

Gibson Traffic Consultants, Inc.
2813 Rockefeller Avenue
Suite B
Everett, WA 98201
425.339.8266

RECEIVED
06/28/2021
CITY OF MONROE

Cooper Point Traffic Impact Analysis

Jurisdiction: City of Monroe

May 2021



TABLE OF CONTENTS

1. DEVELOPMENT IDENTIFICATION	1
2. METHODOLOGY	1
3. TRIP GENERATION.....	4
4. TRIP DISTRIBUTION	4
5. INTERSECTION LEVEL OF SERVICE ANALYSIS	7
5.1 Turning Movement Volumes	7
5.2 Intersection Level of Service Results.....	8
6. TRAFFIC MITIGATION FEES	12
6.1 City of Monroe.....	12
6.2 Snohomish County	12
6.3 WSDOT.....	12
7. CONCLUSIONS.....	13

LIST OF FIGURES

Figure 1: Site Vicinity Map	2
Figure 2: Development Trip Distribution - AM Peak-Hour	5
Figure 3: Development Trip Distribution PM Peak-Hour	6
Figure 4: Existing Turning Movements.....	9
Figure 5: 2031 Baseline Turning Movements	10
Figure 6: 2031 Future with Development Turning Movements	11

LIST OF TABLES

Table 1: Level of Service Criteria for Intersections.....	3
Table 2: Trip Generation Summary	4
Table 3: Intersection Level of Service Summary	8

ATTACHMENTS

Snohomish County Key Intersection Impacts.....	A
Counts and Turning Movement Calculations	B
Pipeline Information	C
Level of Service Calculations	D

1. DEVELOPMENT IDENTIFICATION

Gibson Traffic Consultants, Inc. (GTC) has been retained to provide a traffic impact analysis for the proposed Cooper Point 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 Cooper Point development is proposed to consist of a total of 33 single-family residential units that will be constructed in one phase. There is 1 existing single-family residential unit on site that will be removed and credited to the development. The analysis in this report has therefore been performed for 32 net new single-family residential units. The development site is located at the western terminus of 137th Street SE, west of 198th Avenue SE. A site vicinity map has been included in Figure 1.

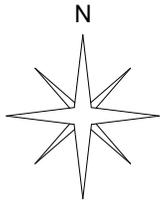
2. METHODOLOGY

Trip generation calculations for the Cooper Point development have been performed utilizing average trip generation data contained in the Institute of Transportation Engineers' (ITE) *Trip Generation, 10th Edition + Supplement (2020)*. The distribution of trips generated by the site is based on approved distributions for developments in the site vicinity.

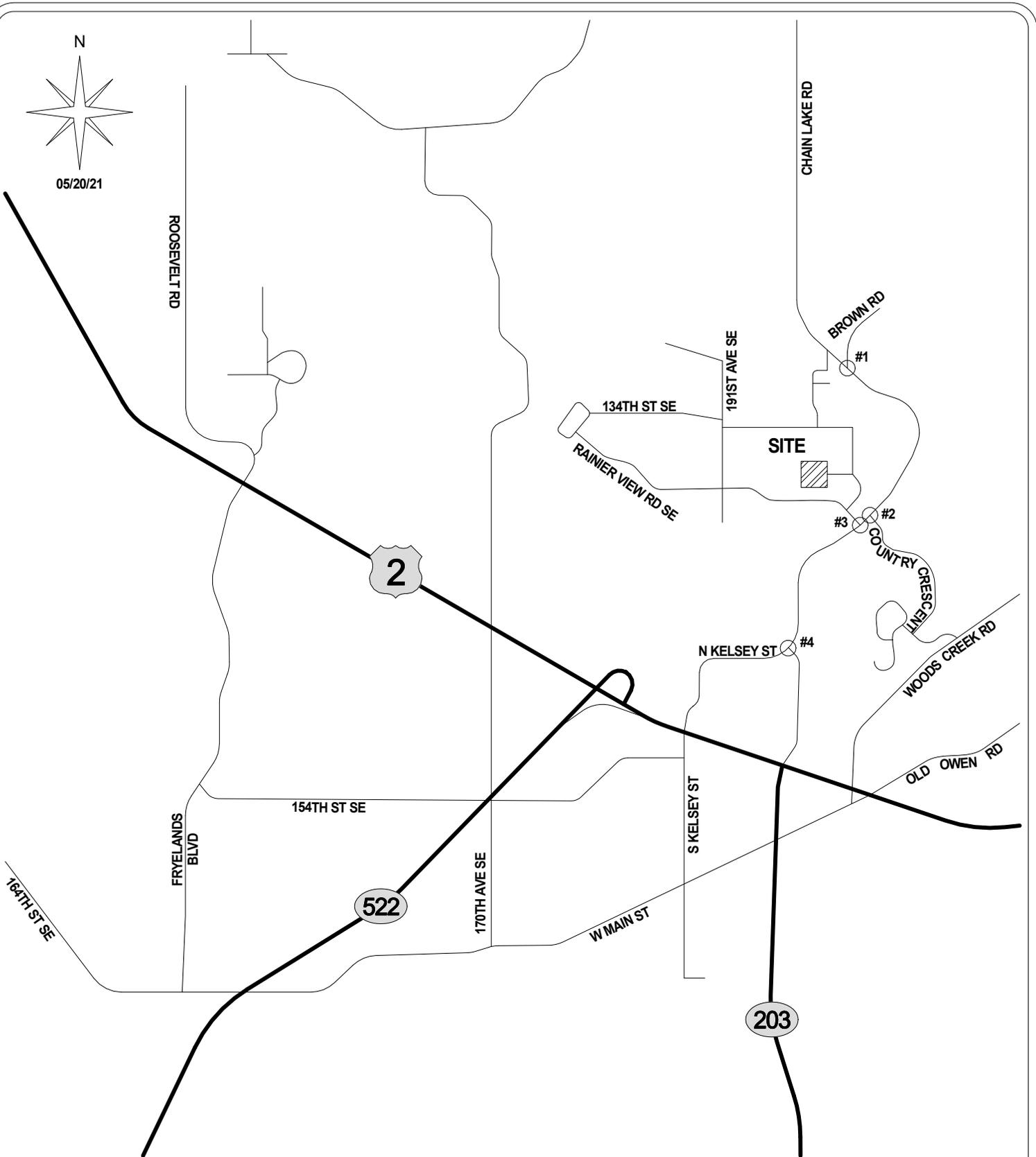
Intersection level of service analysis has been performed based on typical City of Monroe requirements and previous scoping conversations with City of Monroe staff. Level of service analysis has been performed for the following intersections:

1. Chain Lake Road at Brown Road
2. Chain Lake Road at Country Crescent Boulevard
3. Chain Lake Road at Rainier View Road SE
4. Chain Lake Road at Kelsey Street

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.



05/20/21



GIBSON TRAFFIC CONSULTANTS

**TRAFFIC IMPACT STUDY
GTC #21-028**

**COOPER POINT
32 NET NEW
SINGLE-FAMILY
RESIDENTIAL UNITS**

CITY OF MONROE

LEGEND



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 evaluates operations on a corridor level based on the weighted average delay of the intersections along the corridor. The level of service analysis has been performed utilizing the *Synchro 10.3, Build 151* 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 4), which is a roundabout. It is important to note that this intersection is not part of the Chain Lake Road corridor. The intersection level of service threshold for the Chain Lake Road corridor and the intersection of Chain Lake Road at Kelsey Street is LOS D.

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 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 Cooper Point 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 32 net new units of the Cooper Point development, which includes credit for the 1 existing unit on the site. The trip generation calculations are summarized in Table 2.

Table 2: Trip Generation Summary

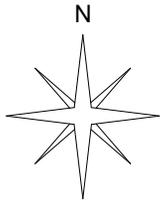
32 Net New Single-Family Residential Units	Average Daily Trips			AM Peak-Hour Trips			PM Peak-Hour Trips		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Generation Rate	9.44 trips per unit			0.74 trips per unit			0.99 trips per unit		
Splits	50%	50%	100%	25%	75%	100%	63%	37%	100%
Trips	151.04	151.04	302.08	5.92	17.76	23.68	19.96	11.72	31.68

The 32 net new units are anticipated to generate approximately 302 average daily trips with approximately 24 AM peak-hour trips and 32 PM peak-hour trips.

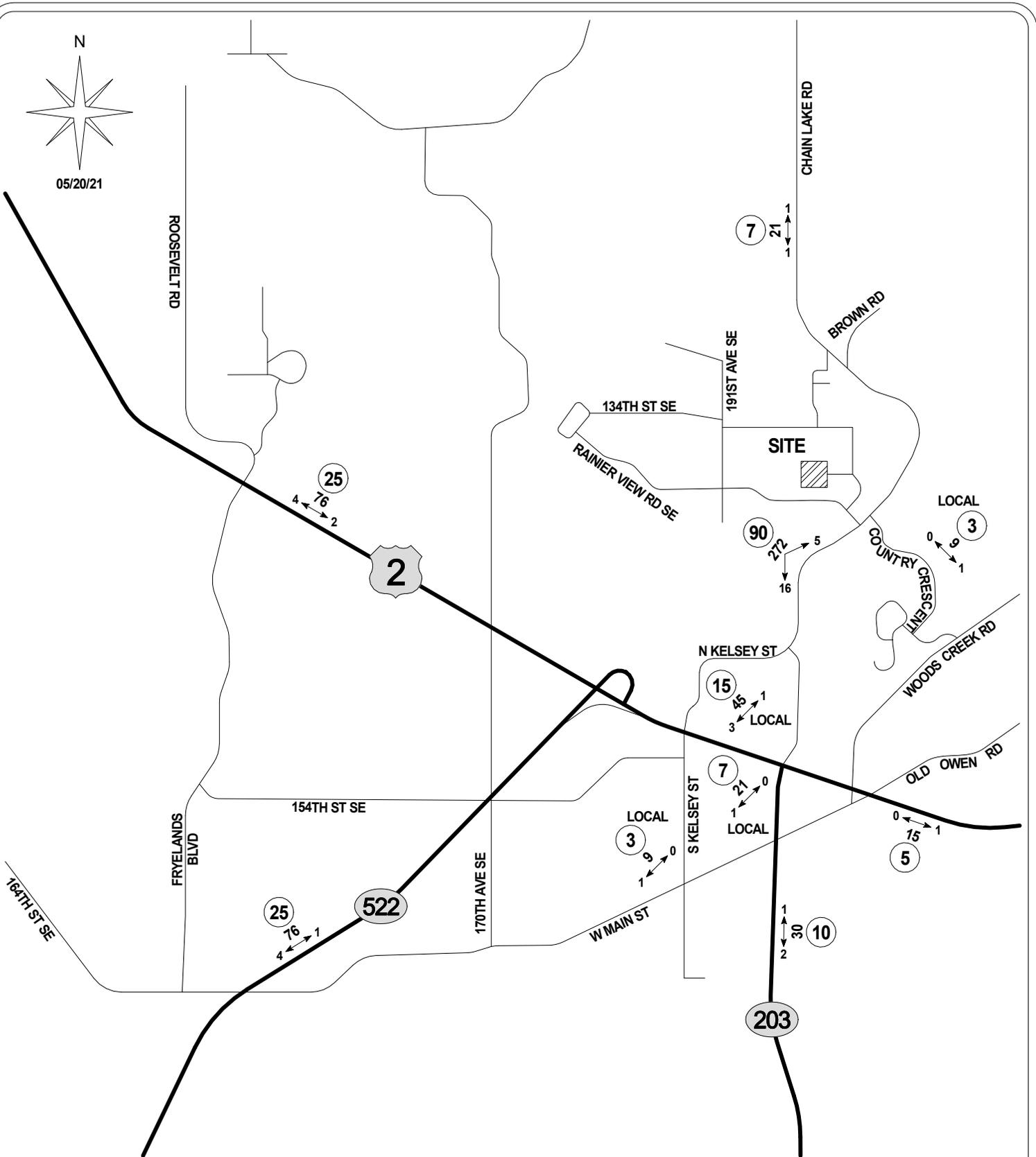
4. TRIP DISTRIBUTION

The distribution of trips generated by the Cooper Point 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 trips generated by the Cooper Point development will impact 3 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.



05/20/21



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #21-028

COOPER POINT
32 NET NEW
SINGLE-FAMILY
RESIDENTIAL UNITS

CITY OF MONROE

LEGEND

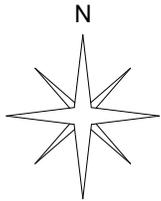
AWDT
AM ↔ PEAK

NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

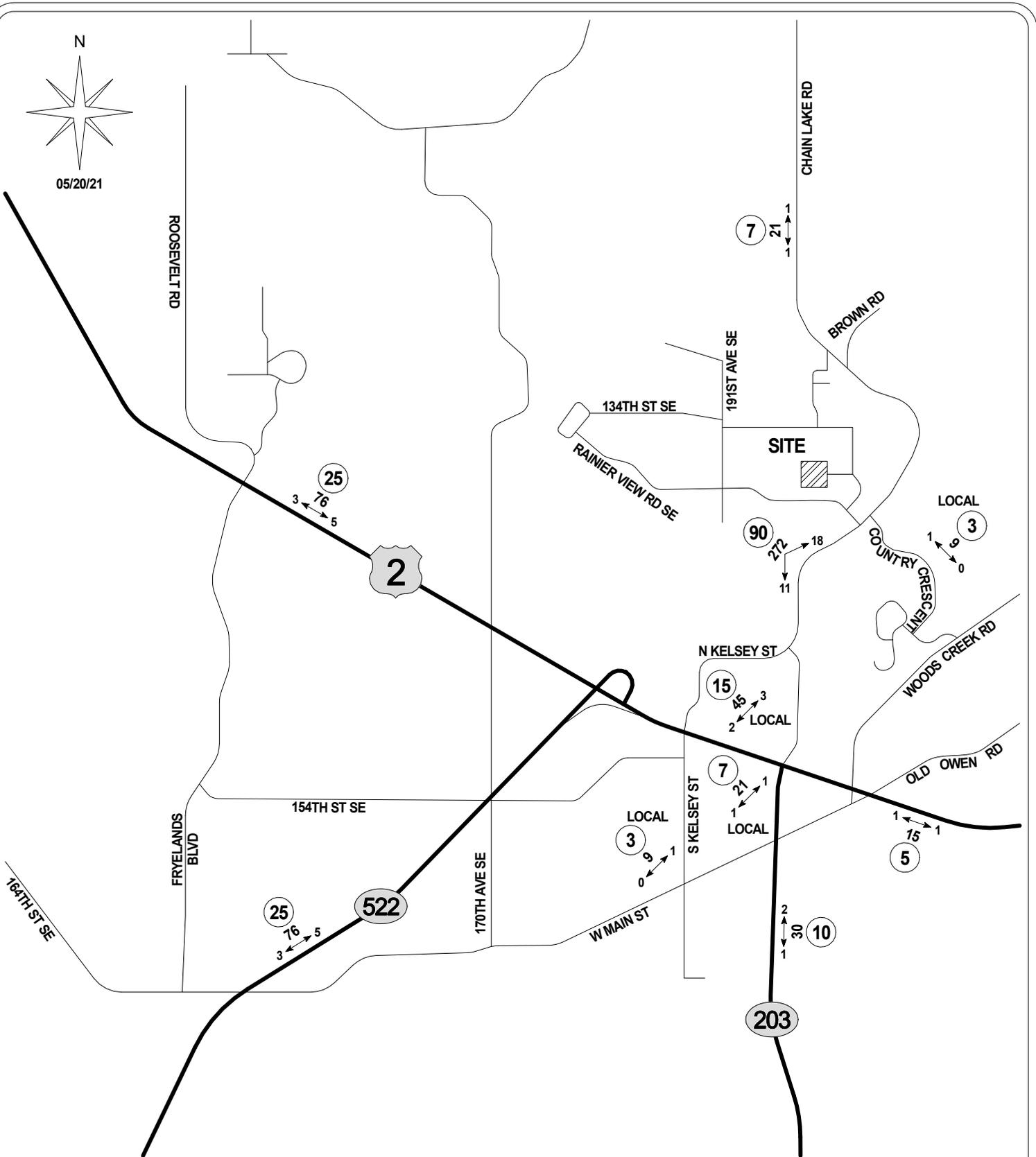


TRIP DISTRIBUTION %

FIGURE 2
DEVELOPMENT
TRIP DISTRIBUTION
AM PEAK-HOUR



05/20/21



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #21-028

COOPER POINT
32 NET NEW
SINGLE-FAMILY
RESIDENTIAL UNITS

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 Brown Road
2. Chain Lake Road at Country Crescent Boulevard
3. Chain Lake Road at Rainier View Road SE
4. Chain Lake Road at Kelsey Street

The analysis has been completed for the 2018 existing, 2031 baseline and 2031 future with development conditions.

