



Gibson Traffic Consultants, Inc.

Transportation Planners and Traffic Engineers

MEMORANDUM

To: Kristina Kyle, City of Monroe
 From: Brad Lincoln, PE *BL*
 Project: Sky View Ridge
 RE: City of Monroe Comment Response 15-PLPR-0002
 Date: March 14, 2016
 GTC #: 15-244

This memorandum provides a revised trip generation analysis for the Sky View Ridge development. The analysis contained in the November 2015 memorandum was based on 44 new single-family residential units. The development only consists of 42 new single-family residential units. The revised trip generation calculations are shown in Table 1.

Table 1: Trip Generation Summary

42 New Single-Family Dwellings	Average Daily Trips			AM Peak-Hour Trips			PM Peak-Hour Trips		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Generation Rate	9.52 trips per unit			0.75 trips per unit			1.00 trips per unit		
Splits	50%	50%	100%	25%	75%	100%	63%	37%	100%
Trips	199.92	199.92	399.84	7.87	26.63	31.50	26.46	15.54	42.00

This is a reduction of trips from what was previously analyzed as part of the November 2015 analysis, but is not anticipated to change the conclusions of the previous analysis.

CITY OF MONROE
RECEIVED

MAR 14 2016

COMMUNITY DEVELOPMENT



Gibson Traffic Consultants, Inc.

Transportation Planners and Traffic Engineers

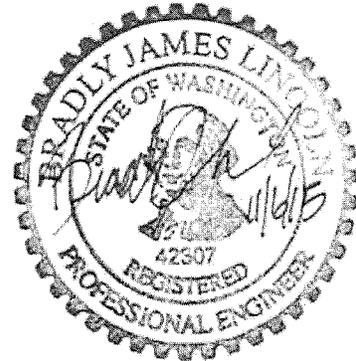
CITY OF MONROE
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COMMUNITY DEVELOPMENT

MEMORANDUM

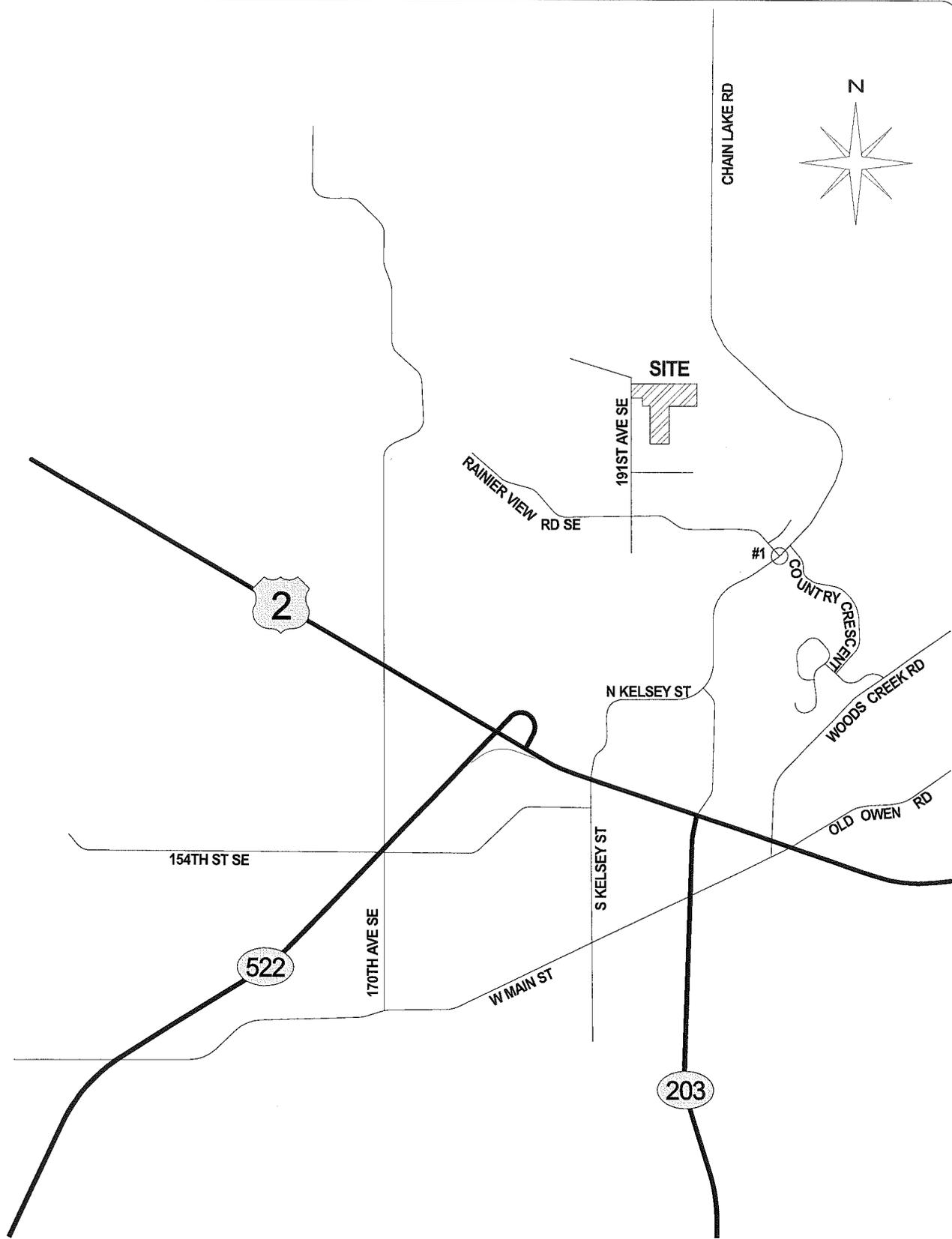
To: Mark Neumann, City of Monroe
From: Brad Lincoln, PE
Project: Sky View Ridge
RE: City of Monroe Comment Response 15-PLPR-0002
Date: November 6, 2015
GTC #: 15-244



This memorandum addresses comments from the City of Monroe dated July 30, 2015 regarding analysis of the intersection of Rainier View Road at Chain Lake Road. The comments generally ask for an analysis of the intersection of Rainier View Road and Chain Lake Road in the year 2025 with the impact of approximately 400 potential future units, none of which have a pending application, and the addition of a 2% annually compounded growth rate. Discussions with City of Monroe staff regarding similar comments on surrounding developments determined that a 1% growth rate was more appropriate than the 2% annually compounding growth due to the number of trips added from the 400 potential units. The approximate locations of the development areas are shown in Figure 1.

It is important to note that the addition of these potential 400 units is not the typical process for a traffic impact analysis in the City of Monroe or surrounding jurisdictions since there is no approved or pending application for the 400 units. Typically a development is only requested to include developments that have been submitted and approved or just an annual growth rate.

Intersection level of service analysis was not performed as part of the original SnoCo Traffic Studies May 1, 2015 traffic impact analysis. This comment response therefore includes an analysis of the intersection of Rainier View Road at Chain Lake Road using standard impact analysis methodologies.



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #15-244

SKY VIEW RIDGE
44 NEW SINGLE-FAMILY UNITS

CITY OF MONROE

LEGEND



DEVELOPMENT SITE



STUDY INTERSECTION

FIGURE 1
SITE VICINITY
MAP

1. Methodology

Trip generation calculations for the Sky View Ridge development has been performed utilizing average trip generation data contained in the Institute of Transportation Engineers' (ITE) *Trip Generation, 9th Edition (2012)*. The distribution of trips generated by the site is based on the approved distributions for the Eaglemont I-III and Eaglemont IV-VIII developments.

It is important to note that a trip generation was performed by SnoCo Traffic Studies, but was re-calculated by GTC due to a discrepancy found on the number of units analyzed compared to the site plan. GTC found that there were 44 lots on the site plan with one existing house within the used parcels. The one existing house will remain according to the site plan, so the conservative number of 44 new units was used for this development.

Congestion is generally measured in terms of level of service (LOS). The *Highway Capacity Manual: 2010 Edition (HCM 2010)* by the Transportation Research Board rates road facilities and intersections between LOS A and LOS F, with LOS A being free flow and LOS F being forced flow or over-capacity conditions. A summary of the level of service criteria is included in Table 1. The level of service at signalized, all-way stop-controlled and roundabout intersections is based on the average delay of all approaches. The level of service for two-way stop-controlled intersections is based on average delays for the critical stopped approach. Geometric characteristics and conflicting traffic movements are taken into consideration when determining level of service values.

The level of service analysis for this report has been performed using the *Synchro 9.0, Build 903* software. The peak-hour factors were adjusted per Snohomish County methodology for future growth volumes.

Table 1: Level of Service Criteria for Intersections

Level of ¹ Service	Expected Delay	Intersection Control Delay (Seconds per Vehicle)	
		Unsignalized Intersections	Signalized & Roundabout Intersections
A	Little/No Delay	≤10	≤10
B	Short Delays	>10 and ≤15	>10 and ≤20
C	Average Delays	>15 and ≤25	>20 and ≤35
D	Long Delays	>25 and ≤35	>35 and ≤55
E	Very Long Delays	>35 and ≤50	>55 and ≤80
F	Extreme Delays ²	>50	>80

The City of Monroe has a level of service threshold of LOS C for collector road intersections and LOS D for arterial road intersections. The City of Monroe also has an interlocal agreement with WSDOT for intersections along US-2, SR-203 and SR-522. The interlocal agreement states that the level of service needs to remain at LOS D for intersections operating at LOS D before development and LOS E for intersections that operate at LOS E before developments. Intersections operating at LOS F before development will require mitigation. The level of service analysis has been performed utilizing the *Synchro 9.1build 903* software and is reported based on the *Synchro 9.1* output.

