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Garibaldi Traffic Impact Analysis

Jurisdiction: City of Monroe

November 2018



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1. DEVELOPMENT IDENTIFICATION

Gibson Traffic Consultants, Inc. (GTC) has been retained to provide a traffic impact analysis for the proposed Garibaldi development to address the City of Monroe, Snohomish County and Washington State Department of Transportation (WSDOT) traffic impacts. Brad Lincoln, responsible for this report and traffic analysis, is a licensed professional engineer (Civil) in the State of Washington and member of the Washington State section of ITE.

The Garibaldi development is proposed to consist of a total of 61 single-family residential units that will be constructed in one phase. There are 2 existing single-family residential units that will be removed and will be credited to the development. The analysis in this report has therefore been performed for 59 new single-family residential units. The development site is located along the west side of Chain Lake Road, north of Rainier View Road SE. A site vicinity map has been included in Figure 1.

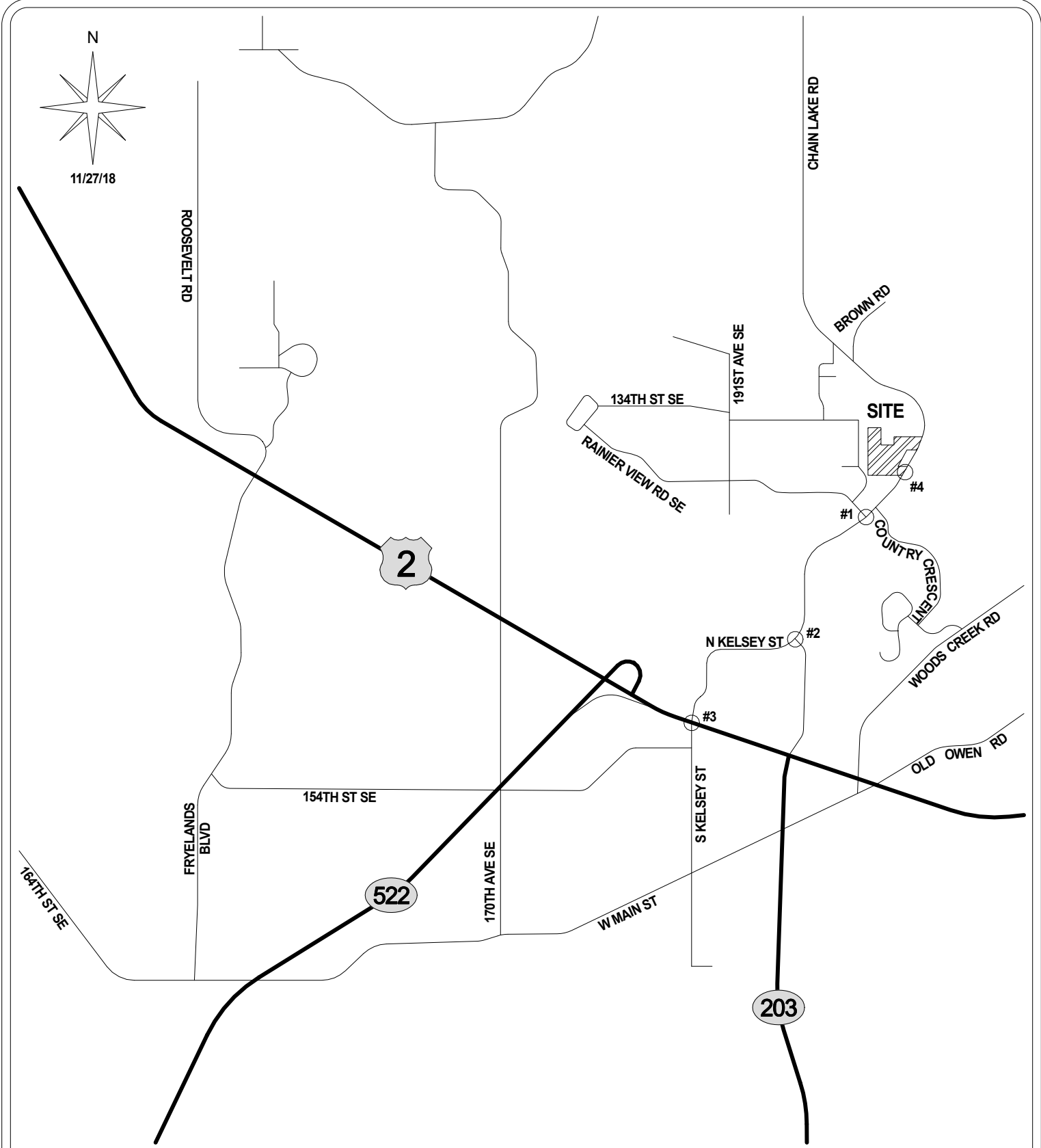
2. METHODOLOGY

Trip generation calculations for the Garibaldi development have been performed utilizing average trip generation data contained in the Institute of Transportation Engineers' (ITE) *Trip Generation, 10th Edition (2017)*. The distribution of trips generated by the site is based on approved distributions for developments in the site vicinity.

Intersection level of service analysis has been performed based on typical City of Monroe requirements and previous scoping conversations with City of Monroe staff. Level of service analysis has been performed for the following intersections:

1. Chain Lake Road at Rainier View Road SE
2. Chain Lake Road at Kelsey Street
3. Kelsey Street at US-2
4. Chain Lake Road at Site Access

Congestion at intersections is generally measured in terms of level of service (LOS). In accordance with *Highway Capacity Manual: 6th Edition (HCM)* by the Transportation Research Board, road facilities and intersections are rated between LOS A and LOS F, with LOS A being free flow and LOS F being forced flow or over-capacity conditions. The level of service at two-way stop-controlled intersections is based on the approach with the highest delay. The level of service at all-way stop-controlled, signalized and roundabout intersections is based on the average delay of all approaches. Geometric characteristics and conflicting traffic movements are taken into consideration when determining level of service values. A summary of the intersection level of service criteria is included in Table 1.



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TRAFFIC IMPACT STUDY
GTC #18-334

GARIBALDI DEVELOPMENT
59 NET NEW SINGLE FAMILY
DWELLINGS

CITY OF MONROE

LEGEND



○ #X

DEVELOPMENT SITE

STUDY INTERSECTION

FIGURE 1
SITE VICINITY
MAP

Table 1: Level of Service Criteria for Intersections

Level of ¹ Service	Expected Delay	Intersection Control Delay (Seconds per Vehicle)	
		Unsignalized Intersections	Signalized 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 D for arterial road intersections, which includes the City of Monroe study intersections. Additionally, 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 development. Intersections operating at LOS F before development will require mitigation. The level of service analysis has been performed utilizing the *Synchro 10.2 Build 0* software for signalized, two-way stop-controlled and all-way stop controlled intersections. The *Sidra 8.0* software has been utilized for the intersection of Chain Lake Road at Kelsey Street (Intersection 2), which is a roundabout.

The City of Monroe also has an interlocal agreement with Snohomish County to provide turning movements at Snohomish County key intersections impacted with 3 or more directional peak-hour trips on any approach or departure and for traffic mitigation fees.

¹ **Source:** *Highway Capacity Manual 6th Edition*.

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.

3. TRIP GENERATION

The trip generation calculations for the Garibaldi development are based on the average trip generation rates for ITE Land Use Code 210, Single-Family Detached Housing. The trip generation calculations are based on the 59 new units of the Garibaldi development, which includes credit for the 2 existing units on the site, and are summarized in Table 2.

Table 2: Trip Generation Summary

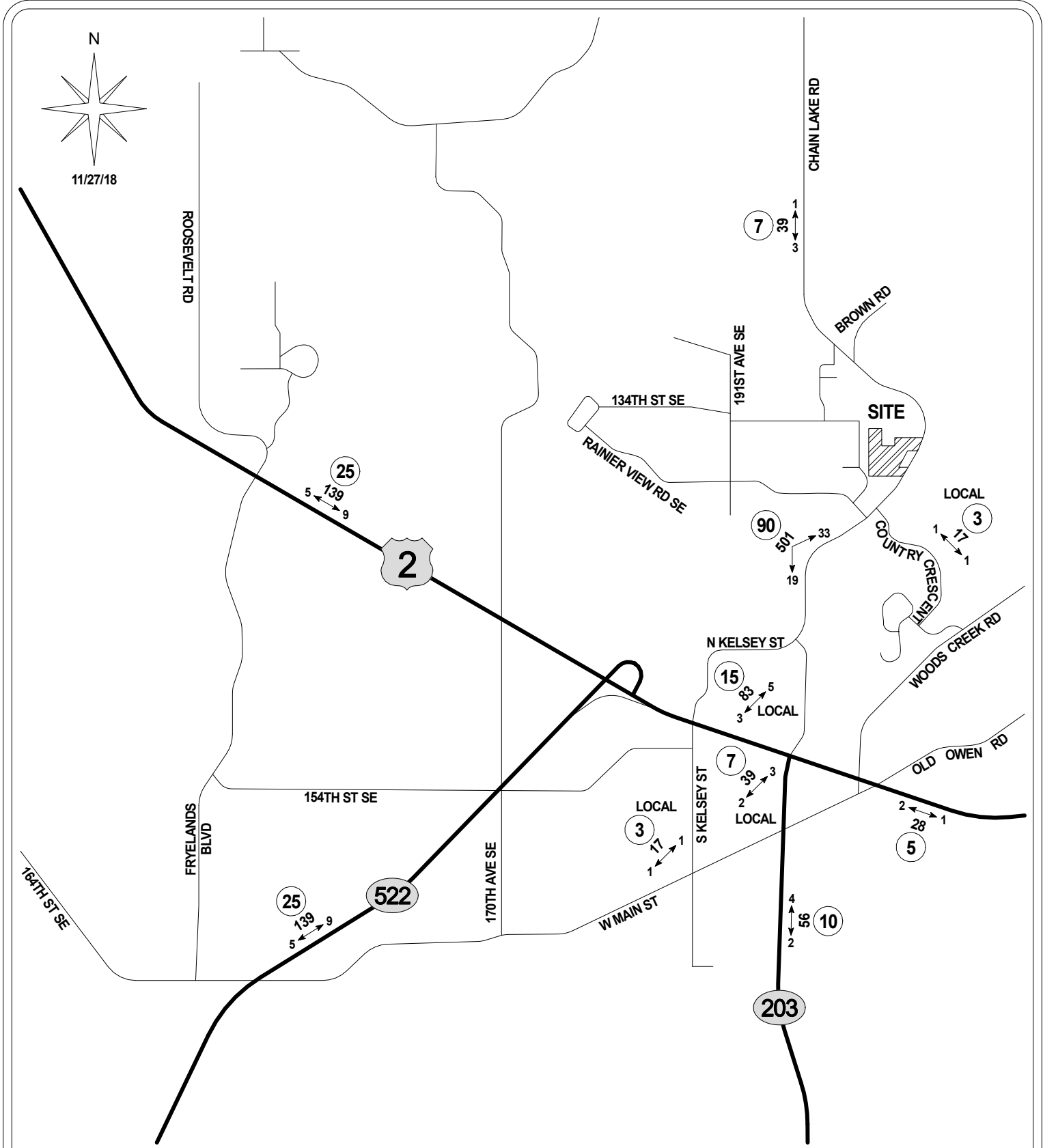
59 New Single-Family Residential Units	Average Daily Trips			AM Peak-Hour Trips			PM Peak-Hour Trips		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Generation Rate	9.44 trips per unit			0.74 trips per unit			0.99 trips per unit		
Splits	50%	50%	100%	25%	75%	100%	63%	37%	100%
Trips	278.48	278.48	556.96	10.92	32.74	43.66	36.80	21.61	58.41

The 59 new units are anticipated to generate approximately 557 average daily trips with approximately 44 AM peak-hour trips and 58 PM peak-hour trips.

4. TRIP DISTRIBUTION

The distribution of trips generated by the Garibaldi development is based on approved distributions for developments in the site vicinity. It is anticipated that 25% of the trips generated by the development will travel to and from the west along US-2. Approximately 35% of the trips generated by the development 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 trips generated by the development 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 trips generated by the development 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. Detailed distributions are included in Figure 2 for the AM peak-hour and Figure 3 for the PM peak-hour.

The interlocal agreement with Snohomish County requires key intersections impacted with 3 or more directional peak-hour trips on any approach or departure to be shown. The Garibaldi development will impact 7 key intersections during the AM and PM peak-hours. The key intersection impacts are shown in detail in the attachments of this report. Snohomish County's trip distribution policy states that trips along US-2 do not need to be distributed west of 88th Street SE. Trips traveling to and from the south along SR-522 and SR-203 are anticipated to travel to and from King County.



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GARIBALDI DEVELOPMENT
59 NET NEW SINGLE FAMILY
DWELLINGS

CITY OF MONROE

LEGEND

AWDT
PM ↔ PEAK



NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

5. INTERSECTION LEVEL OF SERVICE ANALYSIS

The intersections that have been analyzed as part of this report are based on the typical City of Monroe and WSDOT requirements and previous scoping discussions with City of Monroe staff. Level of service analysis has been performed for the following intersections for the weekday PM peak-hour:

1. Chain Lake Road at Rainier View Road SE
2. Chain Lake Road at Kelsey Street
3. Kelsey Street at US-2
4. Chain Lake Road at Site Access

The analysis has been completed for the 2018 existing, 2029 baseline and 2029 future with development conditions. The future year 2029 has been conservatively used instead of 2028 due to 2019 being approximately one month away at the time of this analysis.

5.1 Turning Movement Volumes

The existing turning movements at the study intersections are based on data collected by the independent count firm, Traffic Data Gathering (TDG), in January, March and November 2018. The existing turning movements at the study intersections are shown in Figure 4.

The 2029 baseline volumes have been calculated using an 11-year horizon period and applying a 2% annually compounding growth rate with the following pipeline developments:

- Eaglemont I-III (F.K.A. Eaglemont) – 15 unconstructed new single-family units
- Eaglemont IV (F.K.A. Eaglemont IV-VIII) – 117 new single-family units
- Eaglemont V – 15 new single-family units
- Eaglemont VI (F.K.A. Sky View Ridge) – 44 new single-family units
- Eaglemont VII – 41 new single-family units
- Easton Cove (F.K.A. Klier Property) – 88 new single-family units
- Worthington Heights – 100 new single-family units
- Raspberry Hill – 25 new single-family units
- Clothier Short Plat – 6 new single-family units
- 2 Short Plats north of Easton Cove – 10 new single-family units
- Kestrel Ridge – 30 new single-family units

The approved PM peak-hour trip distributions for the pipeline developments are included in the attachments. For the pipeline projects where a trip distribution was not available, the pipeline trips were distributed in accordance with the Garibaldi distribution. The Eaglemont I-III development is anticipated to have a total of 149 units, however, GTC staff surveyed the area and found 134 completed and lived in houses at the time of the counts in March 2018, resulting in 15 unconstructed houses for the Eaglemont I-III development. Additionally, Easton Cove has been updated to include one more unit (one more inbound trip) and Worthington Heights has been updated to include 6 fewer units (four fewer inbound trips and two fewer outbound trips) from the information provided in the attachments. The 2029 baseline turning movements at the study intersections are shown in Figure 5.

The 2029 future with development turning movements were calculated by adding the trips from the development to the 2029 baseline turning movements. The 2029 future with development turning movements are shown in Figure 6.

The existing turning movement counts and turning movement calculations are included in the attachments.

5.2 Intersection Level of Service Results

The level of service analysis has been performed utilizing the existing control, channelization, peak-hour factors and heavy-vehicle factors from the 2018 counts.

It is important to note that the HCM 6th Edition has limitations that prevent this edition from being used at intersections where there are U-turns and shared lanes. The HCM 2000 has therefore been utilized for this intersection, per WSDOT's protocol.

The level of service analysis shows that the development will not cause any intersection to operate at a deficient level of service. However, the development will add trips to Chain Lake Road at Rainier View Road, which is anticipated to operate at LOS E under the 2029 baseline conditions. The intersection of Chain Lake Road at Rainier View Road SW is discussed later in this report. The level of service results for the study intersections are summarized in Table 3.

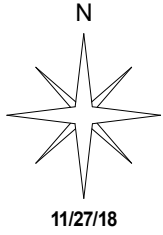
Table 3: Intersection Level of Service Summary

Intersection	Intersection Type	2018 Existing Conditions		2029 Baseline Conditions		2029 Future Conditions with Development	
		LOS	Delay	LOS	Delay	LOS	Delay
1. Chain Lake Road at Rainier View Road SW	Two-Way Stop-Control	B	11.5 sec	E	43.8 sec	F	50.6 sec
2. Chain Lake Road at Kelsey Street	Roundabout	A	7.3 sec	B	11.3 sec	B	12.5 sec
3. Kelsey Street at US-2	Signalized	D	38.8 sec	E	61.4 sec	E	63.0 sec
4. Chain Lake Road at Site Access	Two-Way Stop-Controlled	---	---	---	---	C	20.1 sec

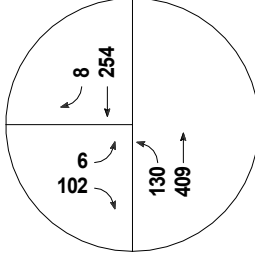
The level of service calculations are included in the attachments.

5.2.1. Chain Lake Road at Rainier View Road

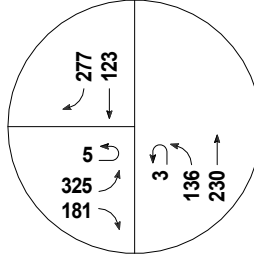
Improvements to the Chain Lake Road corridor have been analyzed as part of the updated City of Monroe Comprehensive Plan. Improvements to Chain Lake Road to increase vehicle capacity are included in the Comprehensive Plan and show the intersection of Chain Lake Road at Rainier View Road operating at LOS C. The frontage improvements that will be completed as part of the Garibaldi development, including dedication of additional right-of-way and payment of City of Monroe traffic mitigation fees, which are discussed later in this report, will help with these improvements.



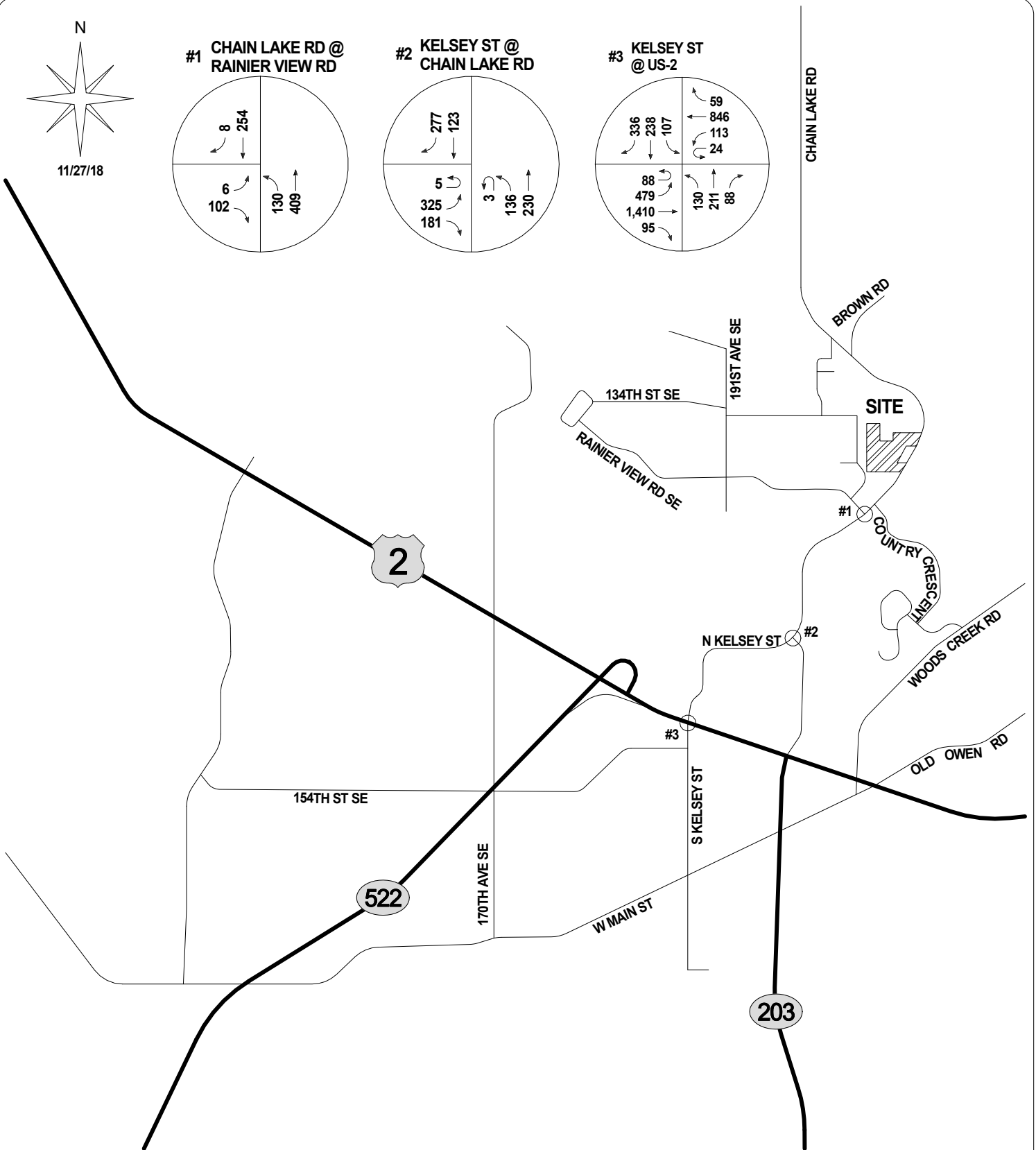
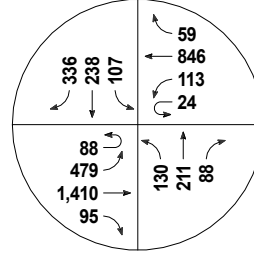
#1 CHAIN LAKE RD @ RAINIER VIEW RD



