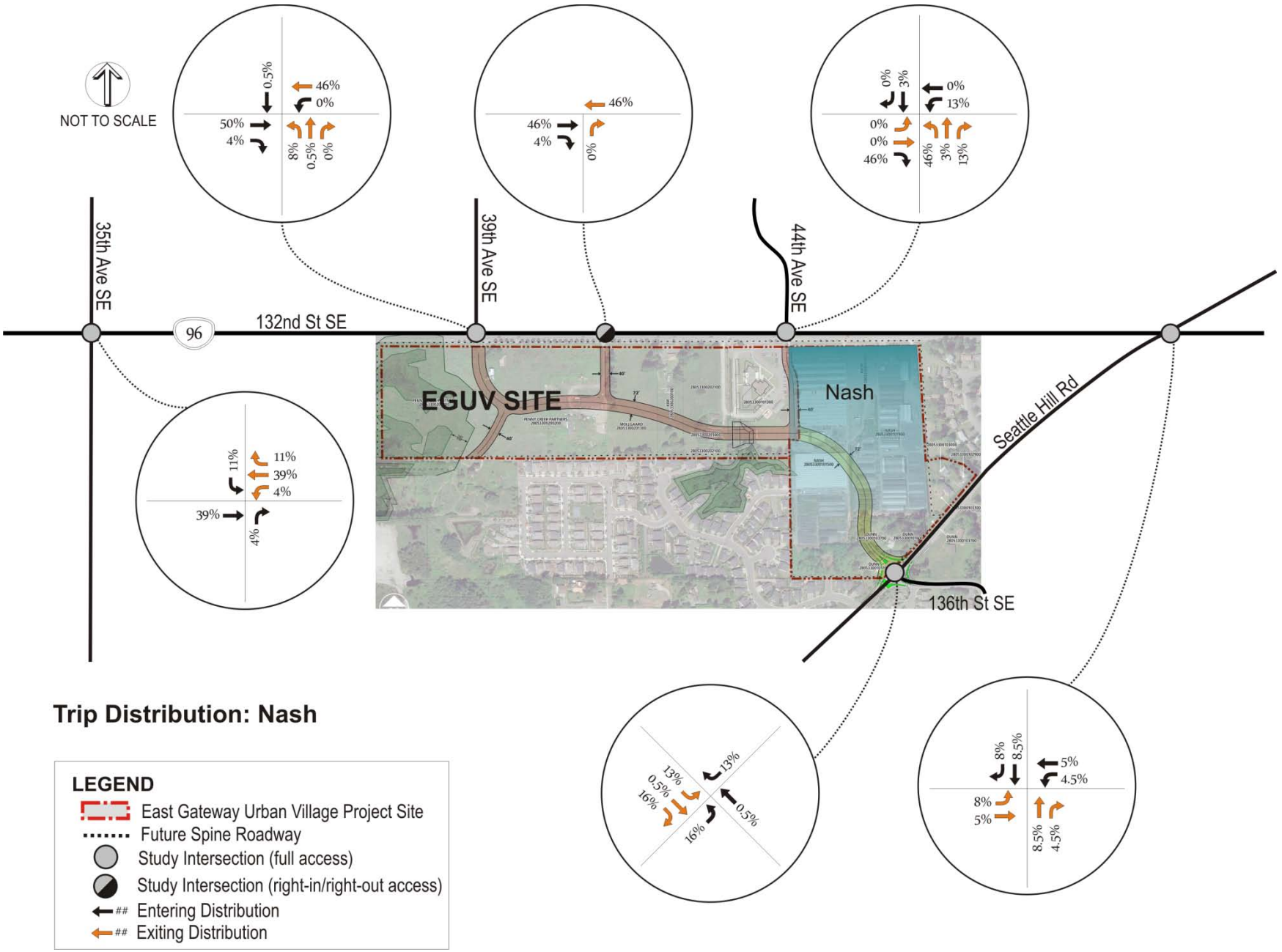


Figure A-4: PM Peak Hour Primary Trip Distribution - Nash parcels

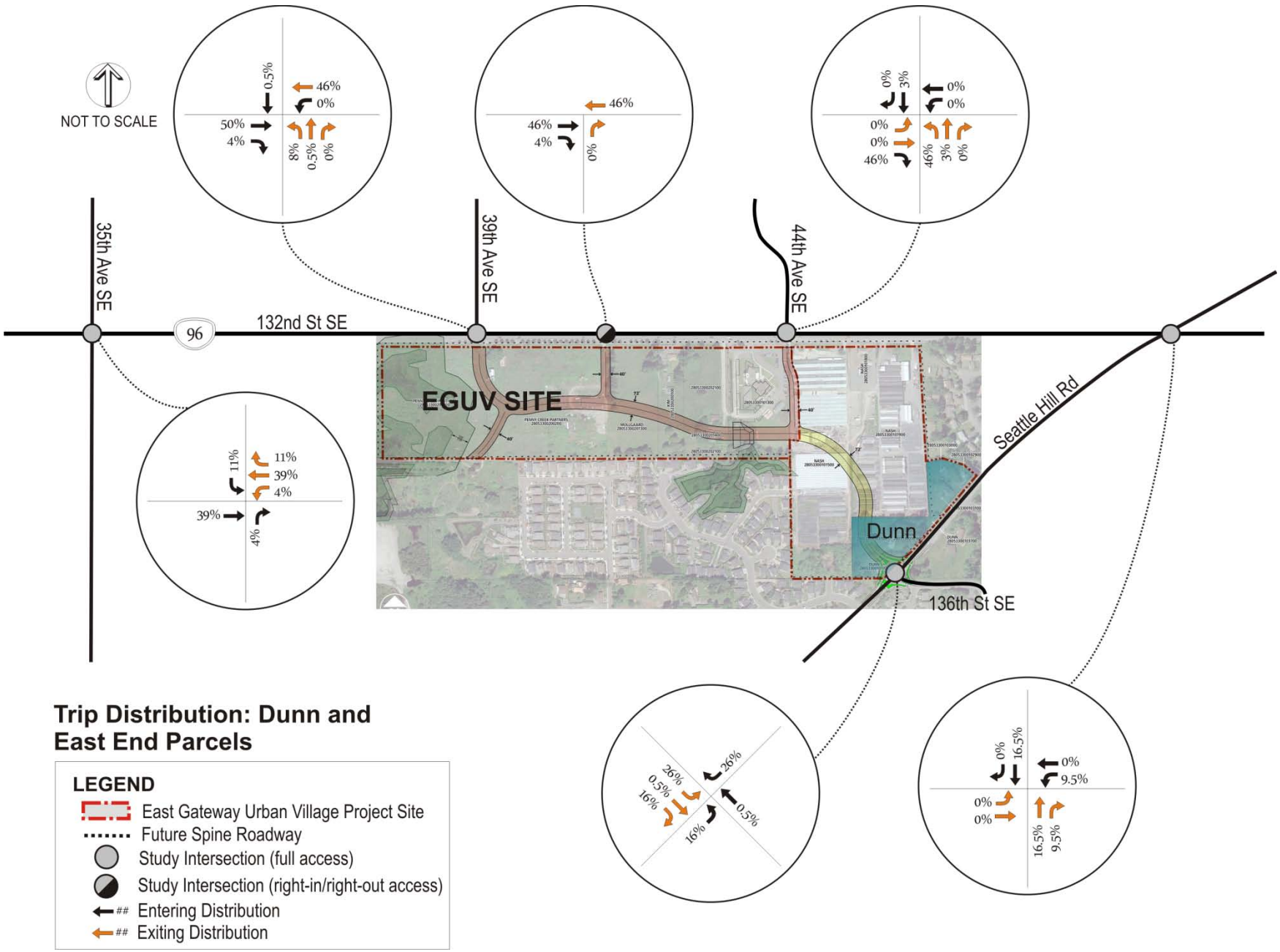


Trip Distribution: Nash

LEGEND

- East Gateway Urban Village Project Site
- Future Spine Roadway
- Study Intersection (full access)
- Study Intersection (right-in/right-out access)
- ## Entering Distribution
- ## Exiting Distribution

Figure A-5: PM Peak Hour Primary Trip Distribution - Dunn and East End parcels



Appendix B

EGUV Traffic Analysis and Development Standards, prepared by DKS Associates 11-2-10

East Gateway Urban Village

Traffic Analysis and Development Standards

Prepared by

DKS Associates
TRANSPORTATION SOLUTIONS

November 2010

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1 INTRODUCTION

This document summarizes the results of the traffic analysis and development standards completed for the development of the City of Mill Creek East Gateway Urban Village. The purpose of this document is to identify the potential transportation impacts of the East Gateway Urban Village on the surrounding street network in terms of level of service, queue lengths, and level of traffic control at access points to the East Gateway Urban Village development. Additionally, this document identifies the development standards including, trip generation, location of access and, access control.

The East Gateway Urban Village (EGUV) is approximately 50 acres of property located within the north east portion of the City of Mill Creek. In general, the EGUV area is located east of 35th Avenue SE, south of 132nd Street SE (SR-96), and west of Seattle Hill Road. The Washington State Department of Transportation (WSDOT) currently operates and maintains the signals on 132nd Street SE (SR-96) and Snohomish County operates and maintains Seattle Hill Road near the EGUV area.

1.1 Project Description

The EGUV plan includes the development of a mix of residential units, retail services, religious institutions, office spaces, public parks and a new internal street connection. The City of Mill Creek completed a SEPA analysis and Comprehensive Plan Amendment for the EGUV area in 2007, in which the proposed land use assumptions were documented. The land use assumptions were updated as a part of this analysis to reflect current proposals for development within the EGUV area. The land uses currently proposed within the EGUV areas include:

- 74 townhomes
- 354 multifamily apartments
- 25,700 square feet of church facilities (existing and planned)
- 60,000 square feet grocery store
- 306,300 square feet specialty retail
- 66,800 square feet of office building

The EGUV includes an internal spine road through the project area that will connect to 132nd Street SE and Seattle Hill Road. The exact alignment of the spine roadway is still under consideration; however, three full access points have been identified to the EGUV area at the following locations: 132nd Street SE/39th Avenue SE, 132nd Street SE/44th Avenue SE, and Seattle Hill Road/136th Street SE. Additionally, a dedicated right-in/right-out only access point to the EGUV will be located off of 132nd Street SE between 39th Avenue SE and 44th Avenue SE. The traffic impacts of the proposed EGUV development were evaluated assuming all trips utilize the these four access point to the site. Figure 1 illustrates the EGUV development area and the proposed spine road alignment and connections to the existing roadway network.