2. Trip Generation and Distribution for the Sky View Ridge Development

The trip generation calculations for the Sky View Ridge development are based on the average trip generation rates for ITE Land Use Code 210, single-family detached housing. This trip distribution was slightly different from the original distribution that SnoCo Traffic Studies utilized, but was within 5%. The trip generation for the Sky View Ridge development is summarized in Table 2.

¹ **Source:** *Highway Capacity Manual 2010*.

LOS A: Free-flow traffic conditions, with minimal delay to stopped vehicles (no vehicle is delayed longer than one cycle at signalized intersection).

LOS B: Generally stable traffic flow conditions.

LOS C: Occasional back-ups may develop, but delay to vehicles is short term and still tolerable.

LOS D: During short periods of the peak hour, delays to approaching vehicles may be substantial but are tolerable during times of less demand (i.e. vehicles delayed one cycle or less at signal).

LOS E: Intersections operate at or near capacity, with long queues developing on all approaches and long delays.

LOS F: Jammed conditions on all approaches with excessively long delays and vehicles unable to move at times.

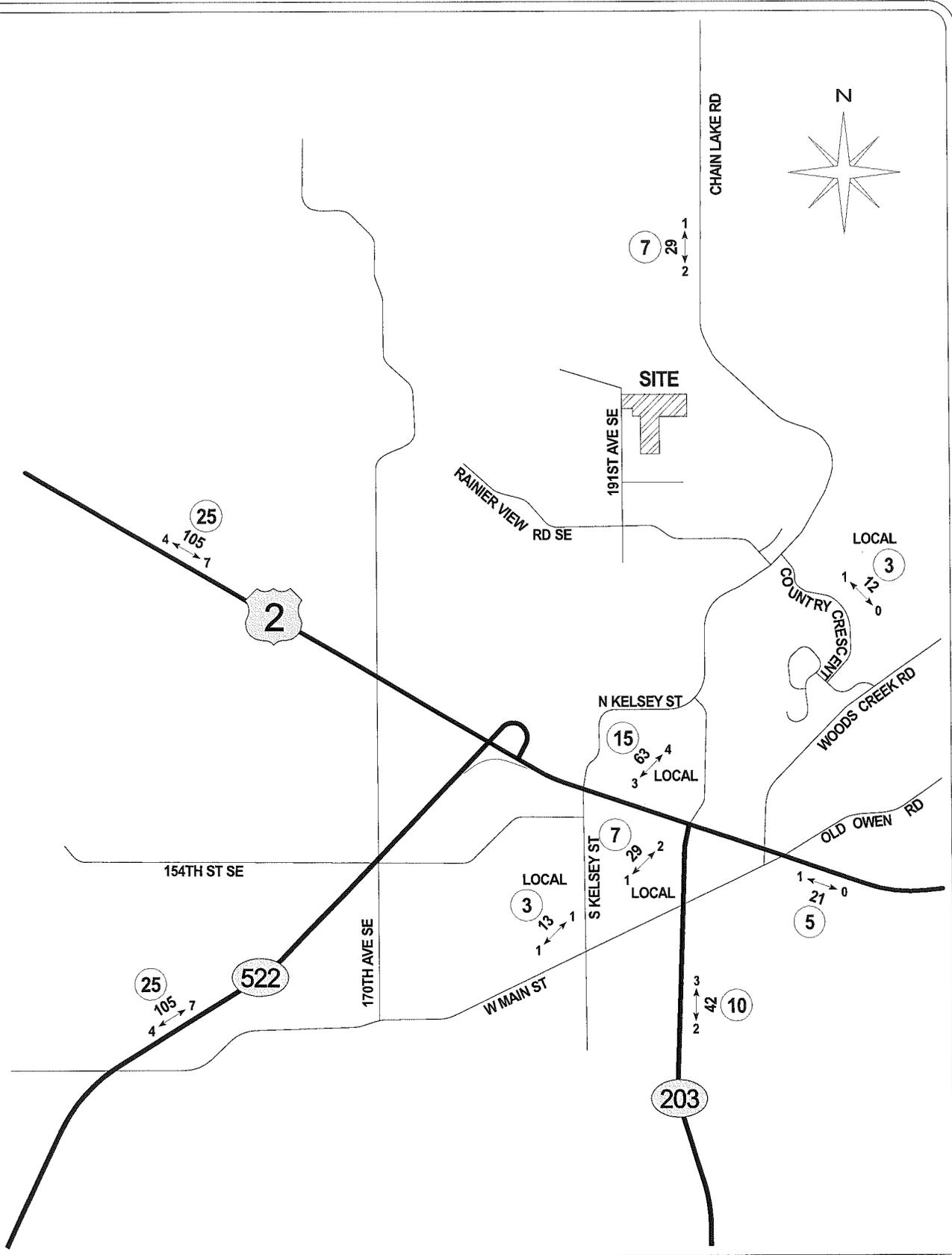
² When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection.

Table 2: Trip Generation Summary

44 New Single-Family Dwellings	Average Daily Trips			AM Peak-Hour Trips			PM Peak-Hour Trips		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Generation Rate	9.52 trips per unit			0.75 trips per unit			1.00 trips per unit		
Splits	50%	50%	100%	25%	75%	100%	63%	37%	100%
Trips	209.44	209.44	418.88	8.25	24.75	33.00	27.72	16.28	44.00

The Sky View Ridge development is anticipated to generate 418.88 new average daily trips (ADT) with 33.00 new AM peak-hour trips and 44.00 new PM peak-hour trips. The trip generation calculations are included in the attachments.

The distribution of trips generated by the Sky View Ridge development is based on previously approved traffic studies conducted for the Eaglemont phases I-III and IV-VIII developments. It is anticipated that 25% of the development's trips will travel to and from the west along US-2. Approximately 35% of the development's trips will travel to and from the south, twenty-five percent along SR-522 and ten percent along SR-203. It is estimated that 28% of the development's trips will travel to and from local areas in the vicinity of the development, ten percent south of US-2, fifteen percent north of US-2 and three percent to the east. The remaining 12% of the development's trips are anticipated to travel to and from the north and east, seven percent to and from the north along Chain Lake Road and five percent to and from the east along US-2. This is consistent with the original Sky View Ridge distribution. A detailed distribution for the PM peak-hour is included in Figure 2.



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #15-244

SKY VIEW RIDGE
44 NEW SINGLE-FAMILY UNITS

LEGEND

AWDT
PM ↔ PEAK

NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

(XX)

TRIP DISTRIBUTION %

FIGURE 2
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

CITY OF MONROE

3. Trip Generation and Distribution for the Future Developments

The trip generation and distribution of the two potential development areas have been calculated using the same methodologies utilized for the Sky View Ridge development, average trip generation rates for ITE Land Use Code 210 and the approved distribution. The trip generation of the potential developments is summarized in Table 1.

Table 1: Trip Generation Summary

Development	Average Daily Trips	PM Peak-Hour Trips		
		Inbound	Outbound	Total
100 Unit	952	63	37	100
300 Unit	2,856	189	111	300
Total	3,808	252	148	400

The distribution of these trips, which is based on the approved distributions for Eaglemont phases I-III and IV-VIII, is summarized in Figure 2.

4. Level of Service Analysis

The level of service analysis for the intersection of Rainier View Road and Chain Lake Road has been performed using the same existing data utilized in the traffic impact analysis for the adjacent Eaglemont IV-VIII development. The 2025 future volumes have been calculating by applying a 1% and 2% annually compounding growth rate to the existing turning movements and adding trips from the following developments:

- Eaglemont I-III (149 single-family units)
- Eaglemont Division IV-VIII (117 single-family units)
- Sky View Ridge (44 single-family units)
- 100 Unit Potential Development (along Chain Lake Road)
- 300 Unit Potential Development (north of Rainier View Road SE, west of Sky View Ridge)

The initial comment identified the use of a 2% growth rate, but City of Monroe staff previously agreed on similar comments for surrounding developments that a 1% growth rate with the 400 potential units was more reasonable. Calculations were performed using a 1% and 2% growth rate. The 2025 future volumes at the intersection of Rainier View Road and Chain Lake Road with the potential pipeline developments are shown in Figure 3. The turning movement calculations are included in the attachments.

The level of service for the intersection of Rainier View Road and Chain Lake Road is summarized in Table 2 with a 1% growth rate and Table 3 with a 2% growth rate.

Table 2: Intersection Level of Service Summary – 1% Growth Rate

Analysis Scenario	Control	Rainier View Road at Chain Lake Road	
		LOS	Delay
2015 Existing Conditions	Two-Way Stop Control	B	12.9 sec
2025 Baseline Conditions (1% Growth and Eaglemont I-VIII)	Two-Way Stop Control	C	24.0 sec
2025 Future Sky View Ridge Conditions (1% Growth and Eaglemont I-VIII))	Two-Way Stop Control	D	28.0 sec
2025 Future Sky View Ridge Conditions (1% Growth, Eaglemont I-VIII and 350 theoretical units)	All-Way Stop Control	D	33.3 sec
2025 Future Sky View Ridge Conditions (1% Growth, Eaglemont I-VIII and 400 theoretical units)	Two-Way Stop Control	F	220.0 sec
	All-Way Stop Control	E	37.9 sec

Table 3: Intersection Level of Service Summary – 2% Growth Rate

Analysis Scenario	Control	Rainier View Road at Chain Lake Road	
		LOS	Delay
2015 Existing Conditions	Two-Way Stop Control	B	12.9 sec
2025 Baseline Conditions (2% Growth and Eaglemont I-VIII)	Two-Way Stop Control	D	25.6 sec
2025 Future Sky View Ridge Conditions (2% Growth and Eaglemont I-VIII))	Two-Way Stop Control	D	29.7 sec
2025 Future Sky View Ridge Conditions (2% Growth, Eaglemont I-VIII and 400 theoretical units)	Two-Way Stop Control	F	349.2 sec
	All-Way Stop Control	E	44.1 sec

The level of service analysis shows that the intersection of Rainier View Road and Chain Lake Road will operate at LOS D with 1% and 2% growth rates with the Sky View Ridge development.

