

MEMORANDUM

DATE: November 1, 2016

TO: David Ratliff, Development Manager, DevCo, Inc.

FROM: Michael Read, PE, Principal, TENW

SUBJECT: Traffic and Parking Impact Analysis of Snoqualmie Ridge Apartments
TENW Project No. 3479

This memorandum summarizes a traffic impact analysis of *Snoqualmie Ridge Apartments*, a proposed multifamily residential project containing 200 apartment units in Snoqualmie, WA. This memo includes documentation of adjacent historical development, project description, existing transportation conditions within the immediate site vicinity, methodology used to derive the trip generation estimate, traffic operational impact analysis, and identification of any mitigation measures to offset traffic impacts.

Historical Context

Per Resolution 702, the City of Snoqualmie and Quadrant Corporation executed a Development Agreement for Snoqualmie Ridge Phase II in March 2004. As part of the approved site plan and entitled buildout of this mixed use development, a mixture of housing types, commercial retail uses, and other civic/institutional buildout was considered under three different development alternatives. In the selected alternative, the proposed development site of the *Snoqualmie Ridge Apartments* project was originally entitled for 160 affordable housing units through the Snoqualmie Ridge II EIS and Development Agreement. This limited scope study is to address a consolidation of other affordable housing units from other development areas within Snoqualmie Ridge II and increase buildout of this specific site to a total of 200 affordable apartment units, a net increase of 40 units.

Project Description

The proposed *Snoqualmie Ridge Apartments* project includes buildout of a 13.6-acre site south of SE Jacobia Street and just west of Snoqualmie Parkway within the Snoqualmie Ridge Development and at Snoqualmie, WA. The residential development would consist of 200 apartment units. A project site vicinity map is shown in **Figure 1**. For the purposes of this analysis, a 2018 horizon was used to evaluate cumulative traffic impacts.

A site plan is illustrated in **Figure 2**. Vehicular site access for the project is proposed via one site access driveway north onto Frontier Avenue SE and a secondary fire/emergency access driveway south, near the Snoqualmie Valley Hospital onto SE 99th Street. A total of 328 on-site parking stalls would be provided.

Access through the site would be provided via a main interior private roadway that would distribute traffic to on-site parking facilities apartment buildings. Two existing ponds to the east and south of the project site would be preserved as buffers between Snoqualmie Parkway and the Snoqualmie Valley Hospital, respectively.

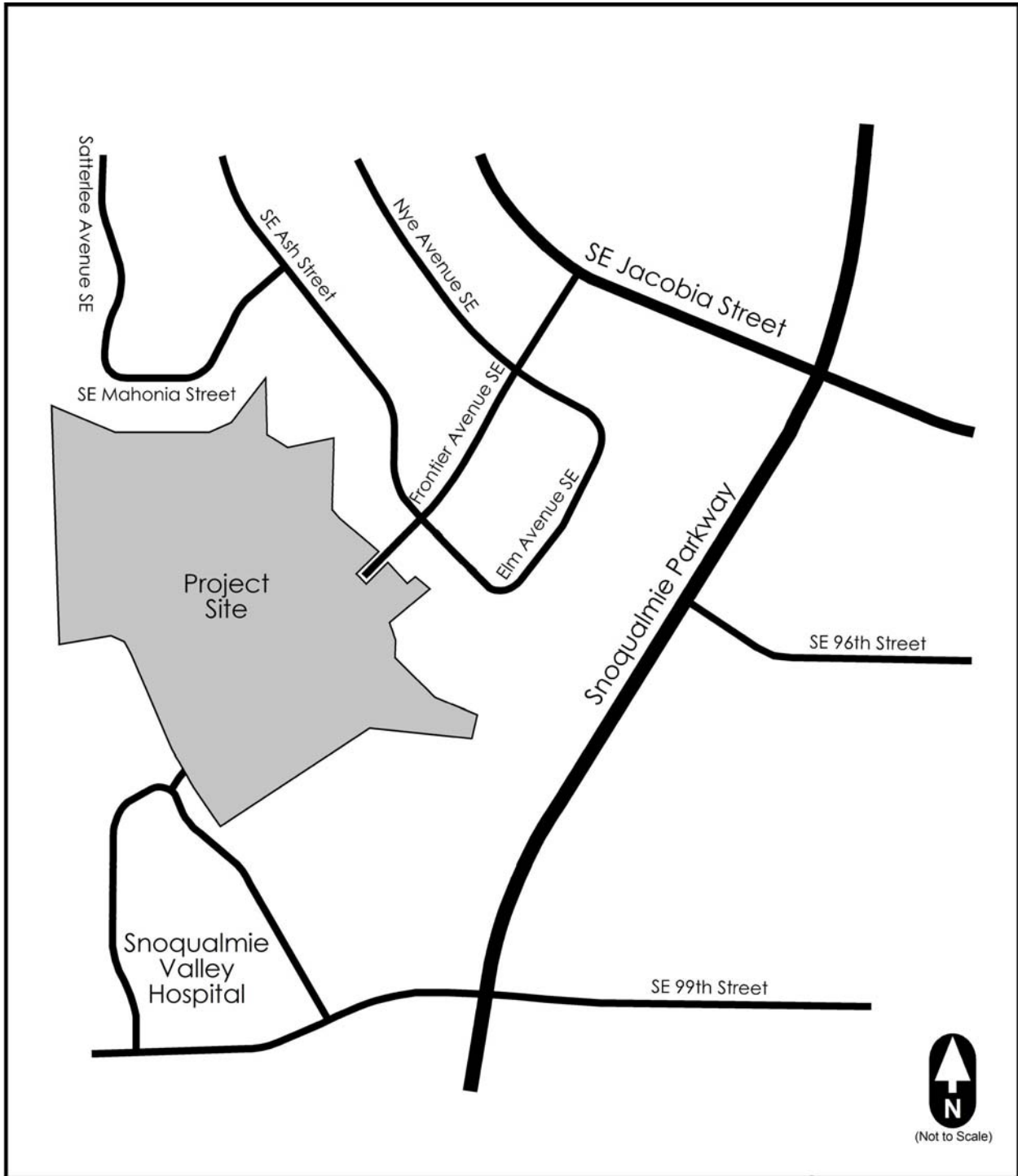
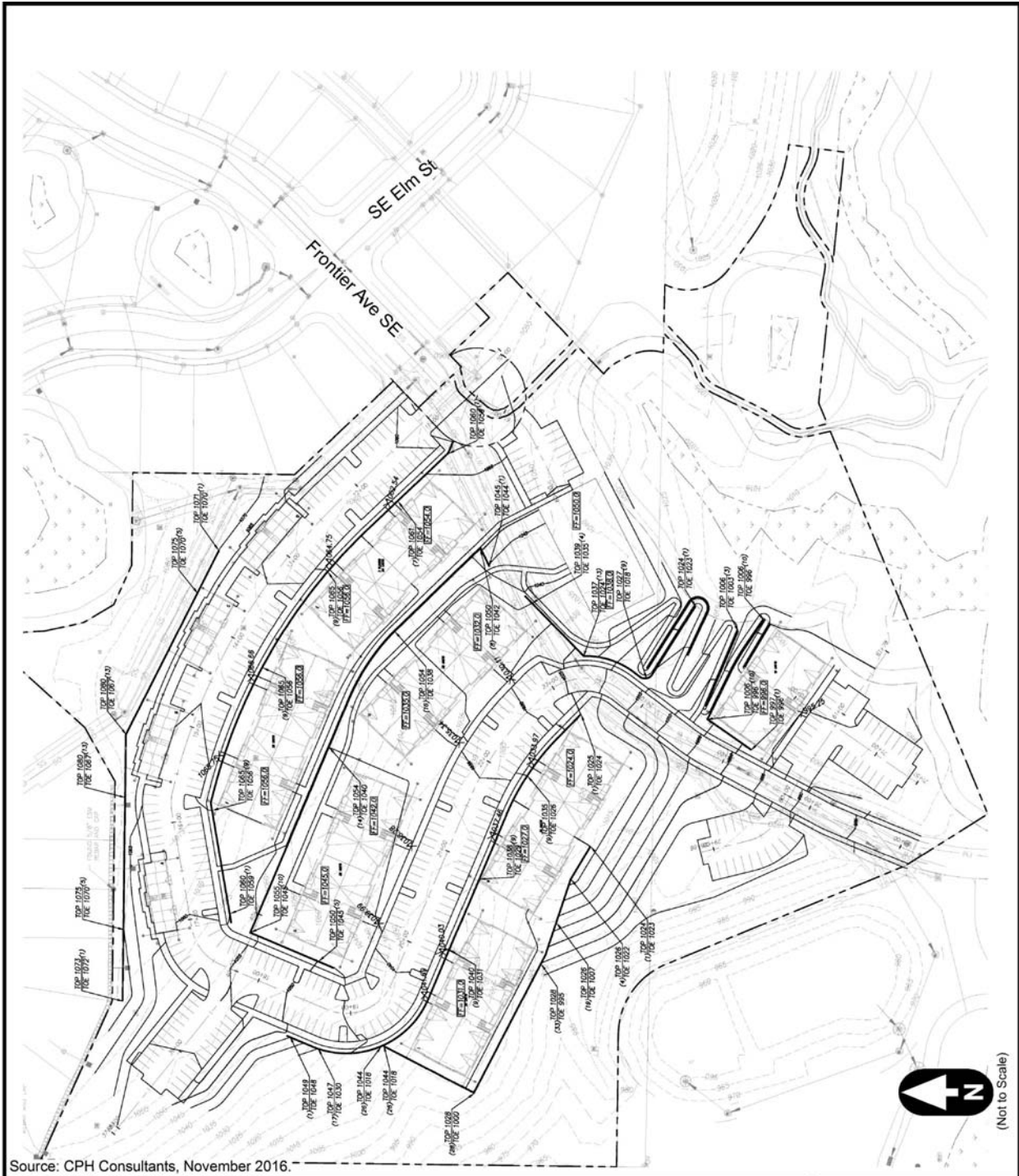