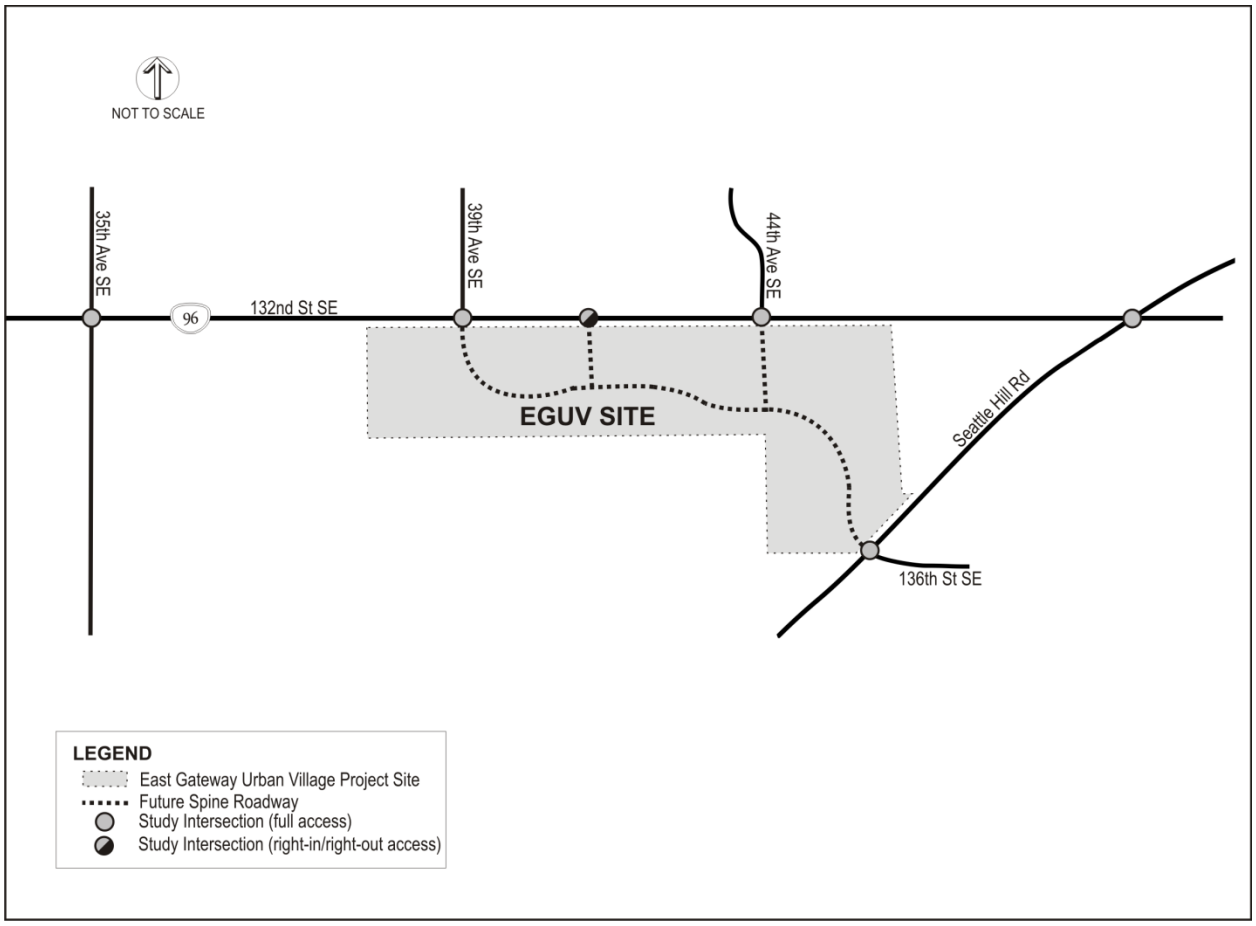

Figure 1: East Gateway Urban Village Study Area

2 EXISTING CONDITIONS

This section documents the existing transportation conditions near the EGUV development. The existing transportation conditions in the study area include the roadway network, intersection traffic control and lane geometries, traffic volumes and intersection operation near the proposed development. Based on the anticipated increase in traffic volumes generated by the proposed development, the following intersections were included in the traffic analysis:

1. 132nd Street SE/35th Avenue SE (signalized)
2. 132nd Street SE/39th Avenue SE (signalized)
3. 132nd Street SE/44th Avenue SE (unsignalized)
4. 132nd Street SE/Seattle Hill Road (signalized)
5. Seattle Hill Road/136th Street SE (unsignalized)

The intersections of 132nd Street SE/ 35th Avenue SE, 139th Street SE/39th Avenue SE, and 132nd Street SE/Seattle Hill Road are signalized intersections operated by WSDOT. The intersection of 132nd Street SE/44th Avenue SE is an unsignalized T-intersection with stop control on the southbound, minor street approach. The intersection of 44th Avenue SE currently serves a predominantly residential development north of 132nd Street SE. The intersection of Seattle Hill Road/136th Street SE is an unsignalized T-intersection with stop control on the westbound, minor approach. 136th Street SE currently serves as the access to a residential development east of Seattle Hill Road. Figure 2 summarizes the existing lane configurations and intersection traffic control at the study intersections.

2.1 Site Description

The EGUV development is located directly south of 132nd Street SE and is bordered on the east by a portion of Seattle Hill Road. The site is bordered to the south by the Westfield Park and Bluegrass subdivisions and by undeveloped property to the west.

The proposed EGUV will include the development of vacant property as well as redevelopment of currently occupied property. The EGUV will include an internal spine road connecting to 132nd Street SE at 39th Ave SE and Seattle Hill Road at approximately 136th Street SE. The internal roadway network also includes two spur connections: one connection from the spine road to 132nd Street SE at 44th Avenue SE for a full access point, and one connection from the spine road to 132nd Street SE at a point between 39th Avenue SE and 44th Avenue SE for a right-in/right-out access point. .

2.2 Roadway Network

Within the study area there are two major roadways that would be impacted by the proposed EGUV development. Those roadways include 132nd Street SE and Seattle Hill Road. 132nd Street SE (SR-96) is classified as a principal arterial street that is operated and maintained by WSDOT. Seattle Hill Road is classified as a minor arterial street that is operated and maintained by Snohomish County. Table 1 summarizes the characteristics of the roadways within the study area. There is a reduced speed limit of 35 mph on 132nd Street SE within the school zone between 39th Avenue SE and 44th Avenue SE near the Archbishop Murphy High School.

Table 1: Existing Roadway Characteristics

Roadway	Jurisdiction	Classification	Posted Speed Limit	Number of Lanes	ADT*
132nd Street SE (SR-96)	WSDOT	Principal Arterial	45 mph	5	31,200
Seattle Hill Road	Snoh. Co.	Minor Arterial	35 mph	2	7,450

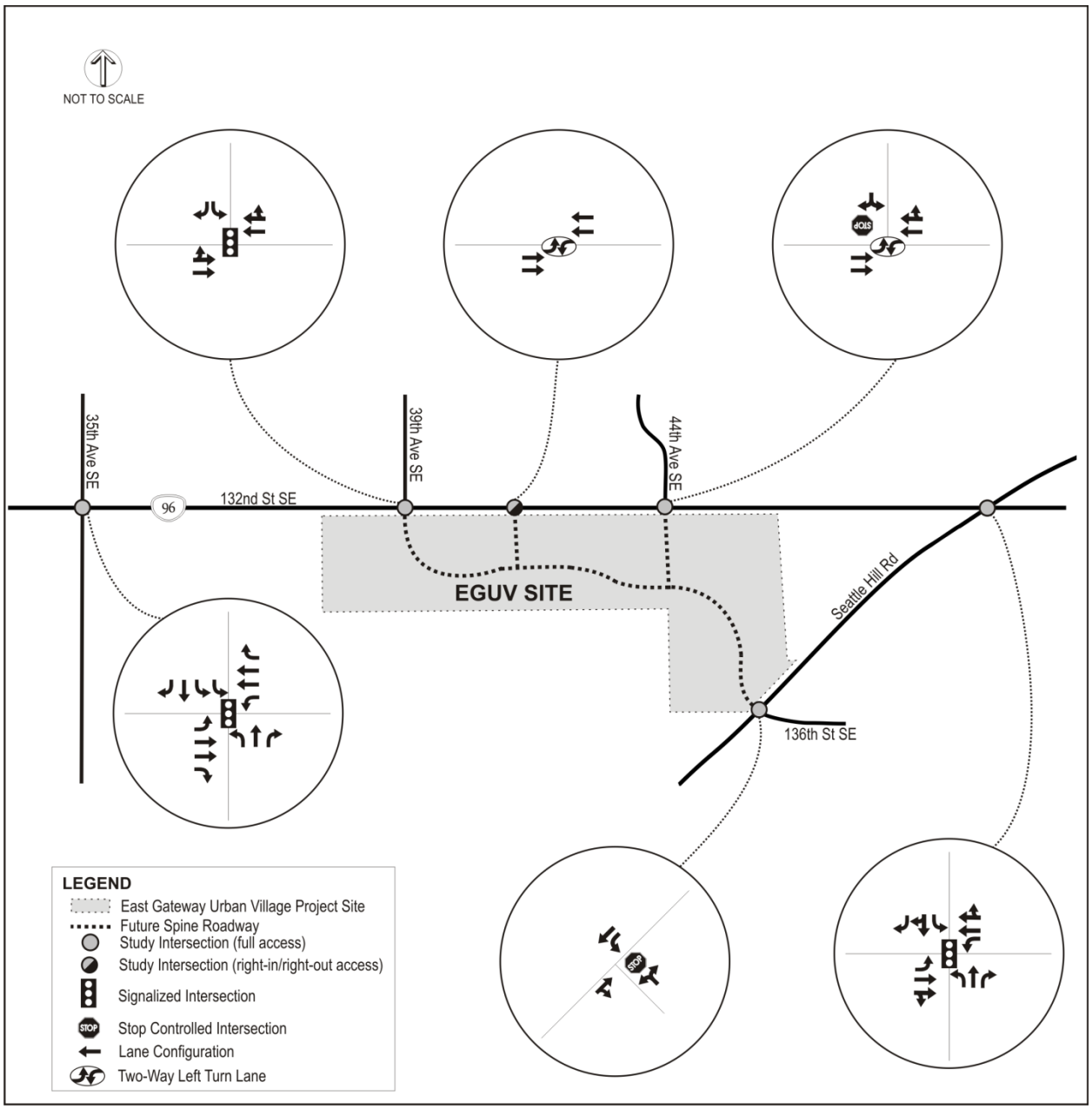

Figure 2: Existing Lane Geometry and Intersection Control

2.3 Existing Intersection Performance

Level of service (LOS) is used as a measure of effectiveness for intersection operation. The LOS at signalized intersections is defined by the average vehicle delay for the entire intersection, and at unsignalized intersections is defined by the average vehicle delay for the stop controlled movements. LOS is similar to a "report card" rating ranging from LOS A to F. LOS A represents free-flow conditions with little or no delay. LOS E represents conditions at intersection capacity, and LOS F represents worst case or over capacity conditions.

The existing PM peak hour traffic volumes at the intersections on 132nd Street SE at 35th Avenue SE, 44th Avenue SE and Seattle Hill Road were collected in January 2010 and the traffic volumes at Seattle Hill Road/136th Street SE was collected in June 2010. Intersection turning movement counts at 132nd Street SE/39th Avenue SE were obtained from WSDOT. The PM peak hour traffic volumes at these five intersections are summarized in Figure 3.

The intersection turning movement counts were used in conjunction with the existing lane geometry, traffic control, and signal timing (at signalized intersections) to determine the existing LOS at the study intersections using *Synchro* traffic analysis software. The existing lane geometry, speed limits, and traffic control were collected from a field review of the site and on aerial maps of the study area. The existing signal timing cards were collected from WSDOT and used to input the current signal timing for the intersections of 132nd Street SE/35th Avenue SE, 132nd Street St/39th Avenue SE, and 132nd Street SE/Seattle Hill Road.

The existing LOS at the study intersections is summarized in Table 2. For the signalized intersections, the average LOS and delay of the entire intersection are reported. For unsignalized intersections, the LOS and delay are reported for both the average of the intersection and for the worst movement of the minor street approach (intersection average/minor approach). The minor street LOS reported in Table 2 corresponds to the southbound left turn at the unsignalized intersection of 132nd Street SE/44th Avenue SE and the westbound through/left movementat the unsignalized intersection of Seattle Hill Road/136th Street SE.

Table 2: Existing PM Peak Hour LOS, Delay, and V/C Ratios

Intersection	Intersection Control	PM Peak Hour		
		LOS	Delay (sec/veh)	V/C Ratio
132nd Street SE/35th Avenue SE	signalized	D	47	0.91
132nd Street SE/39th Avenue SE	signalized	D	22	0.76
132nd Street SE/44th Avenue SE	unsignalized	A / B	1 / 15	-
132nd Street SE/Seattle Hill Road	signalized	D	42	0.80
Seattle Hill Road/136th Street SE	unsignalized	A / B	1 / 12	-

Note: For unsignalized intersections, the LOS and delay are reported for both the total intersection/minor street approach. V/C ratios are not defined for unsignalized intersections.