However, an additional 400 theoretical units will cause the intersection to operate at LOS F with a growth rate of 1% or 2% and the existing configuration and traffic control. The intersection was also analyzed with all-way stop-control to determine if that would result in an acceptable level of service for both growth rate conditions. The all-way stop-control would require minor improvements of signing and striping, but will not require the intersection to be reconstructed.

The analysis shows that all-way stop-control allows the intersection to operate at LOS E with 1% and 2% growth, the Eaglemont I-III and IV-VIII developments, 400 theoretical units plus Sky View. If there were only 350 theoretical additional theoretical units, under a 1% growth rate and with all-way stop-controlled conditions, the intersection would retain an acceptable LOS D with 33.3 seconds of delay.

It is important to note the existing entering volume at this intersection is 875 peak hour trips. The request by the City of Monroe to include a growth rate plus the 400 theoretical units results in a total growth of 750 trips or 86% (1,625 peak-trips) increase for development that has not even been applied for and in addition to the 266 units from the Eaglemont I-III and IV-VIII developments that have been approved. Assuming all the pipeline and growth rate results in over 91% (1,669 peak-trips) traffic growth, or over 9% at this intersection per year compared to the historic growth along this road of less than 1% per year.

5. Conclusions

The intersection of Rainier View Road and Chain Lake Road would still operate at acceptable LOS D with growth rate higher than historical growth, the Eaglemont I-III and IV-VIII developments and the Sky View Ridge development. There is also capacity for an additional 350 theoretical units to be constructed with all-way stop-control at the intersection.

Attachments



July 30, 2015

Ry McDuffy
Land
resolutions
3605 Colby
Ave.
Everett WA 98201

SUBJECT: SKY VIEW RIDGE PRELIMINARY PLAT & PRD
APPLICATION 15-PLPR-0002

TAX PARCEL#: 28063600100500, 280636101000,
28063600100200

13207 & 13221 191st, MONROE, WASHINGTON

Dear Ry,

The City of Monroe is in receipt of the submitted materials dated May 20, 2015 for the Sky View Ridge Preliminary Plat and Planned Residential Development (PRD) located at 13207 & 13221 191st Ave. S.E., Monroe, WA, 98272.

The following are comments on the proposal and/or item(s) needing to be

corrected: **PLANNING**

David Osaki, Community Development, (360)863-4544 / dosaki@monroewa.gov

1. Phase I of the proposal relies on Eaglemont IV-VIII for access. If Eaglemont IV-VIII is not developed, what will be the approach for access to Phase I of the property? If it is from 191st Avenue SE, then a provision for a turnaround is needed.

We propose three possible temporary turnarounds for this development. This will allow for the applicant to construct from multiple points of access depending upon completion of the surrounding projects. See revisions on plans showing temporary turnarounds.

2. Note 8 under Monroe Municipal Code section 18.10.140 Bulk requirements; Table A states, "8. "To maintain proportionate lots, the minimum lot width-to-depth ratio for

4. 132 ND PL sewer, extend to 191st and north up 191st to project extents. (approximately sta 13+00 on 191st Ave.

Please see the attached responses provided by Joseph Smeby.

5. Re-run traffic intersection LOS analysis for Rainier View Rd. and Chain Lake Rd. intersection future conditions, 2025.

See comments from traffic engineer

6. Add 2% growth per year and add an additional 300 homes coming from Rainier View Rd. SE from the east,

See comments from traffic engineer

7. Add 2% growth per year and add an additional 100 homes coming from Chain Lake Rd. from the north.

See comments from traffic engineer

BUILDING

Rick Karns, Building Official, (360) 863- 4553 / rkarns@monroewa.gov

1. Provide cut and fill quantities for the required grading permit.

To be provided at time of grading permit

Prompt response to these review comments will ensure continued timely review of this project. To facilitate continued efficient processing of your application, please resubmit your materials, as a single package, to Kim Shaw in the City of Monroe Community Development Department. Kim may be contacted at (360)-863-4532. Incremental resubmittal of materials is not allowed. The resubmittal needs to include a response letter addressing each of the specific items identified in this letter. The review of re-submitted plans and documents may produce additional comments that were not made during this initial review. An electronic version of these review comments can be provided to you upon request should that make it easier for you to prepare a response letter that will enable you to respond to each item. After review of your additional information/corrections, city staff will notify you as to the status of your application.

In accordance with MMC section 21.50.110, time required by the applicant to correct and/or revise plans is excluded from the 120-day review period for development proposals. Also in accordance with MMC section 21.30.40, the City may close an application due to inactivity if the applicant does not respond to issues regarding compliance with city regulations and standards within 30 days of this notice.

For specific questions please contact each individual department contact listed above. For all

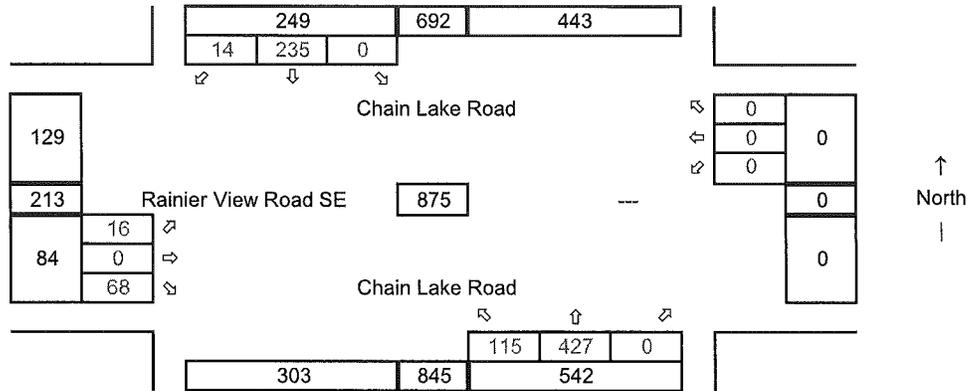
Rainier View Road @ Chain Lake Road Without 400 Units and 1% Growth Rate

Synchro ID: 1

Existing
Average Weekday
PM Peak Hour

Year: 2/17/15

Data Source: TDG



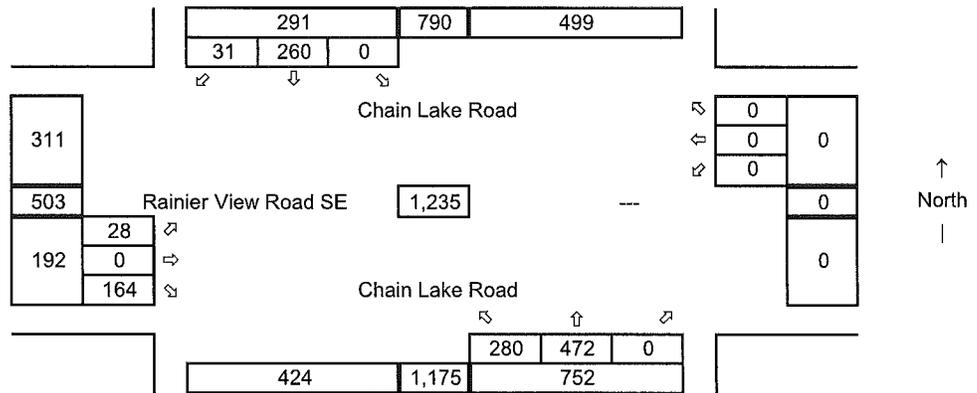
Future without Project
Average Weekday
PM Peak Hour