#2 KELSEY ST @ CHAIN LAKE RD



#3 KELSEY ST @ US-2



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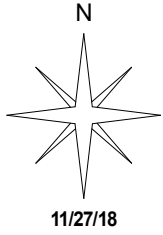
GARIBALDI DEVELOPMENT
59 NET NEW SINGLE FAMILY
DWELLINGS

LEGEND

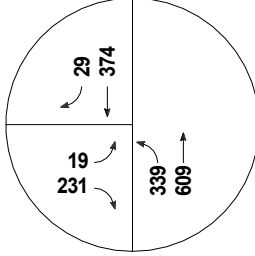
XXX → PM PEAK-HOUR TURNING MOVEMENT VOLUMES

FIGURE 4
EXISTING
TURNING MOVEMENTS

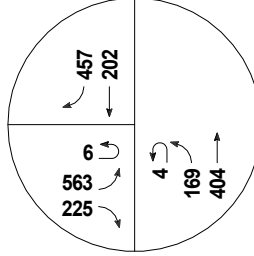
CITY OF MONROE



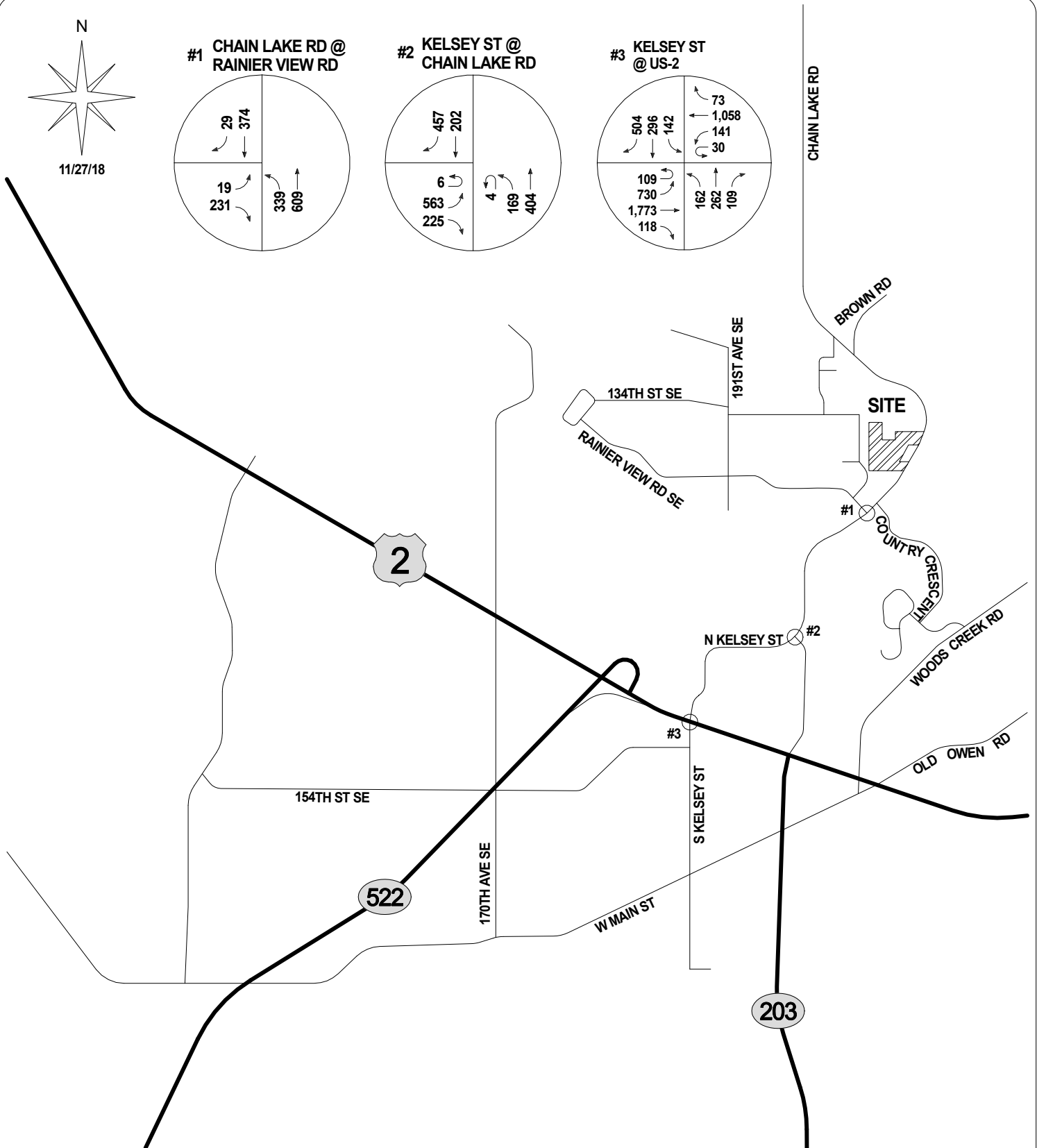
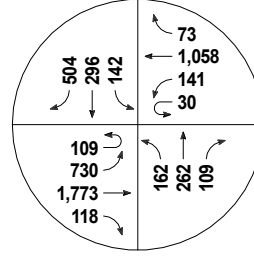
#1 CHAIN LAKE RD @ RAINIER VIEW RD



#2 KELSEY ST @ CHAIN LAKE RD



#3 KELSEY ST @ US-2



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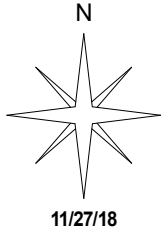
GARIBALDI DEVELOPMENT
59 NET NEW SINGLE FAMILY
DWELLINGS

LEGEND

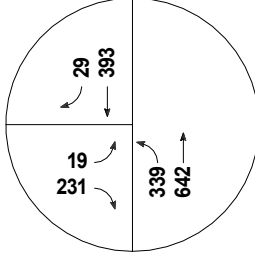
XXX → PM PEAK-HOUR TURNING MOVEMENT VOLUMES

CITY OF MONROE

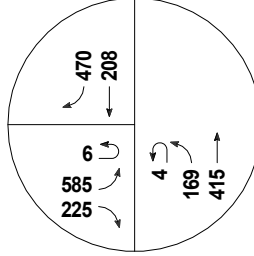
FIGURE 5
2029 BASELINE
TURNING MOVEMENTS



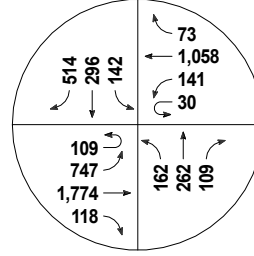
#1 CHAIN LAKE RD @ RAINIER VIEW RD



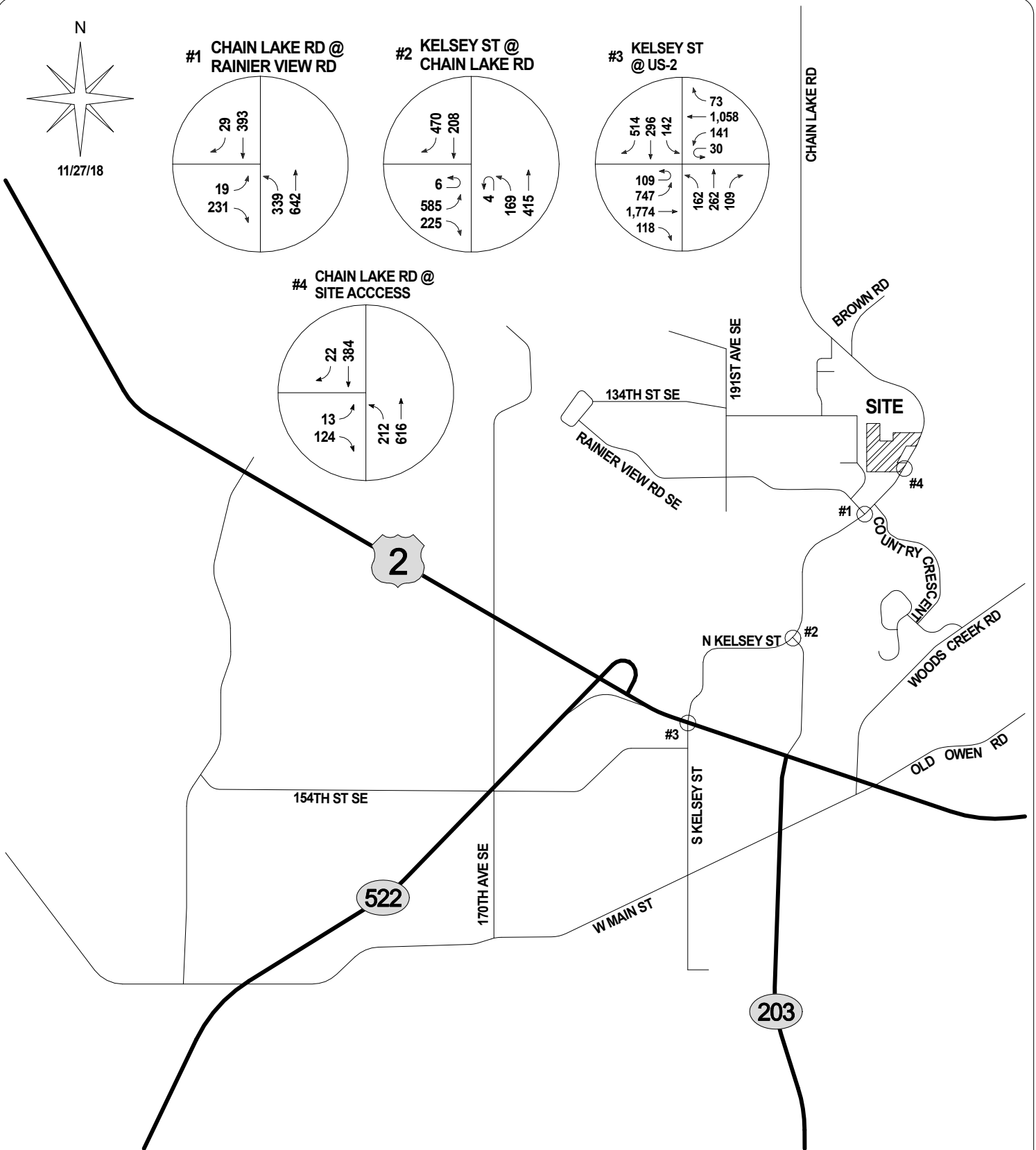
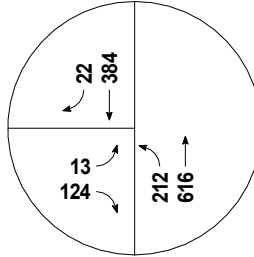
#2 KELSEY ST @ CHAIN LAKE RD



#3 KELSEY ST @ US-2



#4 CHAIN LAKE RD @ SITE ACCESS



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GARIBALDI DEVELOPMENT
59 NET NEW SINGLE FAMILY
DWELLINGS

LEGEND

XXX → PM PEAK-HOUR TURNING MOVEMENT VOLUMES

CITY OF MONROE

FIGURE 6
2029 FUTURE
WITH DEVELOPMENT
TURNING MOVEMENTS

6. TRAFFIC MITIGATION FEES

The Washington Growth Management Act and Revised Code of Washington 82.02.050(2) authorize local jurisdictions to establish proportionate share traffic mitigation fees in order to fund capital facilities, such as roads and intersections. The Garibaldi development is located within the City of Monroe, which has established traffic mitigation fees. The City of Monroe also has interlocal agreements with Snohomish County and WSDOT for traffic mitigation fees.

6.1 City of Monroe

The City of Monroe has established a traffic mitigation fee schedule. The fee for single-family residential units is \$3,475 per unit. The 59 new units of the Garibaldi development will result in City of Monroe traffic mitigation fees of \$205,025.00. It should be noted that these fees may not vest and may be higher when the building applications are pulled.

6.2 Snohomish County

The City of Monroe and Snohomish County have an interlocal agreement that provides for the payment of traffic mitigation for impacts to Snohomish County roadways by City of Monroe developments. Traffic mitigation fees are based on predetermined area impacts or impacts to actual improvement projects. The trip distribution shows that the Garibaldi development will not impact any Snohomish County improvement projects in the Transportation Needs Report with three directional PM peak-hour trips. According to Section 3(a)2 of the *Snohomish County Traffic Worksheet and Traffic Study Requirements for Developments in the City of Monroe*, City of Monroe developments are only required to pay traffic mitigation fees for improvements in the Transportation Needs Report impacted with three directional peak-hour trips. Snohomish County traffic mitigation fees should therefore not be required for the Garibaldi development.

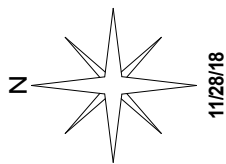
6.3 WSDOT

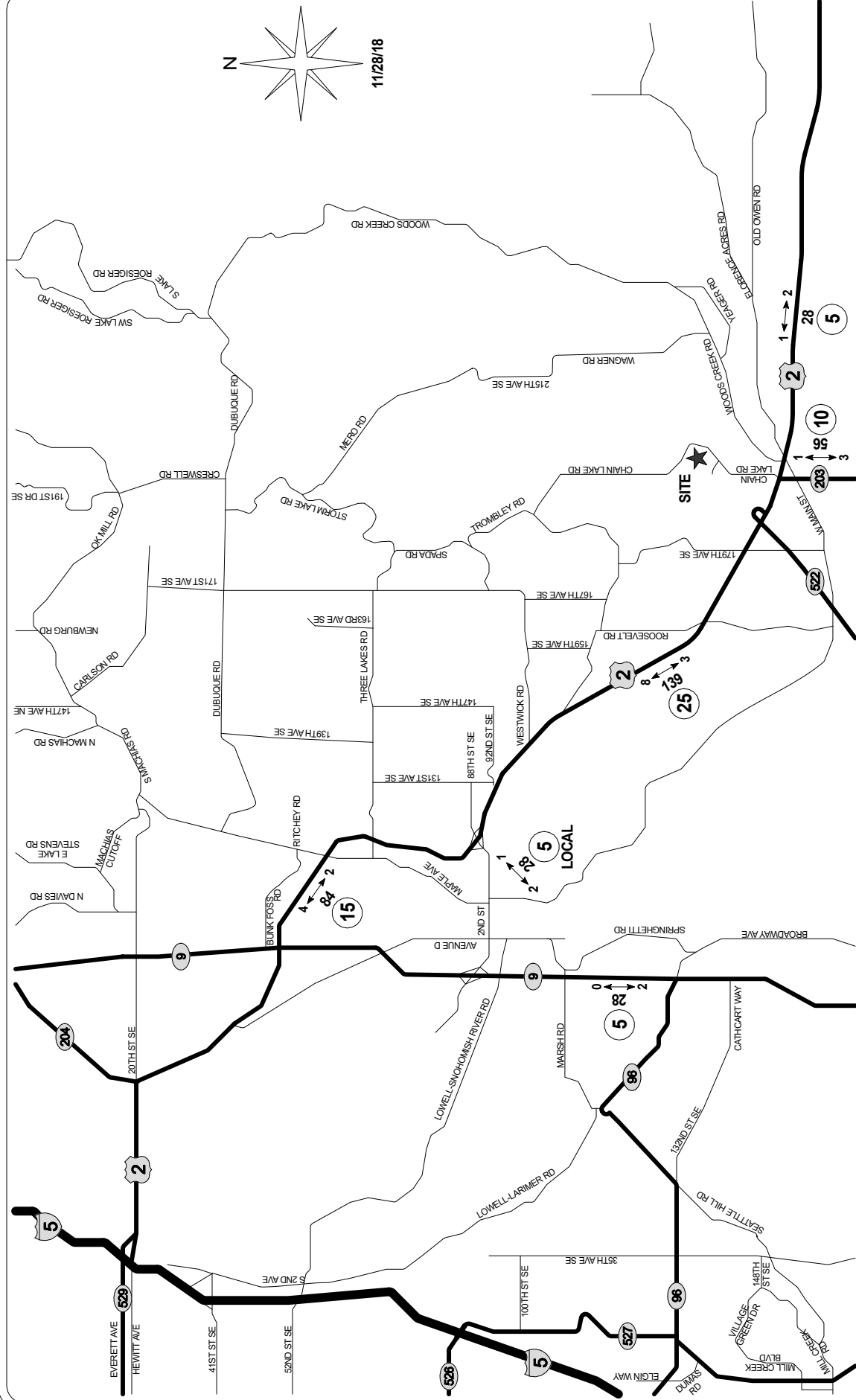
The City of Monroe and WSDOT have an interlocal agreement that provides for the payment of traffic mitigation fees. The interlocal agreement states that a development only has a “significant adverse impact” if the development contributes 25 or more trips to a WSDOT intersection. The WSDOT intersection impacted with more than 25 development trips is expected to operate at acceptable levels of service according to the interlocal agreement between the City of Monroe and WSDOT. WSDOT does not have a collection project for this intersection and therefore the WSDOT traffic mitigation fees should not be required for the Garibaldi development.

7. CONCLUSIONS

The Garibaldi development is proposed to consist of 61 single-family residential units with 2 existing units being removed. The 59 new units of the Garibaldi development are anticipated to generate approximately 557 average daily trips with approximately 44 AM peak-hour trips and 58 PM peak-hour trips. The level of service analysis shows that all the study intersections are anticipated to operate at acceptable levels of service except for Chain Lake Road at Rainier View Road SW, which will operate below LOS D under the 2029 baseline and 2029 future with development conditions. The intersection is planned for capacity improvements identified in the latest Comprehensive Plan. The Garibaldi development will have City of Monroe traffic mitigation fees of \$205,025. The development's impacts will not meet the thresholds for paying traffic mitigation fees to Snohomish County or WSDOT.