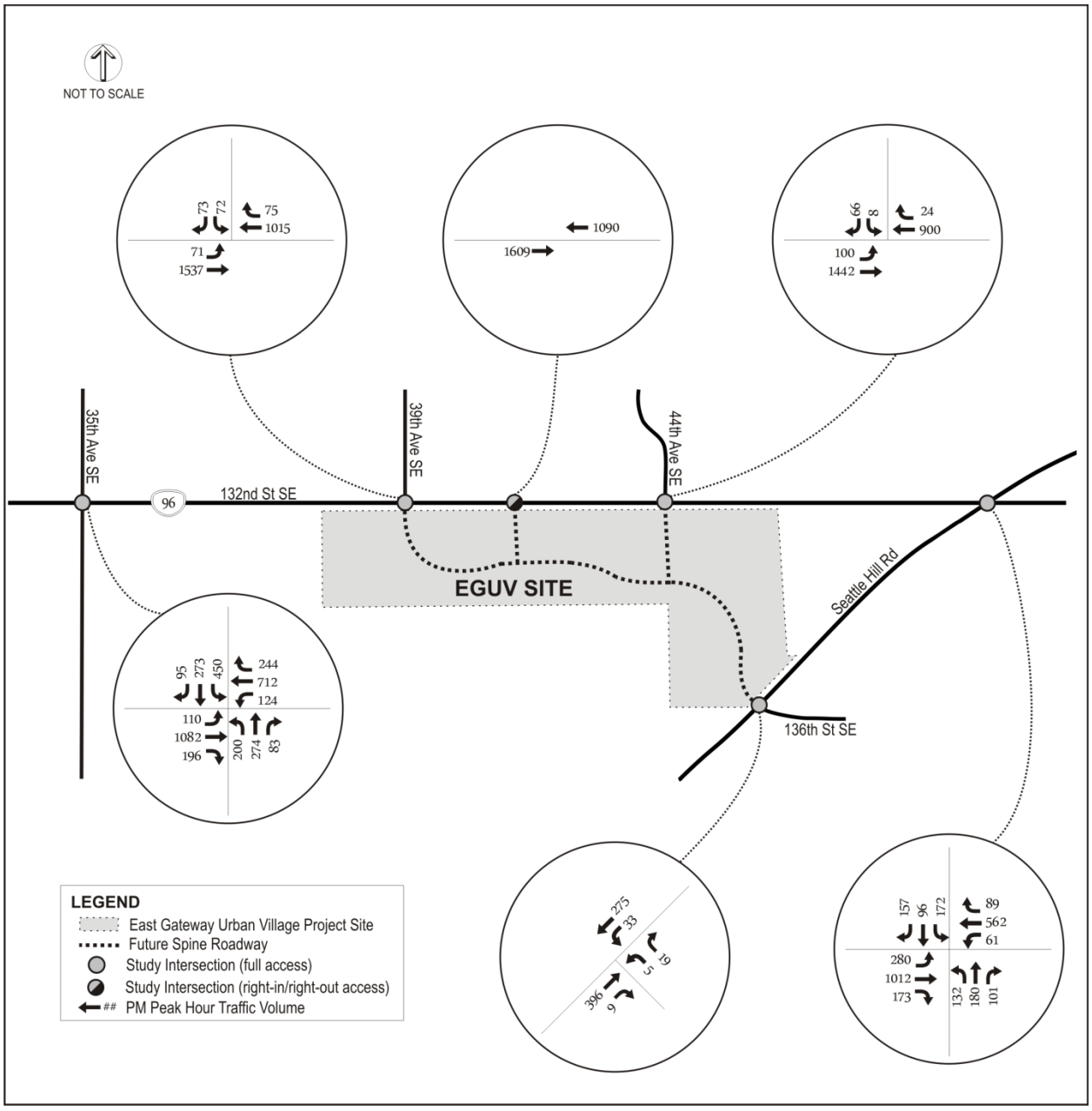

Figure 3: Existing PM Peak Hour Intersection Turning Movement Volumes

2.4 Vehicle Collision History

The most recent collision data within the study area was obtained from WSDOT for the last three years. Table 3 summarizes the collision history at the study intersections on 132nd Street SE for the three-year period between January 2007 and October 2009. Approximately 79 collisions occurred at the study intersections during the three year analysis period. The collision data found approximately 62% of the recorded collisions were property damage only, 38% experienced personal injury, and there were no fatalities. The majority of the collisions at the study intersections were read-end collisions.

Table 3: Study Area Collision Data (2007-2009)

Intersection	Total Collisions	Collision Type			Collision Rate*
		PDO	Injury	Fatal	
132nd Street SE/35th Ave SE	41	28	13	0	0.58
132nd Street SE/39th Ave SE	6	2	4	0	0.12
132nd Street SE/44th Ave SE	2	2	0	0	0.04
132nd Street SE/Seattle Hill Road	30	17	13	0	0.55
Percent of Total:	100%	62%	38%	0%	

*Collision rate represents the number of annual collisions per million entering vehicles.

A collision rate representing the three year analysis period was calculated for each intersection based on the number of recorded collisions and average daily traffic volume entering the intersection. An intersection collision rate greater than 1.0 is generally indicative of an operational or collision-related problem. The intersection of 132nd Street SE/35th Avenue SE experienced the highest collision rate of 0.58 which is well below the threshold for recommended further investigation.

3 TRAFFIC FORECASTS

This section reviews the impact of the proposed EGUV development on the study area transportation system. The analysis includes trip generation, trip distribution, and trip assignment to the surrounding street system.

3.1 Trip Generation

Trip generation to the site was determined based upon published trip generation rates from the Institute of Transportation Engineers (ITE) *Trip Generation, 8th Edition* for similar land uses as proposed within the EGUV development. Trip generation was developed for the following land uses within the EGUV site.

- 74 townhomes
- 354 multifamily apartments
- 25,700 square feet of church facilities (existing and planned)
- 60,000 square feet grocery store
- 306,300 square feet specialty retail
- 66,800 square feet of office building

The methodology outlined in the ITE *Trip Generation* report allows for a reduction in trips for specific land uses associated with internal capture of trips within a multi-use site and for pass-by activity. Internal capture refers to trips made within a multi-use development containing offices, retail, and residential uses, where a portion of the trips generated by one development would originate and be destined to other developments within the site, particularly where the trip can be made by walking. Since the EGUV will include a mix of office, retail, and residential land uses connected with an internal spine roadway that includes pedestrian amenities, the EGUV will likely have a portion of total trips captured within the site that would not result in new vehicular trips on 132nd Street SE or Seattle Hill Road. Since the internal development of individual parcels in the EGUV site is relatively unknown at this stage in the planning process, except for the location of the church and the proposed grocery store development, an average internal capture rate of 25% was applied to all office, retail, and residential developments within the site prior to assigning trips to the surrounding roadway network.

Pass-by trips account for traffic that currently travels on the adjacent roadways to the proposed project that would stop into the development as a part of their pre-existing trip. Pass-by trips are dependent on the type and location of the proposed development with respect to access point locations. Based on the level of land use detail known at the time of the study, pass-by trips for the proposed grocery store were calculated for the site. Pass-by trips for the proposed grocery store would enter and exit the entire site from the adjacent stream of traffic at the proposed 39th Avenue SE access point location. The available ITE pass-by data for grocery store uses was reviewed to determine the appropriate peak hour pass-by trip reduction for grocery stores of a similar size to the proposed development. Based on a review of the ITE data and the size of the proposed development, a pass-by trip reduction of 25% was applied to the trip generation estimates for the grocery store land use.

The total trips generated by the proposed EGUV land uses were reduced for internal capture and pass-by volumes in order to determine the number of new trips that would occur on the surrounding street system as a result of the EGUV development. Table 4 summarizes the trip generation estimate for primary purpose trips that were utilized for the EGUV proposed development impact analysis. The development would generate approximately 1,246 new PM peak hour trips and 16,827 new daily trips onto the local roadways after the appropriate reductions for internal capture and pass-by trips.

Table 4: Trip Generation of Proposed EGUV Development

Land Use	ITE Land Use Code	Land Use Size	Average Daily Trips	PM Peak Hour Trips		
				Enter	Exit	Total
Church	560	25,700 SF	234	7	7	14
New Trips (subtotal)			234	7	7	14
General Office Building	710	66,800 SF	978	26	128	154
Reduction for Internal Trips (-25%)			*-245*	*-6*	*-32*	*-38*
New Trips (subtotal)			733	20	96	116
Supermarket	850	60,000 SF	6,134	321	309	630
Reduction for Internal Trips (-25%)			*-1,534*	-80	-77	-157
Reduction for Pass-by Trips (-25%)			*-1,150*	-61	-59	-120
New Trips (subtotal)			3,450	180	173	353
Specialty Retail Center	814	306,300 SF	13,575	333	424	757
Reduction for Internal Trips (-25%)			*-3,394*	-83	-106	-189
New Trips (subtotal)			10,181	250	318	568
Residential Townhouse	230	74 units	495	31	16	47
Reduction for Internal Trips (-25%)			*-124*	-7	-4	-11
New Trips (subtotal)			371	24	12	36
Apartments	220	354 units	2,478	138	74	212
Reduction for Internal Trips (-25%)			*-620*	-35	-18	-53
New Trips (subtotal)			1,858	103	56	159
TOTAL New Trips			**16,827**	**584**	**662**	**1,246**

3.2 Trip Distribution

Trip distribution represents the forecast of where vehicle trips go to and come from within the study area. The distribution of new trips to and from the EGUV site was developed from the Puget Sound Regional Council (PSRC) travel demand model. The proposed EGUV land use was coded into the 2020 PSRC travel demand model and the distribution of trips to and from the zone representing the EGUV area to the surround street network was used as the basis of the trip distribution for primary purpose trips to and from the EGUV site. The pass-by trip distribution was based on the forecasted traffic volumes on 132nd Street SE from the 2020 PSRC travel demand model for those trips that were not originating from or destined to the zone representing the EGUV area. The trip distribution for primary purpose trips generated by the proposed EGUV development is summarized in Figure 4.

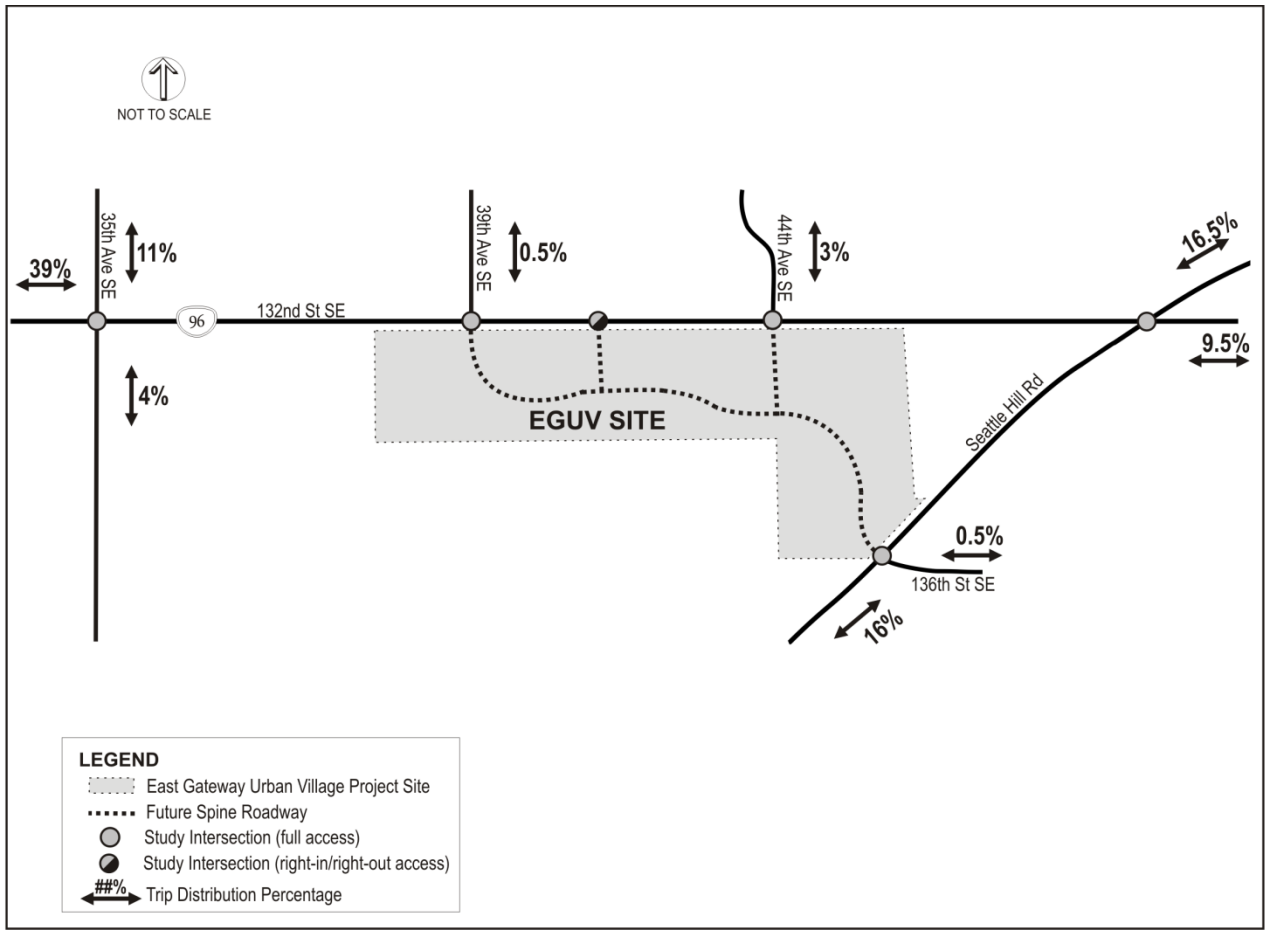

Figure 4: PM Peak Hour Trip Distribution of EGUV Site

3.3 Future Growth of Background Traffic

The average growth rate of traffic volumes without the proposed EGUV was calculated from the PSRC travel demand model for the streets within the study area. Based on the travel demand model, the traffic volumes are projected to grow at an annual average rate of approximately 2% per year. The existing traffic volumes were therefore projected out to 2020 conditions based on the average growth rate to establish future traffic conditions without the proposed EGUV development. The background traffic volumes are summarized in Figure 5.