Year: 2025

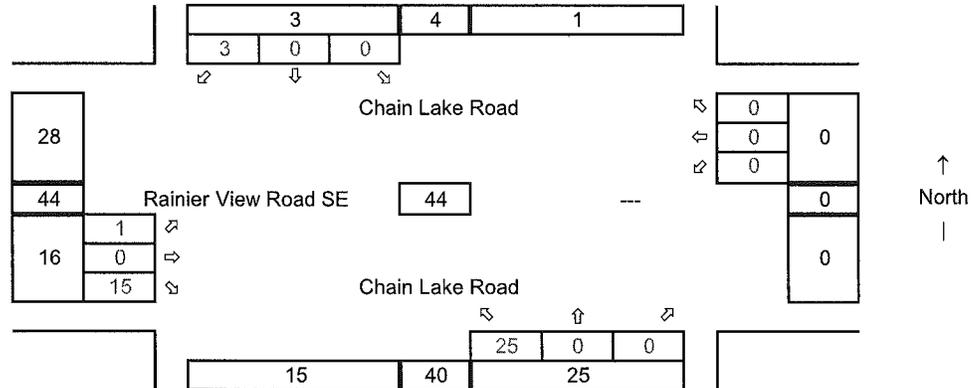
Growth Rate = 1.0%

Years of Growth = 10

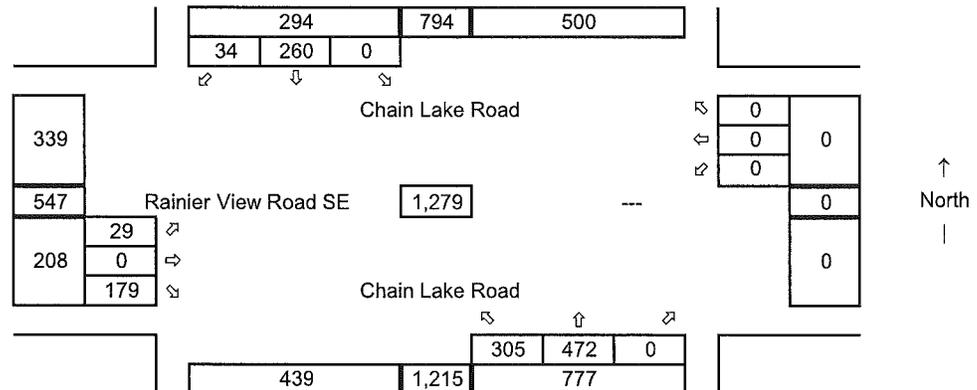
Total Growth = 1.1046



Total Project Trips
Average Weekday
PM Peak Hour



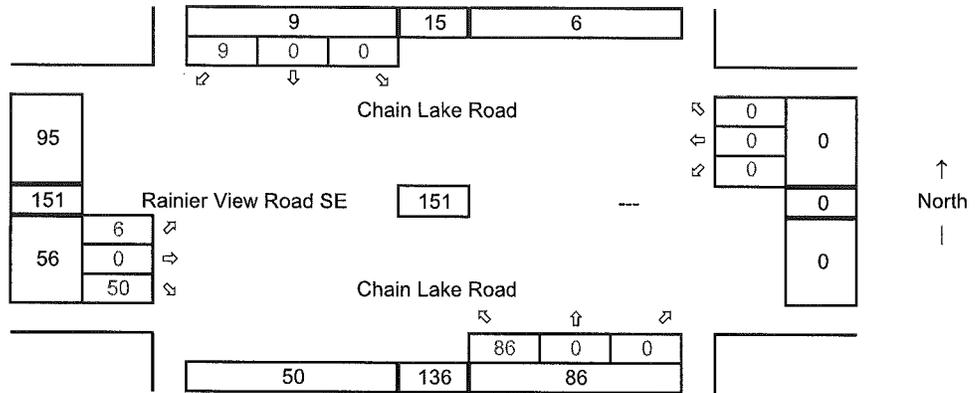
Future with Project
Average Weekday
PM Peak Hour



Rainier View Road @ Chain Lake Road Without 400 Units and 1% Growth Rate

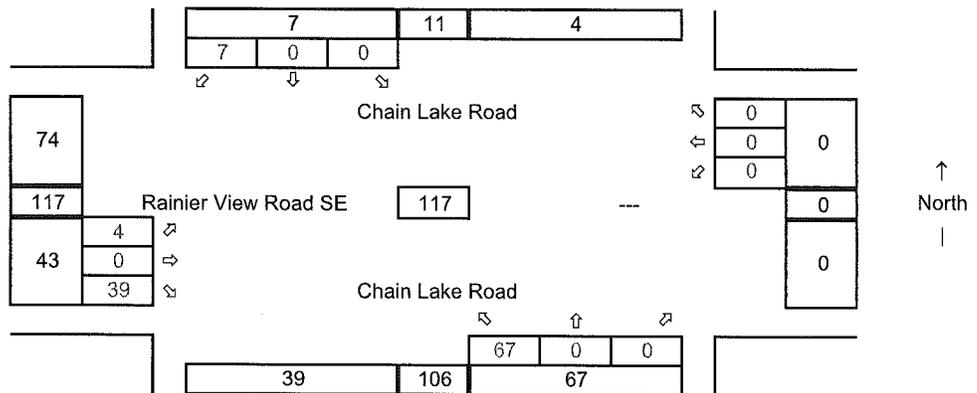
Eaglemont Phases 1-3

Average Weekday
PM Peak Hour



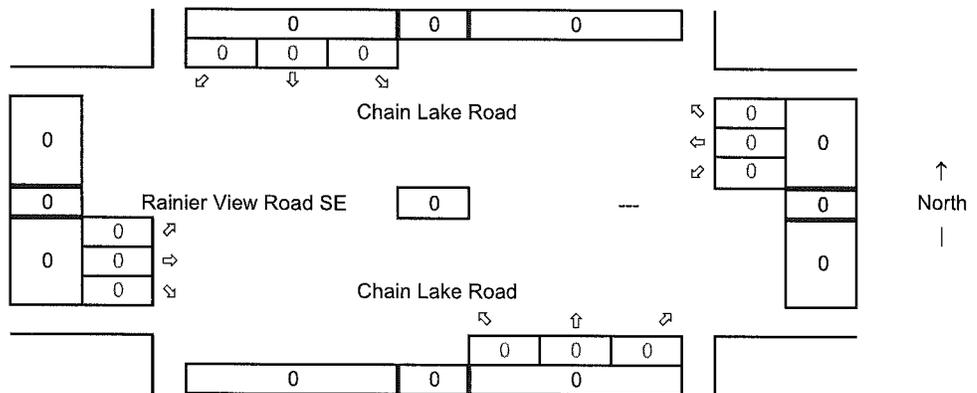
Eaglemont Phases 4-8

Average Weekday
PM Peak Hour



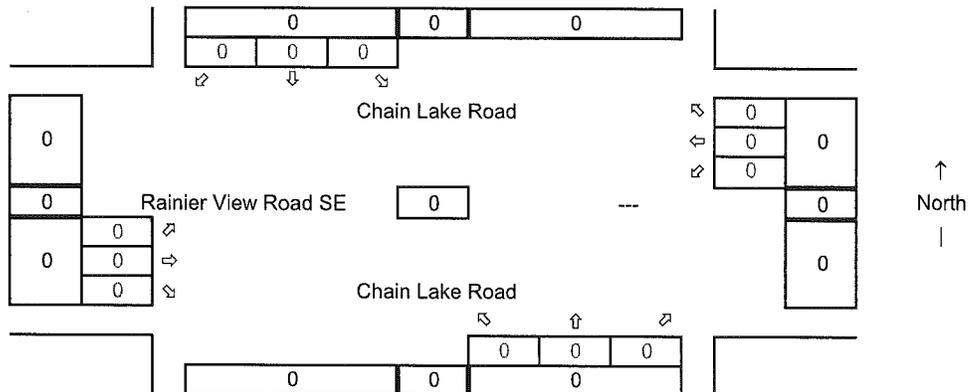
Future 100 Units

Average Weekday
PM Peak Hour



Future 300 Units

Average Weekday
PM Peak Hour



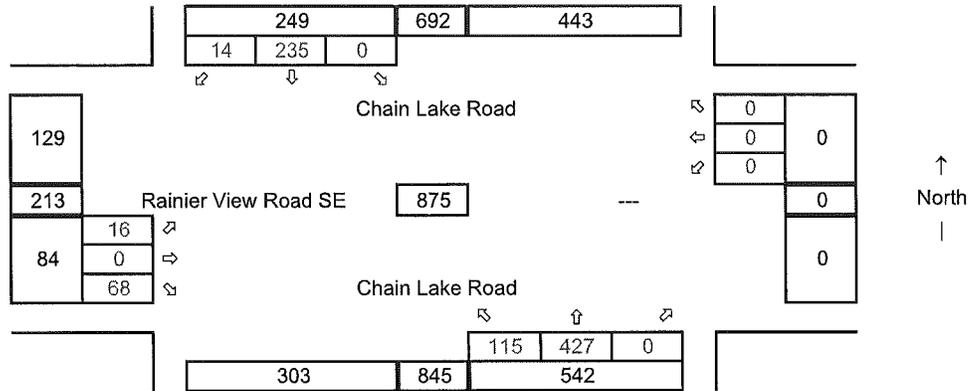
Rainier View Road @ Chain Lake Road with 400 Units and 1% Growth Rate

Synchro ID: 1

Existing
Average Weekday
PM Peak Hour

Year: 2/17/15

Data Source: TDG



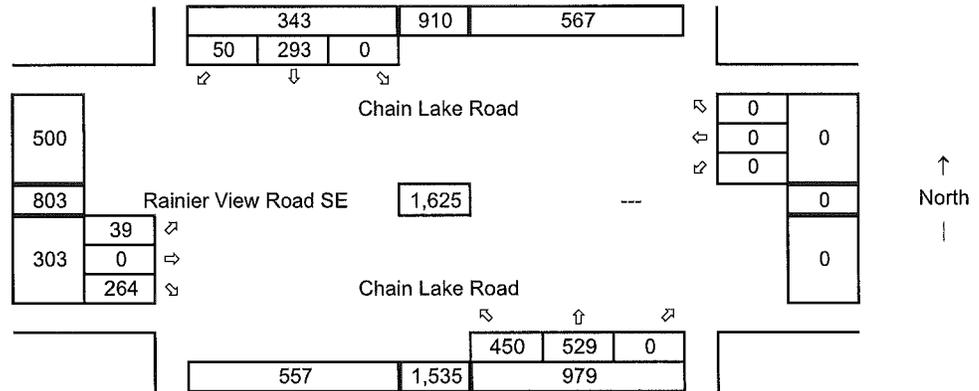
Future without Project
Average Weekday
PM Peak Hour