5.1 Turning Movement Volumes

Historical counts were used in lieu of collecting new counts at the study intersection due to the Covid-19 Pandemic. The existing turning movements at the study intersections are based on data collected by the independent count firm, Traffic Data Gathering (TDG), in January and March 2018. An additional count was provided by the City of Monroe, performed in September 2018 by the independent count firm Idax. The existing turning movements at the study intersections are shown in Figure 4.

The 2031 baseline volumes have been calculated using a 10-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
- Garibaldi – 86 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 Cooper Point 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. Although the count provided by the city was performed later in the year, the same number of pipeline trips were applied to the intersection. This will make the volume at the intersection conservatively high as more houses would have been completed between the January/March counts and the September count.

The 2031 baseline turning movements at the study intersections are shown in Figure 5. The 2031 future with development turning movements were calculated by adding the trips from the development to the 2031 baseline turning movements. The 2031 future with development turning movements are shown in Figure 6. The existing turning movement counts and turning movement calculations are included in the attachments.

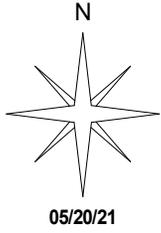
5.2 Intersection Level of Service Results

The level of service analysis has been performed utilizing the existing control, channelization, peak-hour factors and heavy-vehicle factors from the 2018 counts. The level of service results for the study intersections are summarized in Table 3.

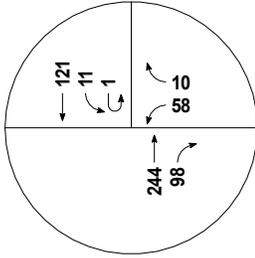
Table 3: Intersection Level of Service Summary

Intersection	Intersection Type	2018 Existing Conditions		2031 Baseline Conditions		2031 Future Conditions with Development	
		LOS	Delay	LOS	Delay	LOS	Delay
1. Chain Lake Road at Brown Road	Two-Way Stop-Control	B	12.0 sec	C	18.7 sec	C	18.8 sec
2. Chain Lake Road at Country Crescent Blvd	Two-Way Stop-Controlled	C	15.1 sec	D	32.6 sec	D	33.1 sec
3. Chain Lake Road at Rainier View Road SW	Two-Way Stop-Control	B	11.3 sec	E	49.8 sec	F	63.5 sec
Chain Lake Corridor		B	13.0 sec	D	39.0 sec	D	46.0 sec
4. Chain Lake Road at Kelsey Street	Roundabout	A	7.3 sec	B	15.3 sec	B	16.7 sec

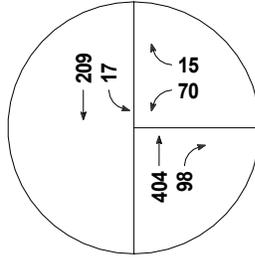
The level of service analysis shows that the development will not cause any intersection to operate at a deficient level of service. The development will add trips to Chain Lake Road at Rainier View Road, which is anticipated to operate at LOS E under the 2031 baseline conditions, but the corridor will operate at acceptable LOS D. The level of service calculations are included in the attachments.



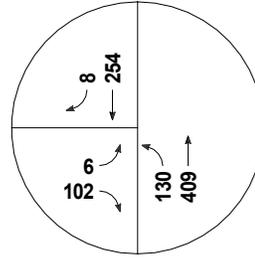
#1 CHAIN LAKE RD @ BROWN RD



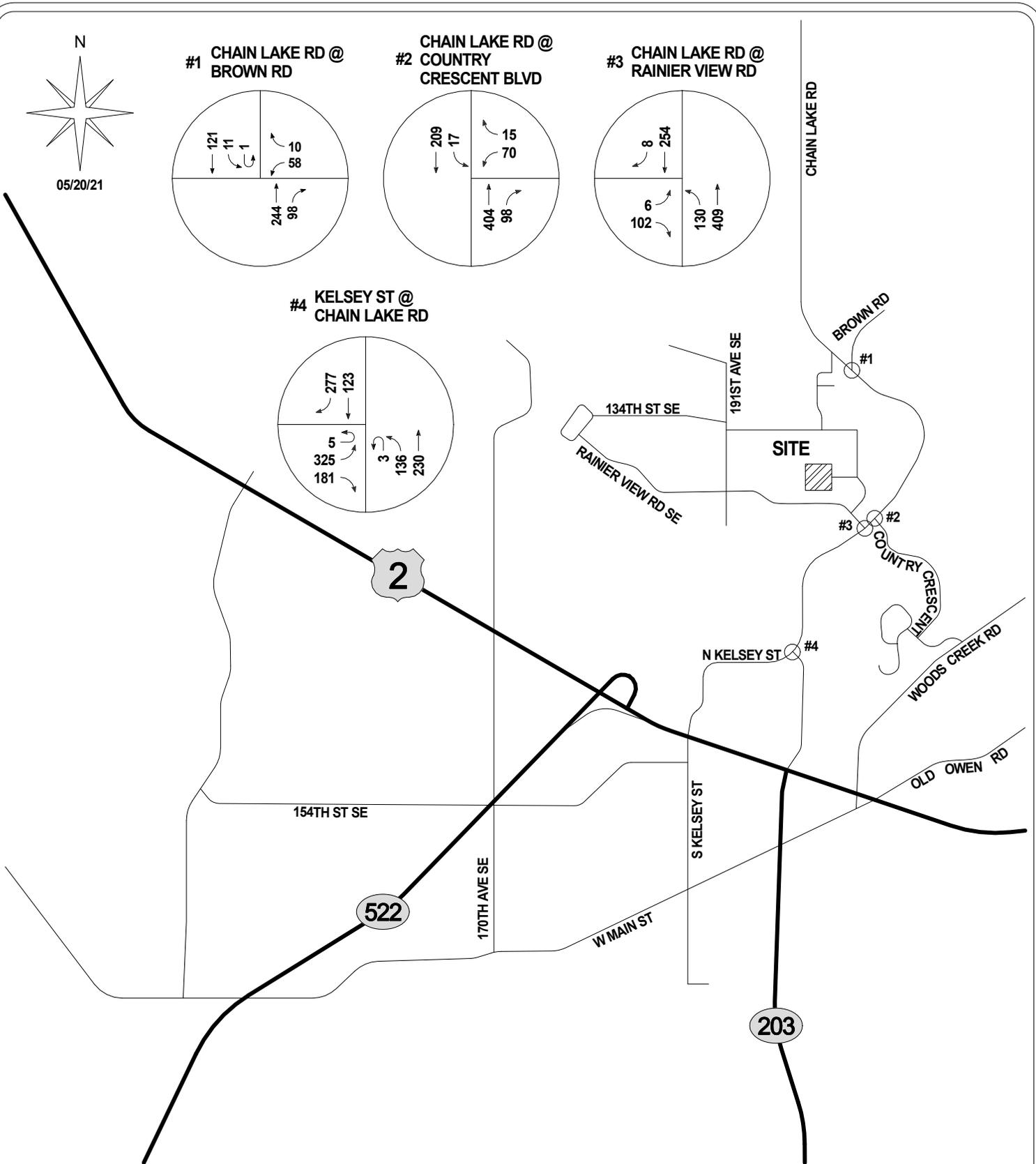
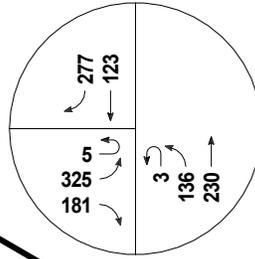
#2 CHAIN LAKE RD @ COUNTRY CRESCENT BLVD



#3 CHAIN LAKE RD @ RAINIER VIEW RD



#4 KELSEY ST @ CHAIN LAKE RD



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #21-028

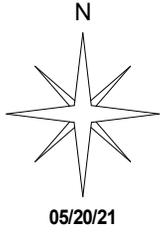
COOPER POINT
32 NET NEW
SINGLE-FAMILY
RESIDENTIAL UNITS

LEGEND

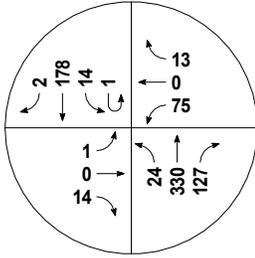
XXX → PM PEAK-HOUR
TURNING MOVEMENT VOLUMES

FIGURE 4
EXISTING
TURNING MOVEMENTS

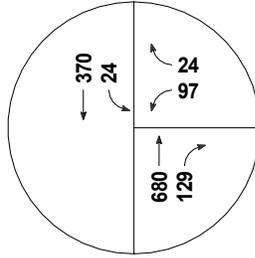
CITY OF MONROE



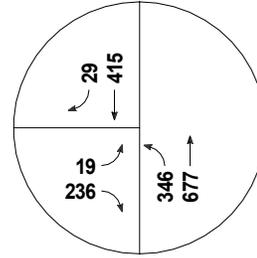
#1 CHAIN LAKE RD @ BROWN RD



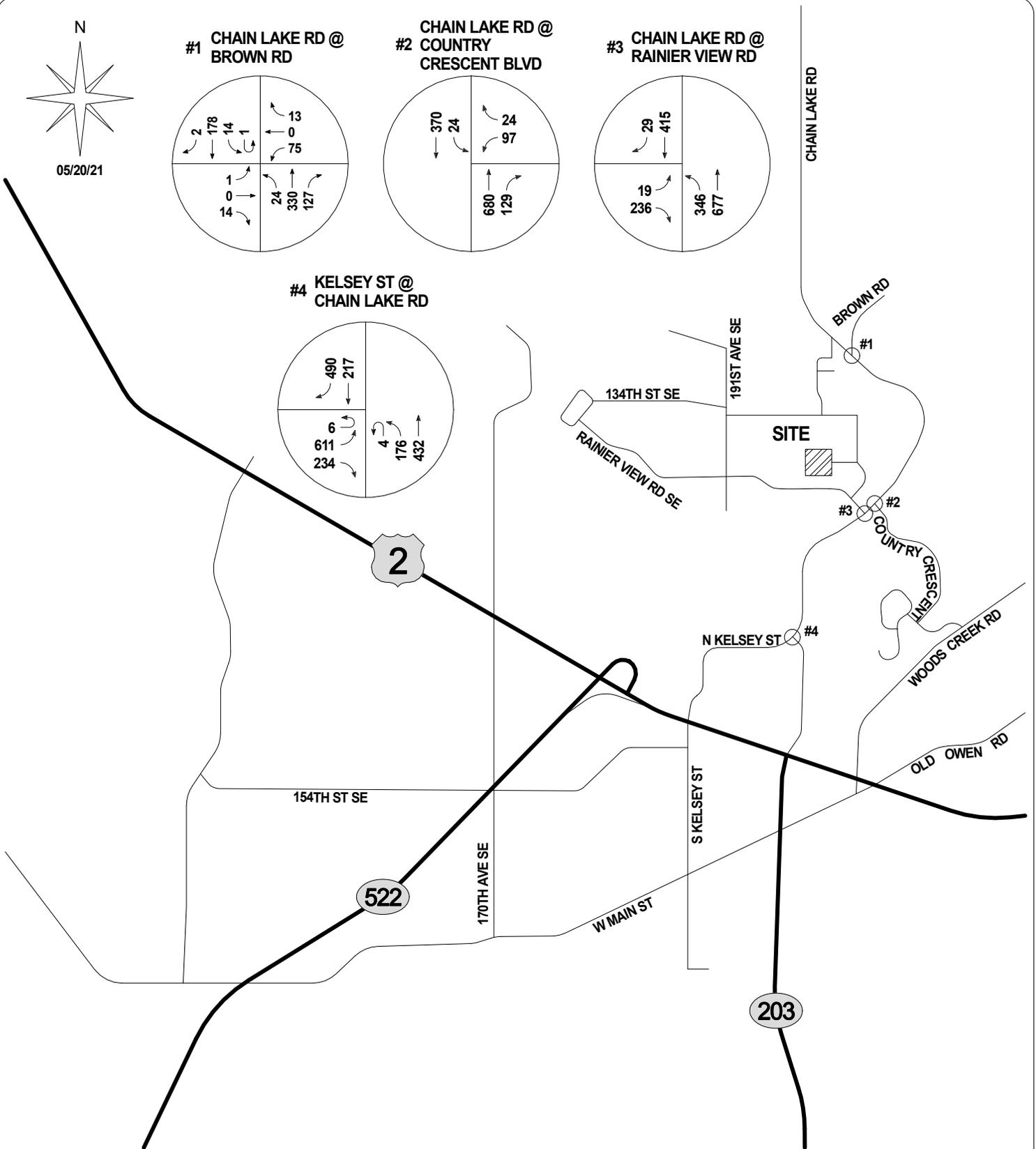
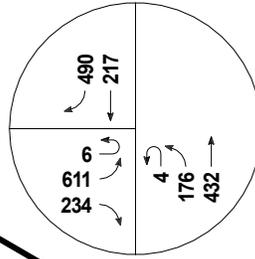
#2 CHAIN LAKE RD @ COUNTRY CRESCENT BLVD



#3 CHAIN LAKE RD @ RAINIER VIEW RD



#4 KELSEY ST @ CHAIN LAKE RD



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #21-028

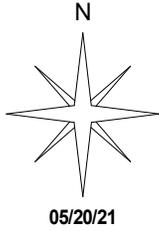
COOPER POINT
32 NET NEW
SINGLE-FAMILY
RESIDENTIAL UNITS

LEGEND

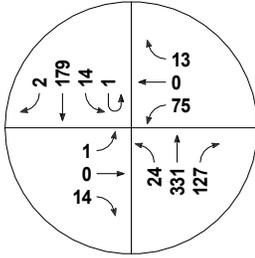
XXX → PM PEAK-HOUR
TURNING MOVEMENT VOLUMES