Snohomish County Key Intersection Impacts





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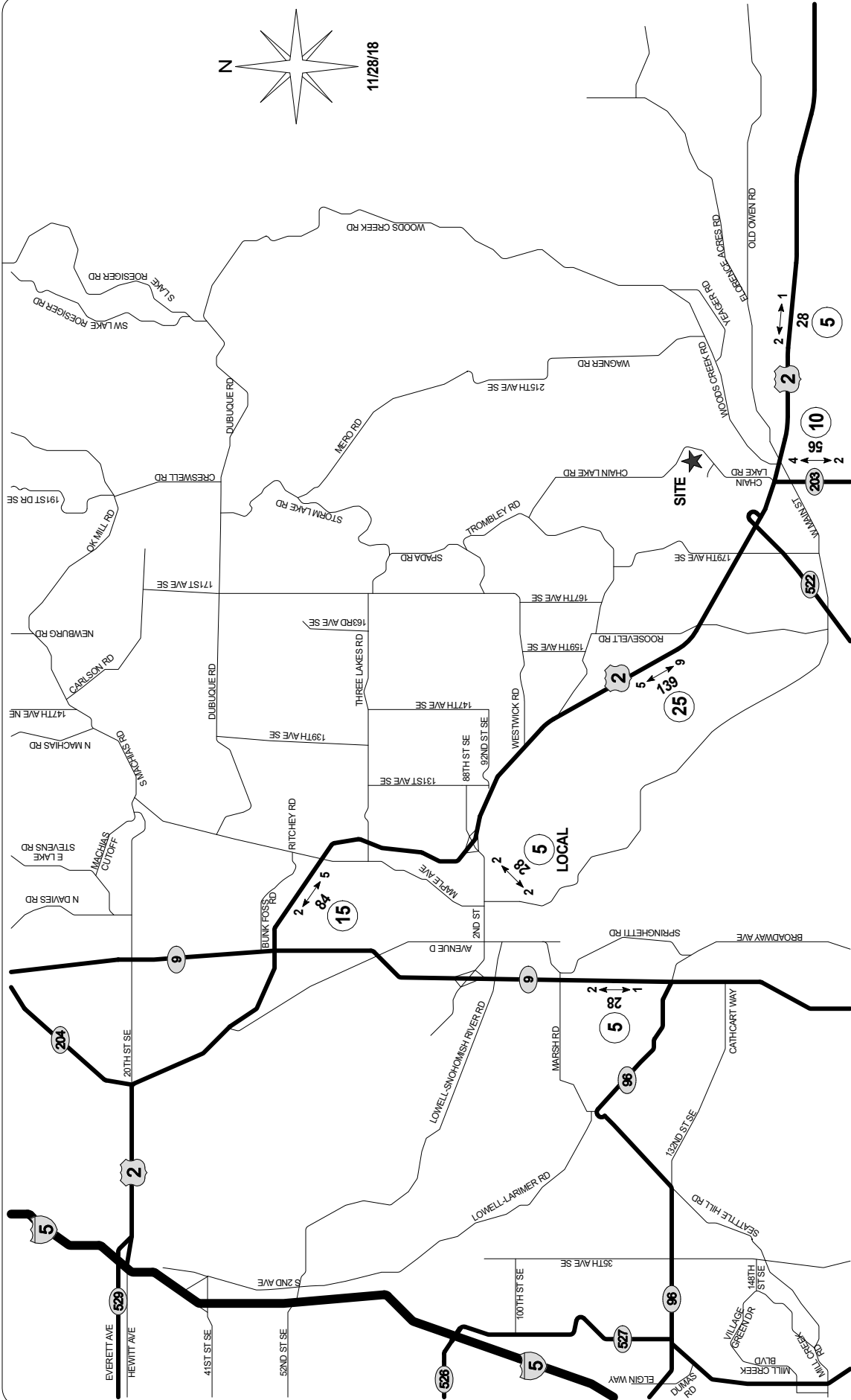
FIGURE A2 DEVELOPMENT TRIP DISTRIBUTION AM PEAK-HOUR

LEGEND
AWD T
AM → PEAK
NEW SITE TRAFFIC
DAILY AND AM PEAK-HOUR
TRIP DISTRIBUTION %

BARAJAS DEVELOPMENT
21 NET NEW SINGLE FAMILY
DWELLINGS

CITY OF MONROE

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11/28/18

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FIGURE A3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

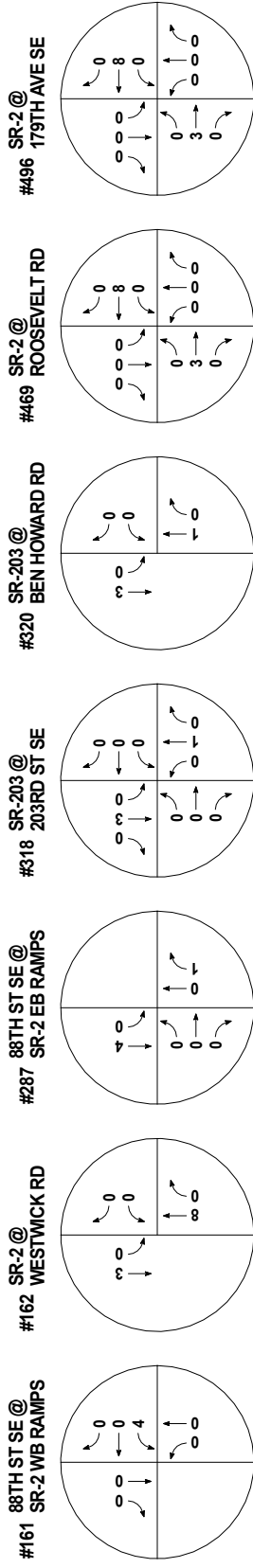
LEGEND
AWD T
PM ← PEAK
NEW SITE TRAFFIC
DAILY AND PM PEAK-HOUR
TRIP DISTRIBUTION %

BARAJAS DEVELOPMENT
21 NET NEW SINGLE FAMILY
DWELLINGS

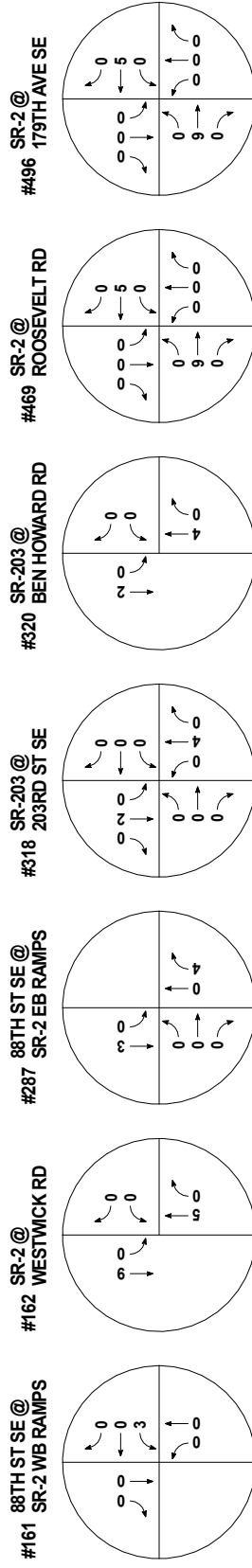
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**AM
PEAK-HOUR**



**PM
PEAK-HOUR**



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BARAJAS DEVELOPMENT
21 NET NEW SINGLE FAMILY
DWELLINGS

LEGEND

XXX → PEAK HOUR
TURNING MOVEMENT VOLUME

FIGURE A4
DEVELOPMENT
KEY INTERSECTION VOLUMES
AM & PM PEAK-HOURS

CITY OF MONROE

Key AM Peak-Hour Key Intersection Volumes

Intersection	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
#161: 88 th St SE at SR-2 WB Ramps	N/A	N/A	N/A	4	0	0	0	0	N/A	N/A	0	0
#162: SR-2 at Westwick Rd	N/A	N/A	N/A	0	N/A	0	N/A	8	0	0	3	N/A
#287: 88 th St SE at SR-2 EB Ramps	0	0	0	N/A	N/A	N/A	N/A	0	1	0	4	N/A
#318: SR-203 at 203 rd St SE	0	0	0	0	0	0	0	1	0	0	3	0
#320: SR-203 at Ben Howard Rd	N/A	N/A	N/A	0	N/A	0	N/A	1	0	0	3	N/A
#469: SR-2 at Roosevelt Rd	0	3	0	0	8	0	0	0	0	0	0	0
#496: SR-2 at 179 th Ave SE	0	3	0	0	8	0	0	0	0	0	0	0

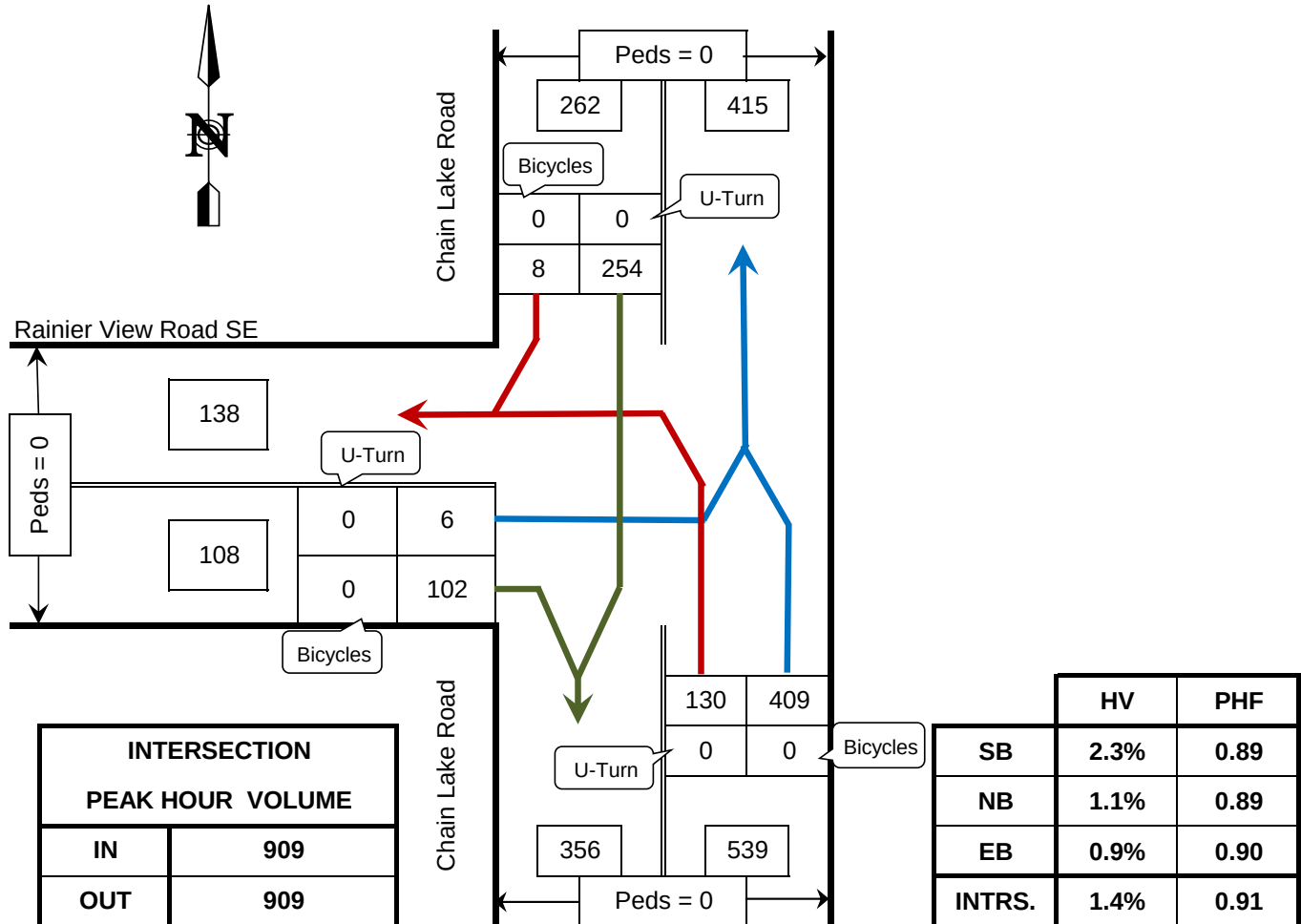
PM Peak-Hour Key Intersection Volumes

Intersection	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
#161: 88 th St SE at SR-2 WB Ramps	N/A	N/A	N/A	3	0	0	0	0	N/A	N/A	0	0
#162: SR-2 at Westwick Rd	N/A	N/A	N/A	0	N/A	0	N/A	5	0	0	9	N/A
#287: 88 th St SE at SR-2 EB Ramps	0	0	0	N/A	N/A	N/A	N/A	0	4	0	3	N/A
#318: SR-203 at 203 rd St SE	0	0	0	0	0	0	0	4	0	0	2	0
#320: SR-203 at Ben Howard Rd	N/A	N/A	N/A	0	N/A	0	N/A	4	0	0	2	N/A
#469: SR-2 at Roosevelt Rd	0	9	0	0	5	0	0	0	0	0	0	0
#496: SR-2 at 179 th Ave SE	0	9	0	0	5	0	0	0	0	0	0	0

Turning Movement Calculations and Counts

TURNING MOVEMENTS DIAGRAM

4:00 PM - 6:00 PM PEAK HOUR: 4:00 PM TO 5:00 PM



HV = Heavy Vehicles
PHF = Peak Hour Factor

Chain Lake Road @ Rainier View Road SE

Monroe, WA

COUNTED BY: VT/CN

DATE OF COUNT: Wed. 1/31/18

REDUCED BY: CN

TIME OF COUNT: 4:00 PM - 6:00 PM

REDUCTION DATE: Tue. 2/6/18

WEATHER: Rainy

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Chain Lake Road @ Rainier View Road SE
Monroe, WA

DATE OF COUNT: Wed. 1/31/18
TIME OF COUNT: 4:00 PM - 6:00 PM

COUNTED BY: VTICN
WEATHER: Rainy

TIME INTERVAL ENDING AT	FROM NORTH ON Chain Lake Road					FROM SOUTH ON Chain Lake Road					FROM EAST ON Rainier View Road SE					INTERVAL TOTALS							
	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds		Bicycle	HV	U-Turn	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:15 PM	0	0	2	0	0	61	5	0	0	3	0	41	111	0	0	0	0	0	0	2	0	28	248
04:30 PM	0	0	3	0	0	72	2	0	0	2	0	34	113	0	0	0	0	0	0	2	0	27	250
04:45 PM	0	0	0	0	0	65	0	0	0	1	0	23	87	0	0	0	0	0	0	1	0	20	196
05:00 PM	0	0	1	0	0	56	1	0	0	0	0	32	98	0	0	0	0	0	0	1	0	27	215
05:15 PM	0	0	1	1	0	60	6	0	0	3	0	30	103	0	0	0	0	2	0	2	0	15	217
05:30 PM	0	0	0	0	0	51	2	0	0	0	0	40	107	0	0	0	0	0	0	2	0	19	221
05:45 PM	0	0	1	0	0	42	1	0	0	1	0	31	110	0	0	0	0	0	0	2	0	19	205
06:00 PM	0	0	0	0	0	57	4	0	0	1	0	38	109	0	0	0	0	0	0	1	0	21	230
PEAK HOUR TOTALS	0	0	6	0	0	254	8	0	0	6	0	130	409	0	0	0	0	1	0	6	0	102	INTERSECTION
ALL MOVEMENTS	262					539					108					909					1.4%		
% HV	2.3%					1.1%					#N/A					0.9%					0.90		
PEAK HOUR FACTOR	0.89					0.89					#N/A					#N/A					0.91		

HV = Heavy Vehicle
PHF = Peak Hour Factor

REDUCED BY: CN

DATE OF REDUCTION: 2/6/2018

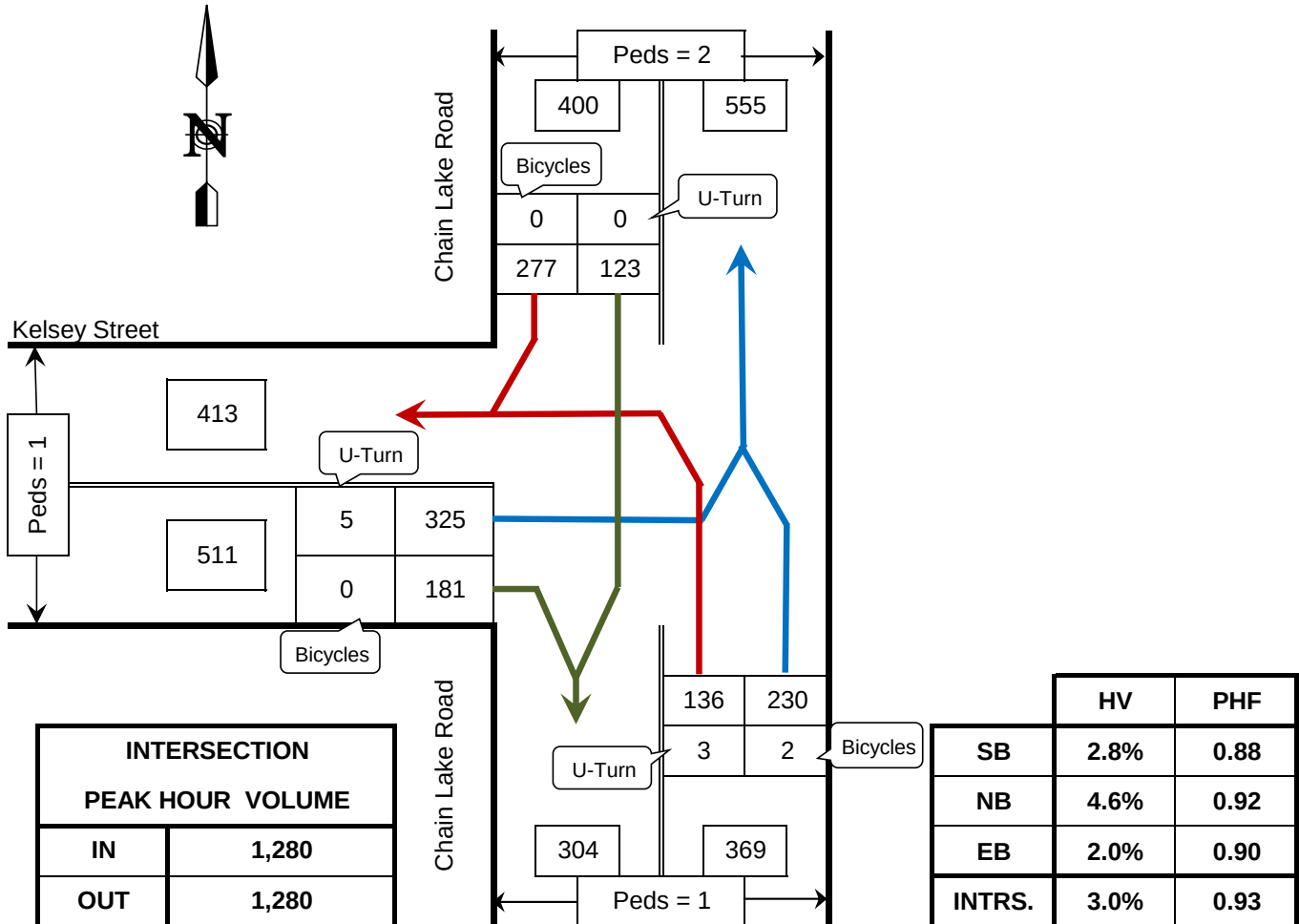
4:00 PM - 6:00 PM PEAK HOUR: 4:00 PM TO 5:00 PM

ROLLING HOUR COUNT

TIME INTERVAL	FROM NORTH ON Chain Lake Road						FROM SOUTH ON Chain Lake Road						FROM EAST ON Rainier View Road SE						INTERVAL TOTALS		
	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds	Bicycle	HV	U-Turn		Left	Thru
2:00 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM - 4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM - 5:00 PM	0	0	6	0	0	254	8	0	6	0	130	409	0	0	0	0	1	0	6	0	102
4:15 PM - 5:15 PM	0	0	5	1	0	253	9	0	6	0	119	401	0	0	0	0	2	0	6	0	89
4:30 PM - 5:30 PM	0	0	2	1	0	232	9	0	4	0	125	395	0	0	0	0	2	0	6	0	81
4:45 PM - 5:45 PM	0	0	3	1	0	209	10	0	4	0	133	418	0	0	0	0	2	0	7	0	80
5:00 PM - 6:00 PM	0	0	2	1	0	210	13	0	5	0	139	429	0	0	0	0	2	0	7	0	74
4:00 PM - 6:00 PM Total:	0	0	8	1	0	464	21	0	0	11	0	269	838	0	0	0	3	0	13	0	176

TURNING MOVEMENTS DIAGRAM

4:00 PM - 6:00 PM PEAK HOUR: 4:00 PM TO 5:00 PM



HV = Heavy Vehicles
PHF = Peak Hour Factor

Chain Lake Road @ Kelsey Street

Monroe, WA

COUNTED BY: VT

DATE OF COUNT: Wed. 3/7/18

REDUCED BY: CN

TIME OF COUNT: 4:00 PM - 6:00 PM

REDUCTION DATE: Fri. 3/9/18

WEATHER: Overcast

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Chain Lake Road @ Kelsey Street
Monroe, WA

DATE OF COUNT: Wed. 3/7/18
TIME OF COUNT: 4:00 PM - 6:00 PM

COUNTED BY: VT
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON Chain Lake Road					FROM SOUTH ON Chain Lake Road					FROM EAST ON					FROM WEST ON Kelsey Street					INTERVAL TOTALS						
	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds	Bicycle	HV	U-Turn	Left	Thru		Right					
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
04:15 PM	0	0	3	0	0	25	79	0	1	6	0	35	61	0	0	0	0	0	0	0	0	0					
04:30 PM	0	0	3	0	0	38	60	0	0	4	1	34	50	0	0	0	0	0	0	0	0	0					
04:45 PM	0	0	2	0	0	18	67	0	1	3	0	40	48	0	0	0	0	0	0	0	0	0					
05:00 PM	2	0	3	0	0	42	71	1	0	4	2	27	71	0	0	0	0	0	0	0	0	0					
05:15 PM	1	0	2	0	0	25	49	0	1	5	0	28	60	0	0	0	0	0	0	0	0	0					
05:30 PM	0	0	2	1	0	26	51	0	1	1	1	30	64	0	0	0	0	0	0	0	0	0					
05:45 PM	1	0	2	1	0	17	61	0	0	1	0	22	59	0	0	0	0	0	0	0	0	0					
06:00 PM	0	0	1	0	0	17	74	0	0	0	1	0	30	66	0	0	0	0	0	0	0	0					
PEAK HOUR TOTALS	2	0	11	0	0	123	277	1	2	17	3	136	230	0	0	0	0	0	0	0	0	0					
ALL MOVEMENTS	2.8%					4.6%					0.92					#N/A					0						
% HV																2.0%					511						
PEAK HOUR FACTOR																0.90											
																						1280		3.0%		0.93	