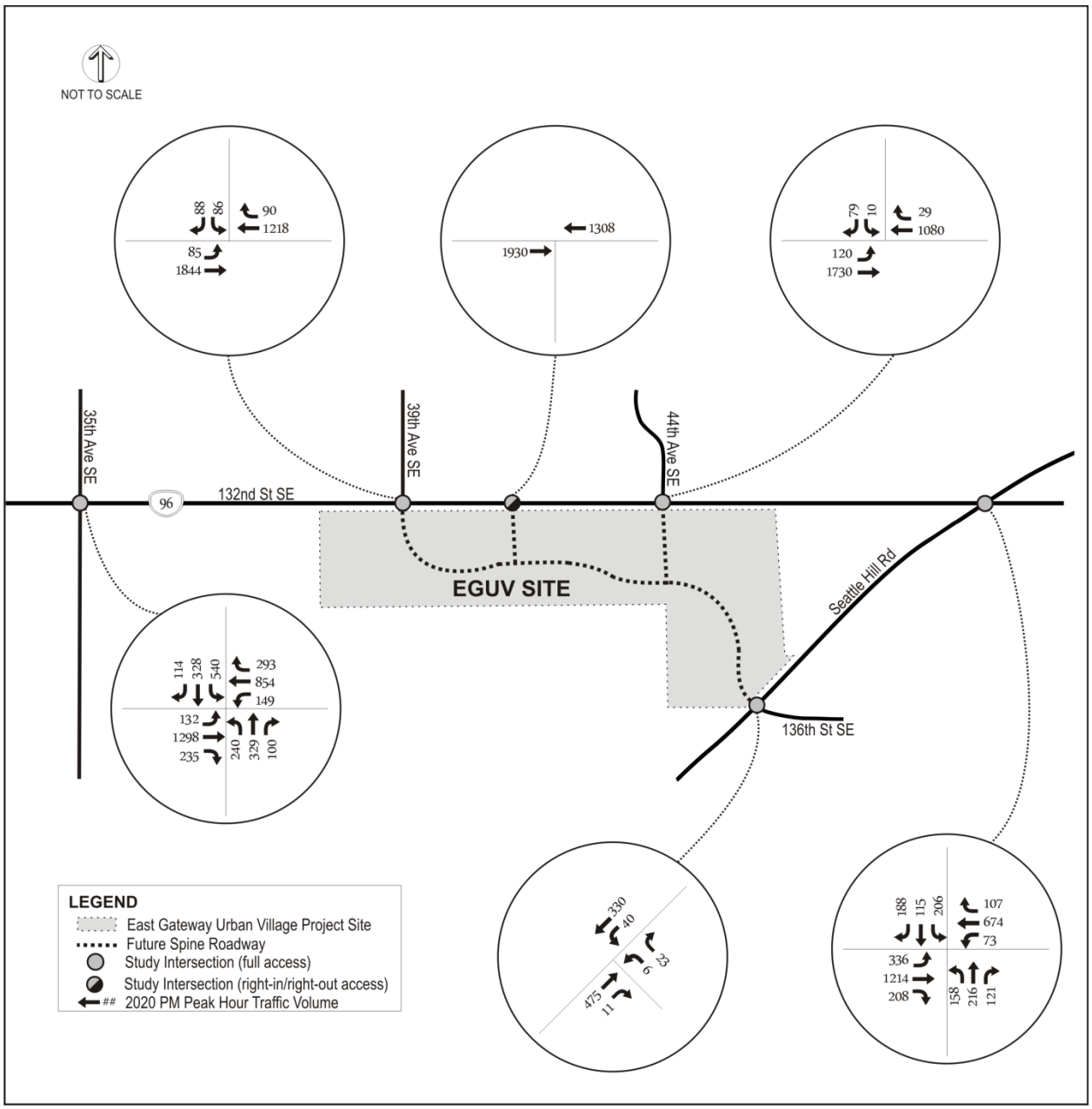

Figure 5: Future Baseline (2020) Turning Movement Volumes

3.3 Project Trip Assignment

The new trips generated by the proposed EGUV development were assigned to the surrounding street network based on the trip distribution shown in Figure 4. The projected traffic volumes generated by the proposed EGUV development are shown for each study intersection for the PM peak period in Figure 6. The projected traffic volumes of the proposed EGUV development include both new trips generated by the development as well as pass-by trips that were reassigned to the surrounding street system due to the development. The resulting volumes of the future background turning movement counts plus the projected PM peak hour traffic volumes associated with the EGUV development are shown in Figure 7.

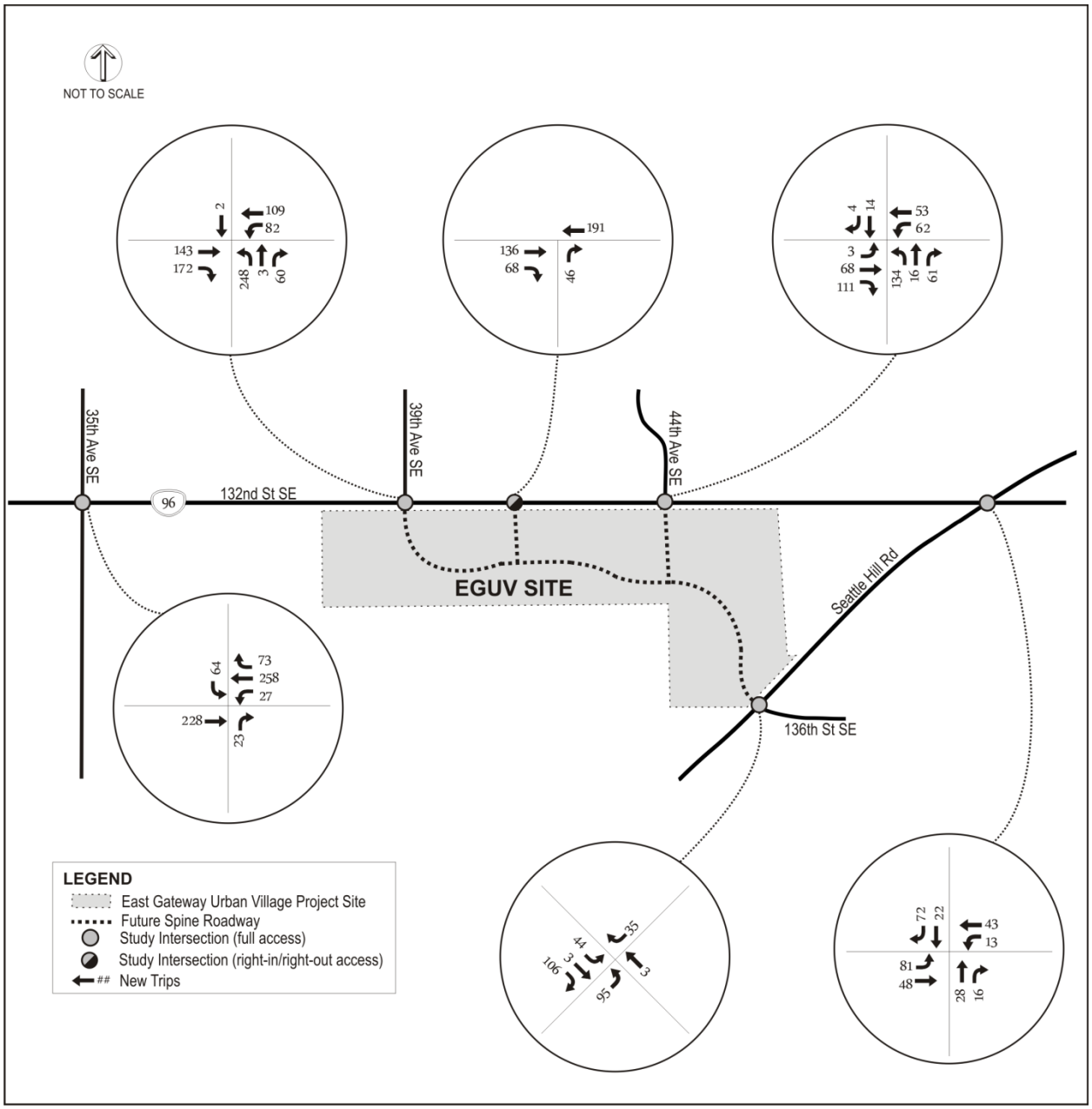

Figure 6: PM Peak Hour EGUV Trips

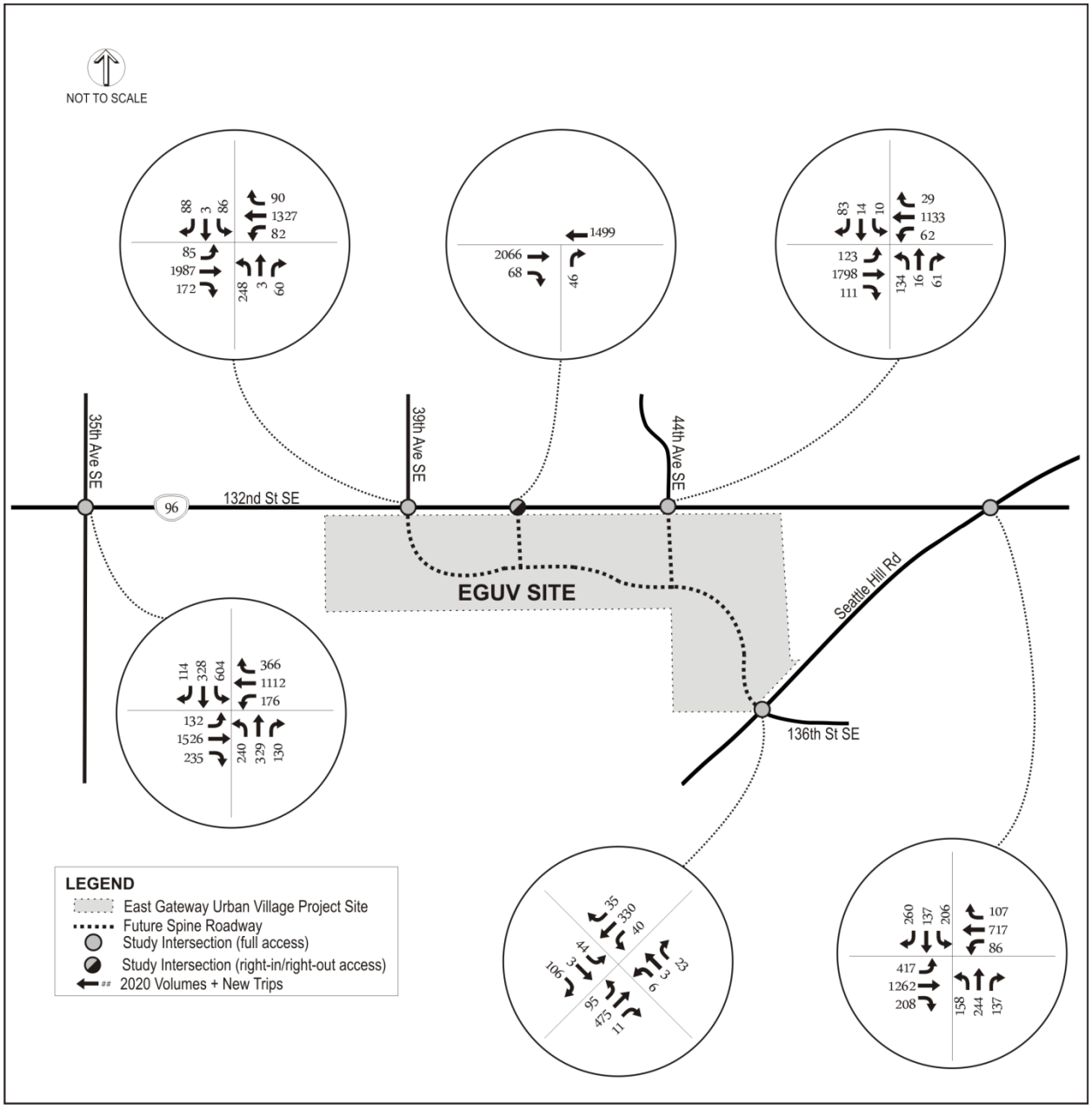

Figure 7: PM Peak Hour Future Baseline Plus EGUV Turning Movement Volumes

4 TRANSPORTATION IMPACTS OF EGUV FULL BUILD-OUT

This section reviews the impact of the full build-out of the proposed EGUV development on the study area transportation system. The analysis includes an evaluation of the operating conditions at study intersections including a signal warrant analysis, evaluation of signal phasing and coordination, queuing analysis, and recommended lane configuration at the proposed primary access point locations.