FIGURE 5
2031 BASELINE
TURNING MOVEMENTS

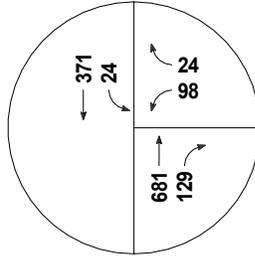
CITY OF MONROE



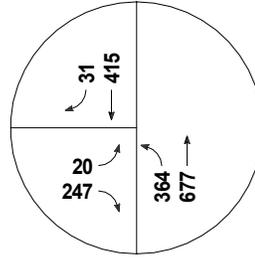
#1 CHAIN LAKE RD @ BROWN RD



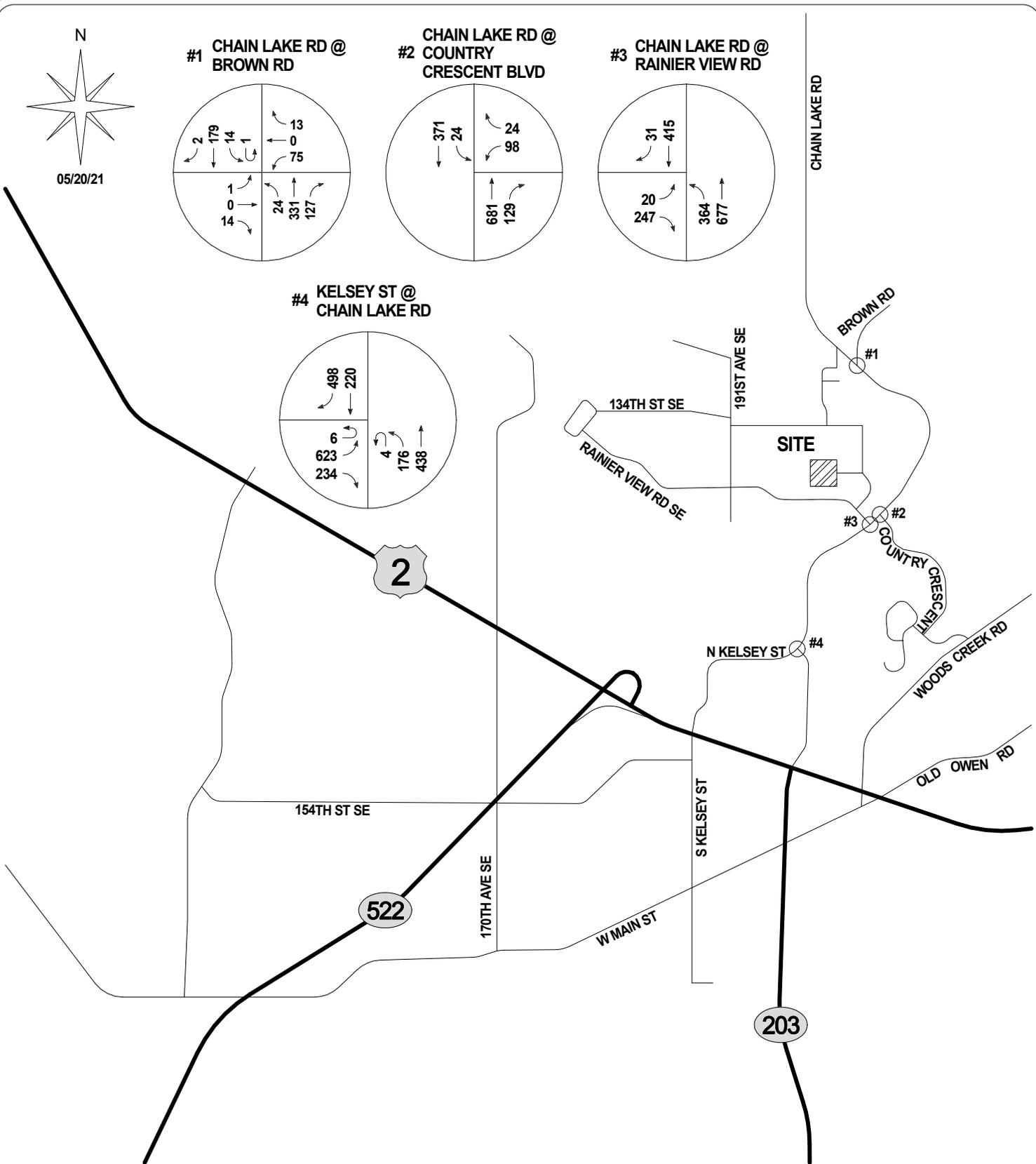
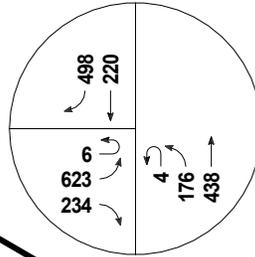
#2 CHAIN LAKE RD @ COUNTRY CRESCENT BLVD



#3 CHAIN LAKE RD @ RAINIER VIEW RD



#4 KELSEY ST @ CHAIN LAKE RD



GIBSON TRAFFIC CONSULTANTS

**TRAFFIC IMPACT STUDY
GTC #21-028**

**COOPER POINT
32 NET NEW
SINGLE-FAMILY
RESIDENTIAL UNITS**

CITY OF MONROE

LEGEND

XXX → PM PEAK-HOUR
TURNING MOVEMENT VOLUMES

**FIGURE 6
2031 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 Cooper Point 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 \$3,570 per unit. The 32 net new units of the Cooper Point development will result in City of Monroe traffic mitigation fees of \$114,240.00. It should be noted that these fees may not vest and may be higher at the time of building permit application.

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 Snohomish County improvement projects in the Transportation Needs Report will not be impacted by three directional PM peak-hour trips generated by the Cooper Point development. 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 Cooper Point development.

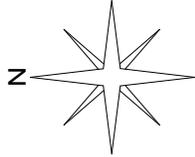
6.3 WSDOT

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 trip distribution shows that there are not any WSDOT intersections impacted by 25 or more peak-hour trips generated by the Cooper Point development. WSDOT traffic mitigation fees should not be required for the Cooper Point development.

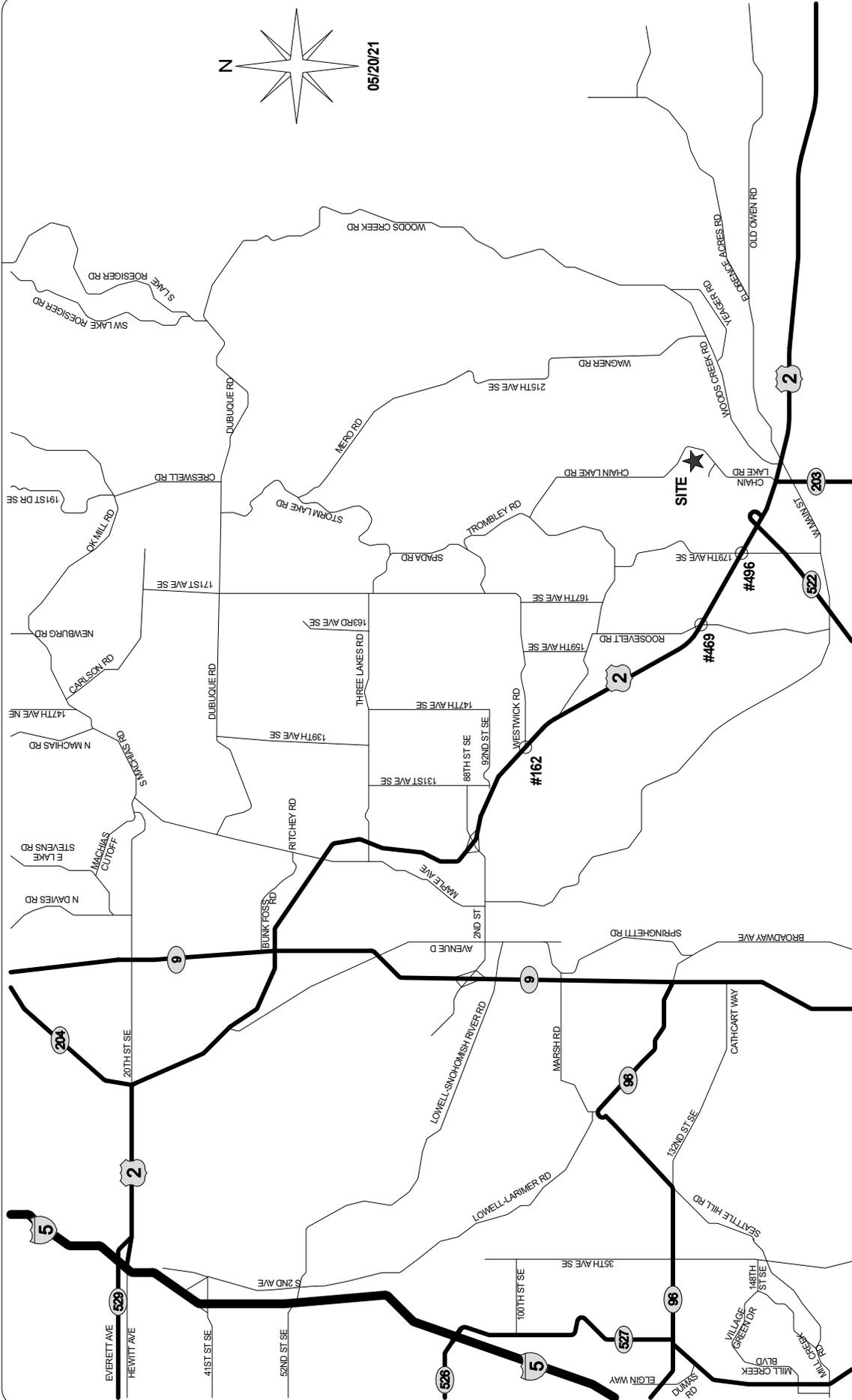
7. CONCLUSIONS

The Cooper Point development is proposed to consist of 33 single-family residential units with 1 existing unit being removed. The 32 net new units of the Cooper Point development are anticipated to generate approximately 302 average daily trips with approximately 24 AM peak-hour trips and 32 PM peak-hour trips. The level of service analysis shows that the Chain Lake Road corridor and the intersection of Chain Lake Road at Kelsey Street are anticipated to operate acceptably. The Cooper Point development will have City of Monroe traffic mitigation fees of \$114,240.00, based on the current fees. The impacts of the development will not meet the thresholds for paying traffic mitigation fees to Snohomish County or WSDOT.

Snohomish County Key Intersection Impacts



05/20/21



TRAFFIC IMPACT STUDY
GTC #21-028

FIGURE A1
KEY INTERSECTION
LOCATIONS

GIBSON TRAFFIC CONSULTANTS

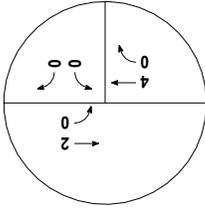
COOPER POINT
32 NET NEW
SINGLE-FAMILY
RESIDENTIAL UNITS
CITY OF MONROE

LEGEND

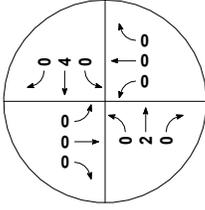
★ DEVELOPMENT SITE

○ KEY INTERSECTION

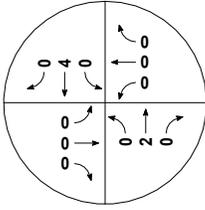
#162 WESTWICK RD



#469 ROOSEVELT RD

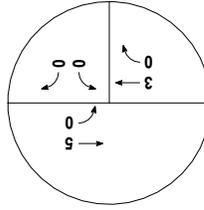


#496 179TH AVE SE

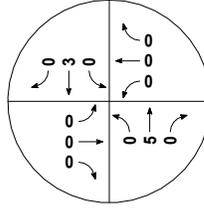


AM
PEAK-HOUR

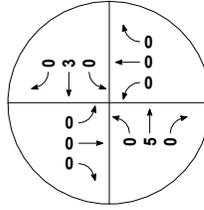
#162 WESTWICK RD



#469 ROOSEVELT RD



#496 179TH AVE SE



PM
PEAK-HOUR

GIBSON TRAFFIC CONSULTANTS

COOPER POINT
32 NET NEW
SINGLE-FAMILY
RESIDENTIAL UNITS
CITY OF MONROE

LEGEND

XXX →

PEAK-HOUR
TURNING MOVEMENT VOLUME

TRAFFIC IMPACT STUDY
GTC #21-028

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

Key AM Peak-Hour Key Intersection Volumes

Intersection	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
#162: SR-2 at Westwick 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	2	0	0	4	0	0	0	0	0	0	0
#496: SR-2 at 179 th Ave SE	0	2	0	0	4	0	0	0	0	0	0	0

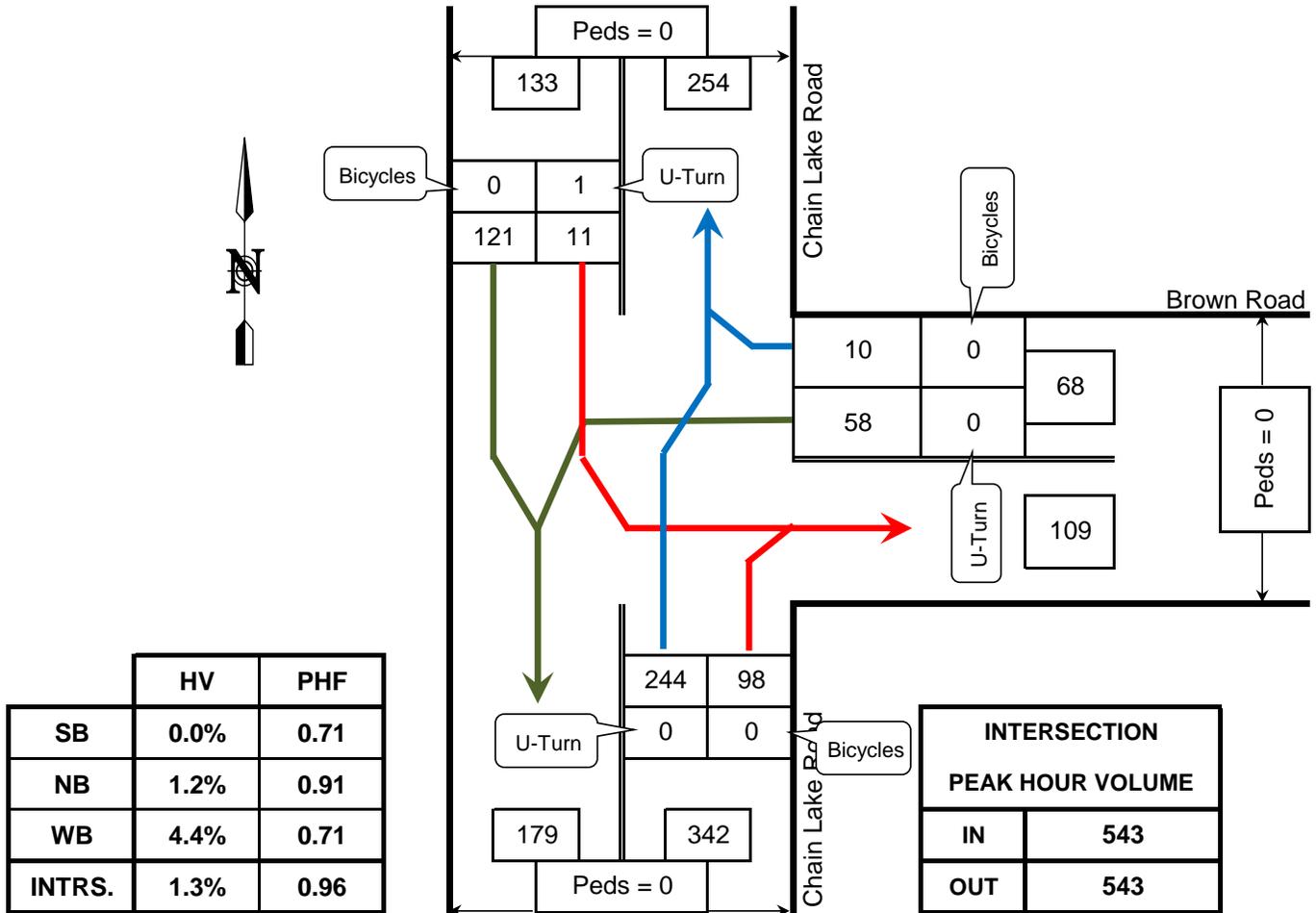
PM Peak-Hour Key Intersection Volumes

Intersection	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
#162: SR-2 at Westwick Rd	N/A	N/A	N/A	0	N/A	0	N/A	3	0	0	5	N/A
#469: SR-2 at Roosevelt Rd	0	5	0	0	3	0	0	0	0	0	0	0
#496: SR-2 at 179 th Ave SE	0	5	0	0	3	0	0	0	0	0	0	0