HV = Heavy Vehicle
PHF = Peak Hour Factor

REDUCED BY: CN

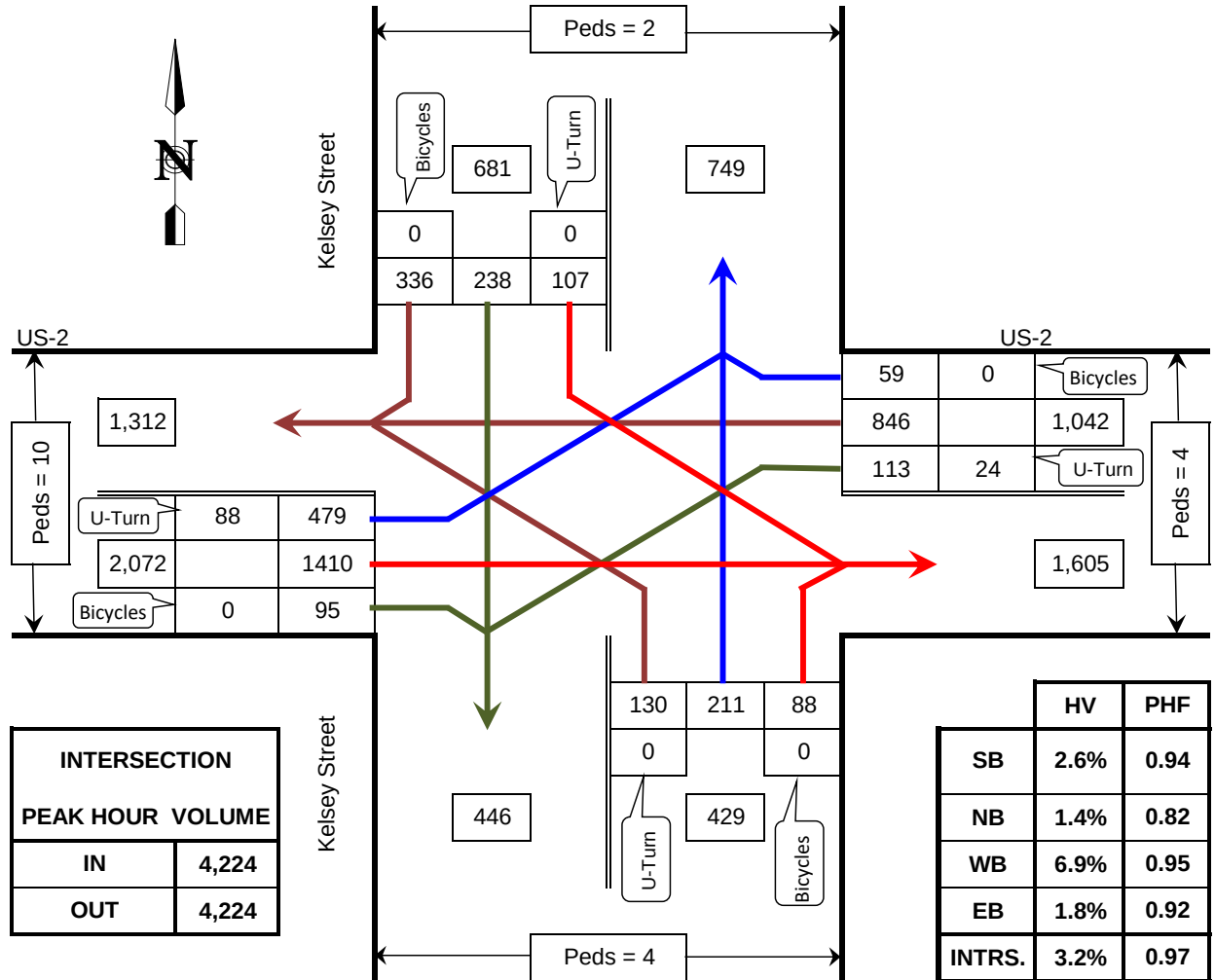
DATE OF REDUCTION: 3/9/2018

ROLLING HOUR COUNT

TIME INTERVAL	FROM NORTH ON Chain Lake Road					FROM SOUTH ON Chain Lake Road					FROM EAST ON					FROM WEST ON Kelsey Street					INTERVAL TOTALS	
	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds	Bicycle	HV	U-Turn	Left	Thru		Right
2:00 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:15 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:30 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:00 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:15 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:30 PM - 4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:45 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:00 PM - 5:00 PM	2	0	11	0	0	123	277	1	2	17	3	136	230	0	0	0	0	10	5	325	0	181
4:15 PM - 5:15 PM	3	0	10	0	0	123	247	1	2	16	3	129	229	0	0	0	0	9	4	329	0	185
4:30 PM - 5:30 PM	3	0	9	1	0	111	238	1	3	13	3	125	243	0	0	0	0	0	0	0	0	0
4:45 PM - 5:45 PM	4	0	9	2	0	110	232	1	2	11	3	107	254	0	0	0	0	6	1	370	0	169
5:00 PM - 6:00 PM	2	0	7	2	0	85	235	0	2	8	1	110	249	0	0	0	0	5	1	361	0	159
4:00 PM - 6:00 PM Total:	4	0	18	2	0	208	512	1	4	25	4	246	479	0	0	0	0	15	6	686	0	340

TURNING MOVEMENTS DIAGRAM

4:00 PM - 6:00 PM PEAK HOUR: 4:00 PM TO 5:00 PM



Kelsey Street @ US-2

Monroe, WA

COUNTED BY: TDG

DATE OF COUNT: Thu. 11/15/18

REDUCTION DATE: Fri. 11/16/18

TIME OF COUNT: 4:00 PM - 6:00 PM

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Kelsey Street @ US-2 Monroe, WA				DATE OF COUNT: Thu. 11/15/18 TIME OF COUNT: 4:00 PM - 6:00 PM				COUNTED BY: TDG DATE OF REDUCTION: 11/16/2018																					
TIME INTERVAL ENDING AT	FROM NORTH ON Kelsey Street					FROM SOUTH ON Kelsey Street					FROM EAST ON US-2					FROM WEST ON US-2					INTERVAL TOTALS								
	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds	Bicycle	HV	U-Turn	Left	Thru		Right							
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
04:15 PM	1	0	5	0	29	46	74	1	0	1	0	27	42	19	0	0	25	7	28	203	17	0	18	32	136	368	28	1056	
04:30 PM	0	0	7	0	22	61	99	2	0	2	0	41	63	27	1	0	17	8	35	194	13	4	0	10	26	120	309	22	1040
04:45 PM	1	0	3	0	29	59	81	0	0	1	0	32	51	20	1	0	18	3	16	244	10	3	0	8	14	125	382	25	1090
05:00 PM	0	0	3	0	27	73	82	1	0	2	0	30	55	22	2	0	12	6	34	205	19	3	0	2	16	98	351	20	1038
05:15 PM	0	0	3	0	26	61	74	0	1	0	0	33	63	23	2	0	9	4	31	200	10	2	0	8	16	122	353	18	1034
05:30 PM	0	0	0	0	33	41	81	1	0	0	0	23	39	18	2	0	10	5	30	232	16	5	0	6	22	125	310	16	991
05:45 PM	0	0	0	0	21	53	88	0	0	1	0	27	63	24	1	0	11	6	33	187	18	11	0	6	27	109	306	18	980
06:00 PM	0	0	1	0	18	50	62	1	0	2	0	32	48	24	0	0	5	2	34	254	14	4	0	6	16	96	284	27	961
PEAK HOUR TOTALS	2	0	18	0	107	238	336	4	0	6	0	130	211	88	4	0	72	24	113	846	59	10	0	38	88	479	1410	95	INTERSECTION
ALL MOVEMENTS	681					429					1042					2072					4224								
% HV	2.6%					1.4%					6.9%					1.8%					3.2%								
PEAK HOUR FACTOR	0.84					0.82					0.95					0.92					0.97								

HV = Heavy Vehicle
PHF = Peak Hour Factor

4:00 PM - 6:00 PM PEAK HOUR: 4:00 PM TO 5:00 PM

ROLLING HOUR COUNT

TIME INTERVAL	FROM NORTH ON Kelsey Street					FROM SOUTH ON Kelsey Street					FROM EAST ON US-2					FROM WEST ON US-2					INTERVAL TOTALS								
	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds	Bicycle	HV	U-Turn	Left	Thru	Right	Peds	Bicycle	HV	U-Turn	Left	Thru		Right							
2:00 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
2:15 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
2:30 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
3:00 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
3:15 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
3:30 PM - 4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
3:45 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
4:00 PM - 5:00 PM	2	0	18	0	107	238	336	4	0	6	0	130	211	88	4	0	72	24	113	846	59	10	0	38	88	479	1410	95	4224
4:15 PM - 5:15 PM	1	0	16	0	104	253	336	3	1	5	0	136	232	92	6	0	56	21	116	843	52	12	0	28	72	465	1395	85	4202
4:30 PM - 5:30 PM	1	0	9	0	115	233	318	2	1	3	0	118	208	83	7	0	49	18	111	881	55	13	0	24	68	470	1396	79	4153
4:45 PM - 5:45 PM	0	0	6	0	107	228	325	2	1	3	0	113	220	87	7	0	42	21	128	824	63	21	0	22	81	464	1320	72	4043
5:00 PM - 6:00 PM	0	0	4	0	98	205	305	2	1	3	0	115	213	89	5	0	35	17	128	873	58	22	0	26	81	462	1253	79	3966
4:00 PM - 6:00 PM Total:	2	0	22	0	205	443	641	6	1	9	0	245	424	177	9	0	107	41	241	1719	117	32	0	64	169	931	2663	174	8190

1 Rainier View @ Chain Lake Rd

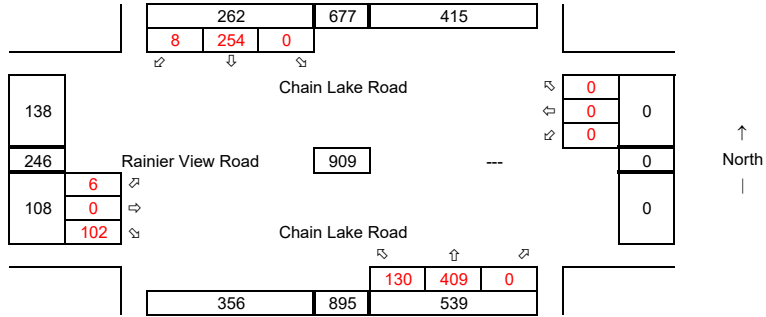
Synchro ID: 1

Existing

Average Weekday
PM Peak Hour

Year: 1/31/18

Data Source: TDG



Future without Project

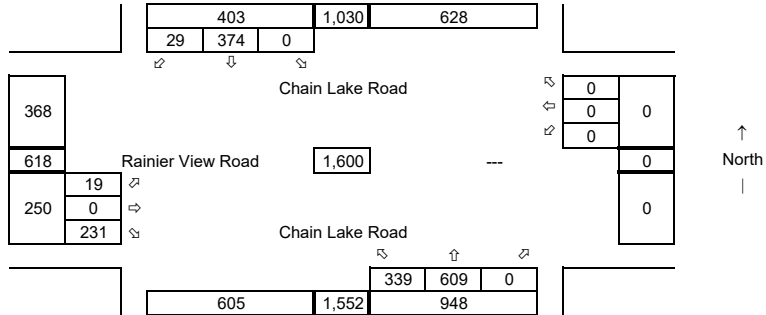
Average Weekday
PM Peak Hour

Year: 2029

Growth Rate = 2.0%

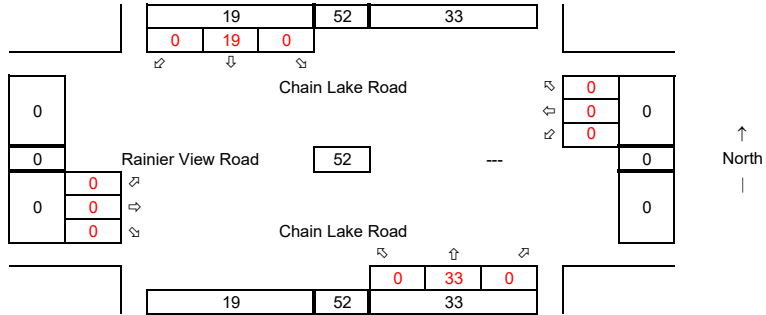
Years of Growth = 11

Total Growth = 1.2434



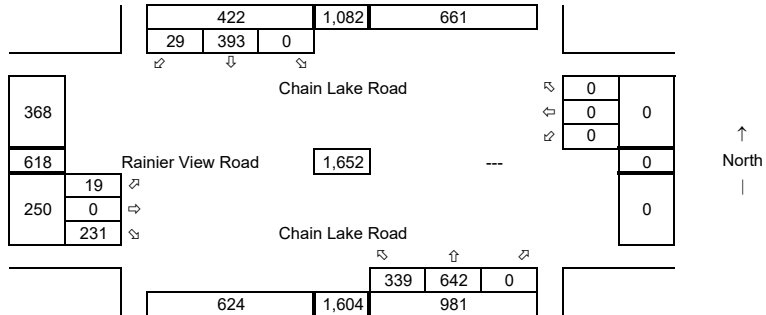
Total Project Trips

Average Weekday
PM Peak Hour



Future with Project

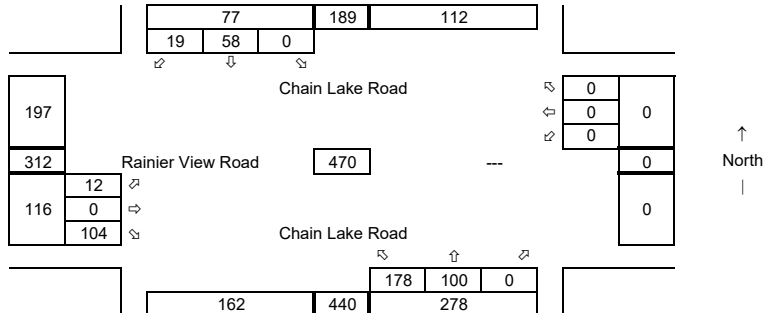
Average Weekday
PM Peak Hour



Pipeline Trips

Average Weekday
PM Peak Hour

Eaglemont 1-7
Easton Cove
Worthington Heights
Raspberry Hill
Clothier Short Plat
2 Short Plats
Kestrel Ridge



2 Kelsey St @ Chain Lake Rd

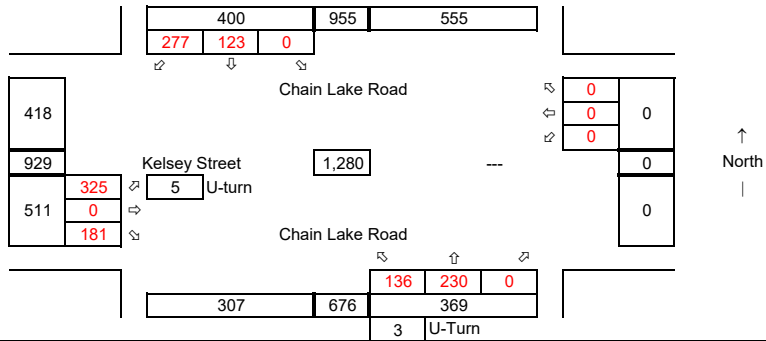
Synchro ID: 2

Existing

Average Weekday
PM Peak Hour

Year: 3/7/18

Data Source: TDG



Future without Project

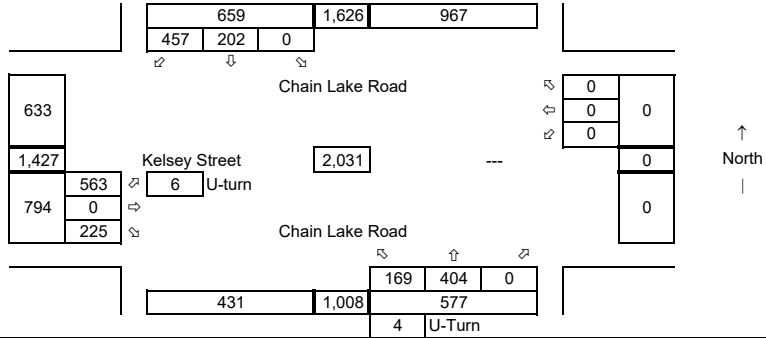
Average Weekday
PM Peak Hour

Year: 2029

Growth Rate = 2.0%

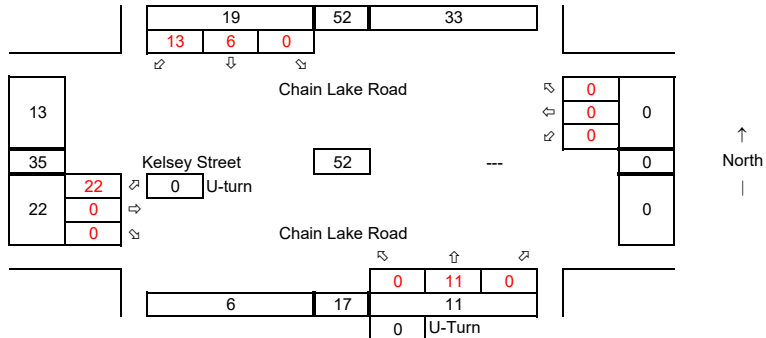
Years of Growth = 11

Total Growth = 1.2434



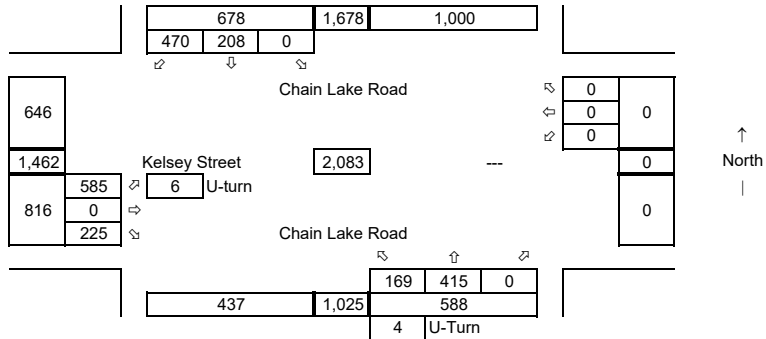
Total Project Trips

Average Weekday
PM Peak Hour



Future with Project

Average Weekday
PM Peak Hour



Pipeline Trips

Average Weekday
PM Peak Hour

Eaglemont 1-7
Easton Cove
Worthington Heights
Raspberry Hill
Clothier Short Plat
2 Short Plats
Kestrel Ridge



3 Kelsey St @ US-2

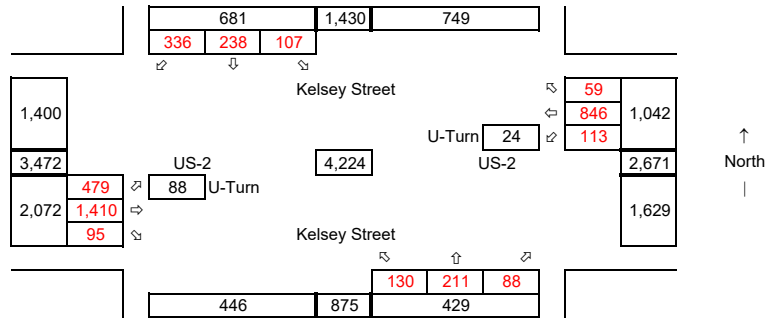
Synchro ID: 3

Existing

Average Weekday
PM Peak Hour

Year: 11/15/18

Data Source: TDG



Future without Project

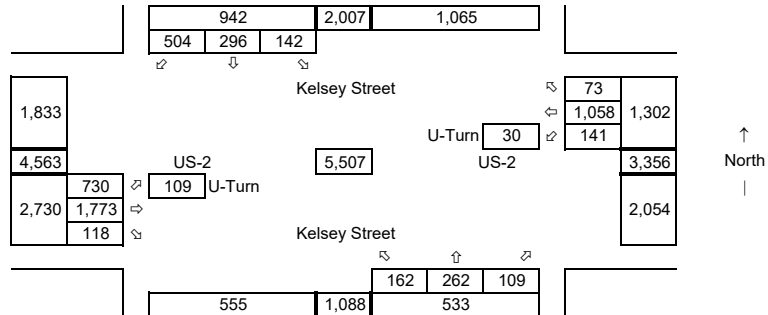
Average Weekday
PM Peak Hour

Year: 2029

Growth Rate = 2.0%

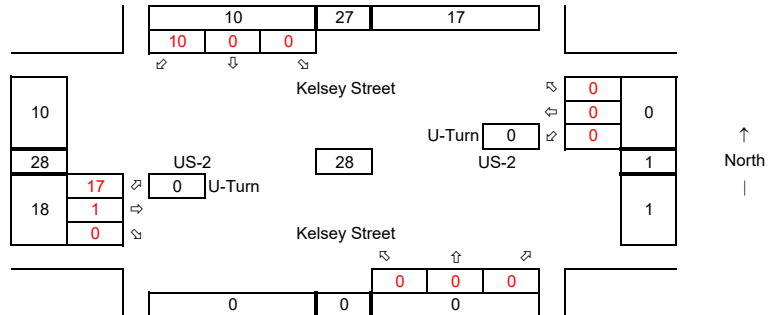
Years of Growth = 11

Total Growth = 1.2434



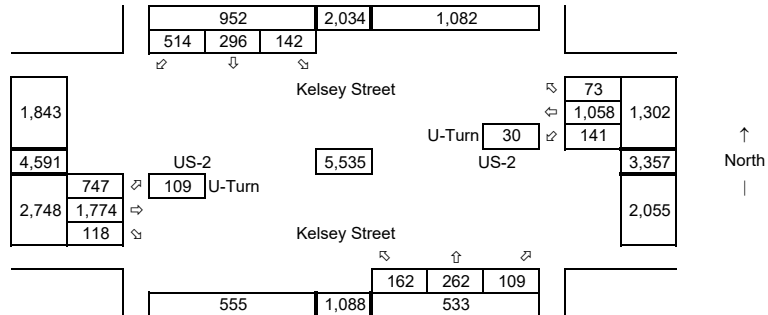
Total Project Trips

Average Weekday
PM Peak Hour



Future with Project

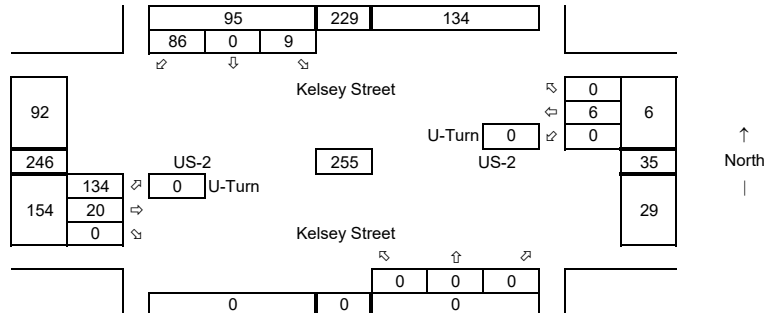
Average Weekday
PM Peak Hour



Pipeline Trips

Average Weekday
PM Peak Hour

Eaglemont 1-7
Easton Cove
Worthington Heights
Raspberry Hill
Clothier Short Plat
2 Short Plats
Kestrel Ridge



4 Site Access @ Chain Lake Rd

Synchro ID: 4

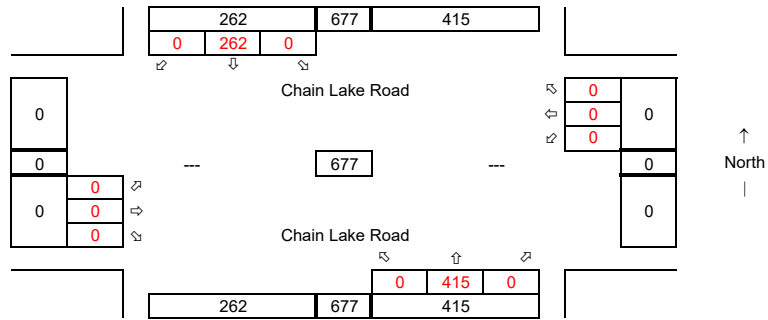
Existing

Average Weekday
PM Peak Hour

Year: 1/31/18

Data Source: GTC

Volumes extrapolated from the
north leg of Rainier View Rd at
Chain Lake Rd.