4.1 Signal Warrant Analysis

A signal warrant analysis was completed for the intersection of 132nd Street SE/44th Avenue SE based on the projected volumes from the EGUV development and the existing traffic volumes on 132nd Street SE. The signal warrant analysis was completed according to the *Manual on Uniform Traffic Control Devices, 2009 Edition* (MUTCD) signal warrant criteria for peak hour conditions. According to the MUTCD, the need for a traffic signal shall be considered if the total of both approaches on the major street exceeds 1,800 vehicles per lane per hour and the minor street approach with two lanes carries more than 150 vehicles for one hour of an average day. The existing total volume of both approaches on 132nd Street SE is approximately 2,950 vehicles in the peak hour. Based on the EGUV development, the proposed 44th Avenue SE access point into the development area is projected to have 211 northbound vehicles during the PM peak hour, which meets the warrant for signalizing the intersection at this location. Without a traffic signal controlling the intersection, vehicles exiting the EGUV site would experience significant delay resulting in an intersection LOS of F.

A signal warrant analysis was not completed for the intersection of Seattle Hill Road/136th Street SE as a roundabout is planned at that location to provide efficient intersection operations while contributing to an aesthetically appealing entrance to the EGUV.

4.2 Proposed Lane Geometry

The lane geometry at the intersection of 132nd Street SE/39th Avenue SE was based upon the signal plans developed by Snohomish County with input from the City of Mill Creek for this intersection. The signal design for this intersection accommodates a future four lane cross-section for the south leg of the intersection into the EGUV development. The south leg of the intersection would have one inbound travel lane and three outbound lanes. The turning movement configuration for northbound lanes out of the EGUV development has not been finalized. Given the high number of northbound left turns out of the EGUV at this location, two northbound left turn lanes are recommended at this access point. Since the south leg of the intersection is considerably wider than the north leg of the intersection, dedicating two lanes to left turning traffic and having the third lane operate as a northbound through/right lane creates some alignment issues in that the northbound through movement would be offset by more than 12-ft from the receiving lane. The degree of offset between the northbound through lanes would likely create operational problems. In order to provide an improved alignment for the northbound through movement, while providing additional capacity for northbound left turns, the northbound approach should be configured to have one dedicated left turn lane, a shared left/through lane, and a dedicated right turn lane. This configuration would require operating the signal split phase for the northbound and southbound movements.

The lane geometry of the 132nd Street SE/44th Avenue SE intersection has not been established. However, the south leg of 44th Avenue SE would likely have one lane into the site that is aligned with the edge of traveled-way with the southbound movement of the north leg of the intersection. This alignment would minimize the impacts to the existing church property. The northbound volumes out of the EGUV at this location are similar in magnitude and directional split to those at 39th Avenue SE with a high proportion of left and right turning movements, and very low through movement. In order to accommodate the high volume of left turning vehicles a dedicated left turn lane, shared left/through lane and dedicated right turn lane is also recommended at this intersection. The north leg of the intersection currently has no pavement markings at the intersection, and operates as one lane northbound and southbound; however, the north leg of the intersection is 34-ft wide. In order to provide efficient intersection operations, it is recommended that the north leg retain one lane inbound and one lane outbound, but that pavement marking should be installed to provide a center island dividing the inbound and outbound movements and aligning the northbound and southbound through movements at the intersection. This configuration would require operating the signal as split phase for the northbound and southbound approach.

132nd Street SE currently is a five lane facility with a two-way left turn lane. It is proposed that the two-way left turn lane would transition into a dedicated left turn pocket at the intersections with 39th Avenue SE and 44th Avenue SE. Conceptual sketches of the proposed lane geometry at the intersections of 132nd Street SE/39th Avenue SE and 132nd Street SE/44th Avenue SE are included in Figure 8 and Figure 9.

A roundabout is proposed at the intersection of the EGUV spine road, 136th Street Southeast, and Seattle Hill Road. Figure 10 depicts a conceptual layout for the roundabout. The inscribed circle for this single-lane roundabout is 130 feet with a circulating lane of 20 feet and a truck apron of 10 feet. The geometry will provide enough capacity for the projected traffic volumes at this intersection and accommodate a design vehicle of a WB-50. As shown in the figure, small amounts of additional right-of-way will likely need to be obtained, particularly in the north and west quadrants of the roundabout.

The right-in/right-out access point to 132nd Street between 39th Avenue SE and 44th Avenue SE should have one lane each direction. The northbound lane would be a dedicated right-turn only lane, and the eastbound movements could be converted from two through lanes, to one through lane and one shared through/right turn lane.