Counts and Turning Movement Calculations

TURNING MOVEMENTS DIAGRAM

4:00 PM - 6:00 PM PEAK HOUR: 4:15 PM TO 5:15 PM



	HV	PHF
SB	0.0%	0.71
NB	1.2%	0.91
WB	4.4%	0.71
INTRS.	1.3%	0.96

INTERSECTION PEAK HOUR VOLUME	
IN	543
OUT	543

HV = Heavy Vehicles
PHF = Peak Hour Factor

Chain Lake Road @ Brown Road

Monroe, WA

COUNTED BY: VT/CN

DATE OF COUNT: Wed. 1/31/18

REDUCED BY: CN

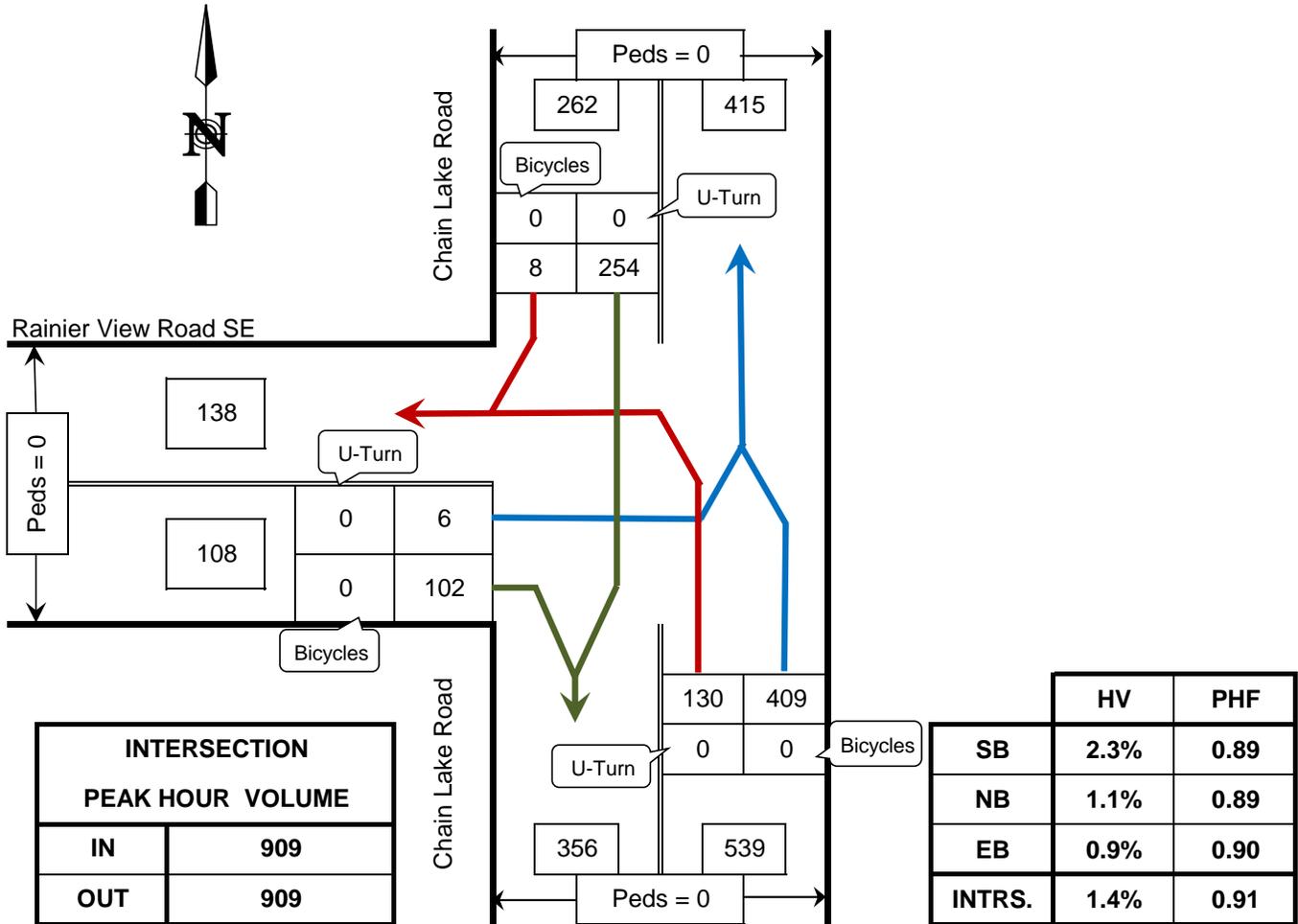
TIME OF COUNT: 4:00 PM - 6:00 PM

REDUCTION DATE: Tue. 2/6/18

WEATHER: Rainy

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

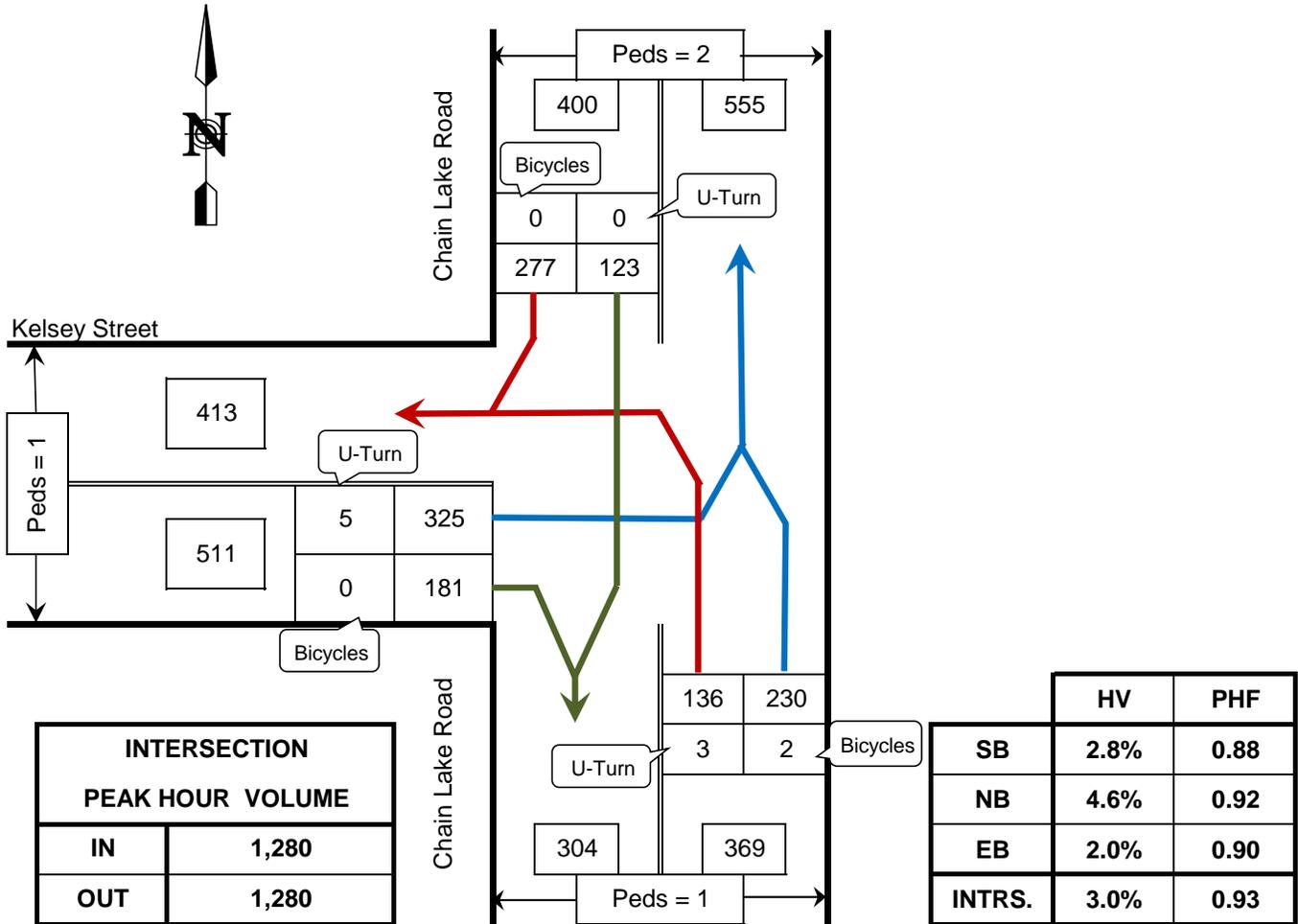
TIME OF COUNT: 4:00 PM - 6:00 PM

REDUCTION DATE: Tue. 2/6/18

WEATHER: Rainy

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

1 Brown Rd @ Chain Lake Rd

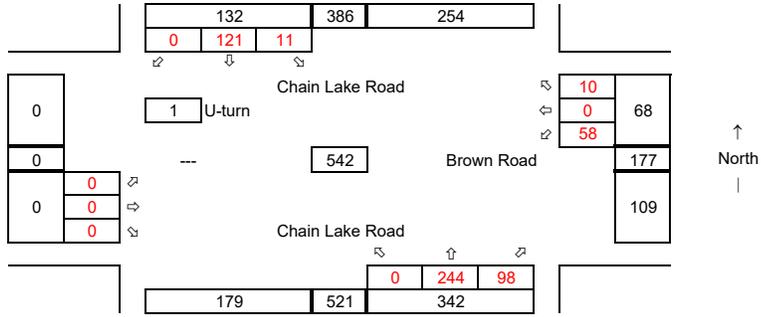
Synchro ID: 1

Existing

Average Weekday
PM Peak Hour

Year: 1/31/18

Data Source: TDG



Future without Project

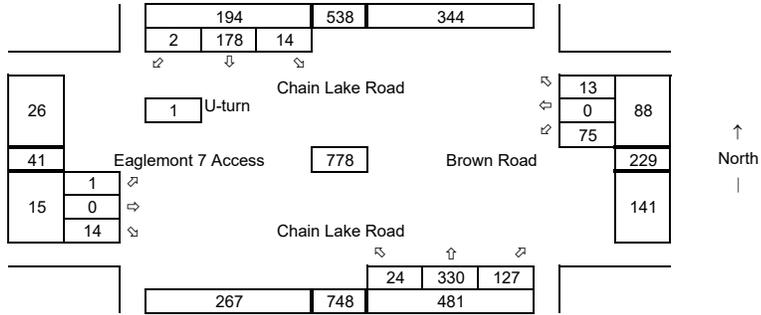
Average Weekday
PM Peak Hour

Year: 2031

Growth Rate = 2.0%

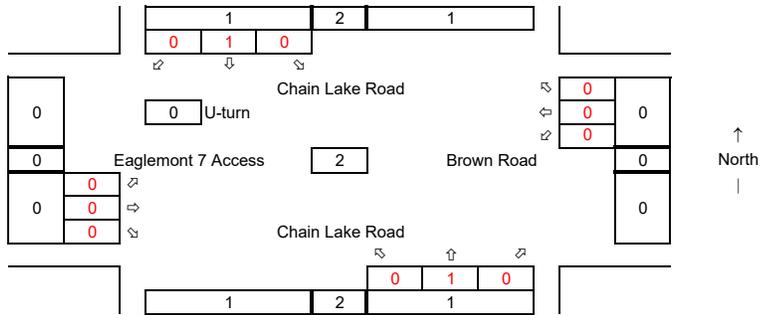
Years of Growth = 13

Total Growth = 1.2936



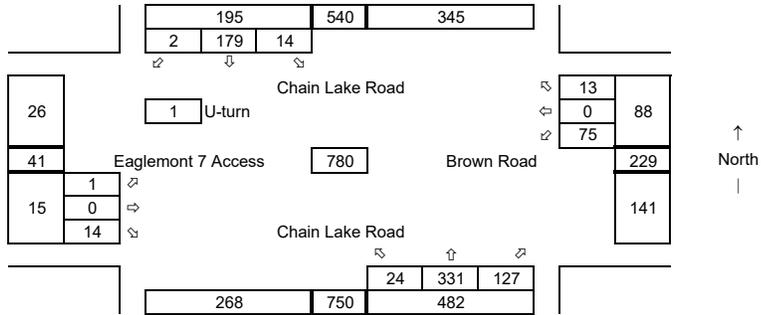
Total Project Trips

Average Weekday
PM Peak Hour



Future with Project

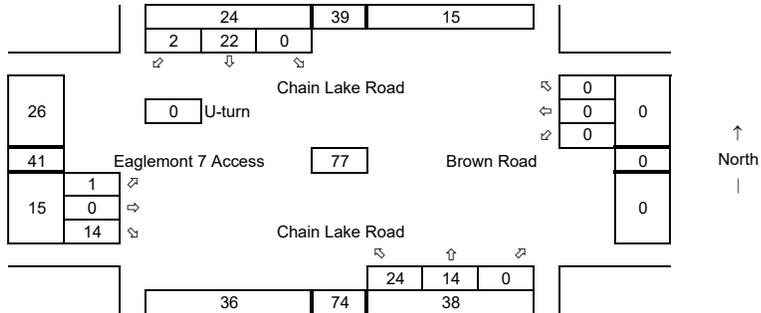
Average Weekday
PM Peak Hour



Pipeline Trips

Average Weekday
PM Peak Hour

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



2 Country Crescent @ Chain Lake

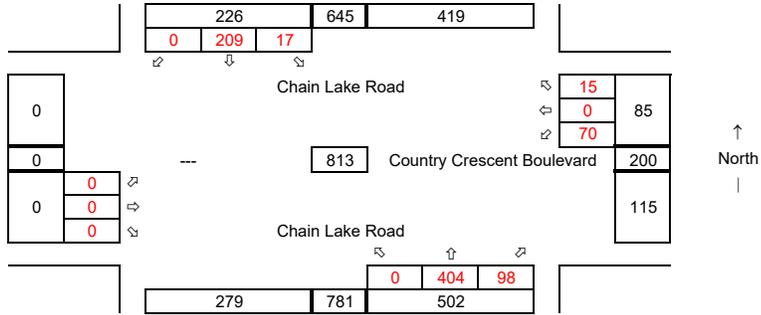
Synchro ID: 2

Existing

Average Weekday
PM Peak Hour

Year: 9/27/18

Data Source: Idax



Future without Project

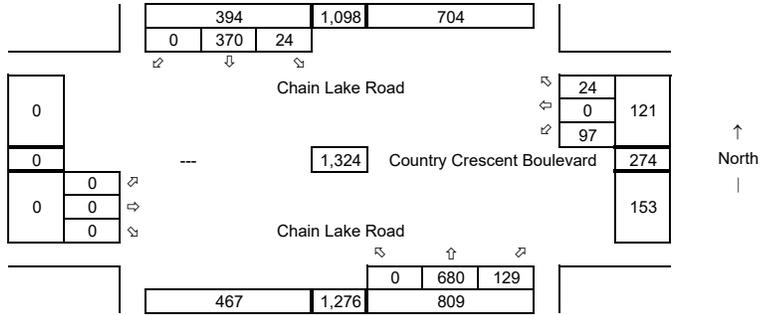
Average Weekday
PM Peak Hour

Year: 2031

Growth Rate = 2.0%

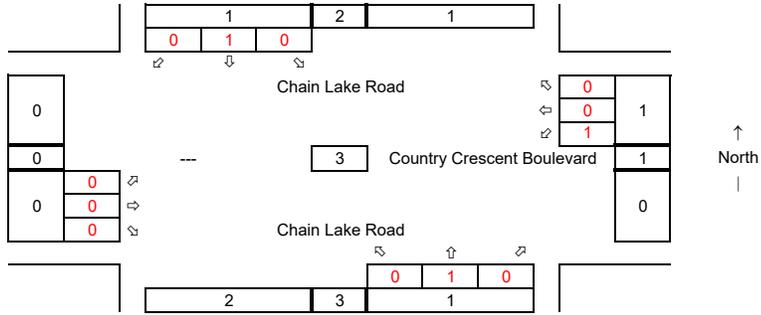
Years of Growth = 13

Total Growth = 1.2936



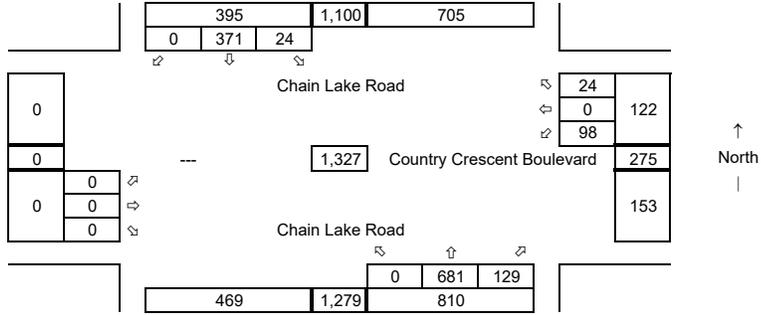
Total Project Trips