Future without Project

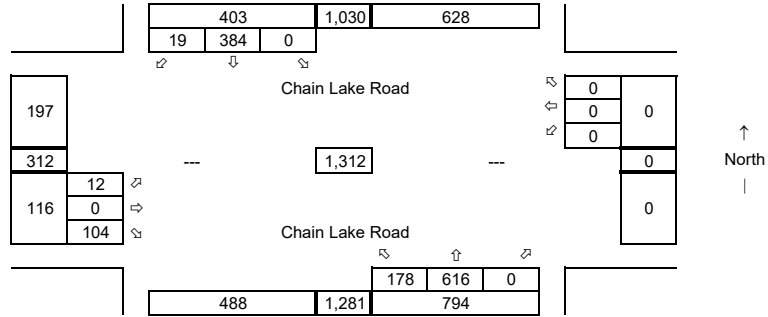
Average Weekday
PM Peak Hour

Year: 2029

Growth Rate = 2.0%

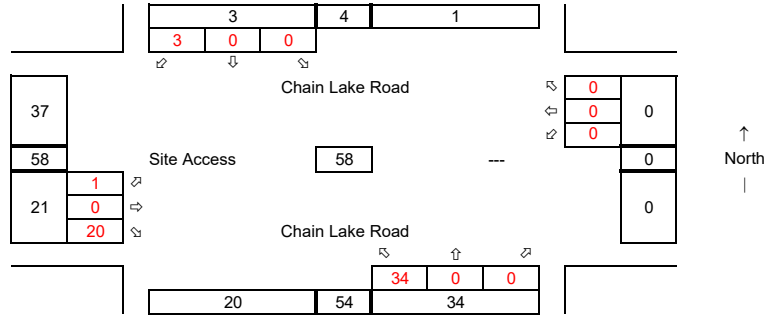
Years of Growth = 11

Total Growth = 1.2434



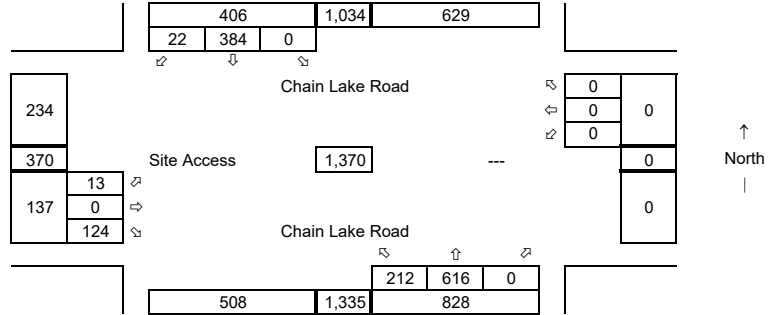
Total Project Trips

Average Weekday
PM Peak Hour



Future with Project

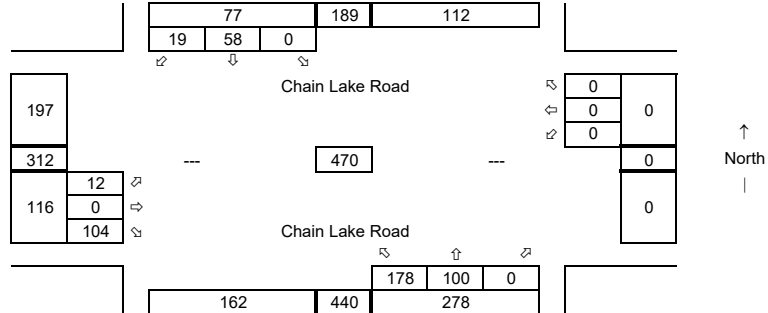
Average Weekday
PM Peak Hour



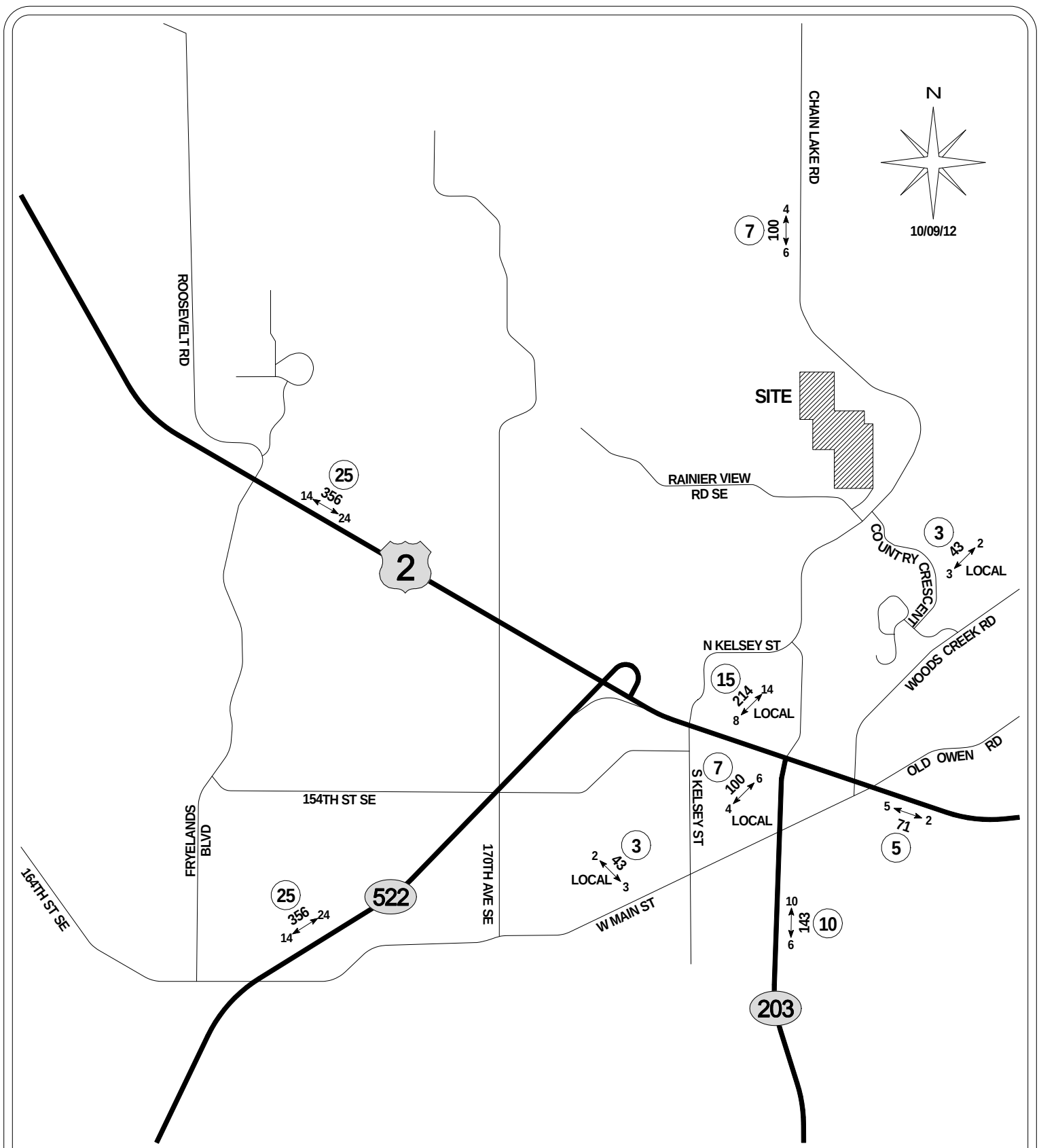
Pipeline Trips

Average Weekday
PM Peak Hour

Eaglemont 1-7
Easton Cove
Worthington Heights
Raspberry Hill
Clothier Short Plat
2 Short Plats
Kestrel Ridge