Figure 1
Project Site Vicinity

Snoqualmie
Ridge
Apartments
Traffic Impact Analysis



Source: CPH Consultants, November 2016.



Figure 2
Site Plan

Snoqualmie
Ridge
Apartments
Traffic Impact Analysis

Existing Transportation Conditions

This section includes an inventory of existing roadway conditions, the key intersection in the site vicinity and traffic volumes, levels of service, and planned roadway improvements.

Roadway Conditions

The following paragraphs describe existing local and arterial roadways that would be used for site access. Roadway characteristics are described in terms of number of lanes, posted speed limits, shoulder types and widths.

Frontier Avenue SE is a 2-lane, unchannelized roadway with a traveled way of approximately 34 feet. Raised curb, gutter, planters, sidewalks, and on-street parking are provided on both sides. The posted speed limit is 25 mph.

SE Jacobia Street is a 2-lane roadway with a traveled way of approximately 34 feet. Raised curb, gutter, planters, sidewalks, and on-street parking are provided on both sides. The roadway is unchannelized throughout the project site vicinity, except as it approaches Snoqualmie Parkway. The posted speed limit is 25 mph.

Snoqualmie Parkway is a 4-lane roadway with a traveled way of approximately 80 to 90 feet throughout the project site vicinity, a landscaped median, 8 foot shoulders on both sides, and a separated, paved non-motorized pathway on the west side of the street. The posted speed limit is 40 mph.

Traffic Counts

Peak hour traffic volumes represent the highest hourly volume of vehicles passing through an intersection during a typical 7-9 a.m. or 4-6 p.m. weekday peak period. Existing p.m. peak period turning movement counts at the study intersection was conducted in July 2016 by iDax Data Solutions. Given the distribution of traffic and total project trips, only one off-site intersection was determined to warrant review with the City during preliminary traffic scoping. **Figure 3** summarizes existing p.m. peak period turning movements at the study intersection.

Attachment 1 includes the collected 2016 p.m. peak hour traffic counts.

Intersection Levels of Service

Intersection level of service (LOS) analyses were conducted at the study intersections during the weekday PM peak hour of existing conditions and with project traffic generated at full buildout of the *Snoqualmie Ridge Apartments* project. LOS refers to the degree of congestion on a roadway or intersection. It is a measure of vehicle operating speed, travel time, travel delays, and driving comfort. A letter scale from A to F generally describes LOS.