Average Weekday
PM Peak Hour



Future with Project

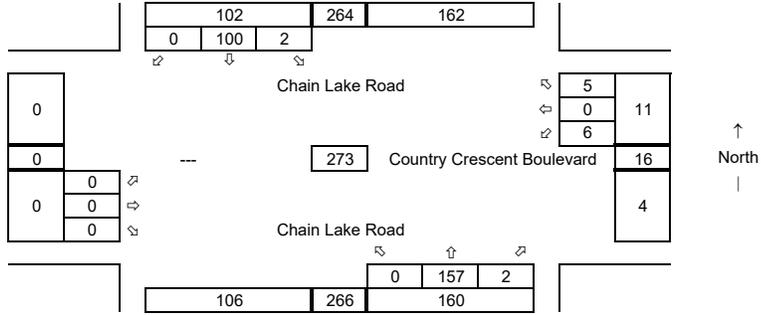
Average Weekday
PM Peak Hour



Pipeline Trips

Average Weekday
PM Peak Hour

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



3 Rainier View @ Chain Lake

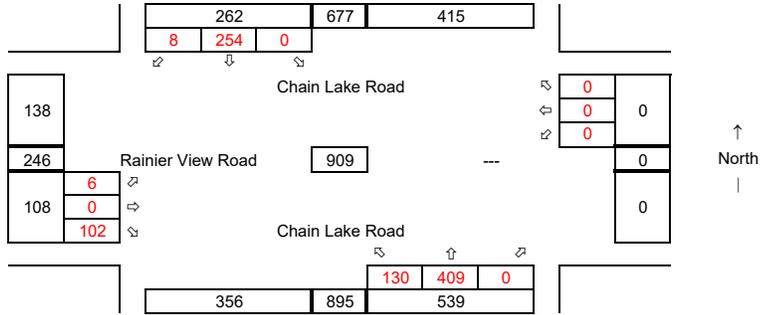
Synchro ID: 3

Existing

Average Weekday
PM Peak Hour

Year: 1/31/18

Data Source: TDG



Future without Project

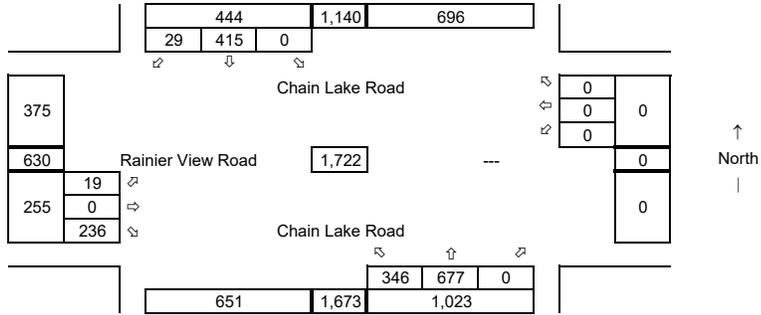
Average Weekday
PM Peak Hour

Year: 2031

Growth Rate = 2.0%

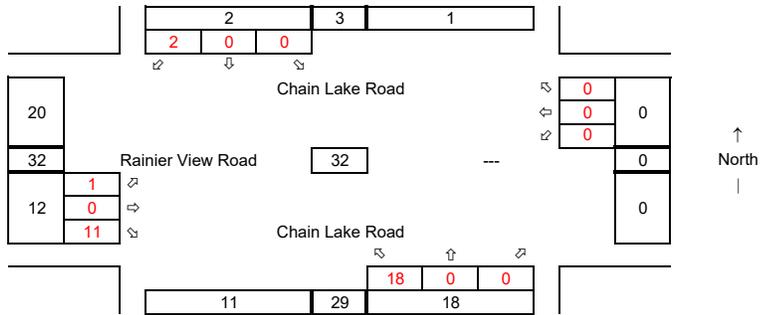
Years of Growth = 13

Total Growth = 1.2936



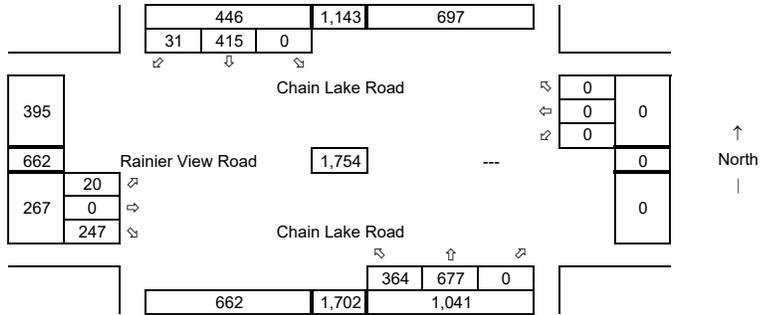
Total Project Trips

Average Weekday
PM Peak Hour



Future with Project

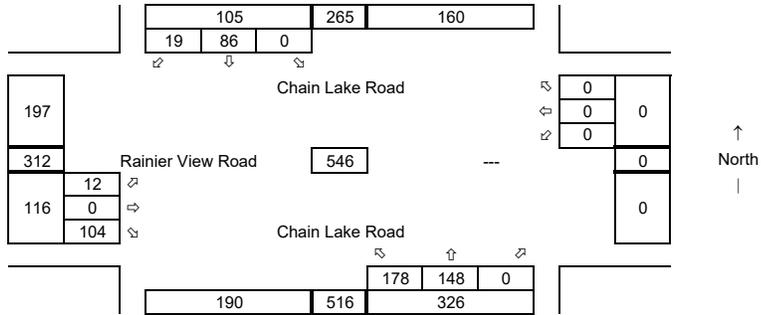
Average Weekday
PM Peak Hour



Pipeline Trips

Average Weekday
PM Peak Hour

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



4 Kelsey St @ Chain Lake Rd

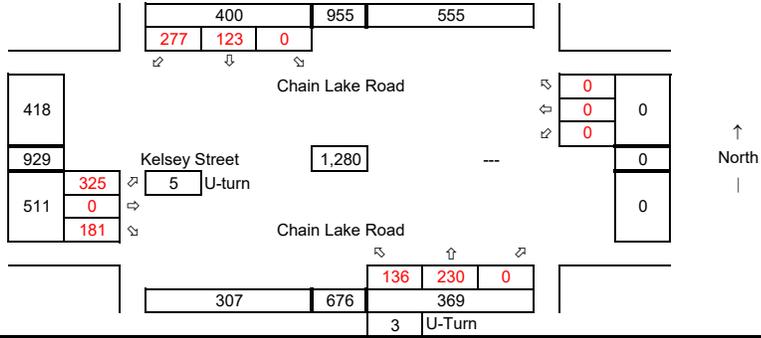
Synchro ID: 4

Existing

Average Weekday
PM Peak Hour

Year: 3/7/18

Data Source: TDG



Future without Project

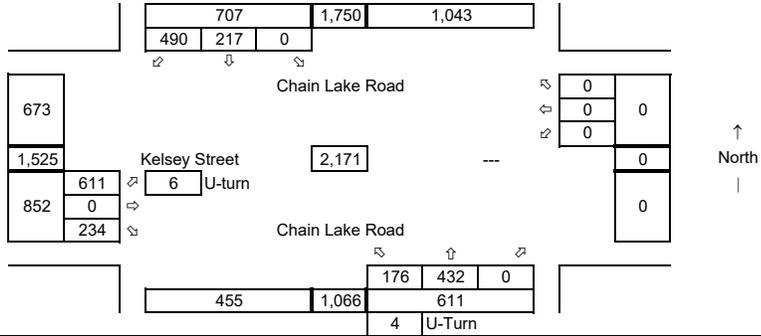
Average Weekday
PM Peak Hour

Year: 2031

Growth Rate = 2.0%

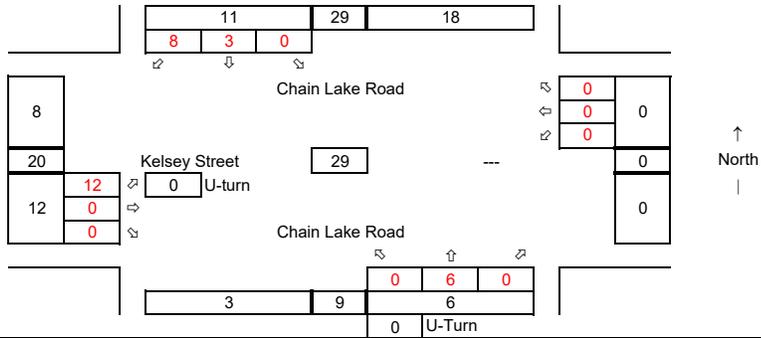
Years of Growth = 13

Total Growth = 1.2936



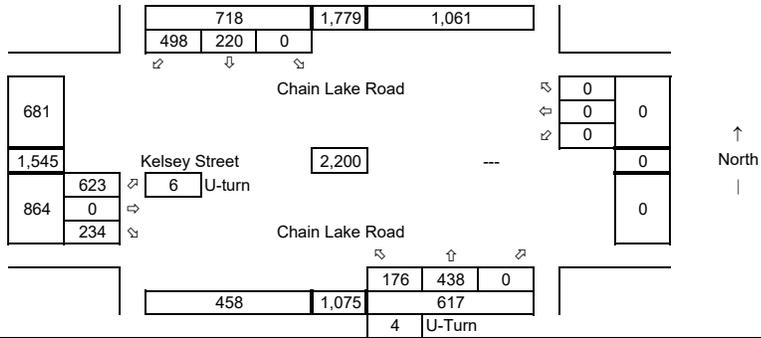
Total Project Trips

Average Weekday
PM Peak Hour



Future with Project

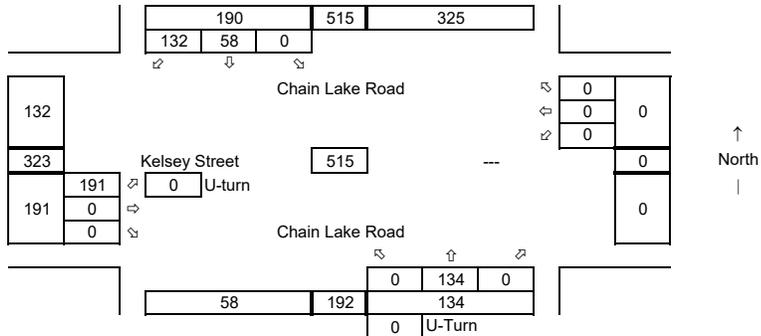
Average Weekday
PM Peak Hour



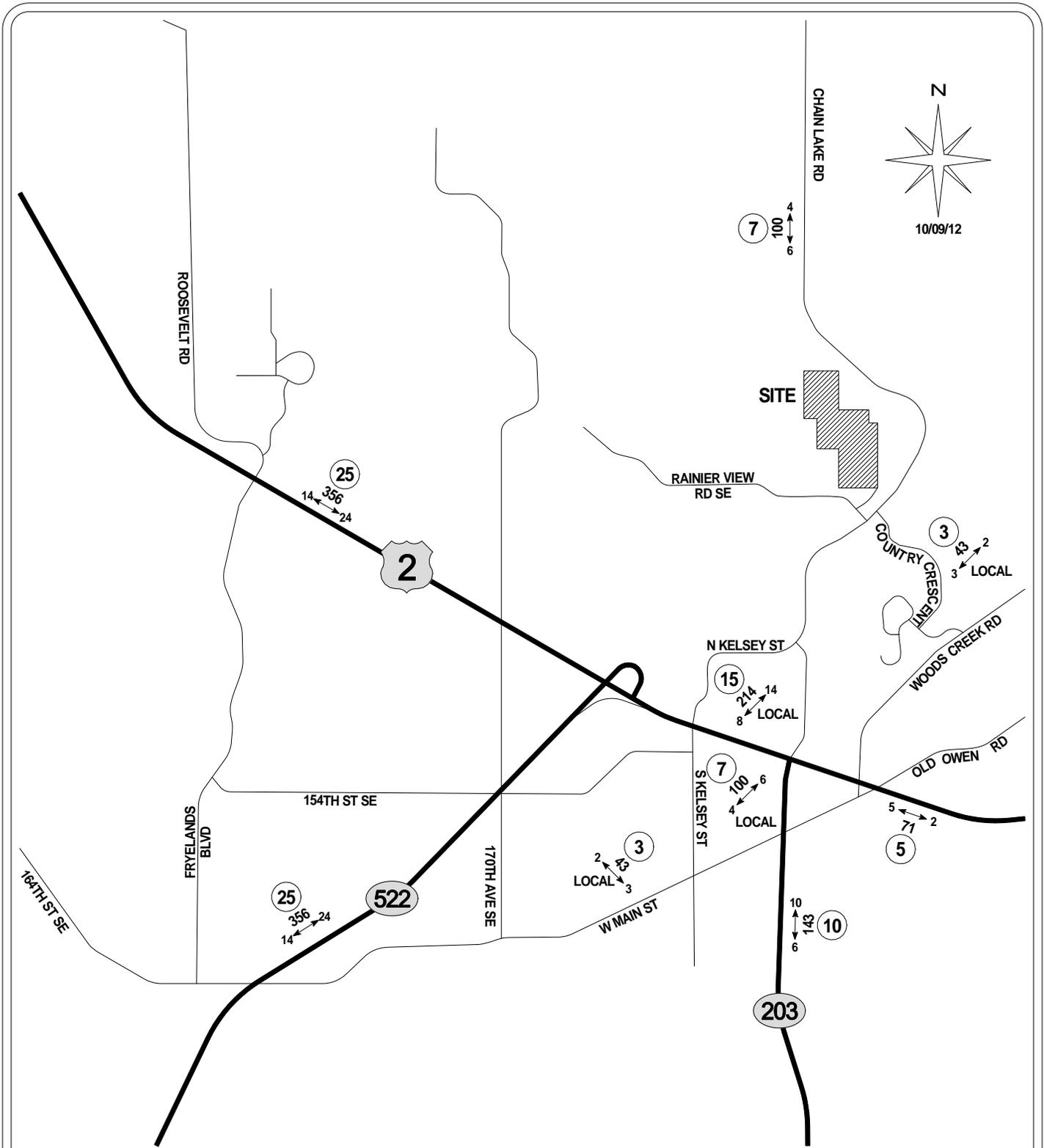
Pipeline Trips

Average Weekday
PM Peak Hour

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



Pipeline Information



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #12-087

EAGLEMONT
149 SINGLE-FAMILY UNITS

LEGEND

AWDT
PM ↔ PEAK

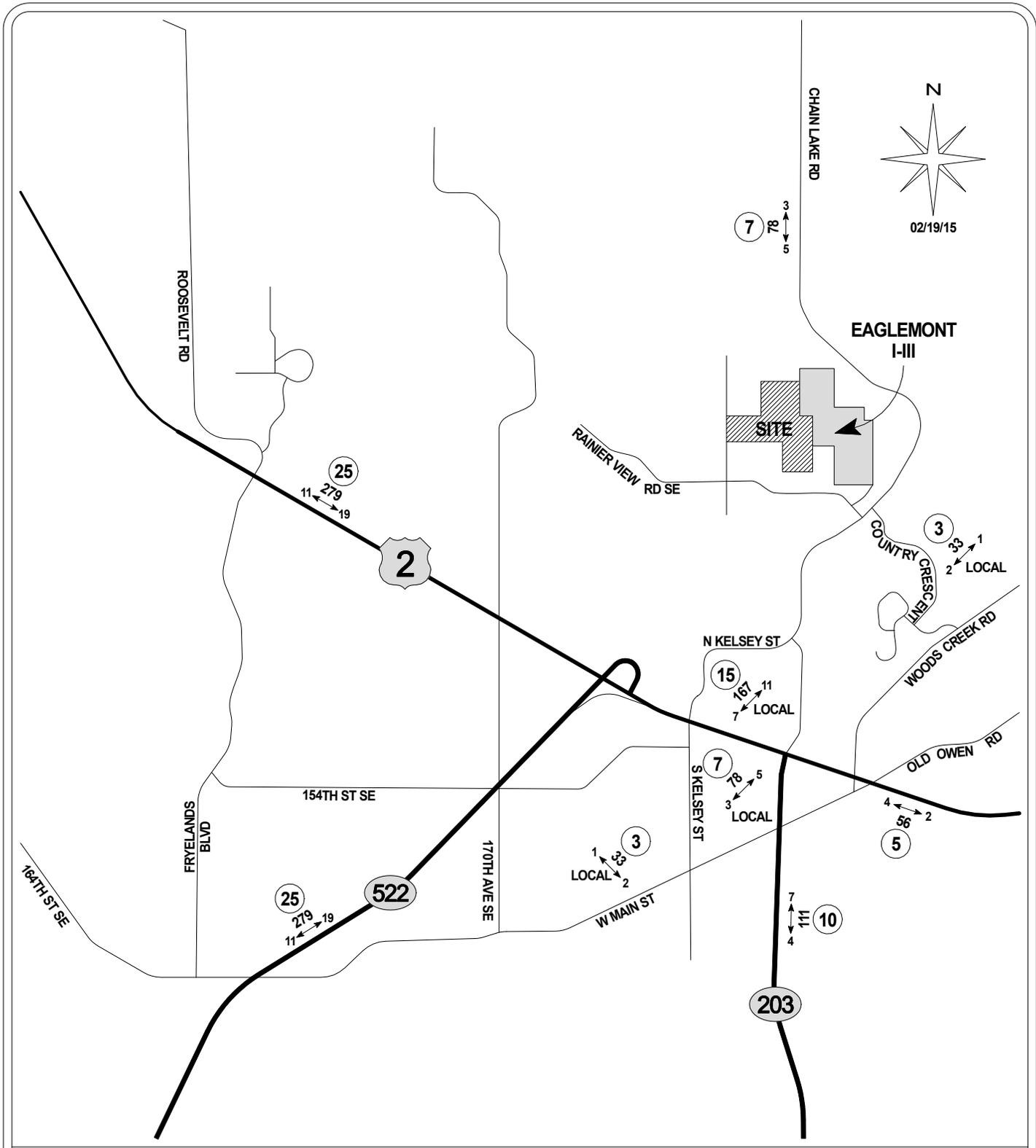
NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