Pipeline Information



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #12-087

EAGLEMONT
149 SINGLE-FAMILY UNITS

CITY OF MONROE

LEGEND

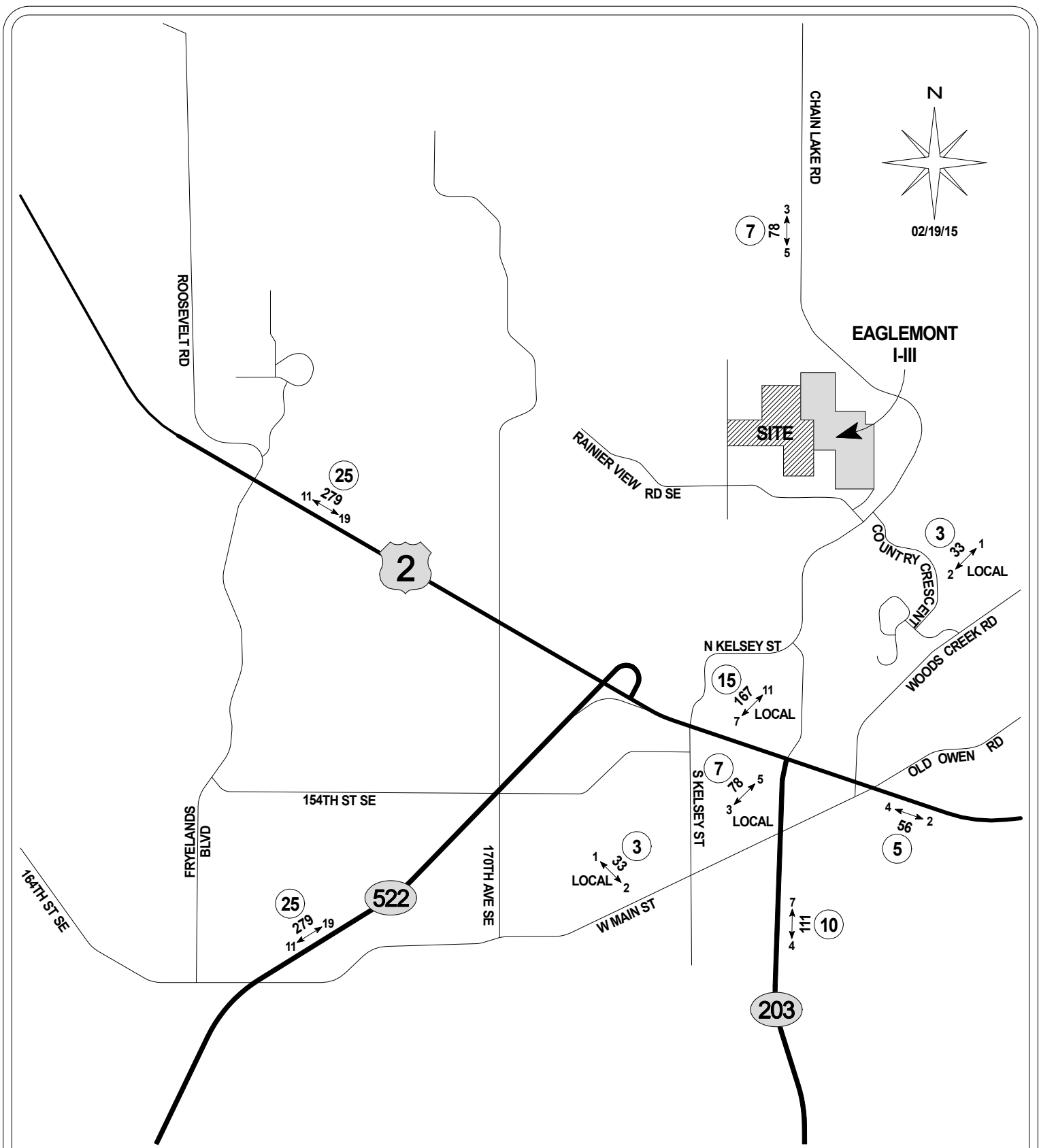
AWDT
PM ↔ PEAK

NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

25

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #15-045

EAGLEMONT IV-VIII
117 NEW SINGLE-FAMILY UNITS

CITY OF MONROE

LEGEND

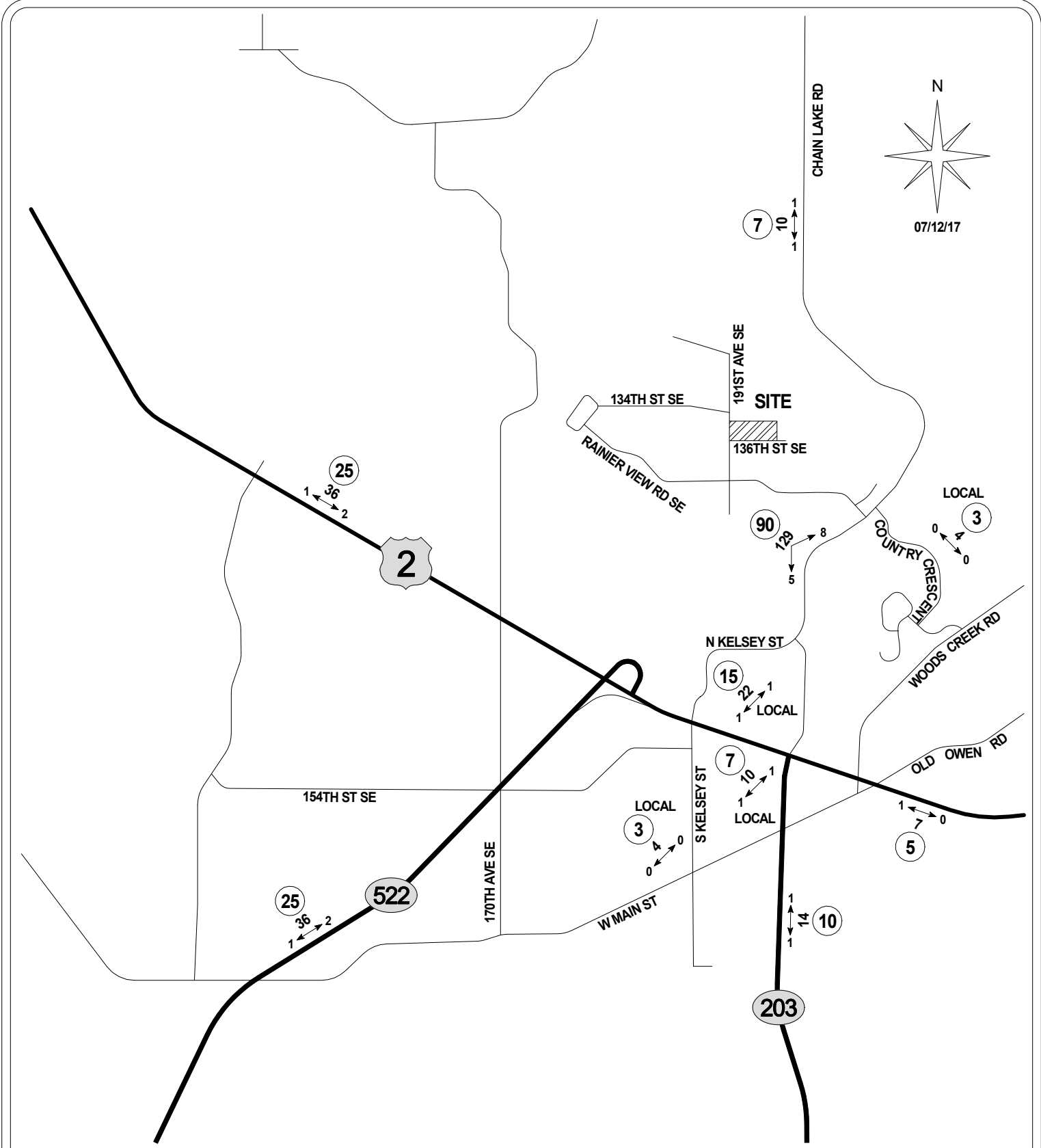
AWDT
PM ↔ PEAK



NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #17-130

EAGLEMONT 5
15 NEW SINGLE FAMILY
DWELLINGS

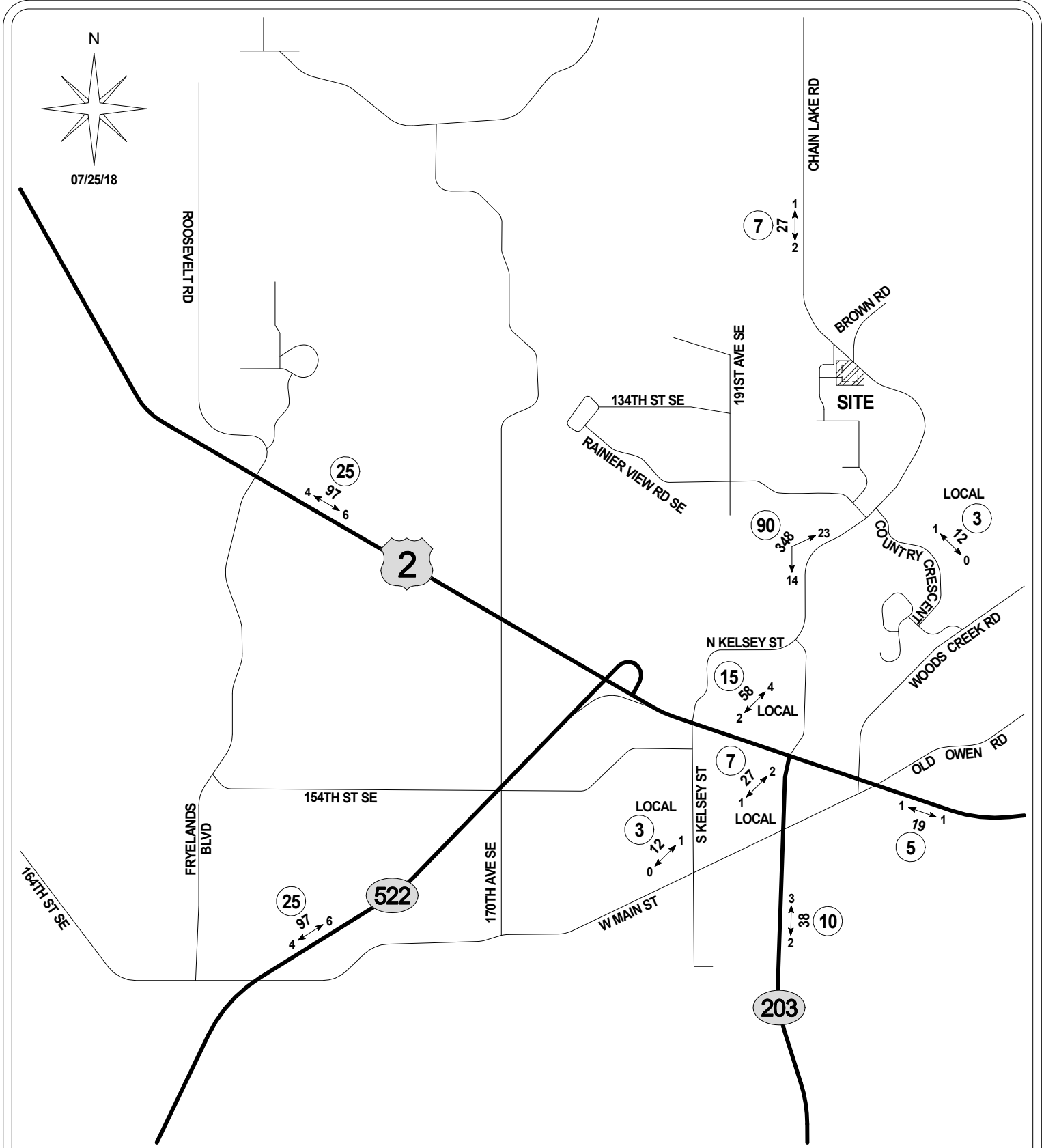
LEGEND
AWDT
PM ↔ PEAK

NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

XX

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #18-042

EAGLEMONT 7
41 NEW SINGLE FAMILY
DWELLINGS

CITY OF MONROE

LEGEND

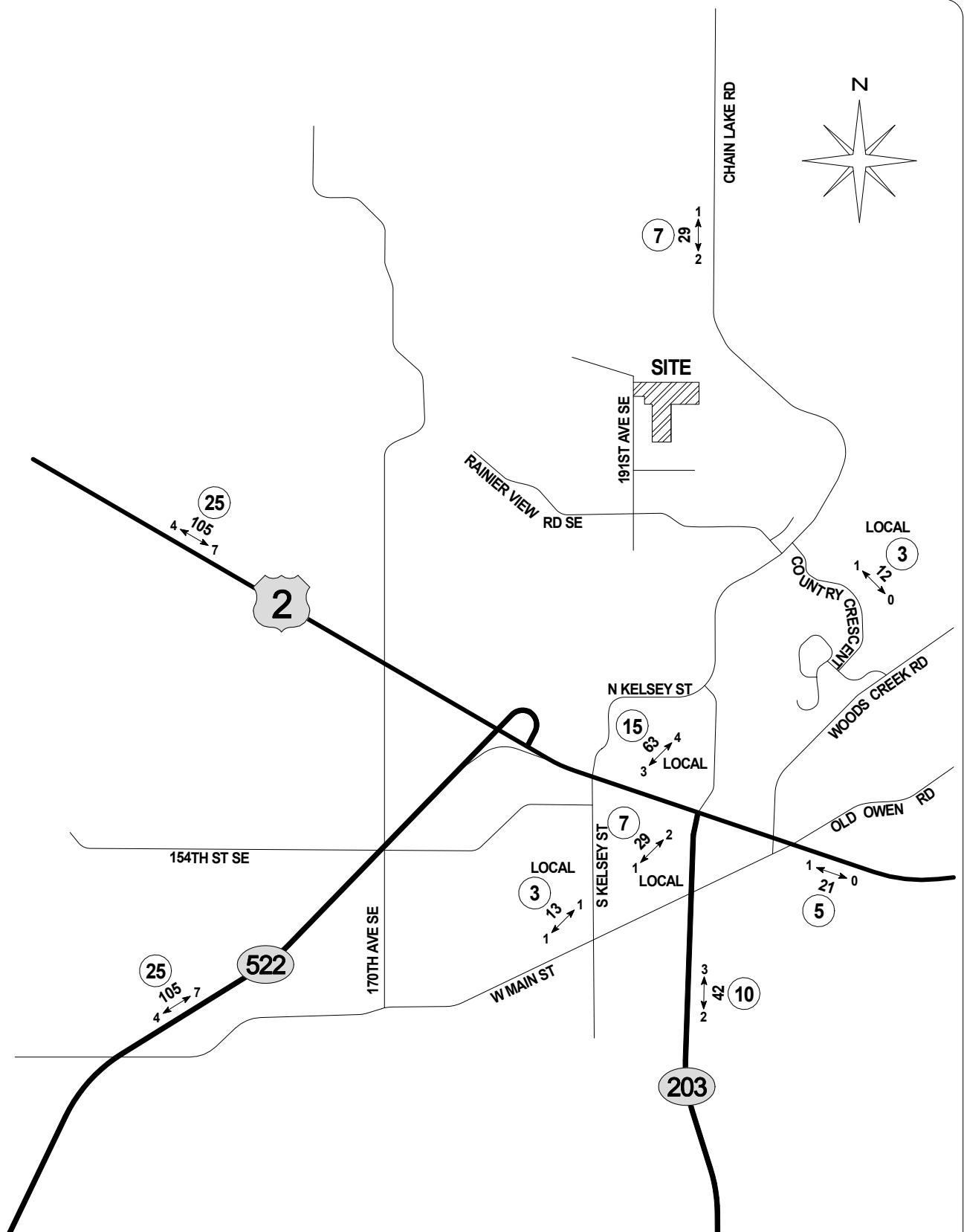
AWDT
PM ↔ PEAK



NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #15-244

SKY VIEW RIDGE
44 NEW SINGLE-FAMILY UNITS

CITY OF MONROE

LEGEND

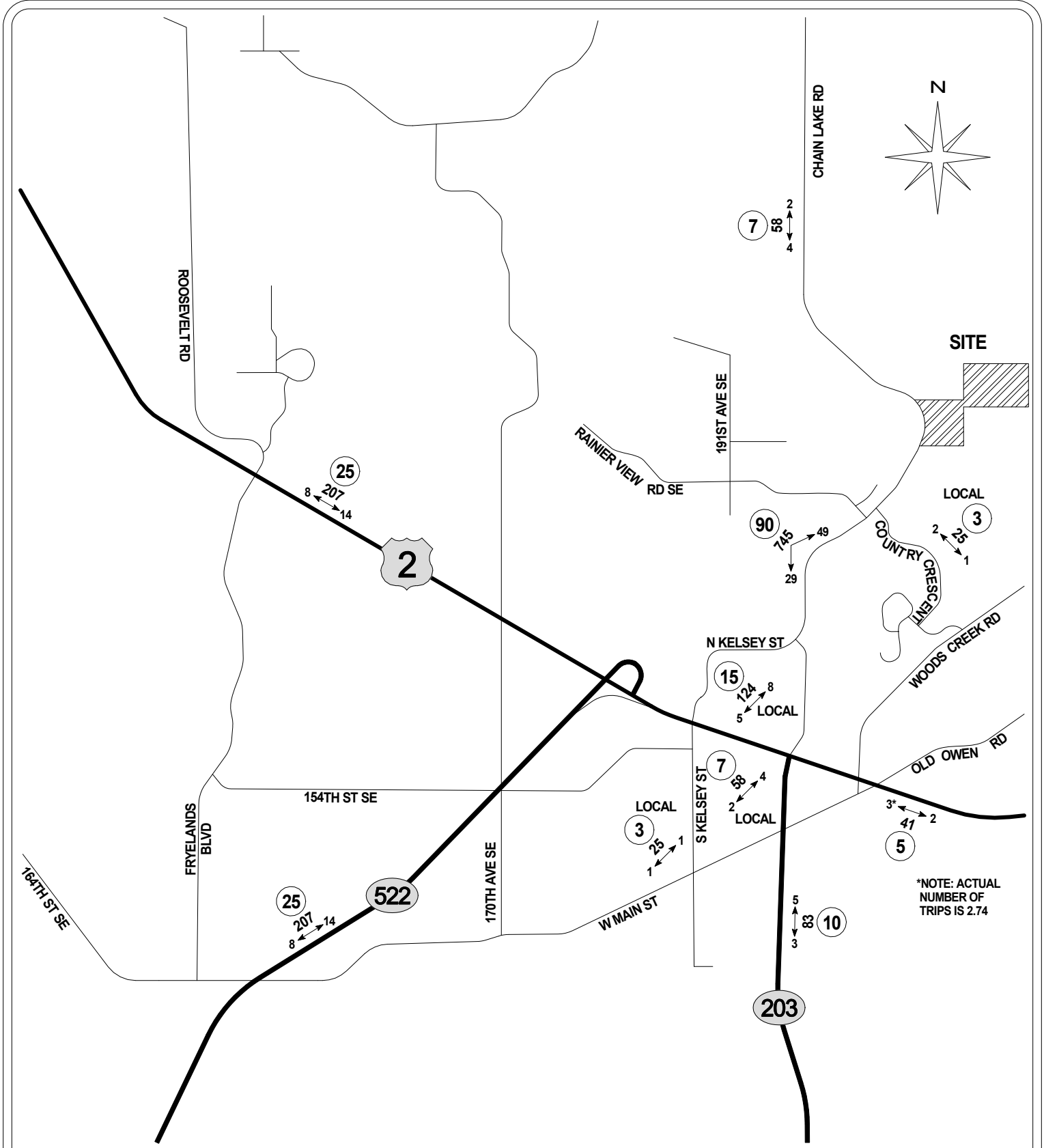
AWDT
PM ↔ PEAK



NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

TRIP DISTRIBUTION %

FIGURE 2
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #16-030

KLIER DEVELOPMENT
87 NEW SINGLE FAMILY
DWELLINGS

CITY OF MONROE

LEGEND

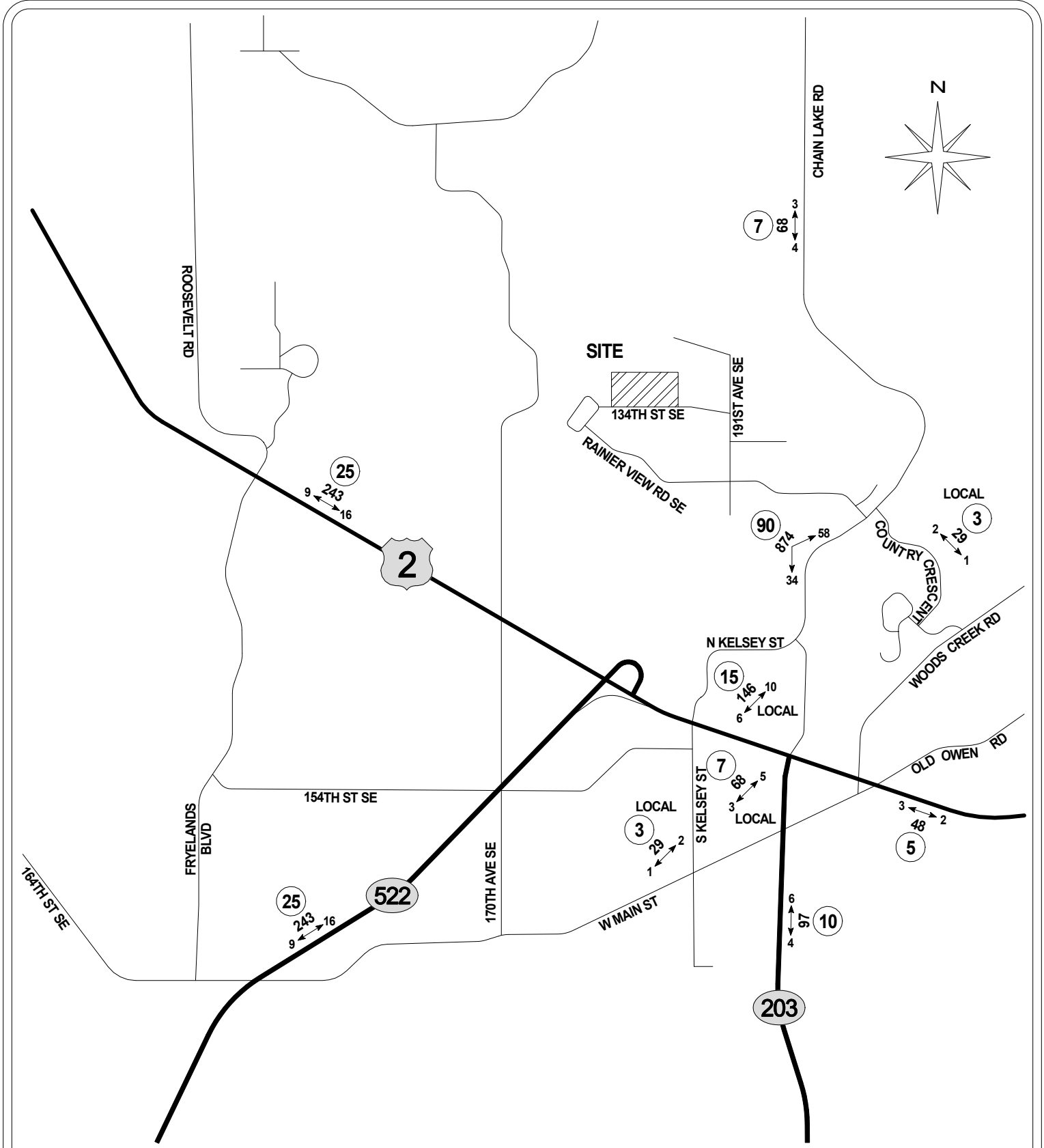
AWDT
PM ↔ PEAK



NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #16-171

WORTHINGTON HEIGHTS
106 SINGLE FAMILY
DWELLINGS

CITY OF MONROE

LEGEND

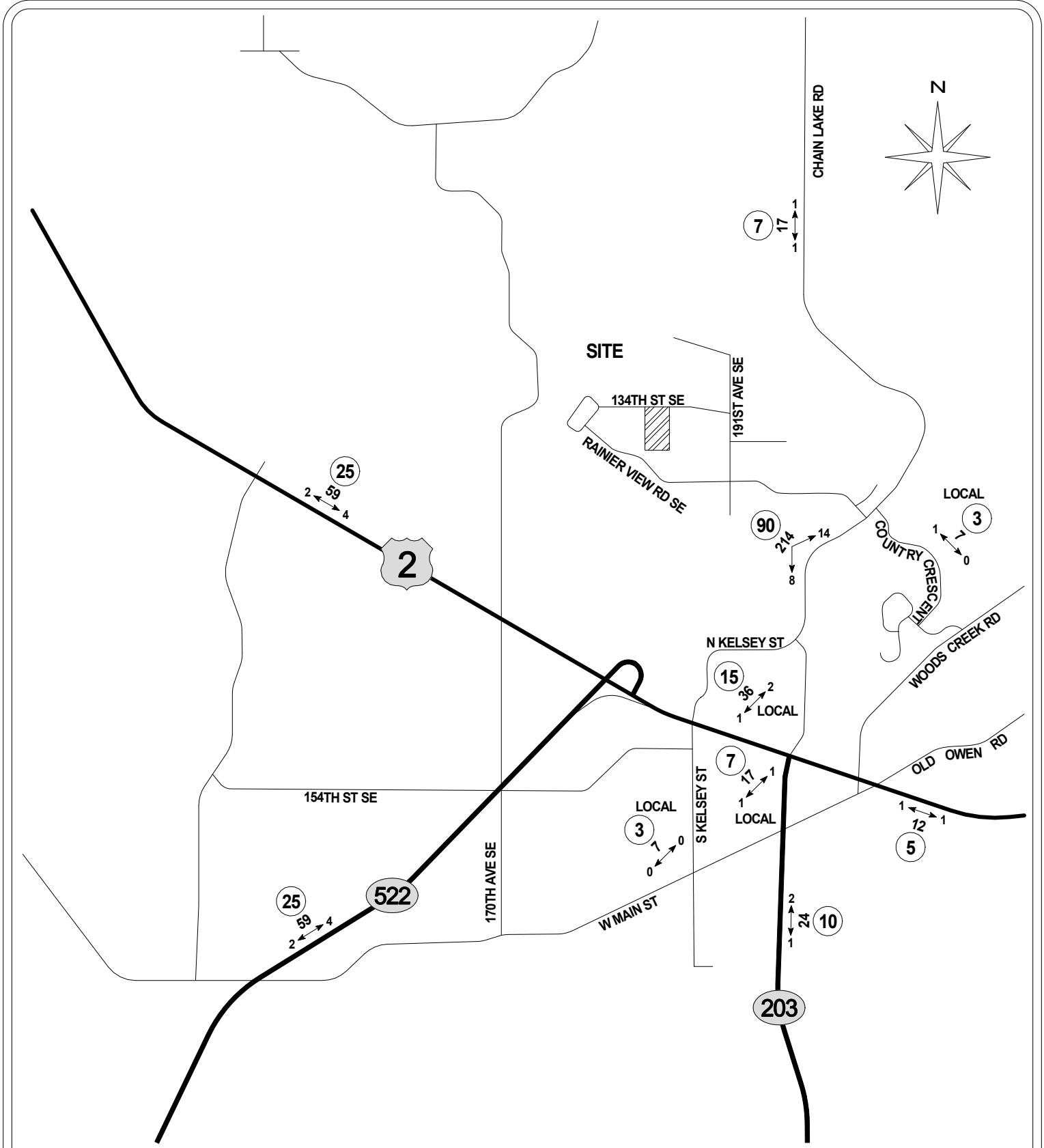
AWDT
PM ↔ PEAK



NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #16-165

**RASPBERRY HILL
25 NEW SINGLE FAMILY
DWELLINGS**

CITY OF MONROE

LEGEND

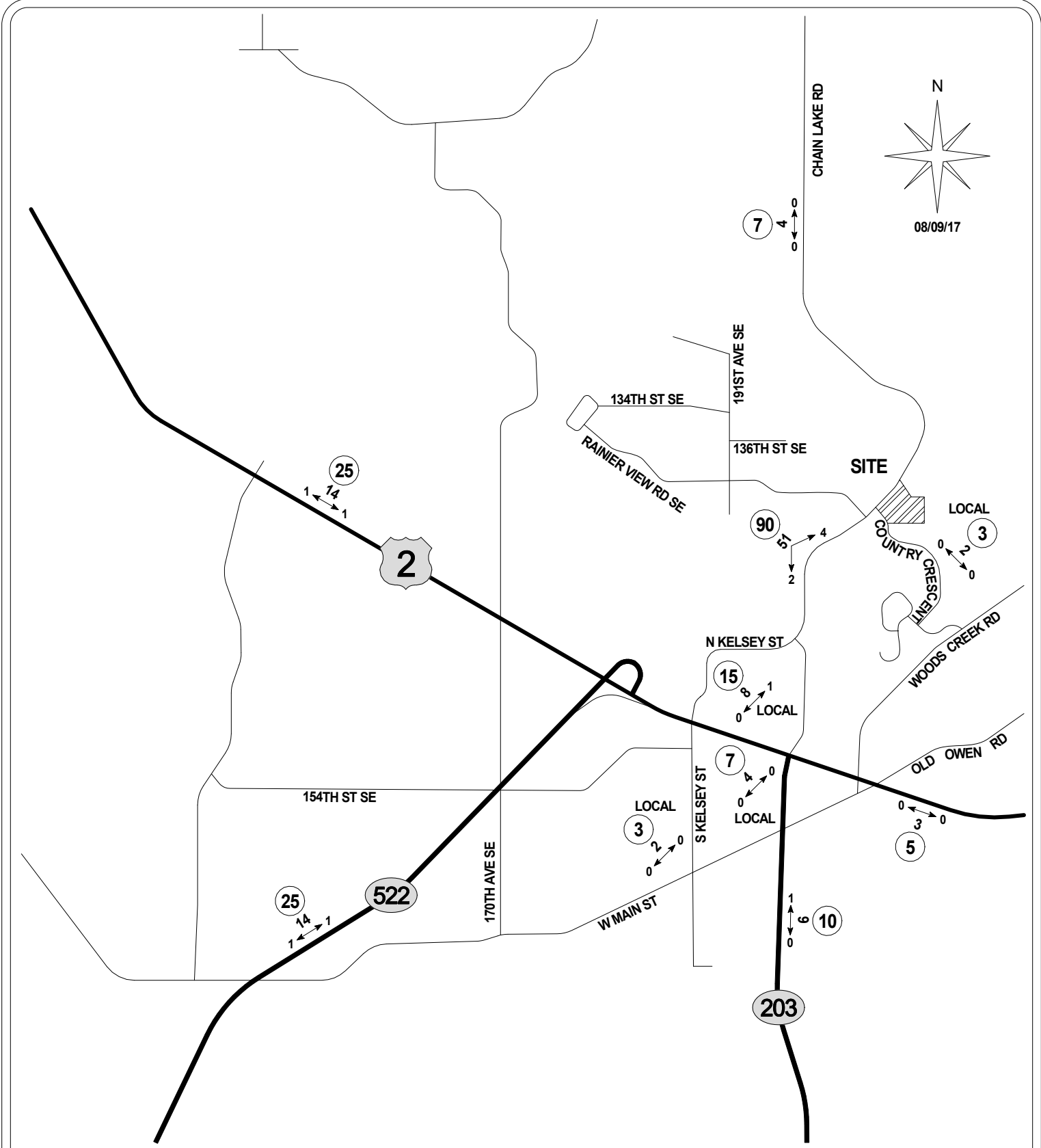
AWDT PM ↔ PEAK



NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

TRIP DISTRIBUTION %

**FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR**



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #17-167

CLOTHIER SHORT PLAT
6 NEW SINGLE FAMILY
DWELLINGS

CITY OF MONROE

LEGEND

AWDT
PM ↔ PEAK



NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

2 Short Plats North of Easton
Cove Trip Generation

Eaglemont 7
GTC #18-042

PM Peak-Hour

%	New ADT	New PM Peak Hour Trips		
		In	Out	Total
100%	94	6	4	9.90
1%	0.94	0.06	0.04	0.10
2%	1.89	0.12	0.07	0.20
3%	2.83	0.19	0.11	0.30
4%	3.78	0.25	0.15	0.40
5%	4.72	0.31	0.18	0.50
6%	5.66	0.37	0.22	0.59
7%	6.61	0.44	0.26	0.69
8%	7.55	0.50	0.29	0.79
9%	8.50	0.56	0.33	0.89
10%	9.44	0.62	0.37	0.99
11%	10.38	0.69	0.40	1.09
12%	11.33	0.75	0.44	1.19
13%	12.27	0.81	0.48	1.29
14%	13.22	0.87	0.51	1.39
15%	14.16	0.94	0.55	1.49
16%	15.10	1.00	0.59	1.58
17%	16.05	1.06	0.62	1.68
18%	16.99	1.12	0.66	1.78
19%	17.94	1.19	0.70	1.88
20%	18.88	1.25	0.73	1.98
21%	19.82	1.31	0.77	2.08
22%	20.77	1.37	0.81	2.18
23%	21.71	1.44	0.84	2.28
24%	22.66	1.50	0.88	2.38
25%	23.60	1.56	0.92	2.48
26%	24.54	1.62	0.95	2.57
27%	25.49	1.68	0.99	2.67
28%	26.43	1.75	1.02	2.77
29%	27.38	1.81	1.06	2.87
30%	28.32	1.87	1.10	2.97
31%	29.26	1.93	1.13	3.07
32%	30.21	2.00	1.17	3.17
33%	31.15	2.06	1.21	3.27
34%	32.10	2.12	1.24	3.37
35%	33.04	2.18	1.28	3.47
36%	33.98	2.25	1.32	3.56
37%	34.93	2.31	1.35	3.66
38%	35.87	2.37	1.39	3.76
39%	36.82	2.43	1.43	3.86
40%	37.76	2.50	1.46	3.96
41%	38.70	2.56	1.50	4.06
42%	39.65	2.62	1.54	4.16
43%	40.59	2.68	1.57	4.26
44%	41.54	2.75	1.61	4.36
45%	42.48	2.81	1.65	4.46
46%	43.42	2.87	1.68	4.55
47%	44.37	2.93	1.72	4.65
48%	45.31	3.00	1.76	4.75
49%	46.26	3.06	1.79	4.85
50%	47.20	3.12	1.83	4.95
51%	48.14	3.18	1.87	5.05
52%	49.09	3.24	1.90	5.15
53%	50.03	3.31	1.94	5.25
54%	50.98	3.37	1.98	5.35
55%	51.92	3.43	2.01	5.45
56%	52.86	3.49	2.05	5.54
57%	53.81	3.56	2.09	5.64
58%	54.75	3.62	2.12	5.74
59%	55.70	3.68	2.16	5.84
60%	56.64	3.74	2.20	5.94
61%	57.58	3.81	2.23	6.04
62%	58.53	3.87	2.27	6.14
63%	59.47	3.93	2.31	6.24
64%	60.42	3.99	2.34	6.34
65%	61.36	4.06	2.38	6.44
66%	62.30	4.12	2.42	6.53
67%	63.25	4.18	2.45	6.63
68%	64.19	4.24	2.49	6.73
69%	65.14	4.31	2.53	6.83
70%	66.08	4.37	2.56	6.93
71%	67.02	4.43	2.60	7.03
72%	67.97	4.49	2.64	7.13
73%	68.91	4.56	2.67	7.23
74%	69.86	4.62	2.71	7.33
75%	70.80	4.68	2.75	7.43
76%	71.74	4.74	2.78	7.52
77%	72.69	4.80	2.82	7.62
78%	73.63	4.87	2.85	7.72
79%	74.58	4.93	2.89	7.82
80%	75.52	4.99	2.93	7.92
81%	76.46	5.05	2.96	8.02
82%	77.41	5.12	3.00	8.12
83%	78.35	5.18	3.04	8.22
84%	79.30	5.24	3.07	8.32
85%	80.24	5.30	3.11	8.42
86%	81.18	5.37	3.15	8.51
87%	82.13	5.43	3.18	8.61
88%	83.07	5.49	3.22	8.71
89%	84.02	5.55	3.26	8.81
90%	84.96	5.62	3.29	8.91
91%	85.90	5.68	3.33	9.01
92%	86.85	5.74	3.37	9.11
93%	87.79	5.80	3.40	9.21
94%	88.74	5.87	3.44	9.31
95%	89.68	5.93	3.48	9.41
96%	90.62	5.99	3.51	9.50
97%	91.57	6.05	3.55	9.60
98%	92.51	6.12	3.59	9.70
99%	93.46	6.18	3.62	9.80
100%	94.40	6.24	3.66	9.90

Level of Service Calculations

Garibaldi (18-334)
1: Chain Lake Road & Rainier View Road SE

2018 Existing Conditions
PM Peak-Hour

Intersection

Int Delay, s/veh 2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
----------	-----	-----	-----	-----	-----	-----

Lane Configurations						
Traffic Vol, veh/h	6	102	130	409	254	8
Future Vol, veh/h	6	102	130	409	254	8
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	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	7	112	143	449	279	9

Major/Minor	Minor2	Major1	Major2
-------------	--------	--------	--------

Conflicting Flow All	1019	284	288	0	-	0
Stage 1	284	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	264	757	1280	-	-	-
Stage 1	766	-	-	-	-	-
Stage 2	476	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	234	757	1280	-	-	-
Mov Cap-2 Maneuver	234	-	-	-	-	-
Stage 1	680	-	-	-	-	-
Stage 2	476	-	-	-	-	-

Approach	EB	NB	SB
----------	----	----	----

HCM Control Delay, s	11.5	2	0
HCM LOS	B		

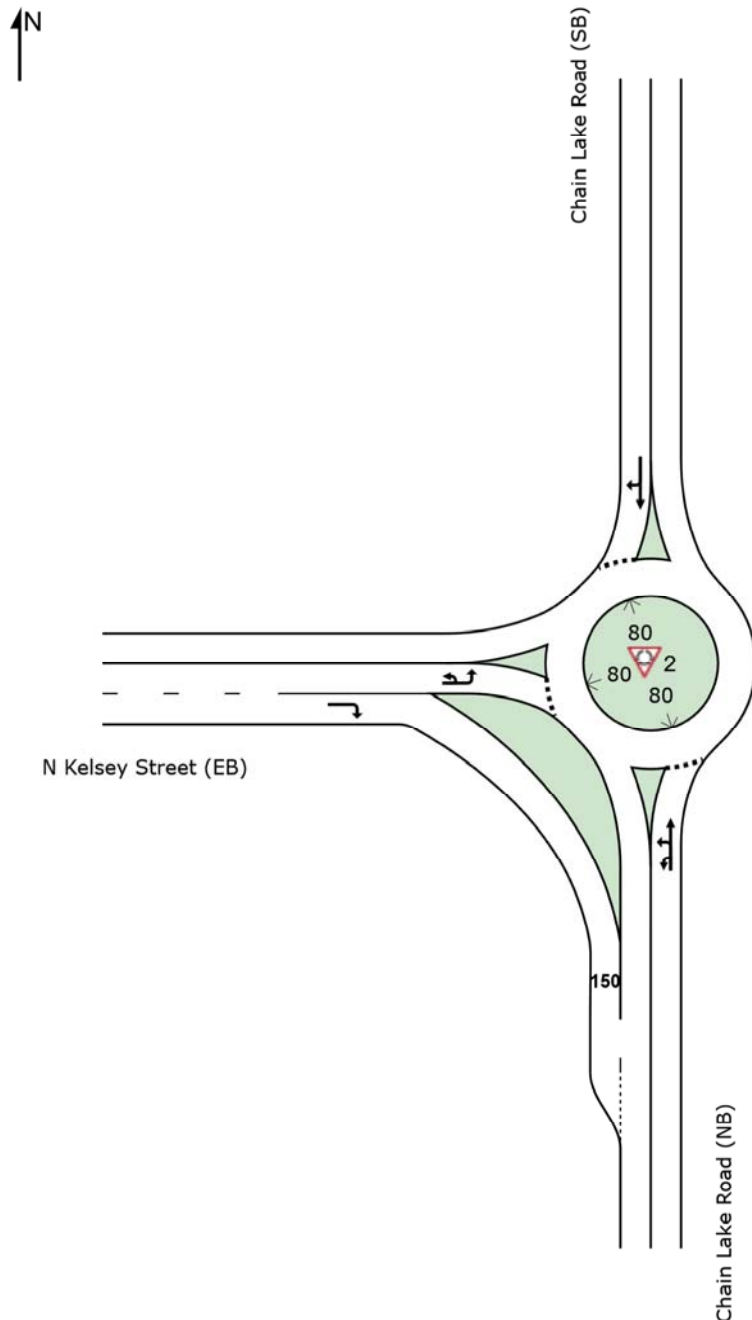
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
-----------------------	-----	-----	-------	-----	-----

Capacity (veh/h)	1280	-	673	-	-
HCM Lane V/C Ratio	0.112	-	0.176	-	-
HCM Control Delay (s)	8.2	-	11.5	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.6	-	-

SITE LAYOUT

Site: 2 [2018 Existing Conditions]

Chain Lake Road at N Kelsey Street
Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: 2 [2018 Existing Conditions]

Chain Lake Road at N Kelsey Street
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Chain Lake Road (NB)												
3u	U	3	3.0	0.397	14.2	LOS B	2.7	68.8	0.63	0.71	0.63	35.2
3	L2	146	3.0	0.397	12.0	LOS B	2.7	68.8	0.63	0.71	0.63	34.5
8	T1	247	3.0	0.397	6.7	LOS A	2.7	68.8	0.63	0.71	0.63	34.6
Approach		397	3.0	0.397	8.7	LOS A	2.7	68.8	0.63	0.71	0.63	34.5
North: Chain Lake Road (SB)												
4	T1	132	3.0	0.369	5.3	LOS A	2.7	68.1	0.46	0.54	0.46	36.2
14	R2	298	3.0	0.369	5.2	LOS A	2.7	68.1	0.46	0.54	0.46	35.2
Approach		430	3.0	0.369	5.2	LOS A	2.7	68.1	0.46	0.54	0.46	35.5
West: N Kelsey Street (EB)												
5u	U	5	3.0	0.248	12.3	LOS B	1.6	40.7	0.35	0.62	0.35	34.4
5	L2	349	3.0	0.248	10.1	LOS B	1.6	40.7	0.35	0.62	0.35	33.8
12	R2	195	3.0	0.120	3.8	LOS A	0.0	0.0	0.00	0.47	0.00	36.8
Approach		549	3.0	0.248	7.9	LOS A	1.6	40.7	0.23	0.57	0.23	34.8
All Vehicles		1376	3.0	0.397	7.3	LOS A	2.7	68.8	0.42	0.60	0.42	34.9

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: GIBSON TRAFFIC CONSULTANTS | Processed: Wednesday, November 28, 2018 4:47:58 PM
Project: H:\2018\18-334\Sidra\Chain Lake Rd at Kelsey St.sip8

Garibaldi (18-334) 2018 Existing Conditions PM Peak-Hour
3: Kelsey Street & US-2

Movement	EBU	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL
Lane Configurations	88	352	1171	91	24	751	36	115	260	104
Traffic Volume (vph)	88	352	1171	91	24	751	36	115	260	104