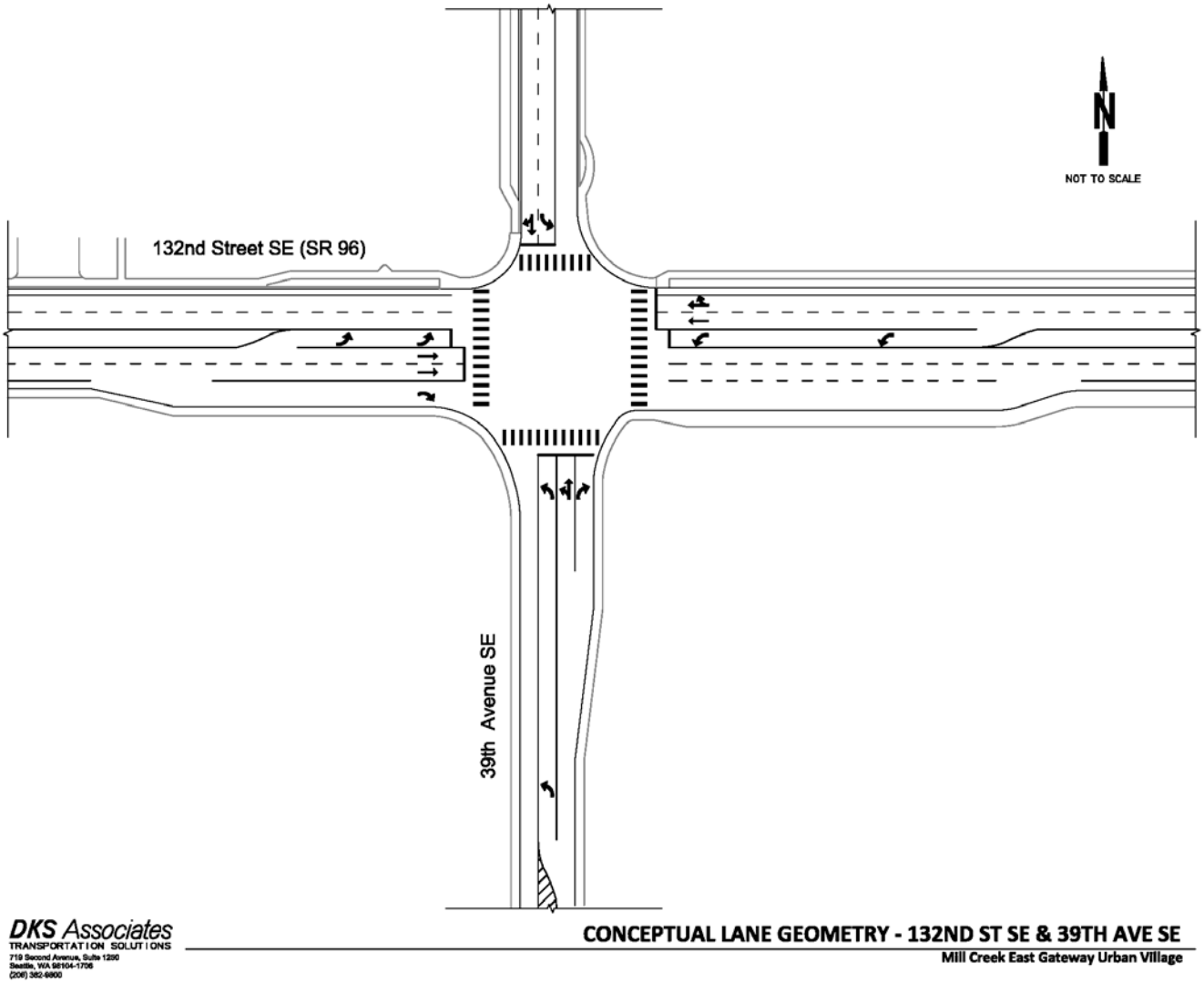

Figure 8: 132nd St SE/39th Ave SE Conceptual Lane Geometry

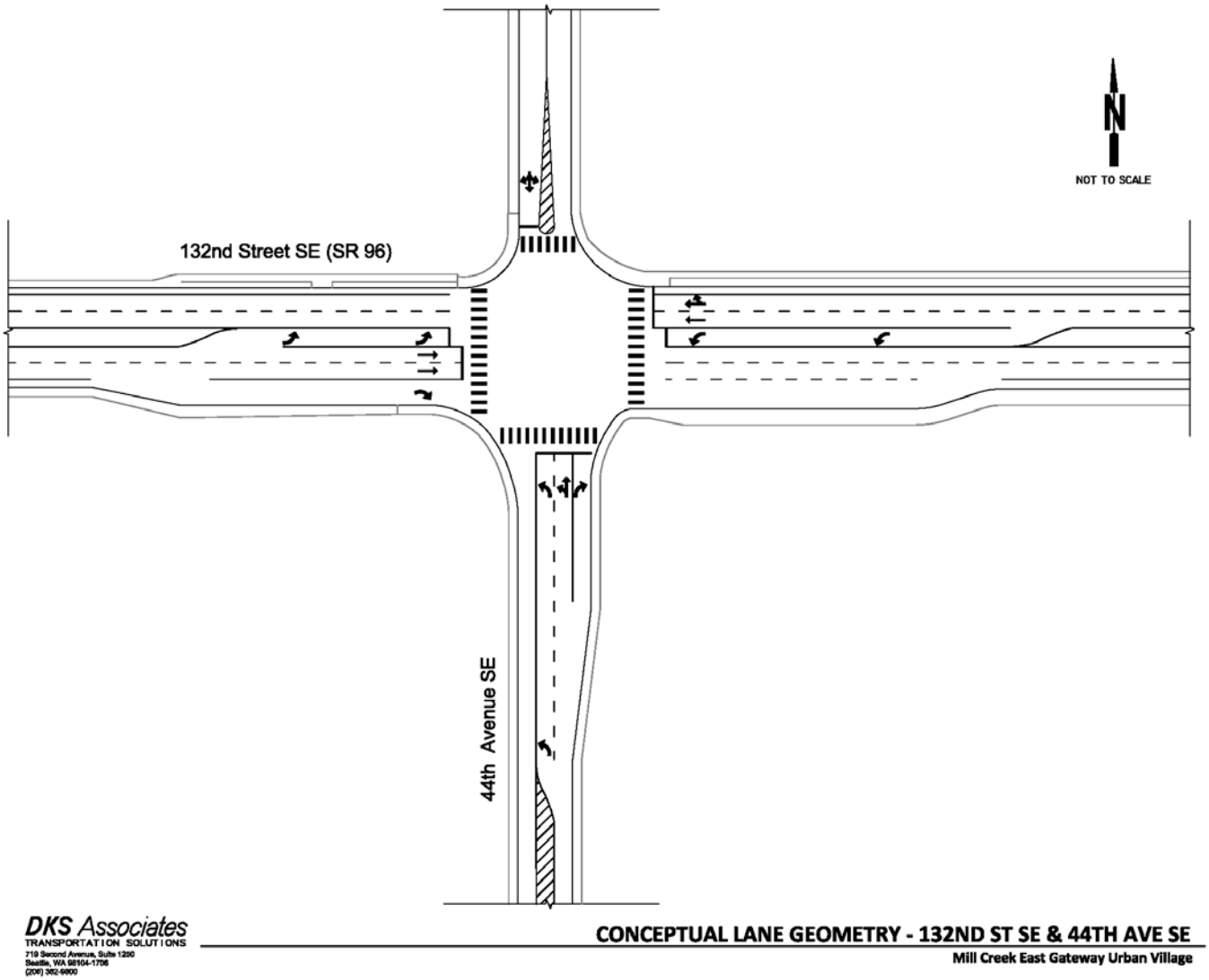

Figure 9: 132nd St SE/44th Ave SE Conceptual Lane Geometry

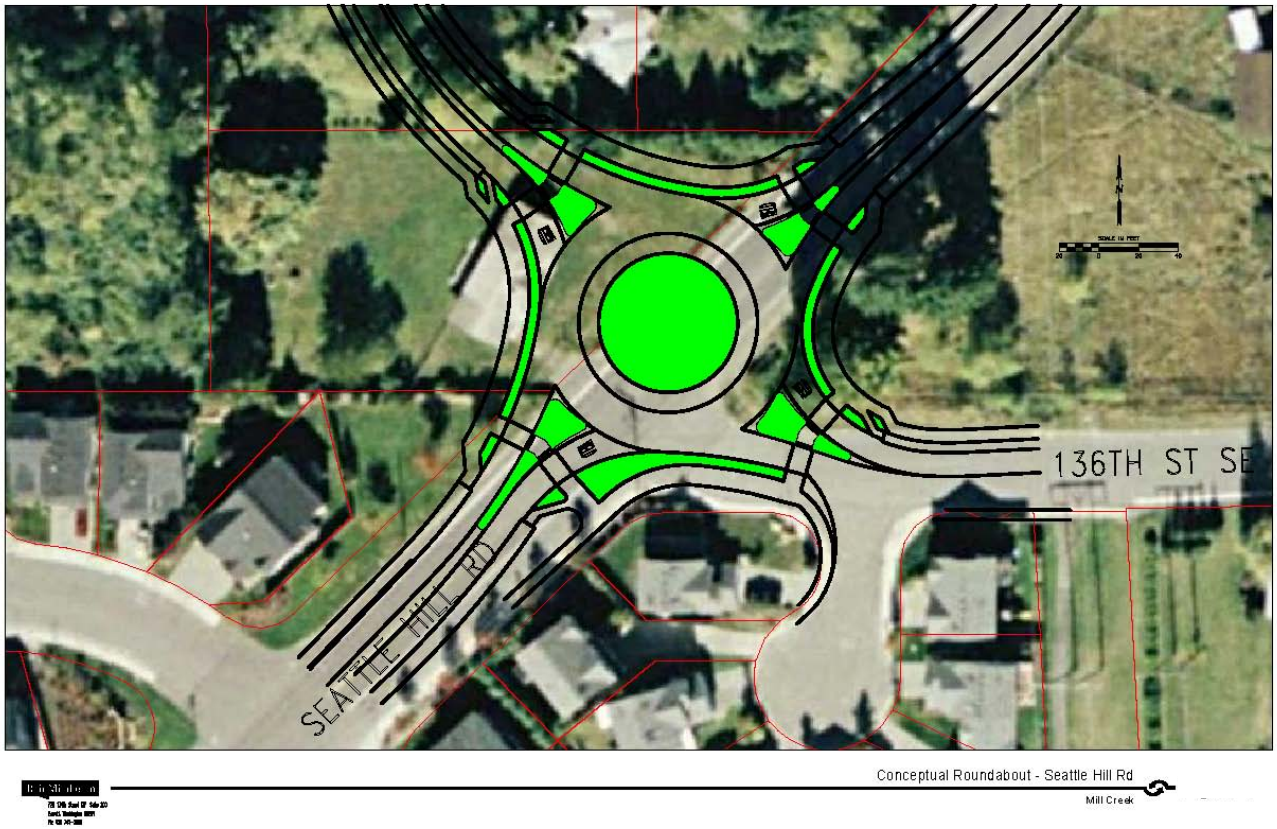

Figure 10: Seattle Hill Road/Spine Road/136th St SE Conceptual Roundabout

4.3 Intersection Performance with EGUV Development

The PM peak hour turning movement volumes of the2020 baseline traffic plus EGUV site were used to evaluate the performance of the study intersections with the development of the EGUV. The intersection performance of the 2020 baseline conditions without the proposed development are summarized in Table 5.

Table 5: Future (2020) Baseline PM Peak Hour LOS, Delay, and V/C Ratios

Intersection	Intersection Control	PM Peak Hour		
		LOS	Delay (sec/veh)	V/C Ratio
132nd Street SE/35th Avenue SE	signalized	E	68	1.07
132nd Street SE/39th Avenue SE	signalized	B	20	0.82
132nd Street SE/44th Avenue SE	unsignalized	B / C	1 / 18	-
132nd Street SE/Seattle Hill Road	signalized	D	52	0.94
Seattle Hill Road/136th Street SE	unsignalized	A / B	1 / 14	-

Note: For unsignalized intersections, the LOS and delay are reported for both the total intersection/minor street approach. V/C ratios are not defined for unsignalized intersections.

For the future conditions with the EGUV site, it was assumed that the intersection of 44th Avenue SE would be signalized and that the signals on 132nd Street SE would be coordinated between 35th Avenue SE and Seattle Hill Road. The proposed lane geometry as described in section 4.2 for each access point was used for the analysis. *Synchro* traffic analysis software was used to optimize the signal timing and calculate the LOS for the five study intersections on 132nd Street SE. The proposed roundabout at Seattle Hill Road/136th Street SE was evaluated using *SIDRA* traffic analysis software. The 2020 Baseline plus EGUV conditions are summarized in Table 6.

Table 6: Future Baseline plus EGUV Site Traffic PM Peak Hour LOS, Delay, and V/C Ratios

Intersection	Intersection Control	PM Peak Hour		
		LOS	Delay (sec/veh)	V/C Ratio
132nd Street SE/35th Avenue SE	signalized	F	97	1.26
132nd Street SE/39th Avenue SE	signalized	C	26	1.00
132nd Street SE/RIRO Access point	unsignalized	A / B	0 / 14	-
132nd Street SE/44th Avenue SE	signalized	B	17	0.88
132nd Street SE/Seattle Hill Road	signalized	D	48	1.03
Seattle Hill Road/136th Street SE	roundabout	A	8	0.48

The continuous flow of traffic at the proposed single lane roundabout will minimize delays, and will satisfactorily handle traffic operations without increasing the number of lanes at the intersection. The safety benefits of the roundabout include geometry that removes the most severe intersection collisions. For example, there are no head on, right angle, or T-bone collisions at a roundabout. In addition, the slower speeds necessary to maneuver through the roundabout reduce the severity of any possible collisions.

4.4 Queuing Analysis

A queuing analysis of the 132nd Street SE/39th Avenue SE and 132nd Street SE/44th Avenue SE intersections was completed based upon the proposed lane geometry and signalization of the intersections. The maximum queue lengths for the northbound approach turning movements out of the proposed development and the eastbound and westbound left turning movements on 132nd Street SE are summarized in Table 7.

Table 7: Queue Lengths at EGUV Signalized Access Points

Intersection	Maximum Queue Length (feet)			
	NBL	NBR	EBL	WBL
132nd Street SE/39th Avenue SE	210	50	85	210
132nd Street SE/44th Avenue SE	145	50	150	100

5 Mitigation Measures for EGUV Full Build-Out

This section outlines the mitigations to address the impacts of the full build-out of the EGUV on the surrounding street system.

5.1 Access Control

The primary access points to the EGUV at 132nd Street SE/39th Avenue SE and 132nd Street SE/44th Avenue SE should be signalized, and a roundabout should be installed at the primary access point at Seattle Hill Road/136th Street SE.

With the signalization of the intersection at 44th Avenue SE, access control measures should be installed on 132nd Street SE to improve operations. The access control measures could include the installation of a raised median, c-curb, or other median treatments to be determined by WSDOT for 132nd Street SE between 35th Avenue SE, 39th Avenue SE, 44th Avenue SE, and Seattle Hill Road. Any existing access points between 35th Avenue SE and Seattle Hill Road outside of the two signalized intersections at 39th Avenue SE and 44th Avenue SE should be converted to right-in/right-out operations. The intersection of 132nd Street SE/44th Avenue SE should be designed to accommodate U-turns.

The roundabout at the primary access point to the EGUV at Seattle Hill Road/136th Street SE should serve as the only access point to the EGUV from Seattle Hill Road.

5.2 Lane Geometry

The access points at 39th Avenue SE and 44th Avenue SE from the EGUV to 132nd Street SE should have three outbound lanes in the northbound direction with a dedicated northbound left turn lane, shared left/through lane, and right turn pocket. Additionally, the existing two-way left turn lane on 132nd Street SE should be converted into left-turn pockets at the 39th Avenue SE and 44th Avenue SE intersections. The dedicated left and right turn pockets for the northbound, eastbound and westbound approaches should be designed to accommodate the queue lengths projected with the full build-out of the EGUV. The 39th Avenue SE and 44th Avenue SE intersections should also be designed to accommodate U-turns and bus pull outs on the far side of the intersection in the eastbound direction.

The access point from the EGUV at Seattle Hill Road/136th Street SE should be a single lane roundabout. The splitter island geometry provides flexibility in the design to accommodate a variety of existing roadway sections. If a center left turn lane is constructed on Seattle Hill Road, the roundabout geometry can be seamlessly integrated into this configuration.

5.3 Traffic Signal Interconnect

When the intersection of 132nd Street SE/44th Avenue SE is signalized, the signals at 35th Avenue SE, 39th Avenue SE, 44th Avenue SE, and Seattle Hill Road should all be interconnected and coordinated to improve the traffic flow through the corridor. There is currently a missing link in the existing traffic signal interconnect on 132nd Street SE between 25th Avenue SE and 35th Avenue that needs to be constructed to provide the communications link from the WSDOT traffic management center to the corridor. Traffic signal interconnect should be installed between 25th Avenue SE and Seattle Hill Road.

Several alternatives exist for completing the interconnect between the signals: Underground interconnect (conduit); aerial interconnect; or wireless interconnect. Underground hardwire interconnect should be considered for the portion of 132nd Street SE adjacent to the EGUV if any sidewalk or frontage improvement will be constructed as a part of the development. Underground hardwire interconnect would require trenching and new conduit. Aerial interconnect using the utility poles on the north side of 132nd Street SE would save on construction costs but may require agreements with the utilities that own the poles. Alternatively, wireless communication between the intersections would also be cost effective and would be a viable alternative due to the clear line of sight between the intersections.

5.4 Spine Road Intersection Spacing and Driveway Widths

The intersection and curb-cut spacing along the spine road within the EGUV development will be developed as the properties within the development are finalized. Each development shall be allowed one two-way access point or two one-way access point per 500-feet of property frontage to the spine road. Access points to the spine road shall have a minimum spacing of 150-feet between the nearest edges of two adjacent access points. Whenever possible, access points shall be placed directly opposite each other. If this alignment is not possible, than the access points on opposite sides of the spine road should be separated by a minimum of 75-feet.

Shared access points are encouraged for adjacent developments. Shared access points shall have a minimum width of 36-feet and shall have a minimum of two outbound lanes and one inbound lane to the development. Sole access points shall have a minimum width of 24-feet with one outbound and one inbound lane to the development.

6 MITIGATION MEASURES FOR INTERIM CONDITIONS

This section outlines the mitigations to address the impacts of the EGUV in the interim condition prior to full build-out of the EGUV on the surrounding street system.

6.1 Access Control

The portion of 132nd Street SE adjacent o the EGUV is classified by WSDOT as a Class 3 facility for access control. According to the WSDOT Highway Classification Description Table, Class 3 facilities balance mobility and access in areas with less than maximum build-out. The minimum spacing of access points for a Class 3 facility is 330-ft, and only one access is allowed to contiguous parcels under the same ownership. Joint access points are preferred for the whole development area where possible.

Any developments adjacent to 132nd Street SE that are approved and constructed prior to the construction of the EGUV spine roadway may be permitted access to 132nd Street SE in accordance with WSDOT access control requirements, subject to WSDOT approval. Where possible, joint access points shall be installed for adjacent developments.

As the EGUV area develops, the City of Mill Creek recognizes that land use adjacent to 132nd Street SE will no longer meet the WSDOT definition of "less than maximum build-out" that defines a Class 3 facility, and access control measures should be installed on 132nd Street SE adjacent to the EGUV site. Access control measures should be installed on 132nd Street SE once the EGUV spine roadway is constructed between 39th Avenue SE and 44th Avenue SE and the intersection of 132nd Street SE/44th Avenue SE is signalized. The access control measures could include median, c-curb, or other treatment as identified by WSDOT. Access control measures should be installed on 132nd Street SE between the intersections of 35th Avenue SE, 39th Avenue SE, 44th Avenue SE and Seattle Hill Road. All temporary access points to 132nd Street SE granted to EGUV developments within the interim conditions shall be closed when the spine road is constructed. The signalized intersection of 39th Avenue SE and 44th Avenue SE shall be designed to accommodate U-turn movements, and shall be the full-access points from 132nd Street SE to the EGUV development.