Year: 2025

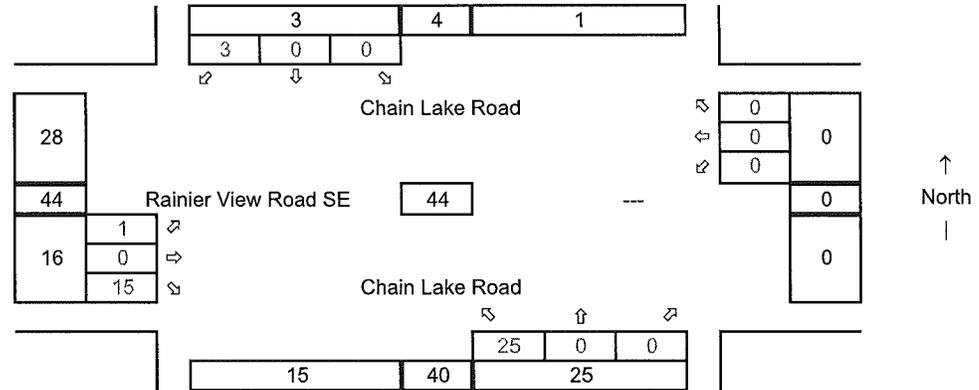
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Years of Growth = 10

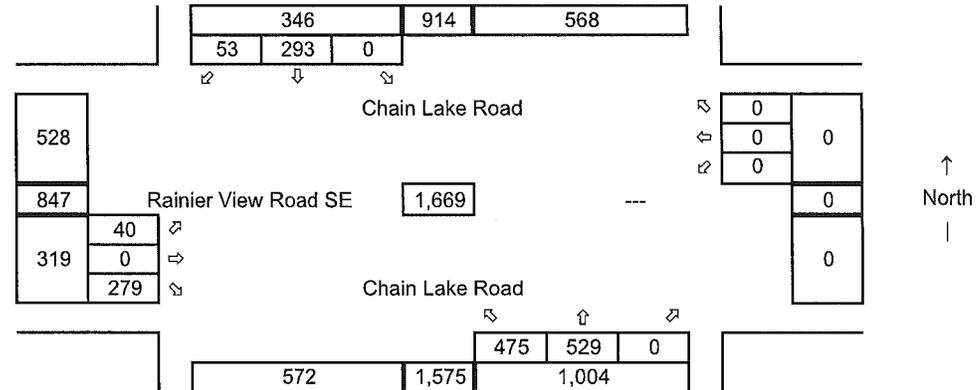
Total Growth = 1.1046



Total Project Trips
Average Weekday
PM Peak Hour

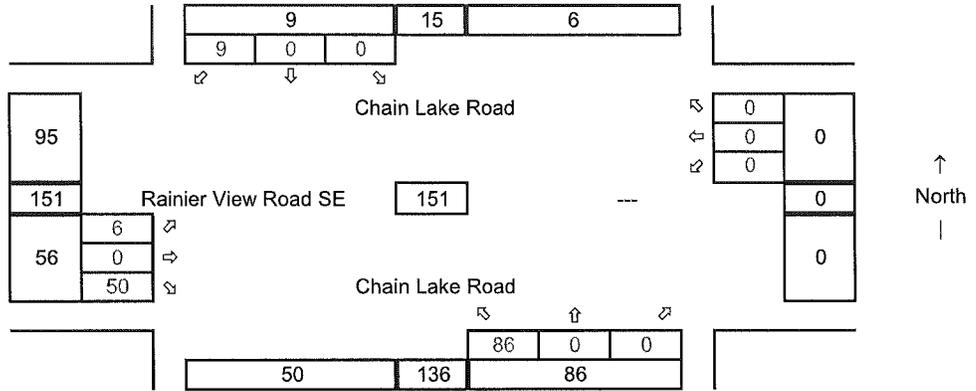


Future with Project
Average Weekday
PM Peak Hour

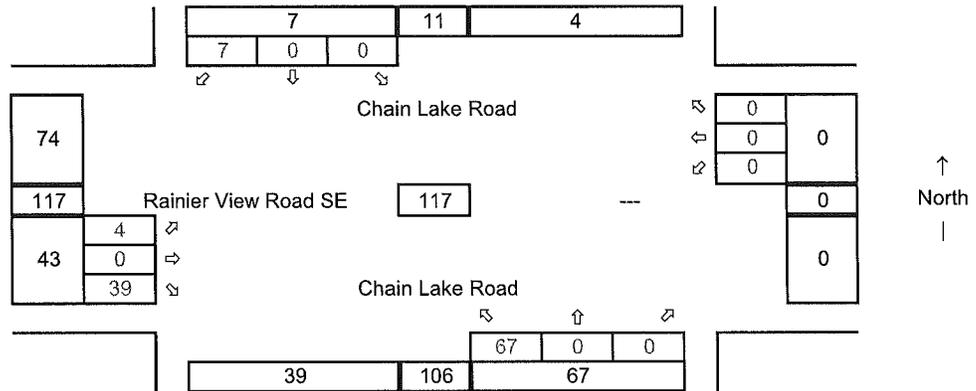


Rainier View Road @ Chain Lake Road with 400 Units and 1% Growth Rate

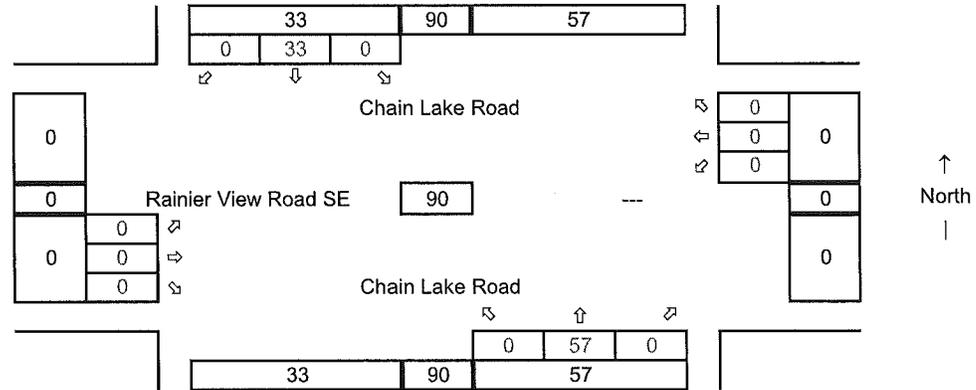
Eaglemont Phases 1-3
Average Weekday
PM Peak Hour



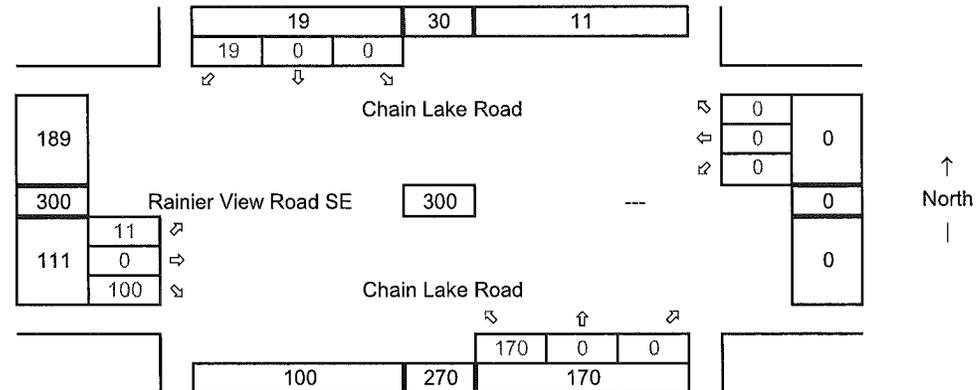
Eaglemont Phases 4-8
Average Weekday
PM Peak Hour