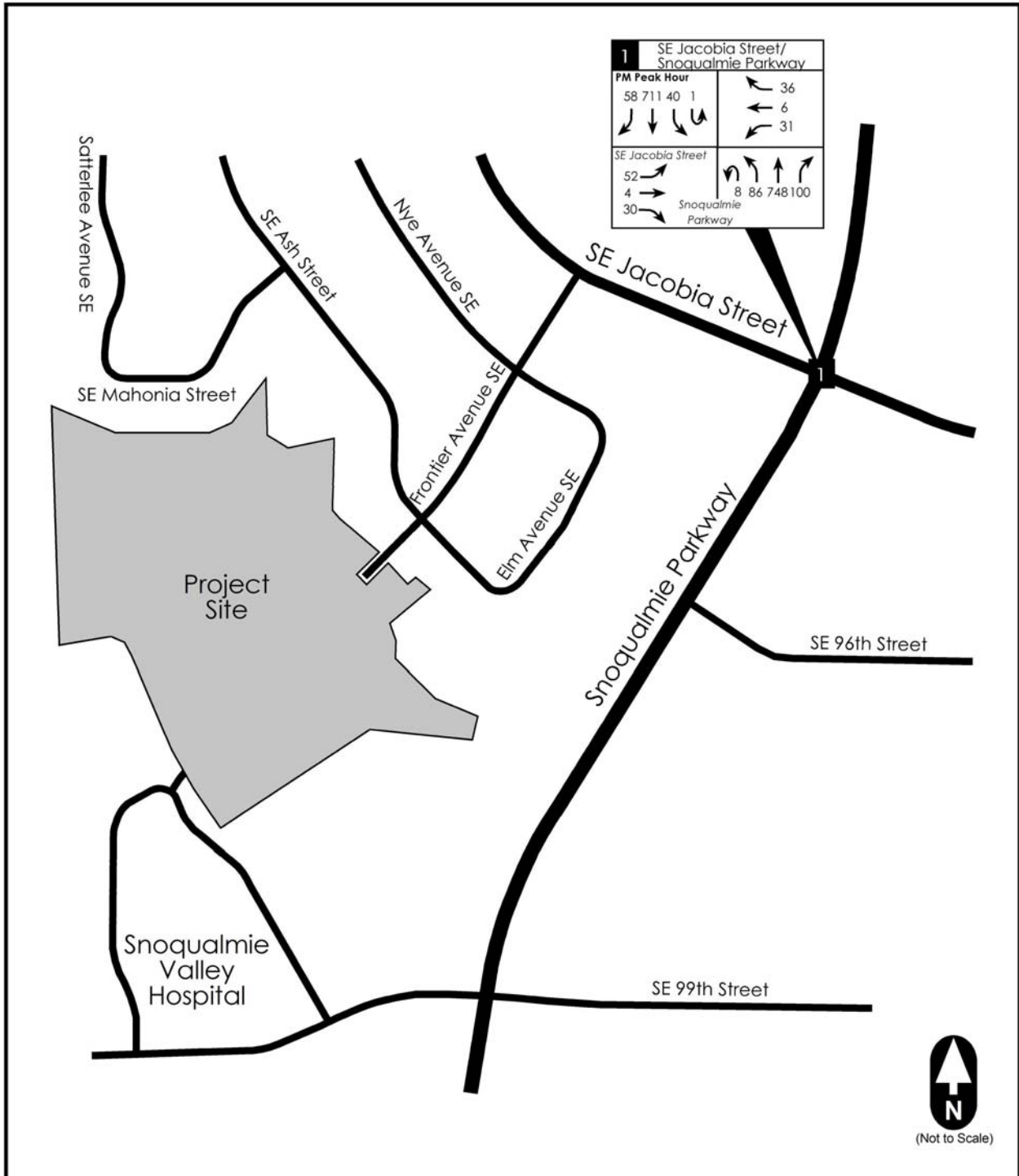


	Figure 3 2015 PM Peak Hour Volumes	Snoqualmie Ridge Apartments Traffic Impact Analysis
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At signalized intersections, LOS A represents free-flow conditions-motorists experience little or no delays, and LOS F represents forced-flow conditions-motorists experience an average delay in excess of 80 seconds per vehicle. The LOS reported for signalized intersections represents the average control delay per vehicle entering the intersection. The LOS reported at stop-controlled intersections is also based on the average control delay (sec/veh) and is reported for each movement. Therefore, the reported LOS at unsignalized intersections does not represent a measure of the overall operations of the intersection.

LOS calculations for both signalized and stop-controlled intersections were calculated using the methodologies and procedures outlined in the 2010 *Highway Capacity Manual (HCM)*, Special Report 209, Transportation Research Board (TRB). **Table 1** outlines the LOS criteria for signalized and unsignalized intersections based on these methodologies.

Table 1
Level of Service Criteria for Signalized and Unsignalized Intersections

Level of Service	Signalized Intersection	Unsignalized Intersection
	Average Delay Range (sec)	Delay Range (sec)
A	≤ 10	≤ 10
B	> 10 to ≤ 20	> 10 to ≤ 15
C	> 20 to ≤ 35	> 15 to ≤ 25
D	> 35 to ≤ 55	> 25 to ≤ 35
E	> 55 to ≤ 80	> 35 to ≤ 50
F	> 80	> 50

Source: "Highway Capacity Manual", Special Report 209, Transportation Research Board, 2010.

As shown in **Table 2**, the study intersection operates at LOS B in 2016. The City of Snoqualmie maintains a level of service standard of LOS D for its arterial signalized intersections. Detailed LOS summary worksheets are included in **Attachment 2**.

Table 2
2016 PM Peak Hour Intersection Levels of Service

Study Intersection	LOS	PM Peak Hour Delay (sec)	V/C Ratio
<i>Signalized Intersections</i>			
#1. SE Jacobia Street/Snoqualmie Parkway	B	11.0	0.43

Source: TENW. Level of service for the intersections has been reported using the HCM 2010, Synchro 8.

Traffic Impact Analysis

The following section describes projected future baseline traffic growth, new trips generated by the proposed development, distribution and assignment of new project trips, intersection level of service impacts, site access, safety and circulation issues, and identification of transportation mitigation to offset impacts.

2018 Baseline Traffic Volumes

Consistent with City traffic study guidelines, an annual growth rate of 2 percent per year was applied to existing counts to evaluate project traffic impact at full buildout. **Attachment 3** summarizes existing, baseline, and with project forecast assumptions at the study intersection.

Project Trip Generation

Trip generation rates compiled by the Institute of Transportation Engineers (ITE) *Trip Generation, 9th Edition, 2012*, were used to estimate p.m. peak hour traffic that would be generated by the proposed action. Trip generation rates/equations Mid-Rise Apartments (ITE Land Use Code 223) were used to estimate new trips generated by the proposed development under a worse-case scenario. **Table 3** summarizes estimated trip generation by the proposed action. An estimated 1,318 weekday daily trips, 69 a.m. peak hour vehicular trips (21 entering and 48 exiting), and 85 p.m. peak hour vehicular trips (49 entering and 36 exiting) is estimated for traffic impacts at full build-out of the project. **Attachment 4** provides a detailed summary of trip generation estimates.

Table 3
Snoqualmie Ridge Apartments Trip Generation Summary

Time Period	In	Out	Total
Weekday Daily	659	659	1,318
Weekday AM Peak Hour	21	48	69
Weekday PM Peak Hour	49	36	85

Source: Trip Generation Manual, 9th Edition, ITE, 2012.

Trip Distribution and Assignment

To distribute trips onto the vicinity-street and arterial network, trip distribution patterns were determined based on review of existing travel patterns, and the relative distribution of schools, employment centers, and residential density in the vicinity. Generally, average distribution and assignment of project trips were:

- 40 percent north via Snoqualmie Parkway; and
- 60 percent south via Snoqualmie Parkway.

Figure 4 illustrates trip distribution during the p.m. peak hour at the study intersection in 2018. Although some minor level of trip distribution into the vicinity residential neighborhood (visiting other residents, etc.) is expected, as a worse-case scenario all traffic was assumed to impact the signalized study intersection.

Intersection Level of Service Impacts

Figure 5 summarizes traffic volume impacts of the proposed *Snoqualmie Ridge Apartments* project during the p.m. peak hour in 2018. **Table 4** summarizes the estimated p.m. level of service impacts in 2018 assuming full buildout of the proposed *Snoqualmie Ridge Apartments* project. As shown, the study intersection is projected to operate at LOS B with or without the project in 2018, meeting adopted City of Snoqualmie level of service standards.