Snohomish County does not have an established roadway classification for access control for Seattle Hill Road, but a new intersection to a County facility should meet the design criteria established in the most current version of the Snohomish County's Engineering Design and Development Standards, or the version of the standards to which the development is vested. Access to parcels adjacent to Seattle Hill Road shall be permitted temporary access according to the Snohomish County standards in the interim conditions until the spine road is constructed between 44th Avenue NE and Seattle Hill Road. Once the spine road is constructed between 44th Avenue SE and Seattle Hill Road, all temporary access points shall be closed and the roundabout at Seattle Hill Road/136th Street SE shall serve as the access point to the EGUV development from Seattle Hill Road.

6.2 Traffic Signal Interconnect

Traffic signal interconnect described in Section 5.3 shall be required on 132nd Street SE at the point when the intersections of 132nd Street SE/39th Avenue SE and 132nd Street SE/44th Avenue SE are signalized. If signals are installed at these two intersections prior to the full build-out of the EGUV, then traffic signal interconnect shall also be installed during the interim conditions.

Appendix C
Stormwater Hydraulics Modeling Output, prepared by Reid Middleton, Inc.

Western Washington Hydrology Model
PROJECT REPORT

Project Name: Basin A
Site Address:
City : Mill Creek
Report Date : 11/4/2010
Gage : Everett
Data Start : 1948/10/01
Data End : 1997/09/30
Precip Scale: 1.00
WWHM3 Version:

PREDEVELOPED LAND USE

Name : Basin A
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Forest, Mod	31.16

Impervious Land Use	Acres

Name : Basin A - Developed
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Forest, Mod	1.92
C, Pasture, Mod	6.15
C, Lawn, Mod	6.42

Impervious Land Use	Acres
ROADS MOD	3.76
ROOF TOPS FLAT	5.16
PARKING MOD	7.75

Element Flows To:

Surface	Interflow	Groundwater
Vault A,	Vault A,	

Name : Vault A
Width : 156 ft.
Length : 468 ft.
Depth: 5ft.
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 18 in.
NotchType : Rectangular
Notch Width : 0.200 ft.
Notch Height: 1.214 ft.
Orifice 1 Diameter: 2.712 in. **Elevation:** 0 ft.

Element Flows To:
Outlet 1 **Outlet 2**

Vault Hydraulic Table

Stage(ft)	Area(acr)	Volume(acr-ft)	Dschrg(cfs)	Infilt(cfs)
0.000	1.676	0.000	0.000	0.000
0.056	1.676	0.093	0.046	0.000
0.111	1.676	0.186	0.064	0.000
0.167	1.676	0.279	0.079	0.000
0.222	1.676	0.372	0.091	0.000
0.278	1.676	0.466	0.102	0.000
0.333	1.676	0.559	0.112	0.000
0.389	1.676	0.652	0.120	0.000
0.444	1.676	0.745	0.129	0.000
0.500	1.676	0.838	0.137	0.000
0.556	1.676	0.931	0.144	0.000
0.611	1.676	1.024	0.151	0.000
0.667	1.676	1.117	0.158	0.000
0.722	1.676	1.210	0.164	0.000
0.778	1.676	1.304	0.170	0.000
0.833	1.676	1.397	0.176	0.000
0.889	1.676	1.490	0.182	0.000
0.944	1.676	1.583	0.188	0.000
1.000	1.676	1.676	0.193	0.000
1.056	1.676	1.769	0.198	0.000
1.111	1.676	1.862	0.204	0.000
1.167	1.676	1.955	0.209	0.000
1.222	1.676	2.048	0.214	0.000
1.278	1.676	2.142	0.218	0.000
1.333	1.676	2.235	0.223	0.000
1.389	1.676	2.328	0.228	0.000
1.444	1.676	2.421	0.232	0.000
1.500	1.676	2.514	0.237	0.000
1.556	1.676	2.607	0.241	0.000
1.611	1.676	2.700	0.245	0.000
1.667	1.676	2.793	0.249	0.000
1.722	1.676	2.887	0.254	0.000
1.778	1.676	2.980	0.258	0.000
1.833	1.676	3.073	0.262	0.000
1.889	1.676	3.166	0.265	0.000
1.944	1.676	3.259	0.269	0.000
2.000	1.676	3.352	0.273	0.000

2.056	1.676	3.445	0.277	0.000
2.111	1.676	3.538	0.281	0.000
2.167	1.676	3.631	0.284	0.000
2.222	1.676	3.725	0.288	0.000
2.278	1.676	3.818	0.292	0.000
2.333	1.676	3.911	0.295	0.000
2.389	1.676	4.004	0.299	0.000
2.444	1.676	4.097	0.302	0.000
2.500	1.676	4.190	0.305	0.000
2.556	1.676	4.283	0.309	0.000
2.611	1.676	4.376	0.312	0.000
2.667	1.676	4.469	0.315	0.000
2.722	1.676	4.563	0.319	0.000
2.778	1.676	4.656	0.322	0.000
2.833	1.676	4.749	0.332	0.000
2.889	1.676	4.842	0.350	0.000
2.944	1.676	4.935	0.372	0.000
3.000	1.676	5.028	0.398	0.000
3.056	1.676	5.121	0.426	0.000
3.111	1.676	5.214	0.456	0.000
3.167	1.676	5.307	0.488	0.000
3.222	1.676	5.401	0.522	0.000
3.278	1.676	5.494	0.557	0.000
3.333	1.676	5.587	0.593	0.000
3.389	1.676	5.680	0.630	0.000
3.444	1.676	5.773	0.667	0.000
3.500	1.676	5.866	0.706	0.000
3.556	1.676	5.959	0.745	0.000
3.611	1.676	6.052	0.784	0.000
3.667	1.676	6.145	0.823	0.000
3.722	1.676	6.239	0.863	0.000
3.778	1.676	6.332	0.903	0.000
3.833	1.676	6.425	0.949	0.000
3.889	1.676	6.518	0.998	0.000
3.944	1.676	6.611	1.048	0.000
4.000	1.676	6.704	1.099	0.000
4.056	1.676	6.797	1.293	0.000
4.111	1.676	6.890	1.645	0.000
4.167	1.676	6.983	2.101	0.000
4.222	1.676	7.077	2.640	0.000
4.278	1.676	7.170	3.251	0.000
4.333	1.676	7.263	3.926	0.000
4.389	1.676	7.356	4.660	0.000
4.444	1.676	7.449	5.448	0.000
4.500	1.676	7.542	6.287	0.000
4.556	1.676	7.635	7.174	0.000
4.611	1.676	7.728	8.106	0.000
4.667	1.676	7.821	9.082	0.000
4.722	1.676	7.915	10.10	0.000
4.778	1.676	8.008	11.16	0.000
4.833	1.676	8.101	12.25	0.000
4.889	1.676	8.194	13.38	0.000
4.944	1.676	8.287	14.55	0.000
5.000	**1.676**	**8.380**	**15.75**	**0.000**
5.056	1.676	8.473	16.99	0.000
5.111	0.000	0.000	18.26	0.000

MITIGATED LAND USE

ANALYSIS RESULTS

Flow Frequency Return Periods for Predeveloped. POC #1 (Basin A)

Return Period	Flow(cfs)
2 year	0.606622
5 year	0.92364
10 year	1.172121
25 year	1.533004
50 year	1.837905
100 year	2.175423

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.378606
5 year	0.642397
10 year	0.887048
25 year	1.29812
50 year	1.69479
100 year	2.184829

Yearly Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1950	0.217	0.276
1951	0.981	0.458
1952	0.473	0.280
1953	0.444	0.273
1954	0.570	0.252
1955	0.858	0.315
1956	1.132	0.729
1957	0.769	0.730
1958	1.101	0.504
1959	0.800	0.336
1960	0.633	0.353
1961	0.594	0.366
1962	0.574	0.621
1963	0.782	0.258
1964	1.196	0.292
1965	0.575	0.233
1966	0.583	0.408
1967	0.303	0.274
1968	0.803	0.284
1969	0.844	0.397
1970	0.385	0.304
1971	0.447	0.290
1972	0.681	0.821
1973	0.607	0.286
1974	0.436	0.477
1975	0.564	0.358
1976	0.455	0.252
1977	0.466	0.298
1978	0.351	0.260

1979	0.472	0.271
1980	1.486	0.268
1981	0.497	0.271
1982	0.564	0.253
1983	0.591	0.443
1984	0.548	0.307
1985	0.567	0.833
1986	0.836	0.642
1987	2.008	2.435
1988	0.832	0.979
1989	0.448	0.447
1990	0.690	0.244
1991	0.591	0.488
1992	0.635	0.385
1993	0.497	0.450
1994	0.297	0.224
1995	0.252	0.394
1996	0.577	0.596
1997	1.138	0.594
1998	2.508	4.359

POC #1 (Basin A)
The Facility PASSED

The Facility PASSED.

Flow(CFS)	Predev	Dev	Percentage	Pass/Fail
0.3033	4330	4254	98	Pass
0.3188	3897	3392	87	Pass
0.3343	3481	2915	83	Pass
0.3498	3096	2571	83	Pass
0.3653	2736	2230	81	Pass
0.3808	2460	1957	79	Pass
0.3963	2192	1751	79	Pass
0.4118	1984	1610	81	Pass
0.4273	1755	1472	83	Pass
0.4428	1552	1323	85	Pass
0.4583	1369	1188	86	Pass
0.4738	1240	1097	88	Pass
0.4893	1116	995	89	Pass
0.5048	1009	922	91	Pass
0.5203	901	840	93	Pass
0.5358	801	768	95	Pass
0.5513	713	694	97	Pass
0.5668	634	617	97	Pass
0.5823	557	557	100	Pass
0.5978	501	491	98	Pass
0.6133	458	434	94	Pass
0.6288	421	380	90	Pass
0.6443	385	326	84	Pass
0.6598	357	299	83	Pass
0.6753	329	269	81	Pass
0.6908	304	256	84	Pass
0.7063	281	235	83	Pass
0.7218	267	216	80	Pass

0.7373	252	196	77	Pass
0.7528	237	185	78	Pass
0.7683	214	175	81	Pass
0.7838	197	163	82	Pass
0.7993	181	154	85	Pass
0.8148	166	144	86	Pass
0.8303	158	129	81	Pass
0.8458	149	123	82	Pass
0.8613	142	118	83	Pass
0.8768	136	114	83	Pass
0.8923	128	109	85	Pass
0.9078	126	104	82	Pass
0.9233	123	100	81	Pass
0.9388	118	96	81	Pass
0.9544	115	91	79	Pass
0.9699	112	80	71	Pass
0.9854	109	72	66	Pass
1.0009	108	63	58	Pass
1.0164	105	60	57	Pass
1.0319	105	56	53	Pass
1.0474	102	52	50	Pass
1.0629	100	50	50	Pass
1.0784	95	48	50	Pass
1.0939	90	46	51	Pass
1.1094	85	44	51	Pass
1.1249	85	44	51	Pass
1.1404	79	42	53	Pass
1.1559	78	42	53	Pass
1.1714	75	42	56	Pass
1.1869	74	40	54	Pass
1.2024	71	38	53	Pass
1.2179	70	36	51	Pass
1.2334	69	34	49	Pass
1.2489	67	34	50	Pass
1.2644	67	32	47	Pass
1.2799	64	32	50	Pass
1.2954	62	31	50	Pass
1.3109	61	30	49	Pass
1.3264	60	28	46	Pass
1.3419	60	28	46	Pass
1.3574	56	28	50	Pass
1.3729	56	28	50	Pass
1.3884	55	28	50	Pass
1.4039	53	28	52	Pass
1.4194	53	26	49	Pass
1.4349	51	26	50	Pass
1.4504	50	26	52	Pass
1.4659	49	26	53	Pass
1.4814	47	26	55	Pass
1.4969	45	26	57	Pass
1.5124	42	26	61	Pass
1.5279	41	26	63	Pass
1.5434	41	25	60	Pass
1.5589	39	25	64	Pass
1.5744	38	25	65	Pass
1.5899	37	24	64	Pass
1.6054	35	24	68	Pass

1.6209	34	24	70	Pass
1.6364	33	24	72	Pass
1.6519	33	24	72	Pass
1.6674	32	24	75	Pass
1.6829	32	24	75	Pass
1.6984	31	24	77	Pass
1.7139	29	23	79	Pass
1.7294	28	23	82	Pass
1.7449	28	23	82	Pass
1.7604	27	23	85	Pass
1.7759	26	23	88	Pass
1.7914	26	23	88	Pass
1.8069	24	23	95	Pass
1.8224	22	21	95	Pass
1.8379	21	21	100	Pass

Water Quality BMP Flow and Volume for POC 1 (Basin A).
On-line facility volume: 0.551 acre-feet
On-line facility target flow: 0.01 **cfs.**
Adjusted for 15 min: 0.2981 **cfs.**
Off-line facility target flow: 0.1873 **cfs.**
Adjusted for 15 min: 0.2003 **cfs.**

Western Washington Hydrology Model
PROJECT REPORT

Project Name: Basin B
Site Address:
City : Mill Creek
Report Date : 11/4/2010
Gage : Everett
Data Start : 1948/10/01
Data End : 1997/09/30
Precip Scale: 1.00
WWHM3 Version:

PREDEVELOPED LAND USE

Name : Basin B
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Forest, Mod	22.27

Impervious Land Use	Acres

Name : Basin B
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Forest, Mod	1.08
C, Lawn, Flat	2.2
C, Pasture, Mod	1.75

Impervious Land Use	Acres
ROADS MOD	2.75
ROOF TOPS FLAT	8.69
PARKING FLAT	5.8

Element Flows To:

Surface	Interflow	Groundwater
Vault B,	Vault B,	

Name : Vault B
Width : 172 ft.
Length : 517 ft.
Depth: 5ft.
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 18 in.
NotchType : Rectangular
Notch Width : 0.121 ft.
Notch Height: 1.214 ft.
Orifice 1 Diameter: 2.211 in. **Elevation:** 0 ft.