25

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

CITY OF MONROE



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #15-045

EAGLEMONT IV-VIII
117 NEW SINGLE-FAMILY UNITS

LEGEND

AWDT
PM ← → PEAK

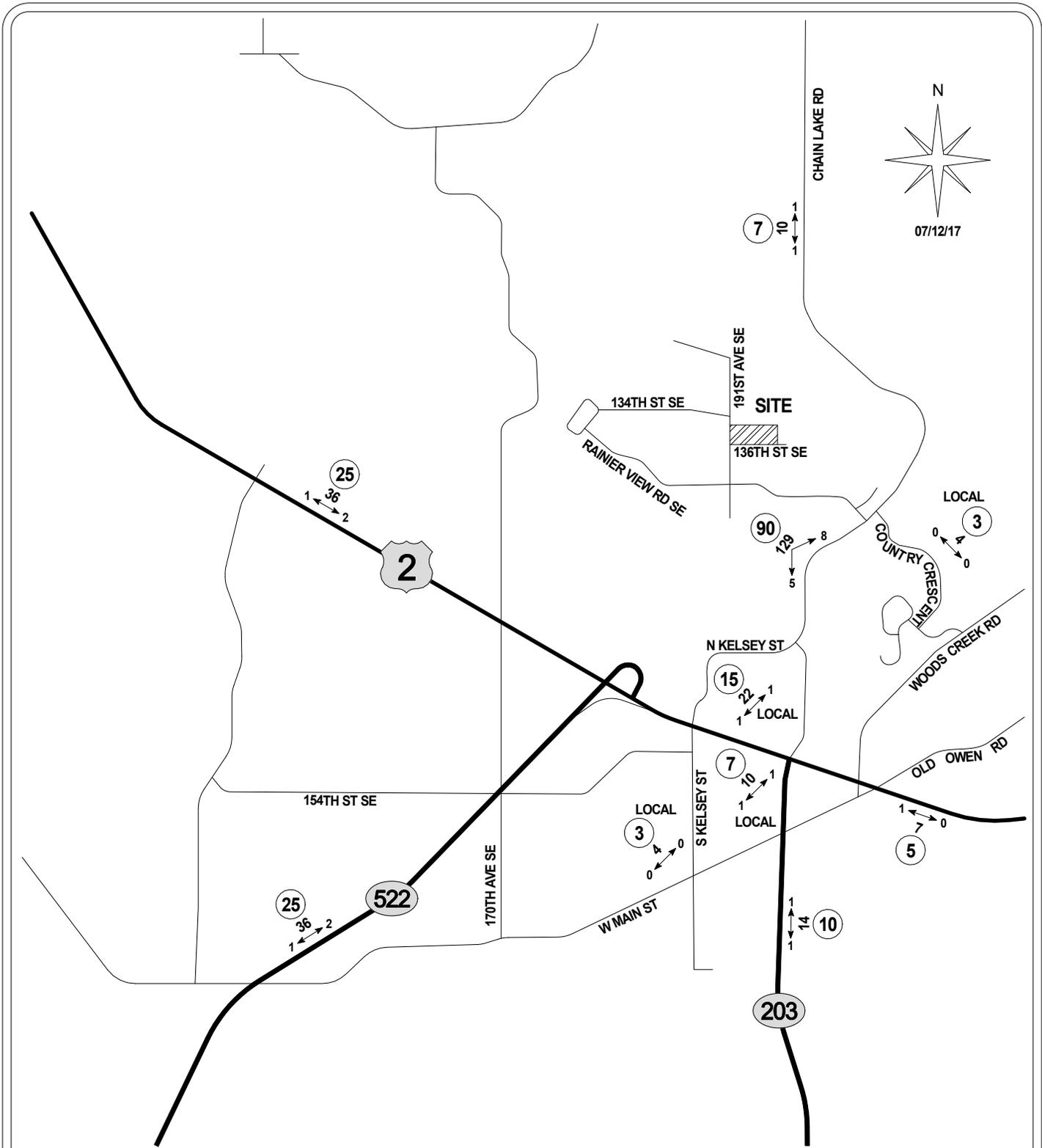
NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

XX

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

CITY OF MONROE



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #17-130

EAGLEMONT 5
15 NEW SINGLE FAMILY
DWELLINGS

LEGEND

AWDT
PM ↔ PEAK

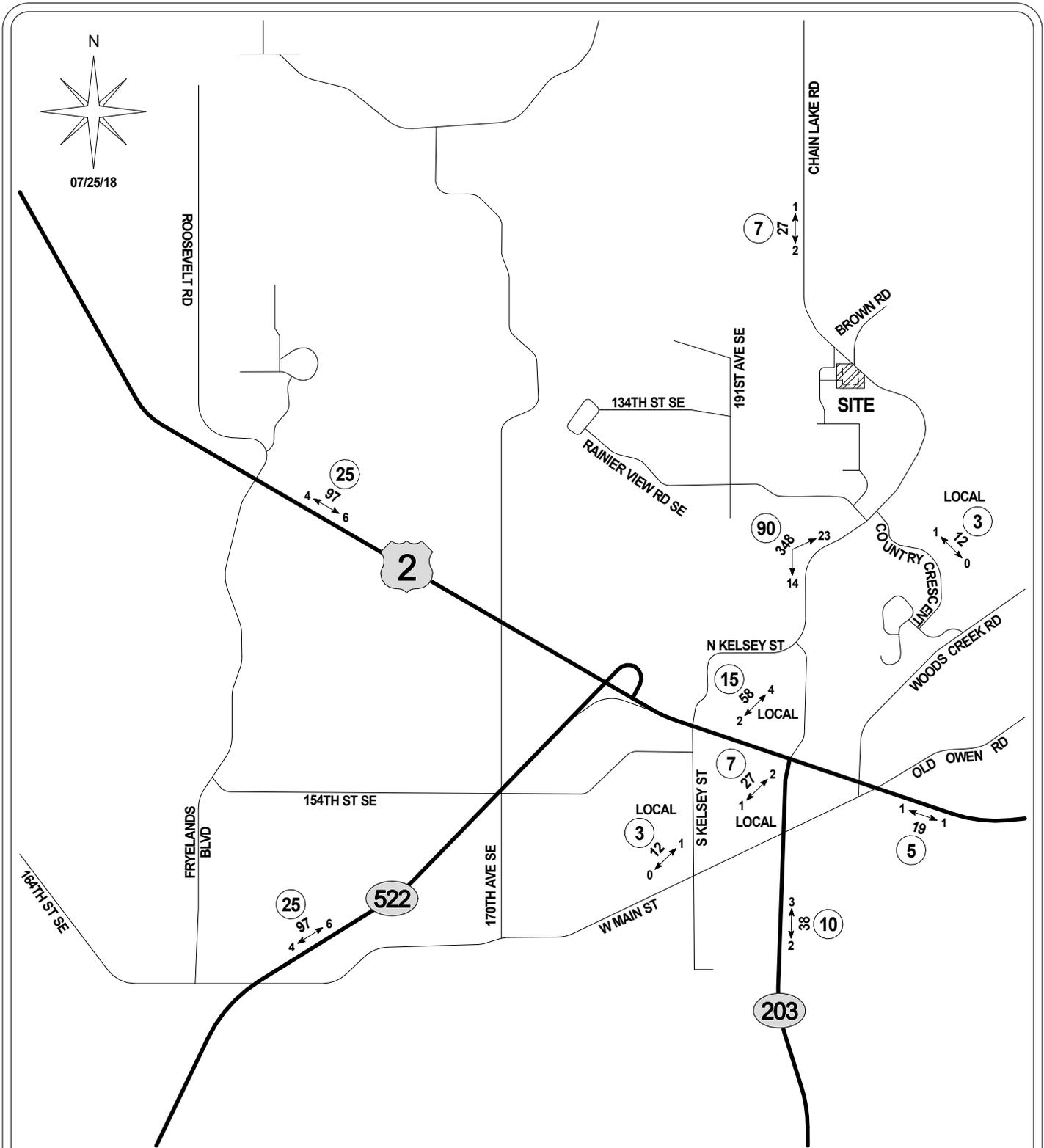
NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)



TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

CITY OF MONROE



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #18-042

EAGLEMONT 7
41 NEW SINGLE FAMILY
DWELLINGS

LEGEND

AWDT
PM ↔ PEAK

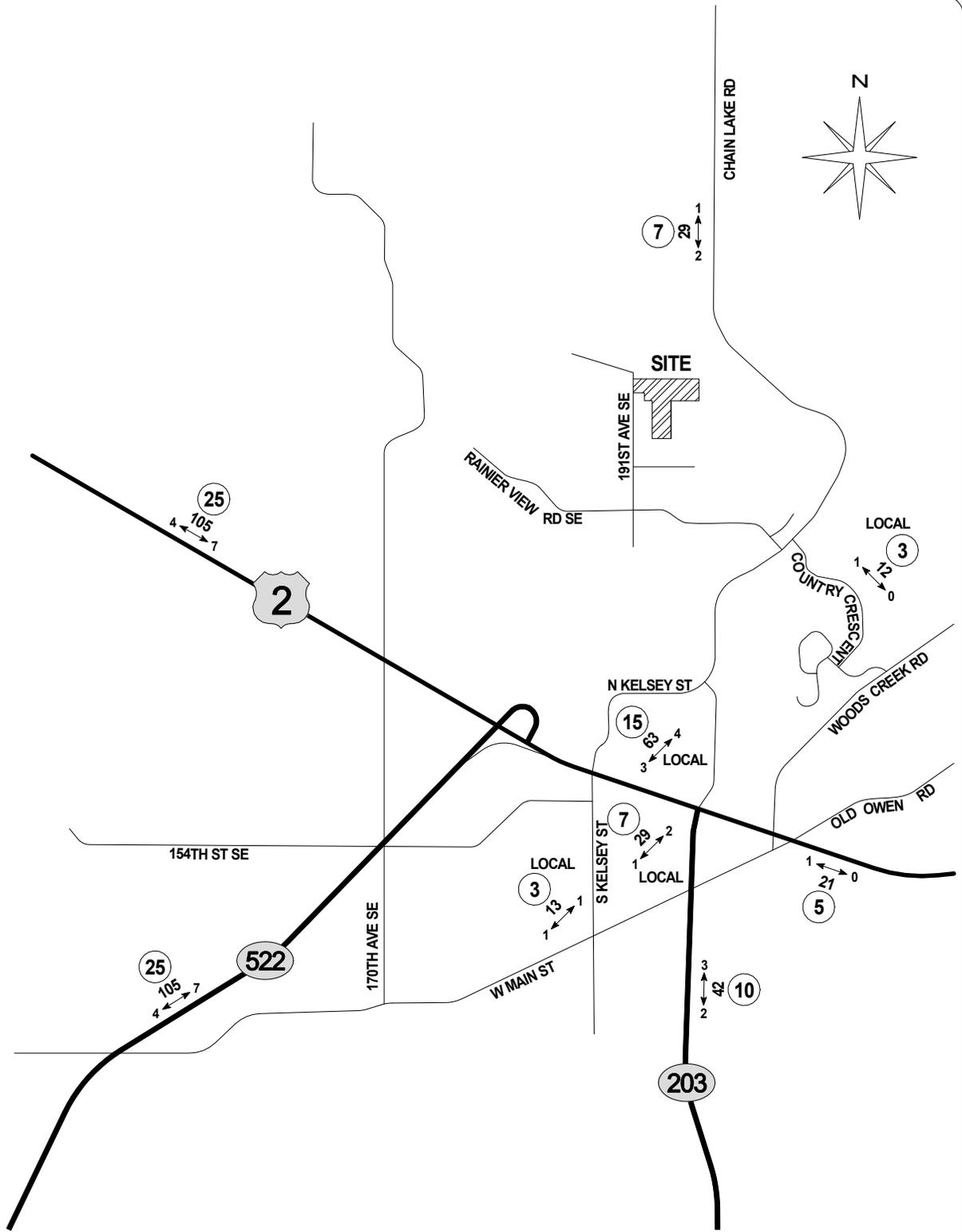
NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)



TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

CITY OF MONROE



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #15-244

SKY VIEW RIDGE
44 NEW SINGLE-FAMILY UNITS

LEGEND

AWDT
PM ↔ PEAK

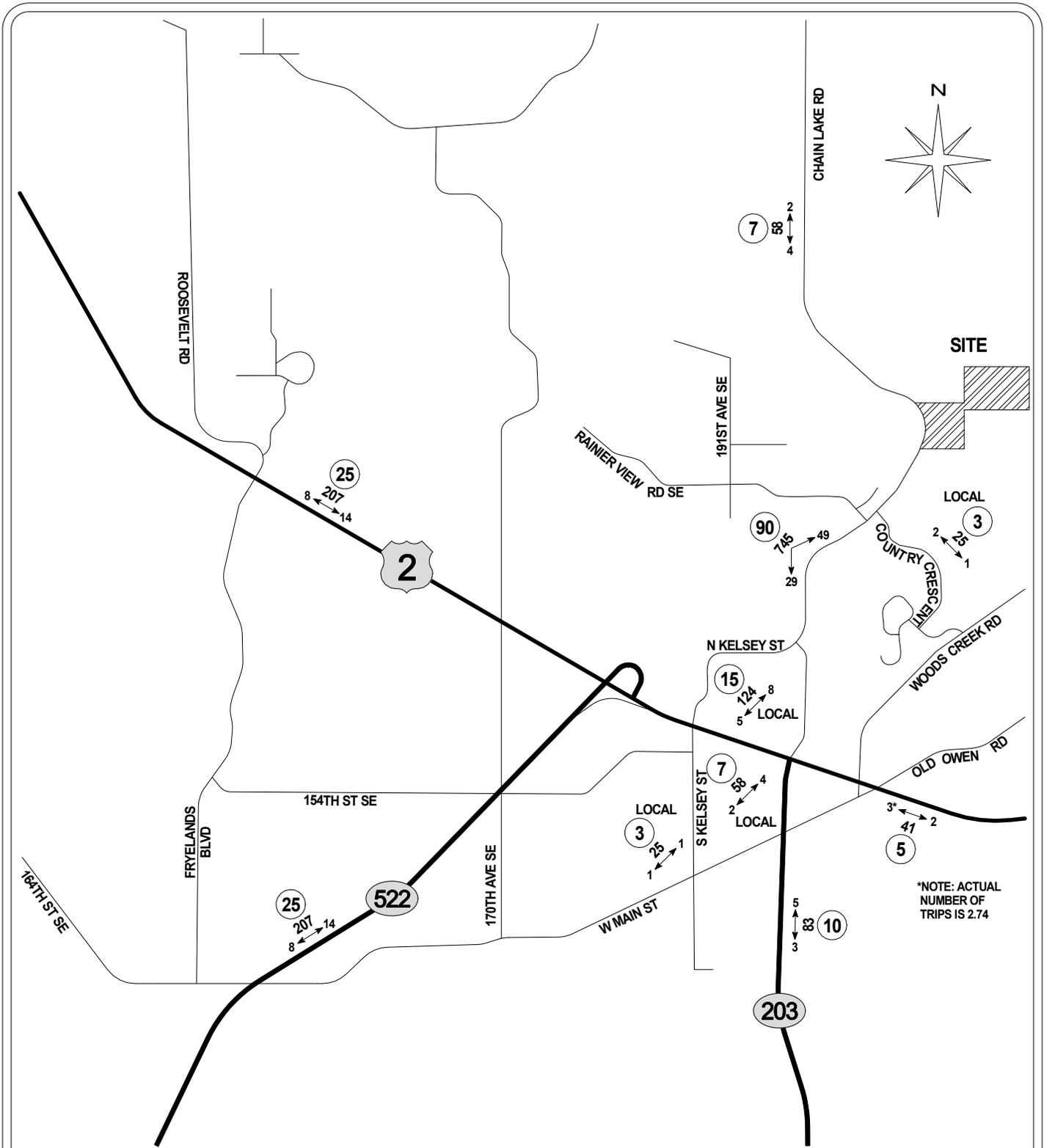
NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)