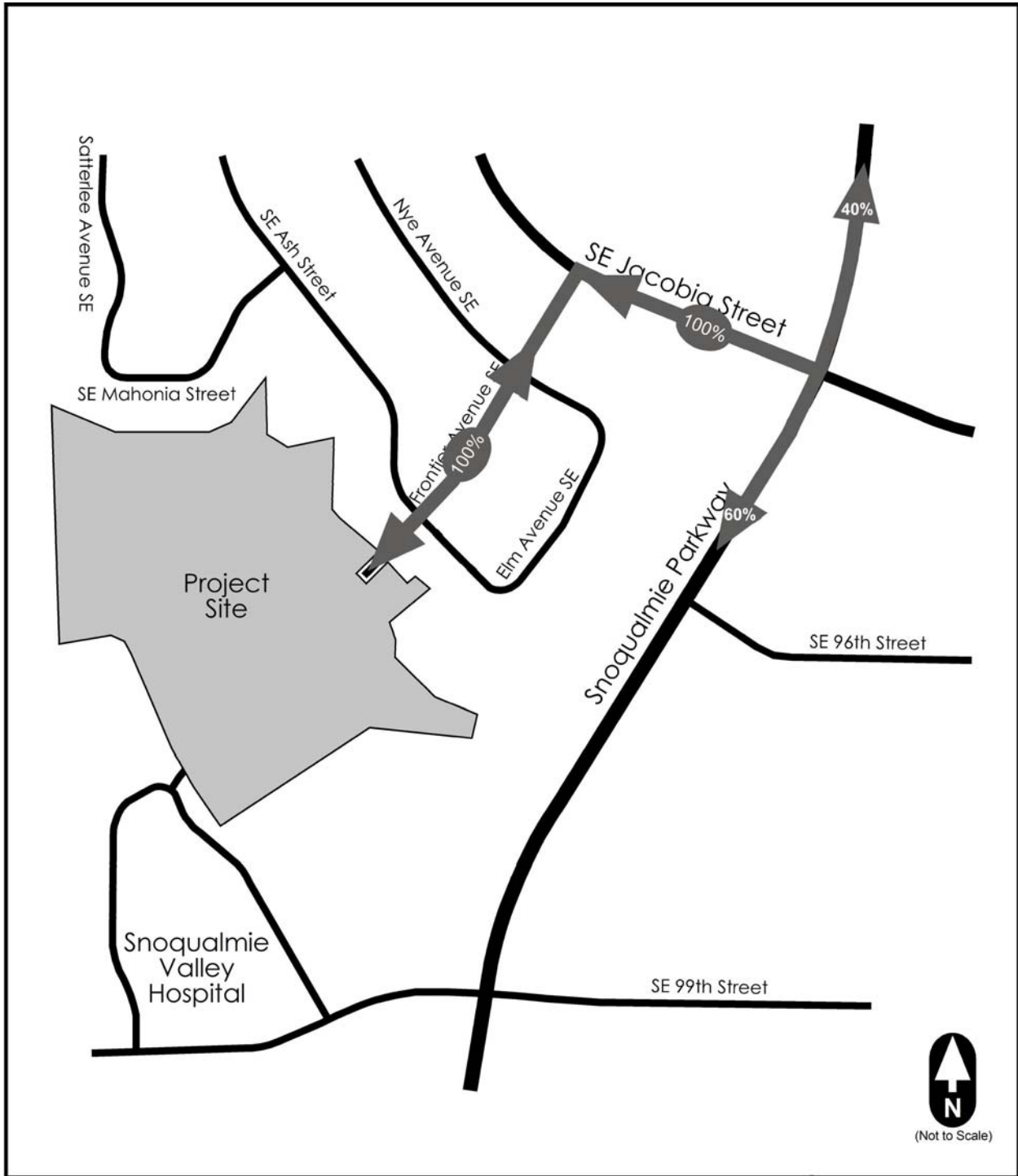
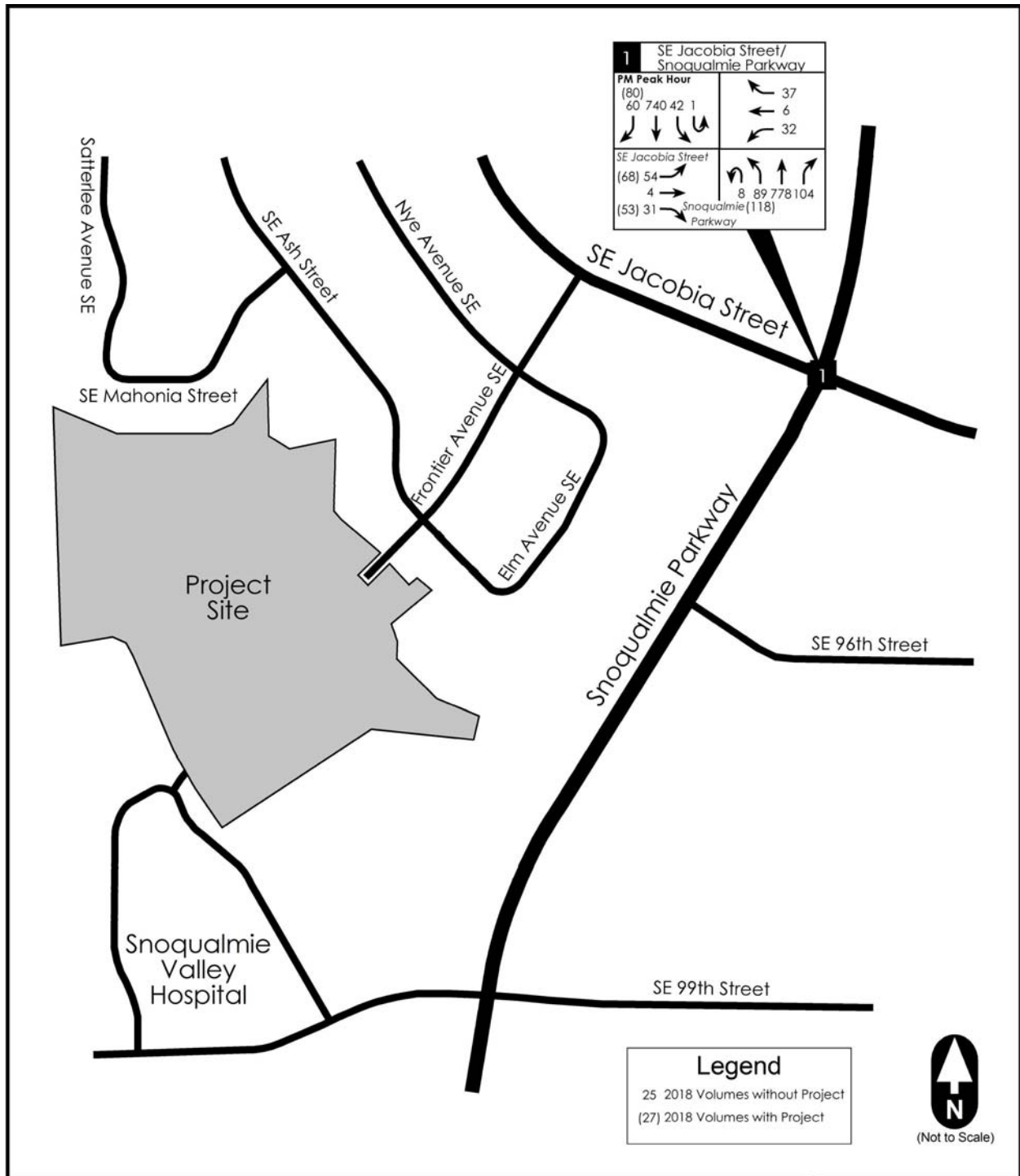


Figure 4
Project Trip Distribution

Snoqualmie
Ridge
Apartments
Traffic Impact Analysis



	<p>Figure 5 2018 PM Peak Hour Traffic Volume Impacts</p>	<p>Snoqualmie Ridge Apartments Traffic Impact Analysis</p>
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Detailed LOS summary worksheets are included in **Attachment 2**.

Table 4
2018 PM Intersection Level of Service Impacts

Study Intersection	PM Peak Hour Without Project			PM Peak Hour With Project		
	LOS	Delay (sec)	V/C Ratio	LOS	Delay (sec)	V/C Ratio
<u>Signalized Intersections</u>						
#1. SE Jacobia Street/Snoqualmie Parkway	B	10.5	0.45	B	11.8	0.49

Source: TENW. Level of service for the intersections has been reported using the HCM 2010, Synchro 8.