Future 100 Units
Average Weekday
PM Peak Hour



Future 300 Units
Average Weekday
PM Peak Hour



Rainier View Road at Chain Lake Road Without 400 Units and 2% Growth Rate

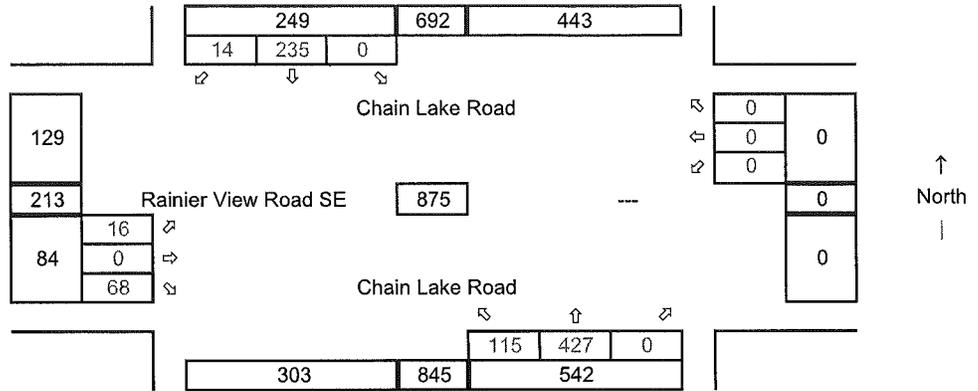
Synchro ID: 1

Existing

Average Weekday
PM Peak Hour

Year: 2/17/15

Data Source: TDG



Future without Project

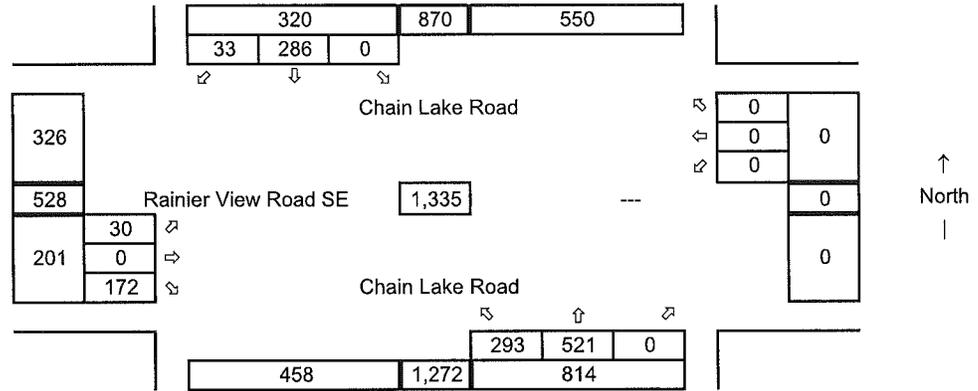
Average Weekday
PM Peak Hour

Year: 2025

Growth Rate = 2.0%

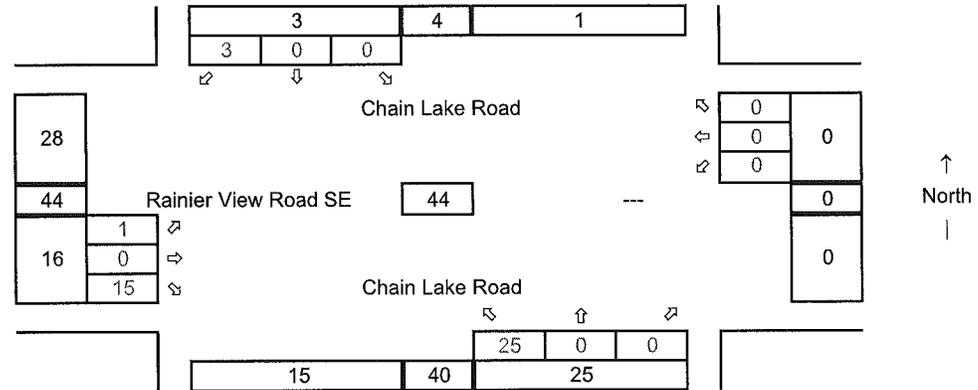
Years of Growth = 10

Total Growth = 1.2190



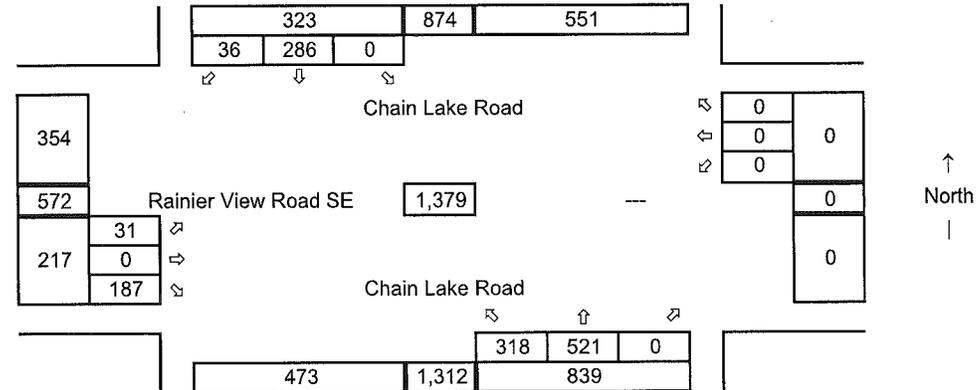
Total Project Trips

Average Weekday
PM Peak Hour



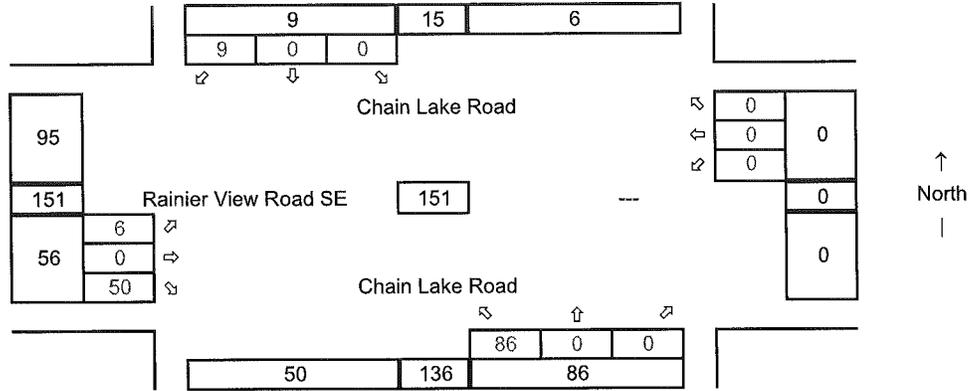
Future with Project

Average Weekday
PM Peak Hour

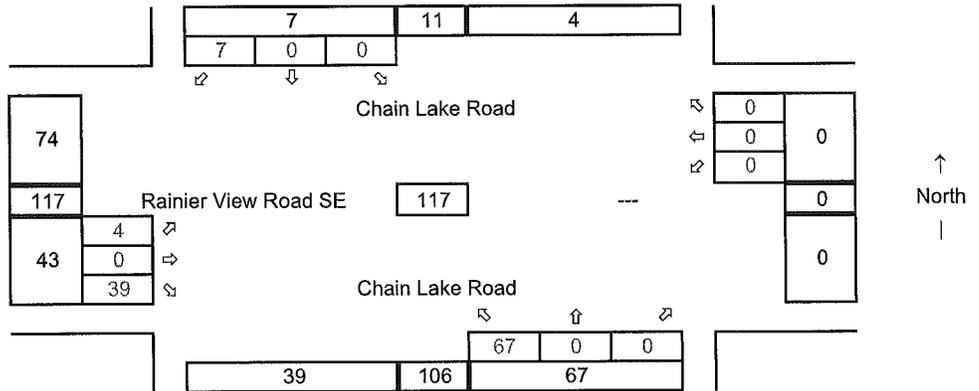


Rainier View Road at Chain Lake Road Without 400 Units and 2% Growth Rate

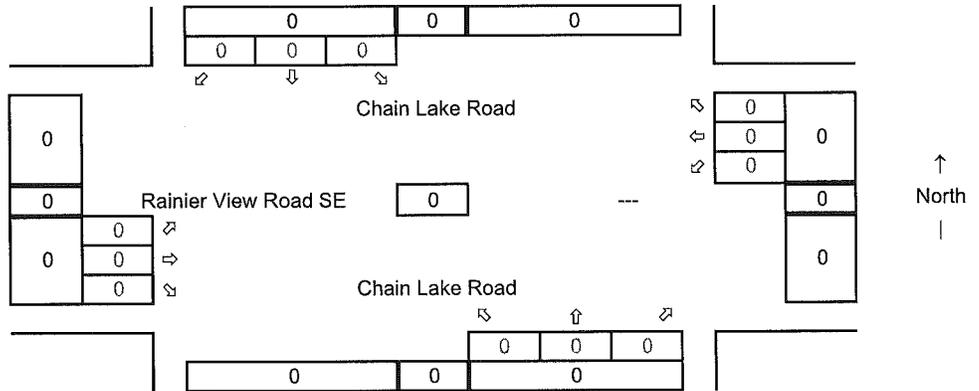
Eaglemont Phases 1-3
Average Weekday
PM Peak Hour



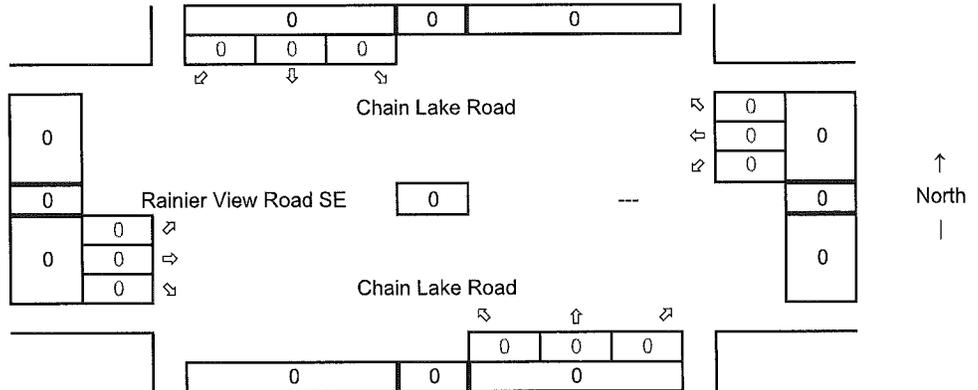
Eaglemont Phases 4-8
Average Weekday
PM Peak Hour



Future 100 Units
Average Weekday
PM Peak Hour



Future 300 Units
Average Weekday
PM Peak Hour



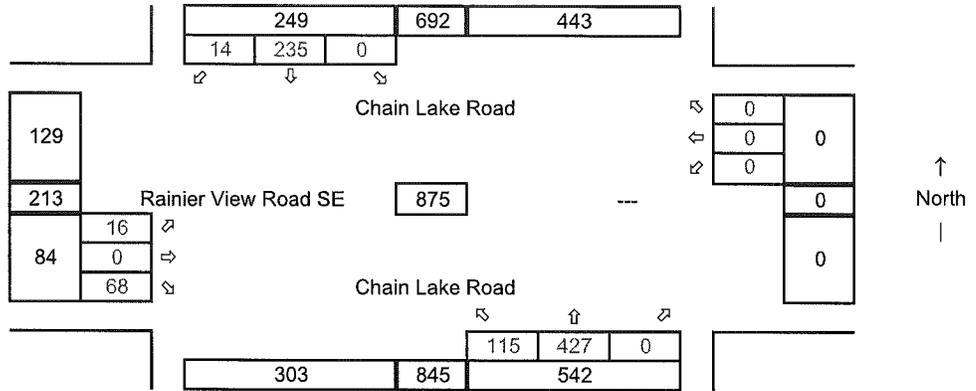
Rainier View Road @ Chain Lake Road with 400 Units and 2% Growth Rate