TRIP DISTRIBUTION %

FIGURE 2
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

CITY OF MONROE



*NOTE: ACTUAL NUMBER OF TRIPS IS 2.74

GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #16-030

KLIER DEVELOPMENT
87 NEW SINGLE FAMILY DWELLINGS

LEGEND

AWDT
PM ↔ PEAK

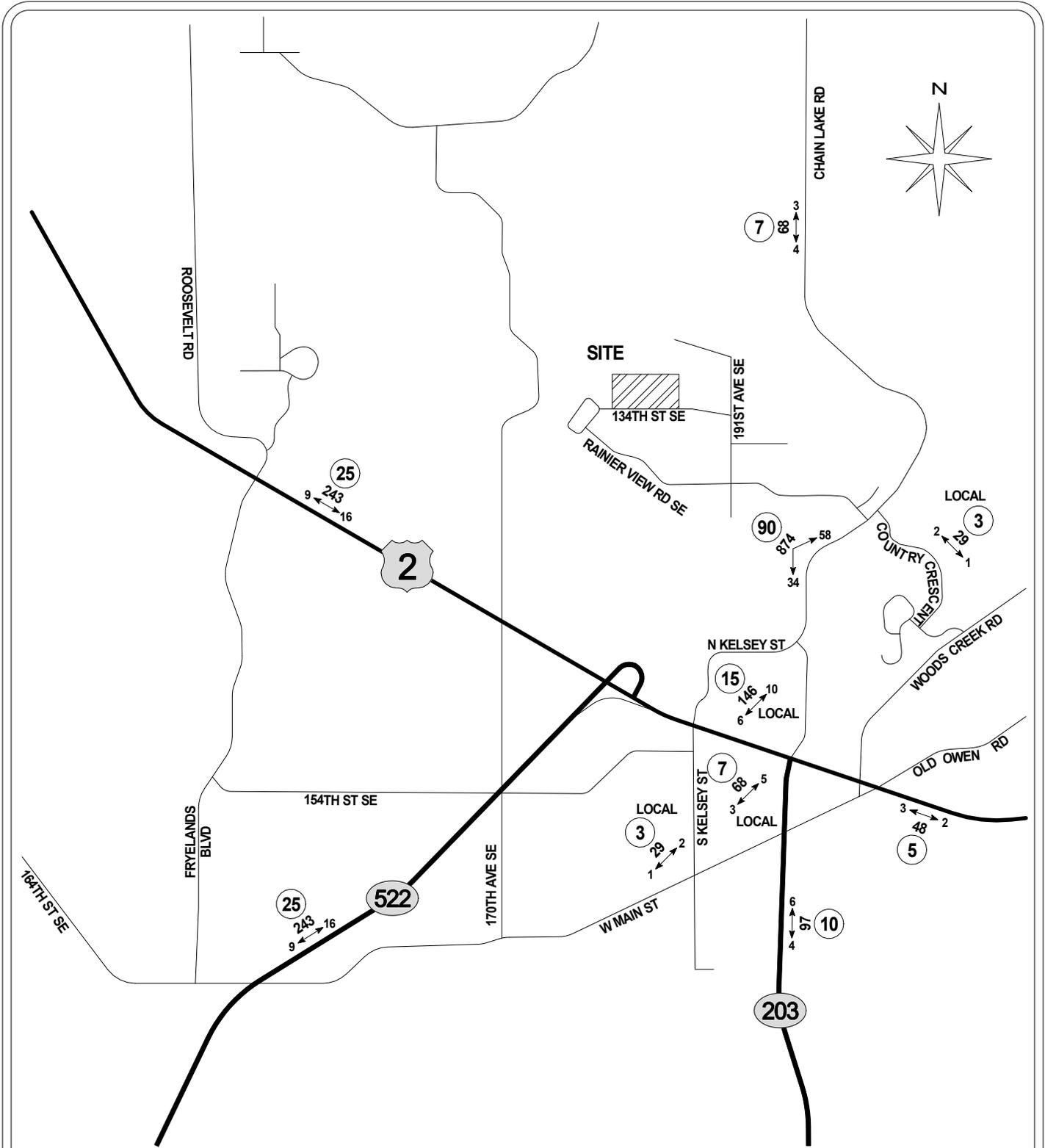
NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

⊙ XX

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

CITY OF MONROE



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #16-171

WORTHINGTON HEIGHTS
106 SINGLE FAMILY
DWELLINGS

LEGEND

AWDT
PM ↔ PEAK

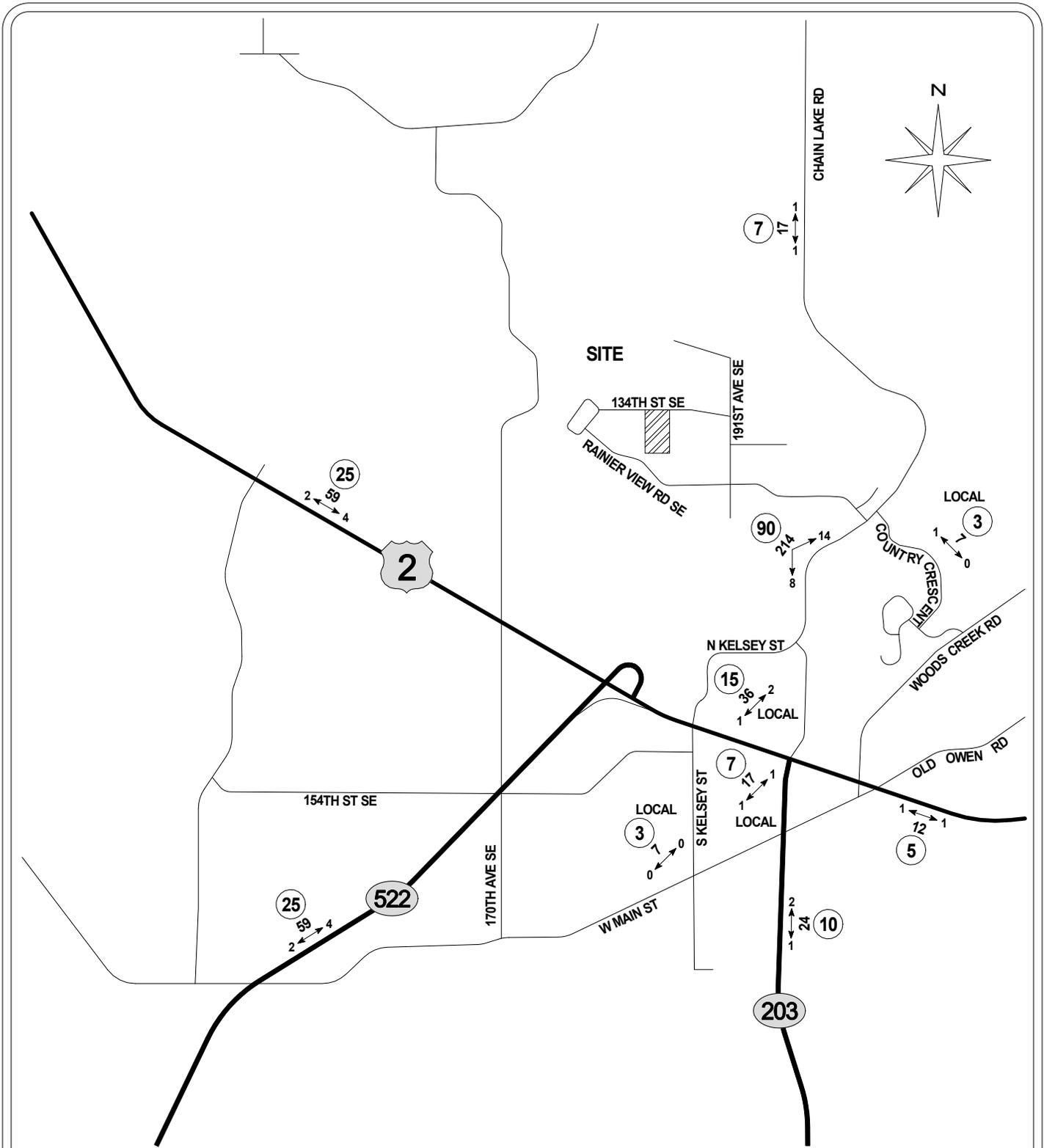
NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)

XX

TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

CITY OF MONROE



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #16-165

RASPBERRY HILL
25 NEW SINGLE FAMILY
DWELLINGS

LEGEND

AWDT
PM ↔ PEAK

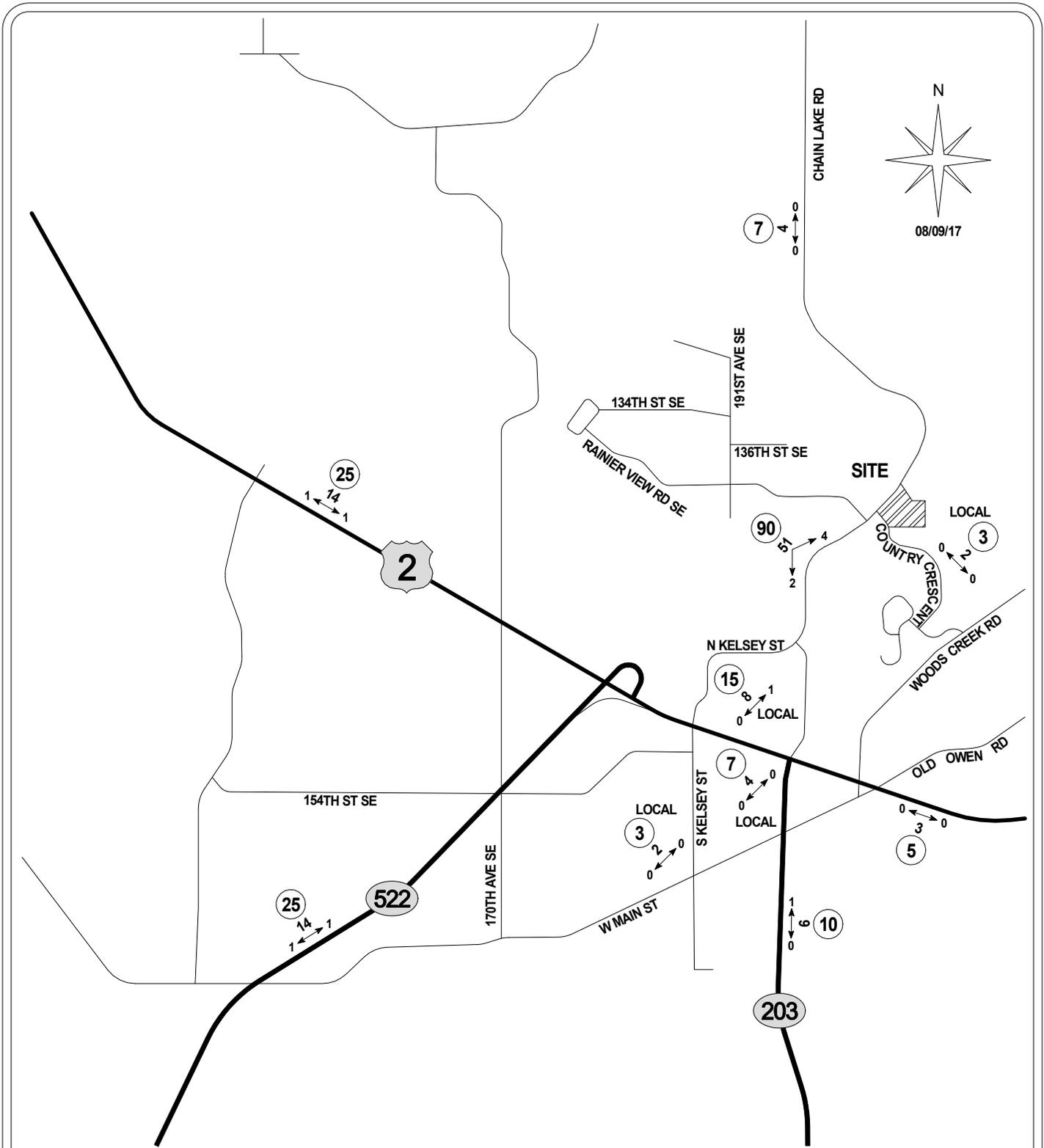
NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)



TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

CITY OF MONROE



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #17-167

CLOTHIER SHORT PLAT
6 NEW SINGLE FAMILY
DWELLINGS

LEGEND

AWDT
PM ↔ PEAK

NEW SITE TRAFFIC
(DAILY/PEAK-HOUR)



TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

CITY OF MONROE

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

%	New ADT	New PM Peak Hour Trips		
		In	Out	Total
100%	94	6	4	10
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

Cooper Point (GTC #21-028)
1: Chain Lake Road & Brown Road

Existing Conditions
PM Peak-Hour

Intersection							
Int Delay, s/veh	1.5						
Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations	Y		P				4
Traffic Vol, veh/h	58	10	244	98	1	11	121
Future Vol, veh/h	58	10	244	98	1	11	121
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	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	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1	1
Mvmt Flow	60	10	254	102	1	11	126

Major/Minor	Minor1	Major1	Major2				
Conflicting Flow All	453	305	0	0	-	356	0
Stage 1	305	-	-	-	-	-	-
Stage 2	148	-	-	-	-	-	-
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	566	737	-	-	-	1208	-
Stage 1	750	-	-	-	-	-	-
Stage 2	882	-	-	-	-	-	-
Platoon blocked, %			-	-			-
Mov Cap-1 Maneuver	566	737	-	-	~-12	~-12	-
Mov Cap-2 Maneuver	566	-	-	-	-	-	-
Stage 1	750	-	-	-	-	-	-
Stage 2	882	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	586	+
HCM Lane V/C Ratio	-	-	0.121	-
HCM Control Delay (s)	-	-	12	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.4	-

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

Cooper Point (GTC #21-028)
 2: Chain Lake Road & Country Crescent Boulevard

Existing Conditions
 PM Peak-Hour

Intersection

Int Delay, s/veh 1.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↖		↖	↗
Traffic Vol, veh/h	70	15	404	98	17	209
Future Vol, veh/h	70	15	404	98	17	209
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	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	71	15	408	99	17	211

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	703	458	0
Stage 1	458	-	-
Stage 2	245	-	-
Critical Hdwy	6.41	6.21	-
Critical Hdwy Stg 1	5.41	-	-
Critical Hdwy Stg 2	5.41	-	-
Follow-up Hdwy	3.509	3.309	-
Pot Cap-1 Maneuver	405	605	-
Stage 1	639	-	-
Stage 2	798	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	399	605	-
Mov Cap-2 Maneuver	399	-	-
Stage 1	639	-	-
Stage 2	785	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.1	0	0.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	399	605	1063	-
HCM Lane V/C Ratio	-	-	0.177	0.025	0.016	-
HCM Control Delay (s)	-	-	16	11.1	8.4	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.6	0.1	0	-