Site Access and Safety Issues

Vehicular site access for the project is proposed via one site access driveway north onto Frontier Avenue SE and a secondary fire/emergency access driveway south, near the Snoqualmie Valley Hospital onto SE 99th Street.

Access through the site would be provided via a main interior private roadway that would distribute traffic to on-site parking facilities and apartment buildings. Perpendicular parking along each of these eight additional interior roadways is proposed. The proposed interior roadways within the development would provide adequate fire and emergency vehicle access to the proposed residential complex with two access fire/emergency vehicle access driveways.

Per City Code, the applicant would be required to construct the necessary site access driveways and interior roadways. The property frontage of Frontier Avenue SE to the north and south of the project site is a full built urban section, and no additional civil frontage improvements are required.

Project Mitigation

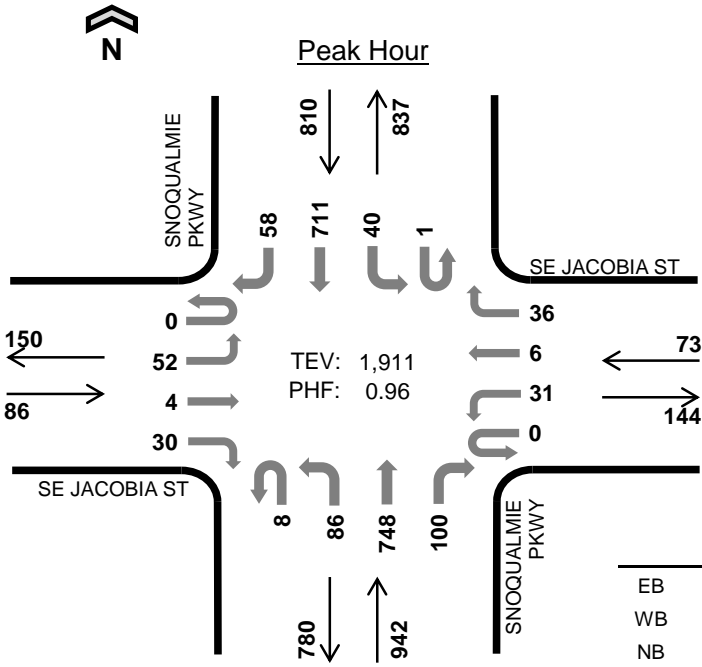
A review of traffic impacts to intersection levels of service, site access, and circulation issues was conducted in association with the *Snoqualmie Ridge Apartments* project, a planned 200-unit residential development in Snoqualmie, WA. The following mitigation measures are recommended to reduce or eliminate project impacts:

- The applicant would be required to construct the necessary site access driveways and interior roadways.
- The results of the traffic operations analysis show that the study intersection is expected to operate at acceptable levels of service with the proposed development. As such, no off-site transportation mitigation is required.

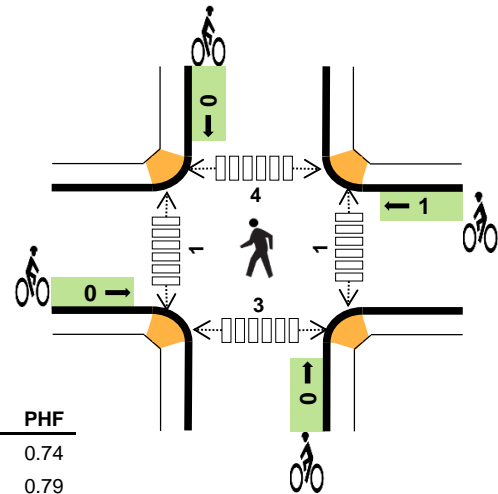
If you have any questions regarding the information presented in this memo, please call me at (206) 361-7333 x 101 or mikeread@tenw.com.

Attachment 1 2016 Traffic Counts

SNOQUALMIE PKWY SE JACOBIA ST



Date: Tue, Jul 19, 2016
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:45 PM to 5:45 PM



	HV %:	PHF
EB	0.0%	0.74
WB	0.0%	0.79
NB	0.2%	0.92
SB	1.2%	0.96
TOTAL	0.6%	0.96

Two-Hour Count Summaries

Interval Start	SE JACOBIA ST Eastbound				SE JACOBIA ST Westbound				SNOQUALMIE PKWY Northbound				SNOQUALMIE PKWY Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	8	0	15	0	2	0	10	0	20	154	16	0	16	206	9	456	0
4:15 PM	0	10	0	13	0	8	2	4	0	12	166	34	0	11	150	8	418	0
4:30 PM	0	7	2	3	0	12	0	2	0	18	202	25	0	15	204	5	495	0
4:45 PM	0	10	2	8	0	6	0	8	1	15	159	20	1	9	194	7	440	1,809
5:00 PM	0	6	0	9	0	9	3	11	3	21	191	21	0	12	174	13	473	1,826
5:15 PM	0	20	1	8	0	6	1	8	2	24	202	28	0	10	160	30	500	1,908
5:30 PM	0	16	1	5	0	10	2	9	2	26	196	31	0	9	183	8	498	1,911
5:45 PM	0	8	2	9	0	4	0	11	0	24	192	23	0	10	120	8	411	1,882
Count Total	0	85	8	70	0	57	8	63	8	160	1,462	198	1	92	1,391	88	3,691	0
Peak Hour	0	52	4	30	0	31	6	36	8	86	748	100	1	40	711	58	1,911	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	0	1	1	0	0	2	0	2	1	0	1	0	2
4:15 PM	2	0	1	2	5	0	0	0	0	0	1	1	4	1	7
4:30 PM	0	0	2	2	4	0	0	0	1	1	0	0	1	0	1
4:45 PM	0	0	0	2	2	0	1	0	0	1	0	0	1	0	1
5:00 PM	0	0	1	2	3	0	0	0	0	0	0	0	1	1	2
5:15 PM	0	0	1	2	3	0	0	0	0	0	0	0	1	2	3
5:30 PM	0	0	0	4	4	0	0	0	0	0	1	1	1	0	3
5:45 PM	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0
Count Total	2	0	6	15	23	0	2	2	1	5	3	2	10	4	19
Peak Hour	0	0	2	10	12	0	1	0	0	1	1	1	4	3	9

Attachment 2 Intersection LOS Summaries

2016 Existing PM Peak
1: SE Jacobia Street & Snoqualmie Parkway

7/25/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	52	4	30	31	6	36	8	86	748	100	1	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			2%				
Storage Length (ft)	100		0	100		0		175		0		175
Storage Lanes	1		0	1		0		1		0		1
Taper Length (ft)	25			25				25				25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	0.95	1.00
Ped Bike Factor		0.99			0.99			1.00		1.00		1.00
Frt		0.866			0.872			0.982				
Flt Protected	0.950			0.950				0.950				0.950
Satd. Flow (prot)	1805	1623	0	1805	1632	0	0	1787	3501	0	0	1805
Flt Permitted	0.950			0.950				0.299				0.271
Satd. Flow (perm)	1805	1623	0	1805	1632	0	0	562	3501	0	0	515
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		41			46			26				
Link Speed (mph)		30			25			30				
Link Distance (ft)		5875			7366			5634				
Travel Time (s)		133.5			200.9			128.0				
Confl. Peds. (#/hr)			3			4			1			1
Confl. Bikes (#/hr)						1						
Peak Hour Factor	0.74	0.74	0.74	0.79	0.79	0.79	0.92	0.92	0.92	0.92	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
Adj. Flow (vph)	70	5	41	39	8	46	9	93	813	109	1	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	70	46	0	39	54	0	0	102	922	0	0	43
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	R NA	Left
Median Width(ft)		12			12			12				
Link Offset(ft)		0			0			0				
Crosswalk Width(ft)		16			16			16				
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	0.99	0.99
Turning Speed (mph)	15		9	15		9	9	15		9	9	15
Number of Detectors	1	1		1	1		1	1	1		1	1
Detector Template												
Leading Detector (ft)	50	50		50	50		50	50	50		50	50
Trailing Detector (ft)	0	0		0	0		0	0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0		0	0
Detector 1 Size(ft)	50	50		50	50		50	50	50		50	50
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	NA		Prot	NA		pm+pt	pm+pt	NA		pm+pt	pm+pt
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases							2	2			6	6
Detector Phase	7	4		3	8		5	5	2		1	1