Element Flows To:
Outlet 1 **Outlet 2**

Vault Hydraulic Table

Stage(ft)	Area(acr)	Volume(acr-ft)	Dschrg(cfs)	Infilt(cfs)
0.000	2.041	0.000	0.000	0.000
0.056	2.041	0.113	0.030	0.000
0.111	2.041	0.227	0.043	0.000
0.167	2.041	0.340	0.052	0.000
0.222	2.041	0.454	0.061	0.000
0.278	2.041	0.567	0.068	0.000
0.333	2.041	0.680	0.074	0.000
0.389	2.041	0.794	0.080	0.000
0.444	2.041	0.907	0.086	0.000
0.500	2.041	1.021	0.091	0.000
0.556	2.041	1.134	0.096	0.000
0.611	2.041	1.248	0.100	0.000
0.667	2.041	1.361	0.105	0.000
0.722	2.041	1.474	0.109	0.000
0.778	2.041	1.588	0.113	0.000
0.833	2.041	1.701	0.117	0.000
0.889	2.041	1.815	0.121	0.000
0.944	2.041	1.928	0.125	0.000
1.000	2.041	2.041	0.128	0.000
1.056	2.041	2.155	0.132	0.000
1.111	2.041	2.268	0.135	0.000
1.167	2.041	2.382	0.139	0.000
1.222	2.041	2.495	0.142	0.000
1.278	2.041	2.608	0.145	0.000
1.333	2.041	2.722	0.148	0.000
1.389	2.041	2.835	0.151	0.000
1.444	2.041	2.949	0.154	0.000
1.500	2.041	3.062	0.157	0.000
1.556	2.041	3.176	0.160	0.000
1.611	2.041	3.289	0.163	0.000
1.667	2.041	3.402	0.166	0.000
1.722	2.041	3.516	0.168	0.000
1.778	2.041	3.629	0.171	0.000
1.833	2.041	3.743	0.174	0.000
1.889	2.041	3.856	0.176	0.000
1.944	2.041	3.969	0.179	0.000

2.000	2.041	4.083	0.182	0.000
2.056	2.041	4.196	0.184	0.000
2.111	2.041	4.310	0.187	0.000
2.167	2.041	4.423	0.189	0.000
2.222	2.041	4.536	0.191	0.000
2.278	2.041	4.650	0.194	0.000
2.333	2.041	4.763	0.196	0.000
2.389	2.041	4.877	0.198	0.000
2.444	2.041	4.990	0.201	0.000
2.500	2.041	5.104	0.203	0.000
2.556	2.041	5.217	0.205	0.000
2.611	2.041	5.330	0.207	0.000
2.667	2.041	5.444	0.210	0.000
2.722	2.041	5.557	0.212	0.000
2.778	2.041	5.671	0.214	0.000
2.833	2.041	5.784	0.220	0.000
2.889	2.041	5.897	0.231	0.000
2.944	2.041	6.011	0.245	0.000
3.000	2.041	6.124	0.261	0.000
3.056	2.041	6.238	0.278	0.000
3.111	2.041	6.351	0.296	0.000
3.167	2.041	6.464	0.316	0.000
3.222	2.041	6.578	0.336	0.000
3.278	2.041	6.691	0.358	0.000
3.333	2.041	6.805	0.380	0.000
3.389	2.041	6.918	0.402	0.000
3.444	2.041	7.032	0.425	0.000
3.500	2.041	7.145	0.449	0.000
3.556	2.041	7.258	0.472	0.000
3.611	2.041	7.372	0.496	0.000
3.667	2.041	7.485	0.520	0.000
3.722	2.041	7.599	0.544	0.000
3.778	2.041	7.712	0.569	0.000
3.833	2.041	7.825	0.597	0.000
3.889	2.041	7.939	0.627	0.000
3.944	2.041	8.052	0.657	0.000
4.000	2.041	8.166	0.688	0.000
4.056	2.041	8.279	0.881	0.000
4.111	2.041	8.392	1.233	0.000
4.167	2.041	8.506	1.687	0.000
4.222	2.041	8.619	2.225	0.000
4.278	2.041	8.733	2.835	0.000
4.333	2.041	8.846	3.510	0.000
4.389	2.041	8.960	4.243	0.000
4.444	2.041	9.073	5.030	0.000
4.500	2.041	9.186	5.868	0.000
4.556	2.041	9.300	6.754	0.000
4.611	2.041	9.413	7.686	0.000
4.667	2.041	9.527	8.660	0.000
4.722	2.041	9.640	9.676	0.000
4.778	2.041	9.753	10.73	0.000
4.833	2.041	9.867	11.83	0.000
4.889	2.041	9.980	12.96	0.000
4.944	2.041	10.09	14.12	0.000
5.000	**2.041**	**10.22**	**15.30**	**0.000**
5.056	2.041	10.32	16.56	0.000
5.111	0.000	0.000	17.83	0.000

MITIGATED LAND USE

ANALYSIS RESULTS

Flow Frequency Return Periods for Predeveloped. POC #2 (Basin B)

Return Period	Flow(cfs)
2 year	0.433552
5 year	0.660124
10 year	0.837713
25 year	1.095635
50 year	1.313547
100 year	1.55477

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	Flow(cfs)
2 year	0.229013
5 year	0.380094
10 year	0.514958
25 year	0.733999
50 year	0.938861
100 year	1.18541

Yearly Peaks for Predeveloped and Mitigated. POC #2

Year	Predeveloped	Mitigated
1950	0.155	0.181
1951	0.701	0.221
1952	0.338	0.186
1953	0.317	0.174
1954	0.407	0.169
1955	0.613	0.199
1956	0.809	0.561
1957	0.550	0.598
1958	0.787	0.203
1959	0.572	0.204
1960	0.452	0.197
1961	0.425	0.193
1962	0.410	0.367
1963	0.559	0.160
1964	0.855	0.192
1965	0.411	0.163
1966	0.417	0.205
1967	0.217	0.180
1968	0.574	0.198
1969	0.603	0.212
1970	0.275	0.195
1971	0.320	0.188
1972	0.486	0.615
1973	0.434	0.178
1974	0.312	0.235

1975	0.403	0.253
1976	0.325	0.169
1977	0.333	0.207
1978	0.251	0.166
1979	0.337	0.174
1980	1.062	0.157
1981	0.355	0.178
1982	0.403	0.160
1983	0.423	0.212
1984	0.392	0.209
1985	0.405	0.521
1986	0.597	0.527
1987	1.435	0.610
1988	0.595	0.521
1989	0.320	0.229
1990	0.493	0.166
1991	0.423	0.207
1992	0.454	0.229
1993	0.355	0.204
1994	0.212	0.151
1995	0.180	0.228
1996	0.412	0.307
1997	0.813	0.280
1998	1.792	3.449

POC #2 (Basin B)
The Facility PASSED

The Facility PASSED.

Flow(CFS)	Predev	Dev	Percentage	Pass/Fail
0.2168	4347	2392	55	Pass
0.2279	3908	1973	50	Pass
0.2389	3501	1752	50	Pass
0.2500	3082	1545	50	Pass
0.2611	2731	1397	51	Pass
0.2722	2453	1292	52	Pass
0.2832	2192	1198	54	Pass
0.2943	1979	1100	55	Pass
0.3054	1759	1012	57	Pass
0.3165	1550	934	60	Pass
0.3276	1376	855	62	Pass
0.3386	1241	795	64	Pass
0.3497	1117	732	65	Pass
0.3608	1011	673	66	Pass
0.3719	908	622	68	Pass
0.3830	804	569	70	Pass
0.3940	712	528	74	Pass
0.4051	631	489	77	Pass
0.4162	557	456	81	Pass
0.4273	499	423	84	Pass
0.4383	458	392	85	Pass
0.4494	419	368	87	Pass
0.4605	387	345	89	Pass
0.4716	357	315	88	Pass

0.4827	330	270	81	Pass
0.4937	304	238	78	Pass
0.5048	282	212	75	Pass
0.5159	267	182	68	Pass
0.5270	254	156	61	Pass
0.5381	236	142	60	Pass
0.5491	214	130	60	Pass
0.5602	195	113	57	Pass
0.5713	181	100	55	Pass
0.5824	165	90	54	Pass
0.5934	158	81	51	Pass
0.6045	149	72	48	Pass
0.6156	142	62	43	Pass
0.6267	136	57	41	Pass
0.6378	128	51	39	Pass
0.6488	126	47	37	Pass
0.6599	123	40	32	Pass
0.6710	118	37	31	Pass
0.6821	115	34	29	Pass
0.6932	112	32	28	Pass
0.7042	109	32	29	Pass
0.7153	108	31	28	Pass
0.7264	105	28	26	Pass
0.7375	105	28	26	Pass
0.7485	102	27	26	Pass
0.7596	100	26	26	Pass
0.7707	95	25	26	Pass
0.7818	90	24	26	Pass
0.7929	85	23	27	Pass
0.8039	85	23	27	Pass
0.8150	79	23	29	Pass
0.8261	78	22	28	Pass
0.8372	75	22	29	Pass
0.8483	74	21	28	Pass
0.8593	71	21	29	Pass
0.8704	70	20	28	Pass
0.8815	69	20	28	Pass
0.8926	67	20	29	Pass
0.9036	67	20	29	Pass
0.9147	64	20	31	Pass
0.9258	62	19	30	Pass
0.9369	61	19	31	Pass
0.9480	60	19	31	Pass
0.9590	60	19	31	Pass
0.9701	56	19	33	Pass
0.9812	56	19	33	Pass
0.9923	55	19	34	Pass
1.0033	53	19	35	Pass
1.0144	53	18	33	Pass
1.0255	51	18	35	Pass
1.0366	50	18	36	Pass
1.0477	49	17	34	Pass
1.0587	47	17	36	Pass
1.0698	45	16	35	Pass
1.0809	42	16	38	Pass
1.0920	41	16	39	Pass
1.1031	41	16	39	Pass

1.1141	39	16	41	Pass
1.1252	38	16	42	Pass
1.1363	37	16	43	Pass
1.1474	35	16	45	Pass
1.1584	34	16	47	Pass
1.1695	33	15	45	Pass
1.1806	33	15	45	Pass
1.1917	32	15	46	Pass
1.2028	32	15	46	Pass
1.2138	31	15	48	Pass
1.2249	29	14	48	Pass
1.2360	28	14	50	Pass
1.2471	28	14	50	Pass
1.2582	27	14	51	Pass
1.2692	26	14	53	Pass
1.2803	26	12	46	Pass
1.2914	23	12	52	Pass
1.3025	22	12	54	Pass
1.3135	21	12	57	Pass

Water Quality BMP Flow and Volume for POC 2 (Basin B).
On-line facility volume: 1.8043 acre-feet
On-line facility target flow: 0.01 **cfs.**
Adjusted for 15 min: 2.705 **cfs.**
Off-line facility target flow: 1.4086 **cfs.**
Adjusted for 15 min: 1.5504 **cfs.**