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0
Total Lost time (s)	0.97	0.91	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.95	1.00	0.95
Flt Protected	3400	4971	1752	3478	1661	1748	1542	1749		
Satd. Flow (prot)	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Flt Permitted	3400	4971	1752	3478	1661	1748	1542	1749		
Satd. Flow (perm)	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	91	363	1207	94	25	774	37	119	268	107
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	454	1295	0	0	180	808	0	107	280
Confl. Peds. (#/hr)	2	4	4	4	2	10	2	10	4	4
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Prot	NA	Prot	Prot	NA	pm+pt	NA	Perm	pm+pt
Protected Phases	5	5	2	1	1	6	3	8	8	7
Permitted Phases										
Actuated Green, G (s)	21.4	42.7	17.6	38.9	17.6	38.9	40.8	40.8	32.6	40.6
Effective Green, g (s)	21.4	42.7	17.6	38.9	17.6	38.9	40.8	40.8	32.6	40.6
Actuated g/C Ratio	0.18	0.36	0.15	0.32	0.15	0.32	0.34	0.34	0.27	0.34
Clearance Time (s)	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	605	1765	256	1125	256	1125	277	587	418	406
v/s Ratio Prot	c0.13	c0.26	0.10	0.23	0.10	0.23	0.03	c0.03	0.02	0.02
v/s Ratio Perm							0.10	0.13	0.02	0.07
v/c Ratio	0.75	0.73	0.70	0.72	0.70	0.72	0.39	0.48	0.07	0.25
Uniform Delay, d1	46.9	33.8	48.8	35.8	48.8	35.8	28.8	31.3	32.5	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.2	1.6	8.5	2.2	8.5	2.2	0.9	0.6	0.3	0.3
Delay (s)	52.1	35.4	57.3	38.0	57.3	38.0	29.7	31.9	32.9	28.3
Level of Service	D	D	E	D	E	D	C	C	C	C
Approach Delay (s)	39.7						41.5			
Approach LOS	D						D			
Intersection Summary										
HCM 2000 Control Delay	38.8						D			
HCM 2000 Volume to Capacity ratio	0.69									
Actuated Cycle Length (s)	120.2						19.2			
Intersection Capacity Utilization	98.3%						F			
Analysis Period (min)	15									
c Critical Lane Group										

Gibson Traffic Consultants, Inc. [SPF] HCM Signalized Intersection Capacity Analysis
H:\2018\18-334\Syncro\Existing Conditions.syn

Garibaldi (18-334) 2018 Existing Conditions PM Peak-Hour
3: Kelsey Street & US-2

Movement	EBU	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL
Lane Configurations	88	352	1171	91	24	751	36	115	260	104
Traffic Volume (vph)	88	352	1171	91	24	751	36	115	260	104
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0
Total Lost time (s)	0.97	0.91	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.95	1.00	0.95
Flt Protected	3400	4971	1752	3478	1661	1748	1542	1749		
Satd. Flow (prot)	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Flt Permitted	3400	4971	1752	3478	1661	1748	1542	1749		
Satd. Flow (perm)	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	91	363	1207	94	25	774	37	119	268	107
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	454	1295	0	0	180	808	0	107	280
Confl. Peds. (#/hr)	2	4	4	4	2	10	2	10	4	4
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Prot	NA	Prot	Prot	NA	pm+pt	NA	Perm	pm+pt
Protected Phases	5	5	2	1	1	6	3	8	8	7
Permitted Phases										
Actuated Green, G (s)	21.4	42.7	17.6	38.9	17.6	38.9	40.8	40.8	32.6	40.6
Effective Green, g (s)	21.4	42.7	17.6	38.9	17.6	38.9	40.8	40.8	32.6	40.6
Actuated g/C Ratio	0.18	0.36	0.15	0.32	0.15	0.32	0.34	0.34	0.27	0.34
Clearance Time (s)	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	605	1765	256	1125	256	1125	277	587	418	406
v/s Ratio Prot	c0.13	c0.26	0.10	0.23	0.10	0.23	0.03	c0.03	0.02	0.02
v/s Ratio Perm							0.10	0.13	0.02	0.07
v/c Ratio	0.75	0.73	0.70	0.72	0.70	0.72	0.39	0.48	0.07	0.25
Uniform Delay, d1	46.9	33.8	48.8	35.8	48.8	35.8	28.8	31.3	32.5	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.2	1.6	8.5	2.2	8.5	2.2	0.9	0.6	0.3	0.3
Delay (s)	52.1	35.4	57.3	38.0	57.3	38.0	29.7	31.9	32.9	28.3
Level of Service	D	D	E	D	E	D	C	C	C	C
Approach Delay (s)	39.7						41.5			
Approach LOS	D						D			
Intersection Summary										
HCM 2000 Control Delay	38.8						D			
HCM 2000 Volume to Capacity ratio	0.69									
Actuated Cycle Length (s)	120.2						19.2			
Intersection Capacity Utilization	98.3%						F			
Analysis Period (min)	15									
c Critical Lane Group										

Gibson Traffic Consultants, Inc. [SPF] HCM Signalized Intersection Capacity Analysis
H:\2018\18-334\Syncro\Existing Conditions.syn

Garibaldi (18-334)
1: Chain Lake Road & Rainier View Road SE

2029 Baseline Conditions
PM Peak-Hour

Intersection

Int Delay, s/veh 8.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
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Lane Configurations						
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Traffic Vol, veh/h	19	231	339	609	374	29
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Future Vol, veh/h	19	231	339	609	374	29
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Conflicting Peds, #/hr	0	0	0	0	0	0
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Sign Control	Stop	Stop	Free	Free	Free	Free
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RT Channelized	-	None	-	None	-	None
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Storage Length	0	-	200	-	-	-
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Veh in Median Storage, #	0	-	-	0	0	-
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Grade, %	0	-	-	0	0	-
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Peak Hour Factor	91	91	91	91	91	91
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Heavy Vehicles, %	1	1	1	1	1	1
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Mvmt Flow	21	254	373	669	411	32
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Major/Minor	Minor2	Major1	Major2
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Conflicting Flow All	1842	427	443	0	-	0
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Stage 1	427	-	-	-	-	-
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Stage 2	1415	-	-	-	-	-
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Critical Hdwy	6.41	6.21	4.11	-	-	-
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Critical Hdwy Stg 1	5.41	-	-	-	-	-
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Critical Hdwy Stg 2	5.41	-	-	-	-	-
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Follow-up Hdwy	3.509	3.309	2.209	-	-	-
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Pot Cap-1 Maneuver	83	630	1122	-	-	-
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Stage 1	660	-	-	-	-	-
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Stage 2	226	-	-	-	-	-
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Platoon blocked, %				-	-	-
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Mov Cap-1 Maneuver	55	630	1122	-	-	-
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Mov Cap-2 Maneuver	55	-	-	-	-	-
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Stage 1	441	-	-	-	-	-
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Stage 2	226	-	-	-	-	-
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Approach	EB	NB	SB
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HCM Control Delay, s	43.8	3.5	0
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HCM LOS	E		
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Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
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Capacity (veh/h)	1122	-	351	-	-
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HCM Lane V/C Ratio	0.332	-	0.783	-	-
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HCM Control Delay (s)	9.8	-	43.8	-	-
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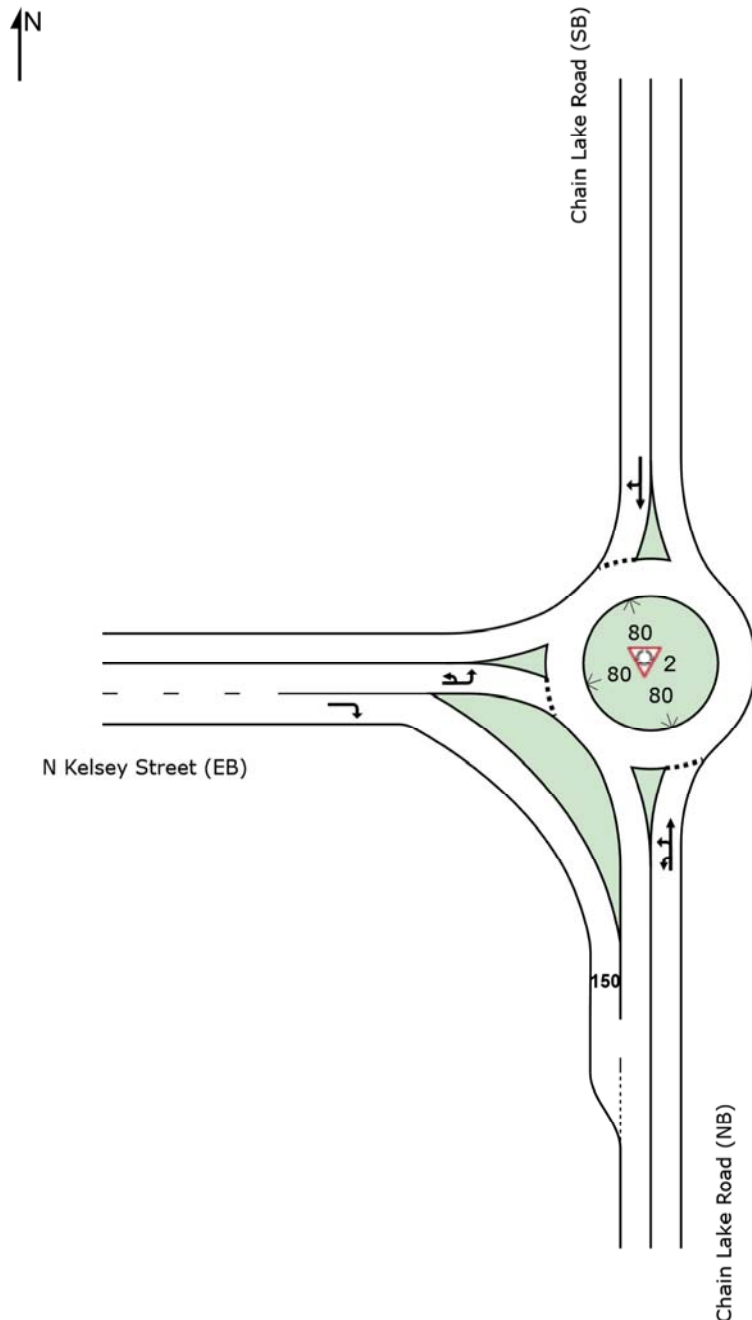
HCM Lane LOS	A	-	E	-	-
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HCM 95th %tile Q(veh)	1.5	-	6.4	-	-
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SITE LAYOUT