2016 Existing PM Peak
 1: SE Jacobia Street & Snoqualmie Parkway

7/25/2016



Lane Group	SBT	SBR
Lane Configurations	↑↑	
Volume (vph)	711	58
Ideal Flow (vphpl)	1900	1900
Grade (%)	-2%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	0.95
Ped Bike Factor	1.00	
Frt	0.989	
Flt Protected		
Satd. Flow (prot)	3564	0
Flt Permitted		
Satd. Flow (perm)	3564	0
Right Turn on Red		Yes
Satd. Flow (RTOR)	15	
Link Speed (mph)	30	
Link Distance (ft)	6716	
Travel Time (s)	152.6	
Confl. Peds. (#/hr)		1
Confl. Bikes (#/hr)		1
Peak Hour Factor	0.96	0.96
Heavy Vehicles (%)	1%	1%
Adj. Flow (vph)	741	60
Shared Lane Traffic (%)		
Lane Group Flow (vph)	801	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	16	
Two way Left Turn Lane		
Headway Factor	0.99	0.99
Turning Speed (mph)		9
Number of Detectors	1	
Detector Template		
Leading Detector (ft)	50	
Trailing Detector (ft)	0	
Detector 1 Position(ft)	0	
Detector 1 Size(ft)	50	
Detector 1 Type	Cl+Ex	
Detector 1 Channel		
Detector 1 Extend (s)	0.0	
Detector 1 Queue (s)	0.0	
Detector 1 Delay (s)	0.0	
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Detector Phase	6	

2016 Existing PM Peak
1: SE Jacobia Street & Snoqualmie Parkway

7/25/2016

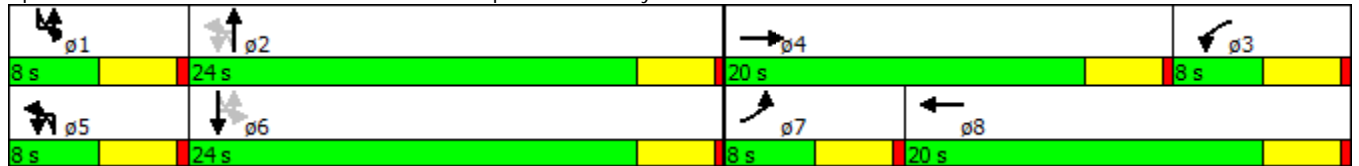


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	8.0	20.0		8.0	8.0
Total Split (s)	8.0	20.0		8.0	20.0		8.0	8.0	24.0		8.0	8.0
Total Split (%)	13.3%	33.3%		13.3%	33.3%		13.3%	13.3%	40.0%		13.3%	13.3%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	4.0	20.0		4.0	4.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5		0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0			0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0	4.0			4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead	Lag		Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None		None	None		None	None	Max		None	None
Walk Time (s)		5.0			5.0				5.0			
Flash Dont Walk (s)		11.0			11.0				11.0			
Pedestrian Calls (#/hr)		0			0				0			
Act Effect Green (s)	4.4	6.2		4.2	6.3			29.2	29.8			28.3
Actuated g/C Ratio	0.10	0.14		0.10	0.15			0.68	0.69			0.66
v/c Ratio	0.38	0.17		0.22	0.19			0.21	0.38			0.09
Control Delay	29.1	10.5		24.3	10.6			5.7	8.1			5.4
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0			0.0
Total Delay	29.1	10.5		24.3	10.6			5.7	8.1			5.4
LOS	C	B		C	B			A	A			A
Approach Delay		21.7			16.4				7.9			
Approach LOS		C			B				A			

Intersection Summary

Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	43.1
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.38
Intersection Signal Delay:	9.2
Intersection LOS:	A
Intersection Capacity Utilization:	47.1%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 1: SE Jacobia Street & Snoqualmie Parkway



2016 Existing PM Peak
 1: SE Jacobia Street & Snoqualmie Parkway

7/25/2016



Lane Group	SBT	SBR
Switch Phase		
Minimum Initial (s)	4.0	
Minimum Split (s)	20.0	
Total Split (s)	24.0	
Total Split (%)	40.0%	
Maximum Green (s)	20.0	
Yellow Time (s)	3.5	
All-Red Time (s)	0.5	
Lost Time Adjust (s)	0.0	
Total Lost Time (s)	4.0	
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Vehicle Extension (s)	3.0	
Recall Mode	Max	
Walk Time (s)	5.0	
Flash Dont Walk (s)	11.0	
Pedestrian Calls (#/hr)	0	
Act Effct Green (s)	28.1	
Actuated g/C Ratio	0.65	
v/c Ratio	0.34	
Control Delay	8.6	
Queue Delay	0.0	
Total Delay	8.6	
LOS	A	
Approach Delay	8.5	
Approach LOS	A	
Intersection Summary		

2018 Baseline PM Peak
1: SE Jacobia Street & Snoqualmie Parkway

7/25/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	54	4	31	32	6	37	8	89	778	104	1	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			2%				
Storage Length (ft)	100		0	100		0		175		0		175
Storage Lanes	1		0	1		0		1		0		1
Taper Length (ft)	25			25				25				25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	0.95	1.00
Ped Bike Factor		0.99			0.99			1.00	1.00			1.00
Frt		0.866			0.872			0.982				
Flt Protected	0.950			0.950				0.950				0.950
Satd. Flow (prot)	1805	1623	0	1805	1632	0	0	1787	3501	0	0	1805
Flt Permitted	0.950			0.950				0.282				0.248
Satd. Flow (perm)	1805	1623	0	1805	1632	0	0	530	3501	0	0	471
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		42			47				26			
Link Speed (mph)		30			25			30				
Link Distance (ft)		5875			7366			5634				
Travel Time (s)		133.5			200.9			128.0				
Confl. Peds. (#/hr)			3			4			1		1	1
Confl. Bikes (#/hr)						1						
Peak Hour Factor	0.74	0.74	0.74	0.79	0.79	0.79	0.92	0.92	0.92	0.92	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
Adj. Flow (vph)	73	5	42	41	8	47	9	97	846	113	1	44
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	47	0	41	55	0	0	106	959	0	0	45
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	R NA	Left
Median Width(ft)		12			12			12				
Link Offset(ft)		0			0			0				
Crosswalk Width(ft)		16			16			16				
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	0.99	0.99
Turning Speed (mph)	15		9	15		9	9	15		9	9	15
Number of Detectors	1	1		1	1		1	1	1		1	1
Detector Template												
Leading Detector (ft)	50	50		50	50		50	50	50		50	50
Trailing Detector (ft)	0	0		0	0		0	0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0		0	0
Detector 1 Size(ft)	50	50		50	50		50	50	50		50	50
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	NA		Prot	NA		pm+pt	pm+pt	NA		pm+pt	pm+pt
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases							2	2			6	6
Detector Phase	7	4		3	8		5	5	2		1	1