Synchro ID: 1

Existing
Average Weekday
PM Peak Hour

Year: 2/17/15

Data Source: TDG



Future without Project

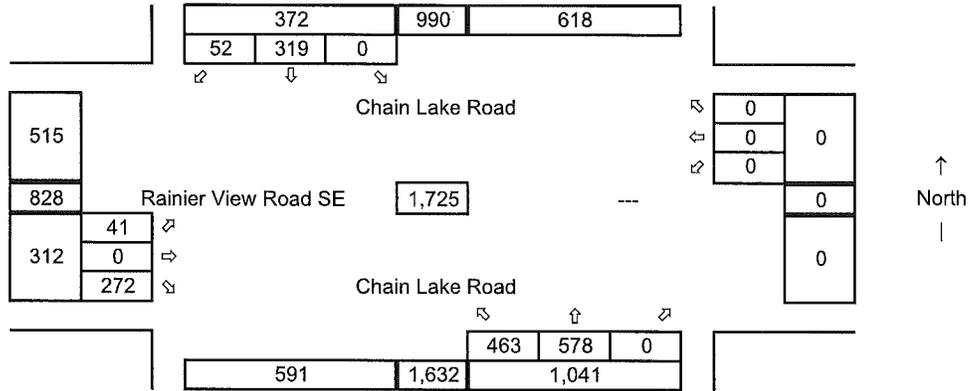
Average Weekday
PM Peak Hour

Year: 2025

Growth Rate = 2.0%

Years of Growth = 10

Total Growth = 1.2190



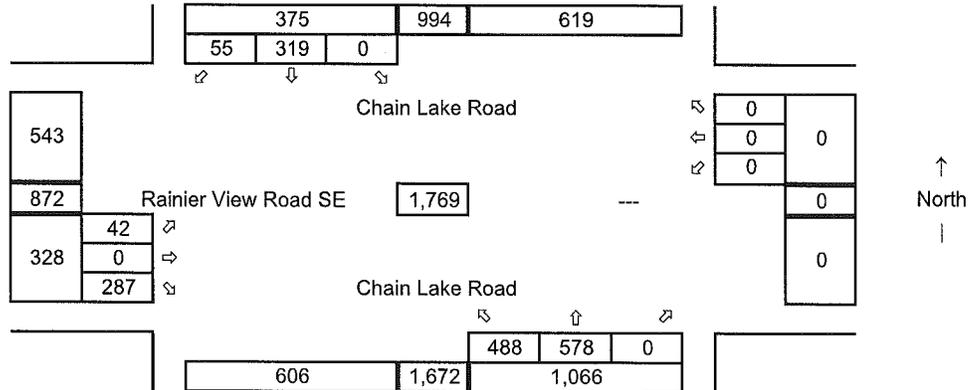
Total Project Trips

Average Weekday
PM Peak Hour



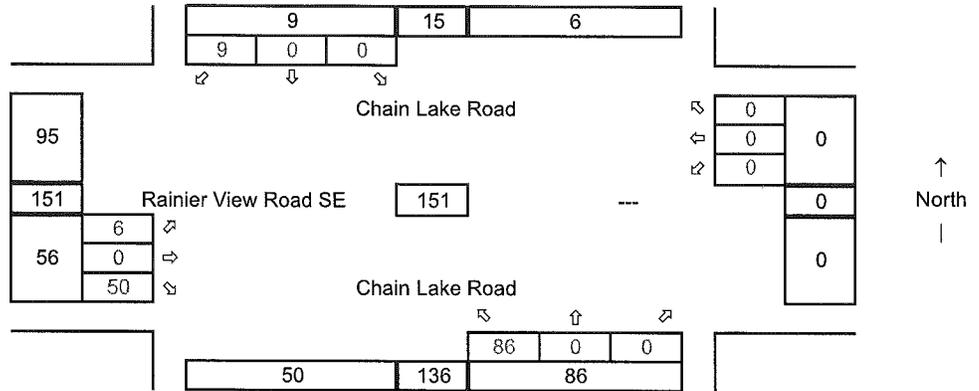
Future with Project

Average Weekday
PM Peak Hour

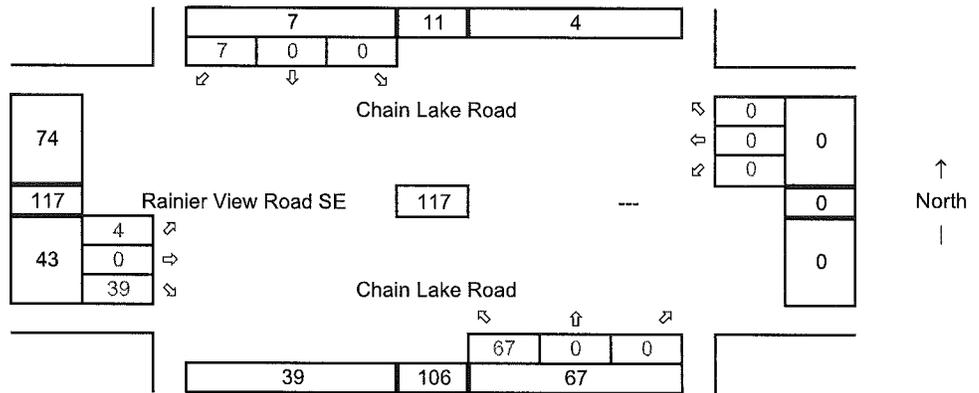


Rainier View Road @ Chain Lake Road with 400 Units and 2% Growth Rate

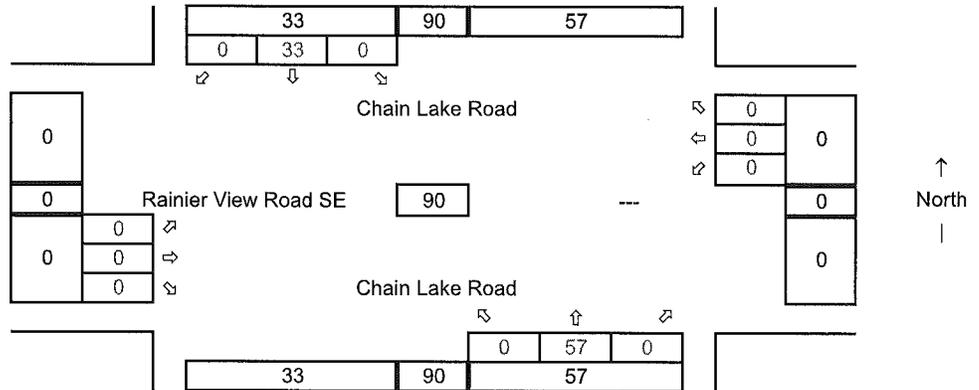
Eaglemont Phases 1-3
Average Weekday
PM Peak Hour



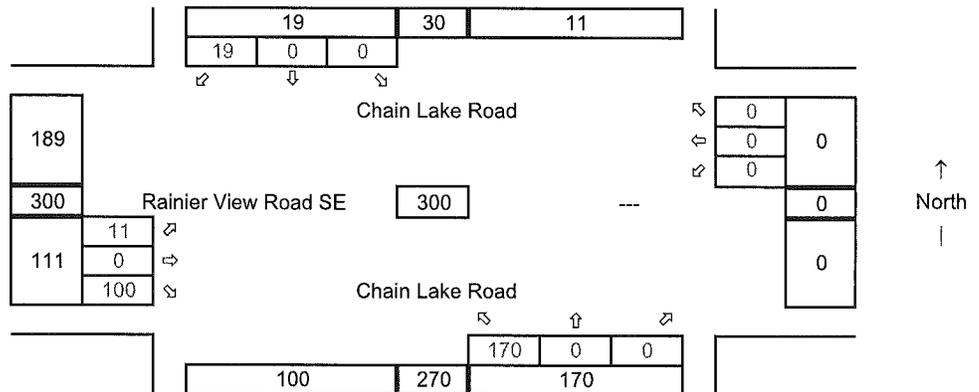
Eaglemont Phases 4-8
Average Weekday
PM Peak Hour



Future 100 Units
Average Weekday
PM Peak Hour



Future 300 Units
Average Weekday
PM Peak Hour



Intersection

Int Delay, s/veh 2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	16	68	115	427	235	14
Future Vol, veh/h	16	68	115	427	235	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	18	76	128	474	261	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	999	269	277	0	-	0
Stage 1	269	-	-	-	-	-
Stage 2	730	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.12	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.218	-	-	-
Pot Cap-1 Maneuver	271	772	1286	-	-	-
Stage 1	778	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	244	772	1286	-	-	-
Mov Cap-2 Maneuver	244	-	-	-	-	-
Stage 1	778	-	-	-	-	-
Stage 2	431	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	1.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1286	-	547	-	-
HCM Lane V/C Ratio	0.099	-	0.171	-	-
HCM Control Delay (s)	8.1	-	12.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.6	-	-

Intersection

Int Delay, s/veh 5.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	28	164	280	472	260	31
Future Vol, veh/h	28	164	280	472	260	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	31	182	311	524	289	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1453	306	323	0	-	0
Stage 1	306	-	-	-	-	-
Stage 2	1147	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.12	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.218	-	-	-
Pot Cap-1 Maneuver	144	736	1237	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	304	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	108	736	1237	-	-	-
Mov Cap-2 Maneuver	108	-	-	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	228	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	24	3.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1237	-	398	-	-
HCM Lane V/C Ratio	0.252	-	0.536	-	-
HCM Control Delay (s)	8.9	-	24	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	1	-	3.1	-	-