Site: 2 [2029 Baseline Conditions]

Chain Lake Road at N Kelsey Street
Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: 2 [2029 Baseline Conditions]

Chain Lake Road at N Kelsey Street
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Chain Lake Road (NB)												
3u	U	4	3.0	0.813	26.7	LOS C	12.7	324.2	1.00	1.25	1.66	29.9
3	L2	182	3.0	0.813	24.4	LOS C	12.7	324.2	1.00	1.25	1.66	29.5
8	T1	434	3.0	0.813	19.2	LOS B	12.7	324.2	1.00	1.25	1.66	29.5
Approach		620	3.0	0.813	20.8	LOS C	12.7	324.2	1.00	1.25	1.66	29.5
North: Chain Lake Road (SB)												
4	T1	217	3.0	0.644	6.2	LOS A	6.7	171.2	0.73	0.63	0.73	35.5
14	R2	491	3.0	0.644	6.0	LOS A	6.7	171.2	0.73	0.63	0.73	34.5
Approach		709	3.0	0.644	6.1	LOS A	6.7	171.2	0.73	0.63	0.73	34.8
West: N Kelsey Street (EB)												
5u	U	6	3.0	0.466	13.0	LOS B	3.9	98.7	0.57	0.67	0.57	33.9
5	L2	605	3.0	0.466	10.8	LOS B	3.9	98.7	0.57	0.67	0.57	33.3
12	R2	242	3.0	0.149	3.8	LOS A	0.0	0.0	0.00	0.47	0.00	36.8
Approach		854	3.0	0.466	8.8	LOS A	3.9	98.7	0.41	0.61	0.41	34.2
All Vehicles		2183	3.0	0.813	11.3	LOS B	12.7	324.2	0.68	0.80	0.87	32.9

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: GIBSON TRAFFIC CONSULTANTS | Processed: Wednesday, November 28, 2018 4:47:59 PM
Project: H:\2018\18-334\Sidra\Chain Lake Rd at Kelsey St.sip8

Garibaldi (18-334) 2029 Baseline Conditions PM Peak-Hour
3: Kelsey Street & US-2

Movement	EBU	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL
Lane Configurations	EBL	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL
Traffic Volume (vph)	109	730	1773	118	30	141	1058	73	162	262
Future Volume (vph)	109	730	1773	118	30	141	1058	73	162	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.0	5.0	4.6	5.0	5.0	4.6	5.0	5.0	4.6
Lane Util. Factor	0.97	0.91	0.97	0.91	0.97	0.91	0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.95
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3400	4979	1752	3467	1663	1747	1540	1749	1663	1747
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3400	4979	1752	3467	1663	1747	1540	1749	1663	1747
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	112	753	1828	122	31	145	1091	75	167	270
RTOR Reduction (vph)	0	0	5	0	0	3	0	0	0	87
Lane Group Flow (vph)	0	865	1945	0	0	176	1163	0	150	287
Confl. Peds. (#/hr)	2	4	4	4	4	4	2	10	4	4
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Prot	NA	Prot	Prot	NA	pm+pt	NA	Perm	pm+pt
Protected Phases	5	5	2	1	1	6	3	8	8	7
Permitted Phases										
Actuated Green, G (s)	39.6	71.5	18.1	50.0	18.1	50.0	41.8	41.8	33.4	39.0
Effective Green, g (s)	39.6	71.5	18.1	50.0	18.1	50.0	41.8	41.8	33.4	39.0
Actuated g/C Ratio	0.27	0.48	0.12	0.34	0.12	0.34	0.28	0.28	0.22	0.26
Clearance Time (s)	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0	5.0	4.6
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	902	2386	212	1161	212	1161	181	431	344	283
v/s Ratio Prot	c0.25	0.39	0.10	c0.34	0.10	c0.34	c0.05	0.04	0.02	0.02
v/c Ratio Perm	0.96	0.82	0.83	1.00	0.83	1.00	0.18	0.15	0.02	0.11
Uniform Delay, d1	54.0	33.2	64.0	49.6	64.0	49.6	47.9	47.5	45.7	45.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.4	2.3	23.2	26.8	23.2	26.8	25.7	3.9	0.4	1.6
Delay (s)	74.4	35.5	87.2	76.4	87.2	76.4	73.6	51.4	46.1	47.2
Level of Service	E	D	F	E	F	E	E	D	D	D
Approach Delay (s)	47.4			77.8			56.4			
Approach LOS	D			E			E			
Intersection Summary										
HCM 2000 Control Delay	61.4									
HCM 2000 Volume to Capacity ratio	0.97									
Actuated Cycle Length (s)	149.2									
Intersection Capacity Utilization	129.9%									
Analysis Period (min)	15									
c Critical Lane Group										

Gibson Traffic Consultants, Inc. [SPF] HCM Signalized Intersection Capacity Analysis
H:\2018\18-334\Synchro\2029 Baseline Conditions.syn

Garibaldi (18-334) 2029 Baseline Conditions PM Peak-Hour
3: Kelsey Street & US-2

Movement	EBU	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL
Lane Configurations	EBL	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL
Traffic Volume (vph)	109	730	1773	118	30	141	1058	73	162	262
Future Volume (vph)	109	730	1773	118	30	141	1058	73	162	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.0	5.0	4.6	5.0	5.0	4.6	5.0	5.0	4.6
Lane Util. Factor	0.97	0.91	0.97	0.91	0.97	0.91	0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.95
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3400	4979	1752	3467	1663	1747	1540	1749	1663	1747
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3400	4979	1752	3467	1663	1747	1540	1749	1663	1747
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	112	753	1828	122	31	145	1091	75	167	270
RTOR Reduction (vph)	0	0	5	0	0	3	0	0	0	87
Lane Group Flow (vph)	0	865	1945	0	0	176	1163	0	150	287
Confl. Peds. (#/hr)	2	4	4	4	4	4	2	10	4	4
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Prot	NA	Prot	Prot	NA	pm+pt	NA	Perm	pm+pt
Protected Phases	5	5	2	1	1	6	3	8	8	7
Permitted Phases										
Actuated Green, G (s)	39.6	71.5	18.1	50.0	18.1	50.0	41.8	41.8	33.4	39.0
Effective Green, g (s)	39.6	71.5	18.1	50.0	18.1	50.0	41.8	41.8	33.4	39.0
Actuated g/C Ratio	0.27	0.48	0.12	0.34	0.12	0.34	0.28	0.28	0.22	0.26
Clearance Time (s)	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0	5.0	4.6
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	902	2386	212	1161	212	1161	181	431	344	283
v/s Ratio Prot	c0.25	0.39	0.10	c0.34	0.10	c0.34	c0.05	0.04	0.02	0.02
v/c Ratio Perm	0.96	0.82	0.83	1.00	0.83	1.00	0.18	0.15	0.02	0.11
Uniform Delay, d1	54.0	33.2	64.0	49.6	64.0	49.6	47.9	47.5	45.7	45.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.4	2.3	23.2	26.8	23.2	26.8	25.7	3.9	0.4	1.6
Delay (s)	74.4	35.5	87.2	76.4	87.2	76.4	73.6	51.4	46.1	47.2
Level of Service	E	D	F	E	F	E	E	D	D	D
Approach Delay (s)	47.4			77.8			56.4			
Approach LOS	D			E			E			
Intersection Summary										
HCM 2000 Control Delay	61.4									
HCM 2000 Volume to Capacity ratio	0.97									
Actuated Cycle Length (s)	149.2									
Intersection Capacity Utilization	129.9%									
Analysis Period (min)	15									
c Critical Lane Group										

Gibson Traffic Consultants, Inc. [SPF] HCM Signalized Intersection Capacity Analysis
H:\2018\18-334\Synchro\2029 Baseline Conditions.syn

Garibaldi (18-334)
1: Chain Lake Road & Rainier View Road SE

2029 Future with Development Conditions
PM Peak-Hour

Intersection

Int Delay, s/veh 9.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
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Lane Configurations						
Traffic Vol, veh/h	19	231	339	642	393	29
Future Vol, veh/h	19	231	339	642	393	29
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	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	21	254	373	705	432	32

Major/Minor	Minor2	Major1	Major2
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Conflicting Flow All	1899	448	464	0	-	0
Stage 1	448	-	-	-	-	-
Stage 2	1451	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	77	613	1103	-	-	-
Stage 1	646	-	-	-	-	-
Stage 2	217	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	51	613	1103	-	-	-
Mov Cap-2 Maneuver	51	-	-	-	-	-
Stage 1	428	-	-	-	-	-
Stage 2	217	-	-	-	-	-

Approach	EB	NB	SB
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HCM Control Delay, s	50.6	3.4	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
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Capacity (veh/h)	1103	-	334	-	-
HCM Lane V/C Ratio	0.338	-	0.823	-	-
HCM Control Delay (s)	9.9	-	50.6	-	-
HCM Lane LOS	A	-	F	-	-
HCM 95th %tile Q(veh)	1.5	-	7.1	-	-

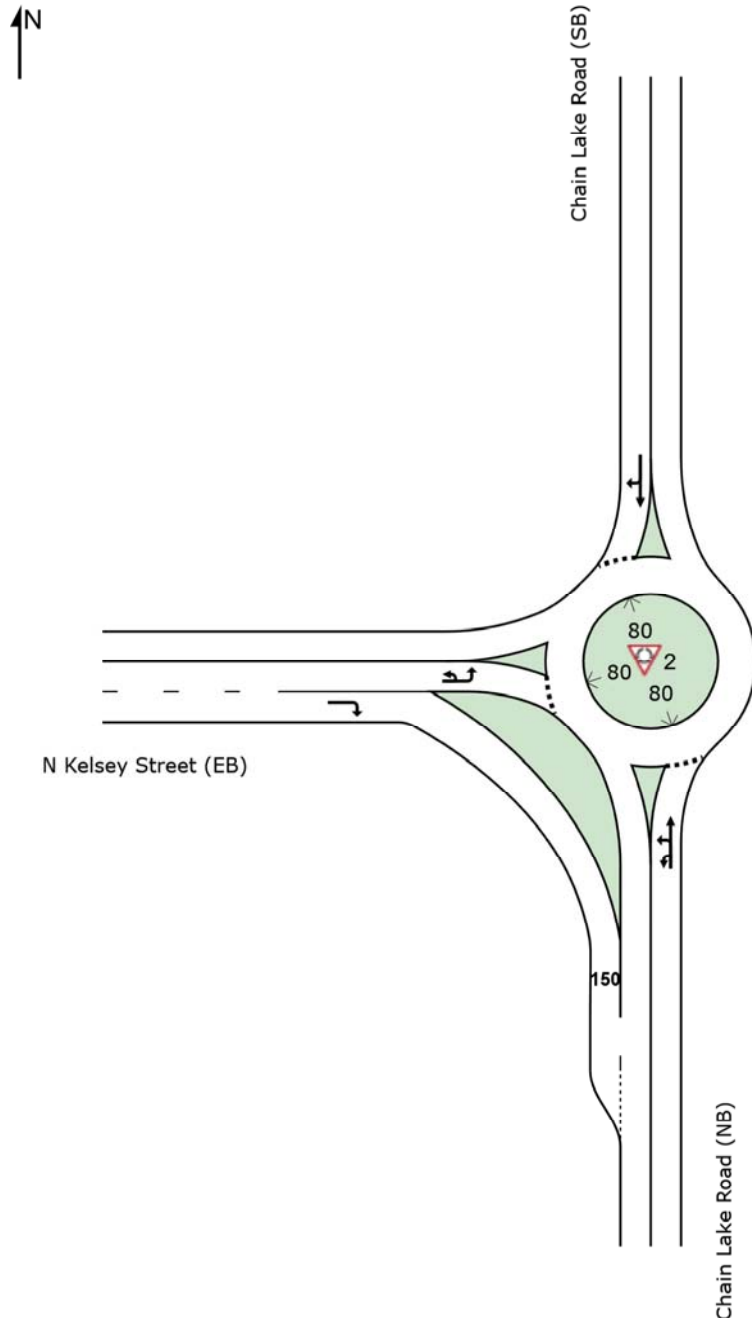
SITE LAYOUT

Site: 2 [2029 Future Conditions w Development]

Chain Lake Road at N Kelsey Street

Site Category: (None)

Roundabout



MOVEMENT SUMMARY

Site: 2 [2029 Future Conditions w Development]

Chain Lake Road at N Kelsey Street
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Chain Lake Road (NB)												
3u	U	4	3.0	0.857	30.6	LOS D	15.0	384.4	1.00	1.34	1.86	28.5
3	L2	182	3.0	0.857	28.3	LOS D	15.0	384.4	1.00	1.34	1.86	28.1
8	T1	446	3.0	0.857	23.1	LOS D	15.0	384.4	1.00	1.34	1.86	28.1
Approach		632	3.0	0.857	24.6	LOS C	15.0	384.4	1.00	1.34	1.86	28.1
North: Chain Lake Road (SB)												
4	T1	224	3.0	0.664	6.3	LOS A	7.2	183.8	0.75	0.64	0.76	35.4
14	R2	505	3.0	0.664	6.2	LOS A	7.2	183.8	0.75	0.64	0.76	34.5
Approach		729	3.0	0.664	6.2	LOS A	7.2	183.8	0.75	0.64	0.76	34.8
West: N Kelsey Street (EB)												
5u	U	6	3.0	0.487	13.1	LOS B	4.1	105.6	0.59	0.67	0.59	33.9
5	L2	629	3.0	0.487	10.8	LOS B	4.1	105.6	0.59	0.67	0.59	33.2
12	R2	242	3.0	0.149	3.8	LOS A	0.0	0.0	0.00	0.47	0.00	36.8
Approach		877	3.0	0.487	8.9	LOS A	4.1	105.6	0.43	0.62	0.43	34.1
All Vehicles		2239	3.0	0.857	12.5	LOS B	15.0	384.4	0.70	0.83	0.94	32.3

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: GIBSON TRAFFIC CONSULTANTS | Processed: Wednesday, November 28, 2018 4:47:59 PM
Project: H:\2018\18-334\Sidra\Chain Lake Rd at Kelsey St.sip8

Garibaldi (18-334) 2029 Future with Development Conditions PM Peak-Hour
3: Kelsey Street & US-2

Movement	EBU	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL
Lane Configurations	EBL	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL
Traffic Volume (vph)	109	747	1774	118	30	141	1058	73	162	262
Future Volume (vph)	109	747	1774	118	30	141	1058	73	162	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.0	5.0	4.6	4.6	5.0	5.0	4.6	5.0	4.6
Lane Util. Factor	0.97	0.91	0.97	0.91	0.97	0.91	0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.95
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3400	4979	1752	3467	1752	3467	1663	1747	1540	1749
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	0.22	0.85	1.00	0.51
Satd. Flow (perm)	3400	4979	1752	3467	1752	3467	391	1483	1540	936
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	112	770	1829	122	31	145	1091	75	167	270
RTOR Reduction (vph)	0	0	5	0	0	0	0	0	0	87
Lane Group Flow (vph)	0	882	1946	0	0	176	1163	0	150	287
Confl. Peds. (#/hr)	2	4	4	4	4	4	2	10	4	4
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Prot	NA	Prot	Prot	NA	pm+pt	NA	Perm	pm+pt
Protected Phases	5	5	2	1	1	6	3	8	Perm	7
Permitted Phases							8		8	4
Actuated Green, G (s)	40.1	72.0	18.1	50.0	18.1	50.0	41.8	41.8	33.4	39.0
Effective Green, g (s)	40.1	72.0	18.1	50.0	18.1	50.0	41.8	41.8	33.4	39.0
Actuated g/C Ratio	0.27	0.48	0.12	0.33	0.12	0.33	0.28	0.28	0.22	0.26
Clearance Time (s)	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0	5.0	4.6
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	910	2394	211	1157	211	1157	180	428	343	281
v/s Ratio Prot	c0.26	0.39	0.10	c0.34	0.10	c0.34	c0.05	0.04	0.02	0.02
v/s Ratio Perm							0.19	0.15	0.02	0.11
v/c Ratio	0.97	0.81	0.83	1.00	0.83	1.00	0.83	0.67	0.07	0.52
Uniform Delay, d1	54.2	33.1	64.3	49.8	64.3	49.8	48.2	47.8	45.9	46.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	22.3	2.2	23.7	27.6	23.7	27.6	26.8	4.1	0.4	1.6
Delay (s)	76.5	35.3	88.0	77.5	88.0	77.5	75.0	51.9	46.3	47.6
Level of Service	E	D	F	E	F	E	E	D	D	D
Approach Delay (s)		48.2		78.9		78.9		57.1		E
Approach LOS		D		E		E		E		E
Intersection Summary										
HCM 2000 Control Delay		63.0								E
HCM 2000 Volume to Capacity ratio		0.98								
Actuated Cycle Length (s)		149.7							19.2	H
Intersection Capacity Utilization		131.0%								
Analysis Period (min)		15								
c Critical Lane Group										

Gibson Traffic Consultants, Inc. [SPF] HCM Signalized Intersection Capacity Analysis
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Garibaldi (18-334) 2029 Future with Development Conditions PM Peak-Hour
3: Kelsey Street & US-2

Movement	EBU	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL
Lane Configurations	EBL	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL
Traffic Volume (vph)	109	747	1774	118	30	141	1058	73	162	262
Future Volume (vph)	109	747	1774	118	30	141	1058	73	162	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.0	5.0	4.6	4.6	5.0	5.0	4.6	5.0	4.6
Lane Util. Factor	0.97	0.91	0.97	0.91	0.97	0.91	0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.95
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3400	4979	1752	3467	1752	3467	1663	1747	1540	1749
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	0.22	0.85	1.00	0.51
Satd. Flow (perm)	3400	4979	1752	3467	1752	3467	391	1483	1540	936
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	112	770	1829	122	31	145	1091	75	167	270
RTOR Reduction (vph)	0	0	5	0	0	0	0	0	0	87
Lane Group Flow (vph)	0	882	1946	0	0	176	1163	0	150	287
Confl. Peds. (#/hr)	2	4	4	4	4	4	2	10	4	4
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Prot	NA	Prot	Prot	NA	pm+pt	NA	Perm	pm+pt
Protected Phases	5	5	2	1	1	6	3	8	Perm	7
Permitted Phases							8		8	4
Actuated Green, G (s)	40.1	72.0	18.1	50.0	18.1	50.0	41.8	41.8	33.4	39.0
Effective Green, g (s)	40.1	72.0	18.1	50.0	18.1	50.0	41.8	41.8	33.4	39.0
Actuated g/C Ratio	0.27	0.48	0.12	0.33	0.12	0.33	0.28	0.28	0.22	0.26
Clearance Time (s)	4.6	5.0	4.6	5.0	4.6	5.0	4.6	5.0	5.0	4.6
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	910	2394	211	1157	211	1157	180	428	343	281
v/s Ratio Prot	c0.26	0.39	0.10	c0.34	0.10	c0.34	c0.05	0.04	0.02	0.02
v/s Ratio Perm							0.19	0.15	0.02	0.11
v/c Ratio	0.97	0.81	0.83	1.00	0.83	1.00	0.83	0.67	0.07	0.52
Uniform Delay, d1	54.2	33.1	64.3	49.8	64.3	49.8	48.2	47.8	45.9	46.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	22.3	2.2	23.7	27.6	23.7	27.6	26.8	4.1	0.4	1.6
Delay (s)	76.5	35.3	88.0	77.5	88.0	77.5	75.0	51.9	46.3	47.6
Level of Service	E	D	F	E	F	E	E	D	D	D
Approach Delay (s)		48.2		78.9		78.9		57.1		E
Approach LOS		D		E		E		E		E
Intersection Summary										
HCM 2000 Control Delay		63.0								E
HCM 2000 Volume to Capacity ratio		0.98								
Actuated Cycle Length (s)		149.7							19.2	H
Intersection Capacity Utilization		131.0%								
Analysis Period (min)		15								
c Critical Lane Group										

Gibson Traffic Consultants, Inc. [SPF] HCM Signalized Intersection Capacity Analysis
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Garibaldi (18-334)
4: Chain Lake Road & Site Access

2029 Future with Development Conditions
PM Peak-Hour

Intersection

Int Delay, s/veh 3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
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Lane Configurations						
Traffic Vol, veh/h	13	124	212	616	384	22
Future Vol, veh/h	13	124	212	616	384	22
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	135	230	670	417	24

Major/Minor	Minor2	Major1	Major2
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Conflicting Flow All	1559	429	441	0	-	0
Stage 1	429	-	-	-	-	-
Stage 2	1130	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	124	626	1119	-	-	-
Stage 1	657	-	-	-	-	-
Stage 2	308	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	83	626	1119	-	-	-
Mov Cap-2 Maneuver	83	-	-	-	-	-
Stage 1	442	-	-	-	-	-
Stage 2	308	-	-	-	-	-

Approach	EB	NB	SB
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HCM Control Delay, s	20.1	2.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
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Capacity (veh/h)	1119	-	386	-	-
HCM Lane V/C Ratio	0.206	-	0.386	-	-
HCM Control Delay (s)	9.1	0	20.1	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.8	-	1.8	-	-