2018 Baseline PM Peak
 1: SE Jacobia Street & Snoqualmie Parkway

7/25/2016



Lane Group	SBT	SBR
Lane Configurations	↑↑	
Volume (vph)	740	60
Ideal Flow (vphpl)	1900	1900
Grade (%)	-2%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	0.95
Ped Bike Factor	1.00	
Frt	0.989	
Flt Protected		
Satd. Flow (prot)	3564	0
Flt Permitted		
Satd. Flow (perm)	3564	0
Right Turn on Red		Yes
Satd. Flow (RTOR)	15	
Link Speed (mph)	30	
Link Distance (ft)	6716	
Travel Time (s)	152.6	
Confl. Peds. (#/hr)		1
Confl. Bikes (#/hr)		1
Peak Hour Factor	0.96	0.96
Heavy Vehicles (%)	1%	1%
Adj. Flow (vph)	771	62
Shared Lane Traffic (%)		
Lane Group Flow (vph)	833	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	16	
Two way Left Turn Lane		
Headway Factor	0.99	0.99
Turning Speed (mph)		9
Number of Detectors	1	
Detector Template		
Leading Detector (ft)	50	
Trailing Detector (ft)	0	
Detector 1 Position(ft)	0	
Detector 1 Size(ft)	50	
Detector 1 Type	Cl+Ex	
Detector 1 Channel		
Detector 1 Extend (s)	0.0	
Detector 1 Queue (s)	0.0	
Detector 1 Delay (s)	0.0	
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Detector Phase	6	

2018 Baseline PM Peak
1: SE Jacobia Street & Snoqualmie Parkway

7/25/2016

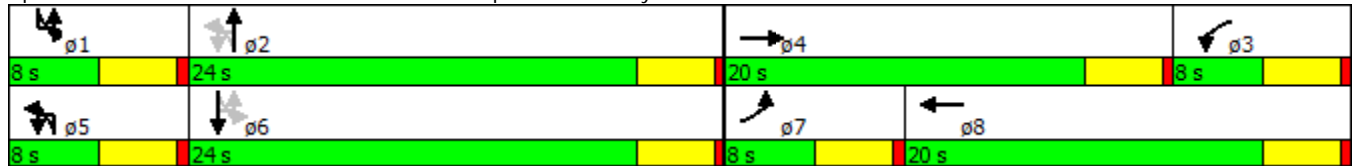


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	8.0	20.0		8.0	8.0
Total Split (s)	8.0	20.0		8.0	20.0		8.0	8.0	24.0		8.0	8.0
Total Split (%)	13.3%	33.3%		13.3%	33.3%		13.3%	13.3%	40.0%		13.3%	13.3%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	4.0	20.0		4.0	4.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5		0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0			0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0	4.0			4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead	Lag		Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None		None	None		None	None	Max		None	None
Walk Time (s)		5.0			5.0				5.0			
Flash Dont Walk (s)		11.0			11.0				11.0			
Pedestrian Calls (#/hr)		0			0				0			
Act Effect Green (s)	4.1	7.7		4.2	6.4			29.2	29.8			28.5
Actuated g/C Ratio	0.09	0.17		0.09	0.14			0.65	0.67			0.64
v/c Ratio	0.44	0.15		0.24	0.20			0.23	0.41			0.11
Control Delay	32.8	9.9		25.4	10.7			6.5	8.9			5.9
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0			0.0
Total Delay	32.8	9.9		25.4	10.7			6.5	8.9			5.9
LOS	C	A		C	B			A	A			A
Approach Delay		23.9			17.0				8.7			
Approach LOS		C			B				A			

Intersection Summary

Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	44.6
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.44
Intersection Signal Delay:	10.2
Intersection LOS:	B
Intersection Capacity Utilization:	48.2%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 1: SE Jacobia Street & Snoqualmie Parkway



2018 Baseline PM Peak
 1: SE Jacobia Street & Snoqualmie Parkway

7/25/2016



Lane Group	SBT	SBR
Switch Phase		
Minimum Initial (s)	4.0	
Minimum Split (s)	20.0	
Total Split (s)	24.0	
Total Split (%)	40.0%	
Maximum Green (s)	20.0	
Yellow Time (s)	3.5	
All-Red Time (s)	0.5	
Lost Time Adjust (s)	0.0	
Total Lost Time (s)	4.0	
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Vehicle Extension (s)	3.0	
Recall Mode	Max	
Walk Time (s)	5.0	
Flash Dont Walk (s)	11.0	
Pedestrian Calls (#/hr)	0	
Act Effct Green (s)	28.4	
Actuated g/C Ratio	0.64	
v/c Ratio	0.37	
Control Delay	9.6	
Queue Delay	0.0	
Total Delay	9.6	
LOS	A	
Approach Delay	9.4	
Approach LOS	A	
Intersection Summary		

2018 Project PM Peak
1: SE Jacobia Street & Snoqualmie Parkway

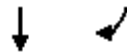
7/25/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	70	4	55	32	6	37	8	97	778	104	1	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			2%				
Storage Length (ft)	100		0	100		0		175		0		175
Storage Lanes	1		0	1		0		1		0		1
Taper Length (ft)	25			25				25				25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	0.95	1.00
Ped Bike Factor		0.99			0.99			1.00		1.00		1.00
Frt		0.859			0.872			0.982				
Flt Protected	0.950			0.950				0.950				0.950
Satd. Flow (prot)	1805	1609	0	1805	1632	0	0	1787	3501	0	0	1805
Flt Permitted	0.950			0.950				0.251				0.245
Satd. Flow (perm)	1805	1609	0	1805	1632	0	0	472	3501	0	0	465
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		74			47			25				
Link Speed (mph)		30			25			30				
Link Distance (ft)		5875			7366			5634				
Travel Time (s)		133.5			200.9			128.0				
Confl. Peds. (#/hr)			3			4			1			1
Confl. Bikes (#/hr)						1						
Peak Hour Factor	0.74	0.74	0.74	0.79	0.79	0.79	0.92	0.92	0.92	0.92	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
Adj. Flow (vph)	95	5	74	41	8	47	9	105	846	113	1	44
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	79	0	41	55	0	0	114	959	0	0	45
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	R NA	Left
Median Width(ft)		12			12			12				
Link Offset(ft)		0			0			0				
Crosswalk Width(ft)		16			16			16				
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	0.99	0.99
Turning Speed (mph)	15		9	15		9	9	15		9	9	15
Number of Detectors	1	1		1	1		1	1	1		1	1
Detector Template												
Leading Detector (ft)	50	50		50	50		50	50	50		50	50
Trailing Detector (ft)	0	0		0	0		0	0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0		0	0
Detector 1 Size(ft)	50	50		50	50		50	50	50		50	50
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	NA		Prot	NA		pm+pt	pm+pt	NA		pm+pt	pm+pt
Protected Phases	7	4		3	8		5	5	2		1	1
Permitted Phases							2	2			6	6
Detector Phase	7	4		3	8		5	5	2		1	1