HCM 2010 TWSC
1: Chain Lake Rd & Rainier View Rd

Sky Ridge View [15-244]

Intersection

Int Delay, s/veh 6.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	29	179	305	472	260	34
Future Vol, veh/h	29	179	305	472	260	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	32	199	339	524	289	38

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1510	308	327	0	-	0
Stage 1	308	-	-	-	-	-
Stage 2	1202	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.12	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.218	-	-	-
Pot Cap-1 Maneuver	133	734	1233	-	-	-
Stage 1	748	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	96	734	1233	-	-	-
Mov Cap-2 Maneuver	96	-	-	-	-	-
Stage 1	748	-	-	-	-	-
Stage 2	207	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	28	3.5	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1233	-	381	-	-
HCM Lane V/C Ratio	0.275	-	0.607	-	-
HCM Control Delay (s)	9	-	28	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	1.1	-	3.8	-	-

HCM 2010 AWSC
1: Chain Lake Rd & Rainier View Rd

Sky View Ridge

Intersection

Intersection Delay, s/veh	33.3								
Intersection LOS	D								
Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Traffic Vol, veh/h	0	38	262	0	446	529	0	293	52
Future Vol, veh/h	0	38	262	0	446	529	0	293	52
Peak Hour Factor	0.92	0.95	0.95	0.92	0.95	0.95	0.92	0.95	0.95
Heavy Vehicles, %	2	1	1	2	2	2	2	2	2
Mvmt Flow	0	40	276	0	469	557	0	308	55
Number of Lanes	0	1	0	0	1	1	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	1
HCM Control Delay	15.9	44	18
HCM LOS	C	E	C

Lane	NBLn1	NBLn2	EBLn1	SBLn1
Vol Left, %	100%	0%	13%	0%
Vol Thru, %	0%	100%	0%	85%
Vol Right, %	0%	0%	87%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	446	529	300	345
LT Vol	446	0	38	0
Through Vol	0	529	0	293
RT Vol	0	0	262	52
Lane Flow Rate	469	557	316	363
Geometry Grp	7	7	2	5
Degree of Util (X)	0.863	0.945	0.533	0.607
Departure Headway (Hd)	6.617	6.109	6.077	6.016
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	549	596	594	599
Service Time	4.363	3.854	4.111	4.053
HCM Lane V/C Ratio	0.854	0.935	0.532	0.606
HCM Control Delay	38	49.1	15.9	18
HCM Lane LOS	E	E	C	C
HCM 95th-tile Q	9.4	12.5	3.1	4.1

HCM 2010 TWSC
1: Chain Lake Rd & Rainier View Rd

Sky View Ridge

Intersection

Int Delay, s/veh 44.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	40	279	475	529	293	53
Future Vol, veh/h	40	279	475	529	293	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	42	294	500	557	308	56

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1893	336	364	0	-	0
Stage 1	336	-	-	-	-	-
Stage 2	1557	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.12	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.218	-	-	-
Pot Cap-1 Maneuver	77	708	1195	-	-	-
Stage 1	726	-	-	-	-	-
Stage 2	192	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	45	708	1195	-	-	-
Mov Cap-2 Maneuver	45	-	-	-	-	-
Stage 1	726	-	-	-	-	-
Stage 2	112	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	220	4.8	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1195	-	249	-	-
HCM Lane V/C Ratio	0.418	-	1.349	-	-
HCM Control Delay (s)	10.2	-	220	-	-
HCM Lane LOS	B	-	F	-	-
HCM 95th %tile Q(veh)	2.1	-	17.9	-	-

1: Chain Lake Rd & Rainier View Rd

Intersection

Int Delay, s/veh 5.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	30	172	293	521	286	33
Future Vol, veh/h	30	172	293	521	286	33
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	32	181	308	548	301	35

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1483	318	336	0	-	0
Stage 1	318	-	-	-	-	-
Stage 2	1165	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.12	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.218	-	-	-
Pot Cap-1 Maneuver	138	725	1223	-	-	-
Stage 1	740	-	-	-	-	-
Stage 2	298	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	103	725	1223	-	-	-
Mov Cap-2 Maneuver	103	-	-	-	-	-
Stage 1	740	-	-	-	-	-
Stage 2	223	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	25.6	3.2	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1223	-	382	-	-
HCM Lane V/C Ratio	0.252	-	0.557	-	-
HCM Control Delay (s)	8.9	-	25.6	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	1	-	3.3	-	-

HCM 2010 TWSC
1: Chain Lake Rd & Rainier View Rd

Sky View Ridge

Intersection

Int Delay, s/veh 6.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	31	187	318	521	286	36
Future Vol, veh/h	31	187	318	521	286	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	33	197	335	548	301	38

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1538	320	339	0	-	0
Stage 1	320	-	-	-	-	-
Stage 2	1218	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.12	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.218	-	-	-
Pot Cap-1 Maneuver	128	723	1220	-	-	-
Stage 1	738	-	-	-	-	-
Stage 2	281	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	93	723	1220	-	-	-
Mov Cap-2 Maneuver	93	-	-	-	-	-
Stage 1	738	-	-	-	-	-
Stage 2	204	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	29.7	3.4	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1220	-	368	-	-
HCM Lane V/C Ratio	0.274	-	0.624	-	-
HCM Control Delay (s)	9.1	-	29.7	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	1.1	-	4	-	-

HCM 2010 TWSC
 1: Chain Lake Rd & Rainier View Rd

Sky View Ridge

Intersection

Int Delay, s/veh 67.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	42	287	488	578	319	55
Future Vol, veh/h	42	287	488	578	319	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	44	302	514	608	336	58

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2001	365	394	0	-	0
Stage 1	365	-	-	-	-	-
Stage 2	1636	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.12	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.218	-	-	-
Pot Cap-1 Maneuver	66	682	1165	-	-	-
Stage 1	704	-	-	-	-	-
Stage 2	176	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 37	682	1165	-	-	-
Mov Cap-2 Maneuver	~ 37	-	-	-	-	-
Stage 1	704	-	-	-	-	-
Stage 2	98	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	\$ 349.2	4.8	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1165	-	211	-	-
HCM Lane V/C Ratio	0.441	-	1.641	-	-
HCM Control Delay (s)	10.5	-	\$ 349.2	-	-
HCM Lane LOS	B	-	F	-	-
HCM 95th %tile Q(veh)	2.3	-	22.6	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Intersection Delay, s/veh	44.1								
Intersection LOS	E								
Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Traffic Vol, veh/h	0	42	287	0	488	578	0	319	55
Future Vol, veh/h	0	42	287	0	488	578	0	319	55
Peak Hour Factor	0.92	0.95	0.95	0.92	0.95	0.95	0.92	0.95	0.95
Heavy Vehicles, %	2	1	1	2	2	2	2	2	2
Mvmt Flow	0	44	302	0	514	608	0	336	58
Number of Lanes	0	1	0	0	1	1	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	1
HCM Control Delay	17.3	60.8	20
HCM LOS	C	F	C

Lane	NBLn1	NBLn2	EBLn1	SBLn1
Vol Left, %	100%	0%	13%	0%
Vol Thru, %	0%	100%	0%	85%
Vol Right, %	0%	0%	87%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	488	578	329	374
LT Vol	488	0	42	0
Through Vol	0	578	0	319
RT Vol	0	0	287	55
Lane Flow Rate	514	608	346	394
Geometry Grp	7	7	2	5
Degree of Util (X)	0.975	1	0.583	0.657
Departure Headway (Hd)	6.833	6.324	6.064	6.008
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	534	578	596	598
Service Time	4.533	4.024	4.101	4.093
HCM Lane V/C Ratio	0.963	1.052	0.581	0.659
HCM Control Delay	58.9	62.4	17.3	20
HCM Lane LOS	F	F	C	C
HCM 95th-tile Q	13.1	14.6	3.7	4.8

Intersection

Intersection Delay, s/veh	37.9								
Intersection LOS	E								
Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Traffic Vol, veh/h	0	40	279	0	475	529	0	293	53
Future Vol, veh/h	0	40	279	0	475	529	0	293	53
Peak Hour Factor	0.92	0.95	0.95	0.92	0.95	0.95	0.92	0.95	0.95
Heavy Vehicles, %	2	1	1	2	2	2	2	2	2
Mvmt Flow	0	42	294	0	500	557	0	308	56
Number of Lanes	0	1	0	0	1	1	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	1
HCM Control Delay	16.9	51.3	18.6
HCM LOS	C	F	C

Lane	NBLn1	NBLn2	EBLn1	SBLn1
Vol Left, %	100%	0%	13%	0%
Vol Thru, %	0%	100%	0%	85%
Vol Right, %	0%	0%	87%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	475	529	319	346
LT Vol	475	0	40	0
Through Vol	0	529	0	293
RT Vol	0	0	279	53
Lane Flow Rate	500	557	336	364
Geometry Grp	7	7	2	5
Degree of Util (X)	0.933	0.96	0.569	0.618
Departure Headway (Hd)	6.715	6.206	6.101	6.11
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	540	585	591	590
Service Time	4.461	3.952	4.131	4.144
HCM Lane V/C Ratio	0.926	0.952	0.569	0.617
HCM Control Delay	49.8	52.7	16.9	18.6
HCM Lane LOS	E	F	C	C
HCM 95th-tile Q	11.6	13	3.6	4.2