2018 Project PM Peak
 1: SE Jacobia Street & Snoqualmie Parkway

7/25/2016



Lane Group	SBT	SBR
Lane Configurations	↑↑	
Volume (vph)	740	65
Ideal Flow (vphpl)	1900	1900
Grade (%)	-2%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	0.95
Ped Bike Factor	1.00	
Frt	0.988	
Flt Protected		
Satd. Flow (prot)	3560	0
Flt Permitted		
Satd. Flow (perm)	3560	0
Right Turn on Red		Yes
Satd. Flow (RTOR)	16	
Link Speed (mph)	30	
Link Distance (ft)	6716	
Travel Time (s)	152.6	
Confl. Peds. (#/hr)		1
Confl. Bikes (#/hr)		1
Peak Hour Factor	0.96	0.96
Heavy Vehicles (%)	1%	1%
Adj. Flow (vph)	771	68
Shared Lane Traffic (%)		
Lane Group Flow (vph)	839	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	16	
Two way Left Turn Lane		
Headway Factor	0.99	0.99
Turning Speed (mph)		9
Number of Detectors	1	
Detector Template		
Leading Detector (ft)	50	
Trailing Detector (ft)	0	
Detector 1 Position(ft)	0	
Detector 1 Size(ft)	50	
Detector 1 Type	Cl+Ex	
Detector 1 Channel		
Detector 1 Extend (s)	0.0	
Detector 1 Queue (s)	0.0	
Detector 1 Delay (s)	0.0	
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Detector Phase	6	

2018 Project PM Peak
 1: SE Jacobia Street & Snoqualmie Parkway

7/25/2016

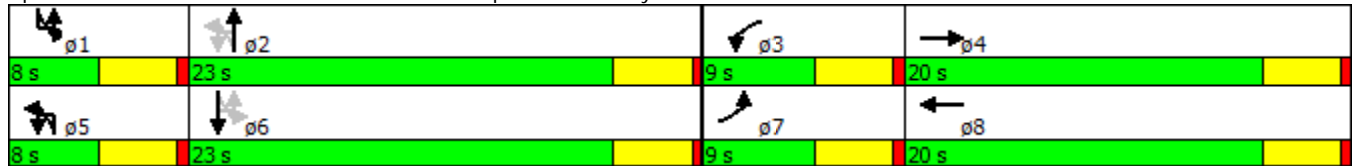


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	8.0	20.0		8.0	8.0
Total Split (s)	9.0	20.0		9.0	20.0		8.0	8.0	23.0		8.0	8.0
Total Split (%)	15.0%	33.3%		15.0%	33.3%		13.3%	13.3%	38.3%		13.3%	13.3%
Maximum Green (s)	5.0	16.0		5.0	16.0		4.0	4.0	19.0		4.0	4.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5		0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0			0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0	4.0			4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead	Lag		Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None		None	None		None	None	Max		None	None
Walk Time (s)		5.0			5.0				5.0			
Flash Dont Walk (s)		11.0			11.0				11.0			
Pedestrian Calls (#/hr)		0			0				0			
Act Effct Green (s)	5.2	8.0		5.1	6.4			27.8	27.3			26.1
Actuated g/C Ratio	0.11	0.17		0.11	0.14			0.60	0.59			0.56
v/c Ratio	0.47	0.23		0.21	0.21			0.29	0.46			0.12
Control Delay	31.6	8.7		24.1	10.8			7.9	10.3			6.7
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0			0.0
Total Delay	31.6	8.7		24.1	10.8			7.9	10.3			6.7
LOS	C	A		C	B			A	B			A
Approach Delay		21.2			16.5				10.1			
Approach LOS		C			B				B			

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 46.3
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.47
 Intersection Signal Delay: 11.8
 Intersection LOS: B
 Intersection Capacity Utilization 49.2%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 1: SE Jacobia Street & Snoqualmie Parkway





Lane Group	SBT	SBR
Switch Phase		
Minimum Initial (s)	4.0	
Minimum Split (s)	20.0	
Total Split (s)	23.0	
Total Split (%)	38.3%	
Maximum Green (s)	19.0	
Yellow Time (s)	3.5	
All-Red Time (s)	0.5	
Lost Time Adjust (s)	0.0	
Total Lost Time (s)	4.0	
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Vehicle Extension (s)	3.0	
Recall Mode	Max	
Walk Time (s)	5.0	
Flash Dont Walk (s)	11.0	
Pedestrian Calls (#/hr)	0	
Act Effct Green (s)	24.0	
Actuated g/C Ratio	0.52	
v/c Ratio	0.45	
Control Delay	11.8	
Queue Delay	0.0	
Total Delay	11.8	
LOS	B	
Approach Delay	11.5	
Approach LOS	B	
Intersection Summary		

Attachment 3 2018 Traffic Forecasts

Existing
Growth Rate = 2.0%
Existing Year = 2016
Future Year = 2018

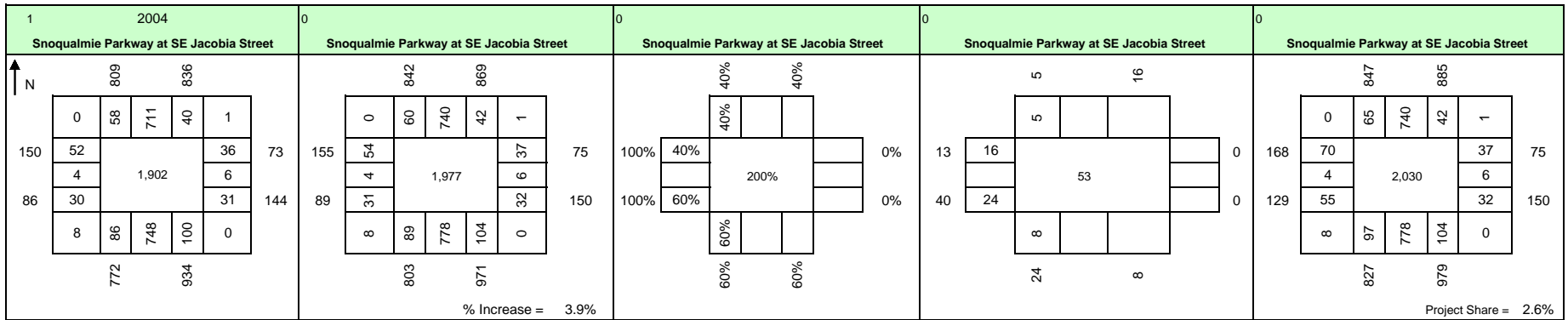
Enter	Exit	Total
49	36	85
Project Trips		

2016 Existing

2018 Baseline

Trip Distribution

2018 With-Project



Attachment 4 Detailed Trip Generation Estimates

ITE Trip Generation, 9th Edition, 2012
Snoqualmie Ridge Apartments - DevCo

Proposed	X	LU Code	AM Peak			PM Peak			Daily Trips	Daily Rate	AM Rate	PM Rate
			Enter	Exit	Trips	Enter	Exit	Trips				
Mid-Rise Apartment (Apt)	200	223	21	48	69	49	36	85	1318	6.59	fitted curve	fitted curve
			21	48	69	49	36	85	1318			
Total with Buildout			21	48	69	49	36	85	1318			