Cooper Point (GTC #21-028)
 3: Chain Lake Road & Rainier View Road SE

Existing Conditions
 PM Peak-Hour

Intersection

Int Delay, s/veh	2.5					
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	4	0	0	4
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	107	137	431	267	8

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	980	275	279	0	0
Stage 1	275	-	-	-	-
Stage 2	705	-	-	-	-
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	277	764	1284	-	-
Stage 1	771	-	-	-	-
Stage 2	490	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	245	761	1279	-	-
Mov Cap-2 Maneuver	245	-	-	-	-
Stage 1	685	-	-	-	-
Stage 2	488	-	-	-	-

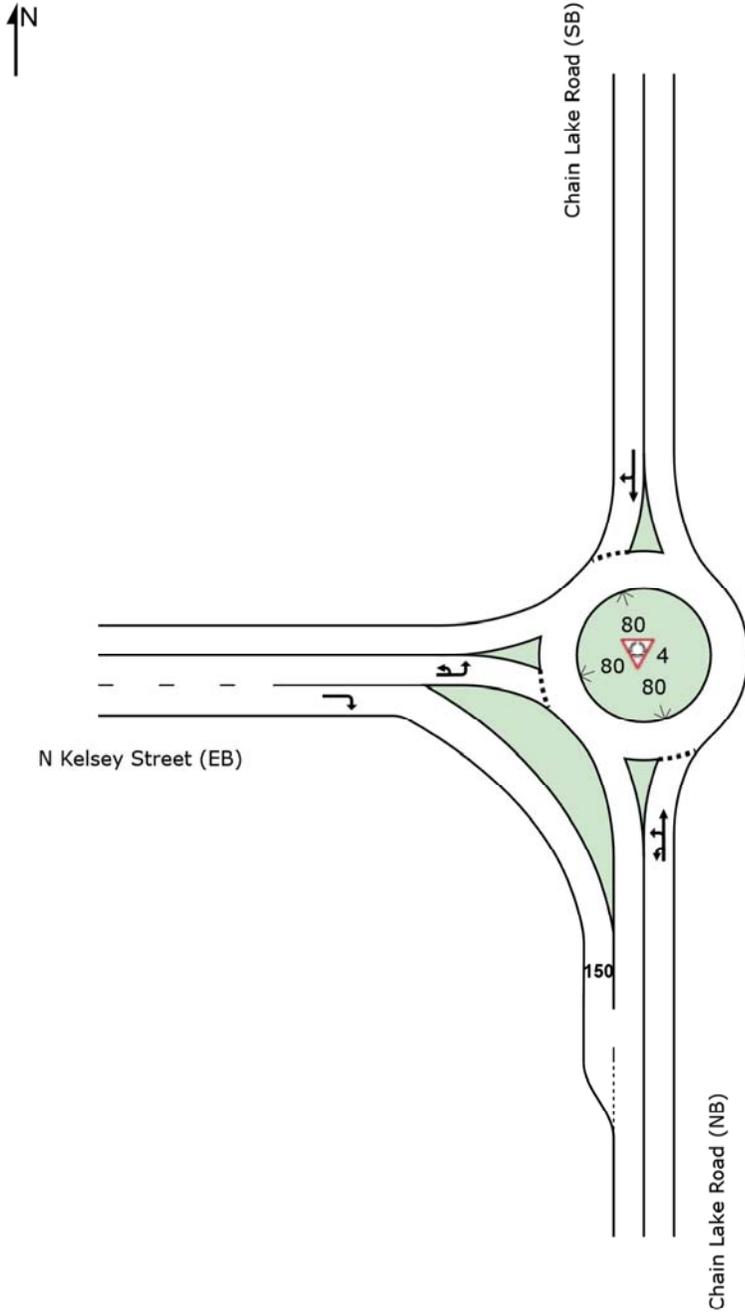
Approach	EB	NB	SB
HCM Control Delay, s	11.3	2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1279	-	681	-	-
HCM Lane V/C Ratio	0.107	-	0.167	-	-
HCM Control Delay (s)	8.2	-	11.3	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.6	-	-

SITE LAYOUT

Site: 4 [Existing Conditions]

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



MOVEMENT SUMMARY

Site: 4 [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.

Cooper Point (GTC #21-028)
 1: Chain Lake Road & Eaglemont 7 Access/Brown Road

2031 Baseline Conditions
 PM Peak-Hour

Intersection

Int Delay, s/veh	2.5												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕	
Traffic Vol, veh/h	1	0	14	75	0	13	24	330	127	1	14	178	2
Future Vol, veh/h	1	0	14	75	0	13	24	330	127	1	14	178	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free						
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	1	0	15	82	0	14	26	359	138	1	15	193	2

Major/Minor	Minor2		Minor1			Major1			Major2				
Conflicting Flow All	711	775	194	712	707	428	195	0	0	-	497	0	0
Stage 1	224	226	-	480	480	-	-	-	-	-	-	-	-
Stage 2	487	549	-	232	227	-	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	-	2.209	-	-
Pot Cap-1 Maneuver	349	330	850	349	361	629	1384	-	-	-	1072	-	-
Stage 1	781	719	-	569	556	-	-	-	-	-	-	-	-
Stage 2	564	518	-	773	718	-	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-	-
Mov Cap-1 Maneuver	334	321	850	336	351	629	1384	-	-	~ -15	~ -15	-	-
Mov Cap-2 Maneuver	334	321	-	336	351	-	-	-	-	-	-	-	-
Stage 1	760	719	-	554	541	-	-	-	-	-	-	-	-
Stage 2	536	504	-	759	718	-	-	-	-	-	-	-	-

Approach	EB		WB			NB			SB			
HCM Control Delay, s	9.8		18.5			0.4						
HCM LOS	A		C									

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1384	-	-	771	361	+	-	-
HCM Lane V/C Ratio	0.019	-	-	0.021	0.265	-	-	-
HCM Control Delay (s)	7.7	0	-	9.8	18.5	-	-	-
HCM Lane LOS	A	A	-	A	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	1	-	-	-

Notes

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

Cooper Point (GTC #21-028)
 2: Chain Lake Road & Country Crescent Boulevard

2031 Baseline Conditions
 PM Peak-Hour

Intersection

Int Delay, s/veh	3.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↘		↖	↗
Traffic Vol, veh/h	97	24	680	129	24	370
Future Vol, veh/h	97	24	680	129	24	370
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	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	98	24	687	130	24	374

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1174	752	0	0	817
Stage 1	752	-	-	-	-
Stage 2	422	-	-	-	-
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	213	412	-	-	815
Stage 1	468	-	-	-	-
Stage 2	664	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	207	412	-	-	815
Mov Cap-2 Maneuver	207	-	-	-	-
Stage 1	468	-	-	-	-
Stage 2	645	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	32.6	0	0.6
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	207	412	815
HCM Lane V/C Ratio	-	-	0.473	0.059	0.03
HCM Control Delay (s)	-	-	37.1	14.3	9.6
HCM Lane LOS	-	-	E	B	A
HCM 95th %tile Q(veh)	-	-	2.3	0.2	0.1

Cooper Point (GTC #21-028)
 3: Chain Lake Road & Rainier View Road SE

2031 Baseline Conditions
 PM Peak-Hour

Intersection

Int Delay, s/veh	9.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	19	236	346	677	415	29
Future Vol, veh/h	19	236	346	677	415	29
Conflicting Peds, #/hr	0	0	4	0	0	4
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	248	364	713	437	31

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	1898	457	472	0	0
Stage 1	457	-	-	-	-
Stage 2	1441	-	-	-	-
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	76	604	1090	-	-
Stage 1	638	-	-	-	-
Stage 2	218	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	50	602	1086	-	-
Mov Cap-2 Maneuver	50	-	-	-	-
Stage 1	422	-	-	-	-
Stage 2	217	-	-	-	-

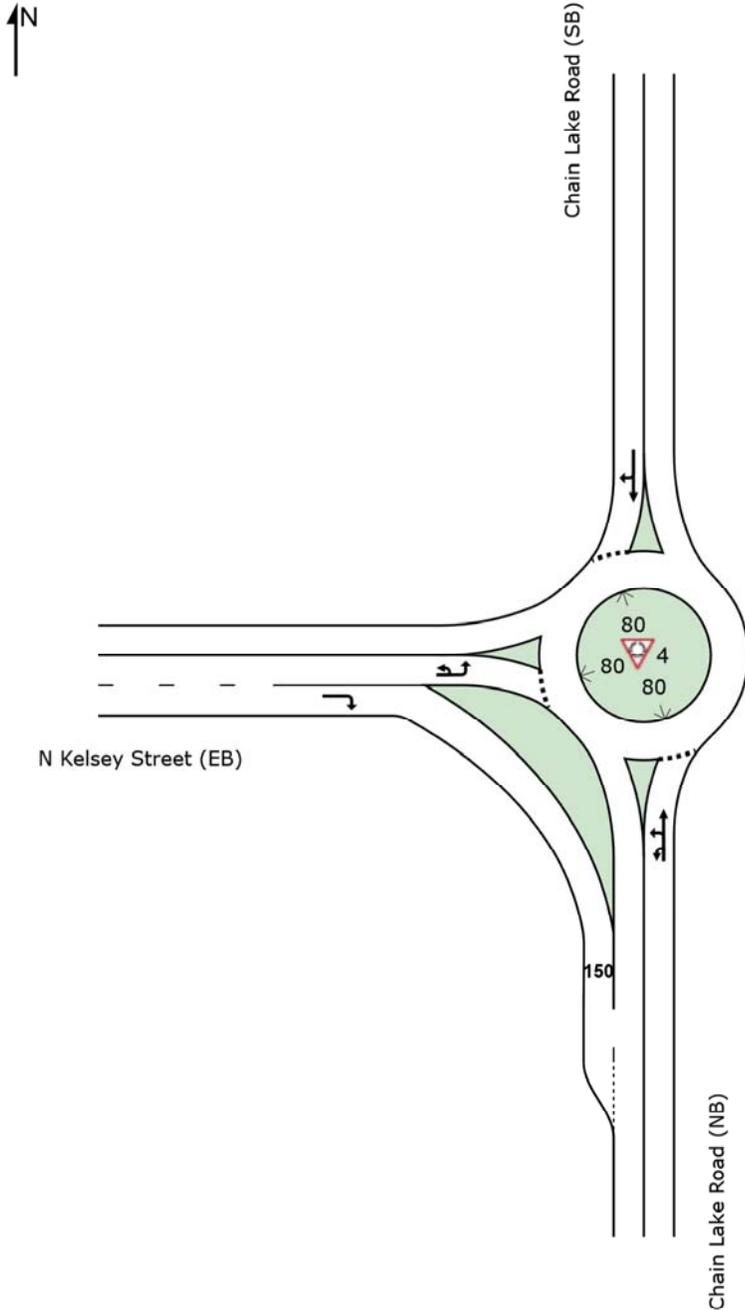
Approach	EB	NB	SB
HCM Control Delay, s	49.8	3.4	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1086	-	330	-	-
HCM Lane V/C Ratio	0.335	-	0.813	-	-
HCM Control Delay (s)	10	-	49.8	-	-
HCM Lane LOS	A	-	E	-	-
HCM 95th %tile Q(veh)	1.5	-	6.9	-	-

SITE LAYOUT

Site: 4 [2031 Baseline Conditions]

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



MOVEMENT SUMMARY

Site: 4 [2031 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	0.927	39.6	LOS D	20.4	521.7	1.00	1.52	2.31	25.6
3	L2	189	3.0	0.927	37.3	LOS D	20.4	521.7	1.00	1.52	2.31	25.2
8	T1	465	3.0	0.927	32.1	LOS D	20.4	521.7	1.00	1.52	2.31	25.3
Approach		658	3.0	0.927	33.7	LOS C	20.4	521.7	1.00	1.52	2.31	25.3
North: Chain Lake Road (SB)												
4	T1	233	3.0	0.697	6.9	LOS A	8.3	213.4	0.80	0.68	0.83	35.3
14	R2	527	3.0	0.697	6.8	LOS A	8.3	213.4	0.80	0.68	0.83	34.4
Approach		760	3.0	0.697	6.9	LOS A	8.3	213.4	0.80	0.68	0.83	34.7
West: N Kelsey Street (EB)												
5u	U	6	3.0	0.514	13.2	LOS B	4.5	115.3	0.63	0.68	0.63	33.8
5	L2	657	3.0	0.514	10.9	LOS B	4.5	115.3	0.63	0.68	0.63	33.2
12	R2	252	3.0	0.155	3.8	LOS A	0.0	0.0	0.00	0.47	0.00	36.8
Approach		915	3.0	0.514	9.0	LOS A	4.5	115.3	0.45	0.62	0.45	34.1
All Vehicles		2333	3.0	0.927	15.3	LOS B	20.4	521.7	0.72	0.90	1.10	31.2

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.

Intersection

Int Delay, s/veh	2.5												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕	
Traffic Vol, veh/h	1	0	14	75	0	13	24	331	127	1	14	179	2
Future Vol, veh/h	1	0	14	75	0	13	24	331	127	1	14	179	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free						
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	1	0	15	82	0	14	26	360	138	1	15	195	2

Major/Minor	Minor2		Minor1			Major1		Major2					
Conflicting Flow All	714	778	196	715	710	429	197	0	0	-	498	0	0
Stage 1	226	228	-	481	481	-	-	-	-	-	-	-	-
Stage 2	488	550	-	234	229	-	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	-	2.209	-	-
Pot Cap-1 Maneuver	348	329	848	347	360	628	1382	-	-	-	1071	-	-
Stage 1	779	717	-	568	555	-	-	-	-	-	-	-	-
Stage 2	563	517	-	771	717	-	-	-	-	-	-	-	-
Platoon blocked, %													
Mov Cap-1 Maneuver	333	320	848	334	350	628	1382	-	-	~ -15	~ -15	-	-
Mov Cap-2 Maneuver	333	320	-	334	350	-	-	-	-	-	-	-	-
Stage 1	758	717	-	553	540	-	-	-	-	-	-	-	-
Stage 2	535	503	-	757	717	-	-	-	-	-	-	-	-

Approach	EB		WB			NB		SB				
HCM Control Delay, s	9.8		18.6			0.4						
HCM LOS	A		C									

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1382	-	-	769	359	+	-	-
HCM Lane V/C Ratio	0.019	-	-	0.021	0.266	-	-	-
HCM Control Delay (s)	7.7	0	-	9.8	18.6	-	-	-
HCM Lane LOS	A	A	-	A	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	1.1	-	-	-

Notes

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

Cooper Point (GTC #21-028)
 2: Chain Lake Road & Country Crescent Boulevard

2031 Future with Development Conditions
 PM Peak-Hour

Intersection						
Int Delay, s/veh	3.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	98	24	681	129	24	371
Future Vol, veh/h	98	24	681	129	24	371
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	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	99	24	688	130	24	375

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1176	753	0	0	818
Stage 1	753	-	-	-	-
Stage 2	423	-	-	-	-
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	212	411	-	-	815
Stage 1	467	-	-	-	-
Stage 2	663	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	206	411	-	-	815
Mov Cap-2 Maneuver	206	-	-	-	-
Stage 1	467	-	-	-	-
Stage 2	644	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	33.1	0	0.6
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	206	411	815	-
HCM Lane V/C Ratio	-	-	0.481	0.059	0.03	-
HCM Control Delay (s)	-	-	37.7	14.3	9.6	-
HCM Lane LOS	-	-	E	B	A	-
HCM 95th %tile Q(veh)	-	-	2.4	0.2	0.1	-

Cooper Point (GTC #21-028)
 3: Chain Lake Road & Rainier View Road SE

2031 Future with Development Conditions
 PM Peak-Hour

Intersection

Int Delay, s/veh	11.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	247	364	677	415	31
Future Vol, veh/h	20	247	364	677	415	31
Conflicting Peds, #/hr	0	0	4	0	0	4
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	260	383	713	437	33

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	1937	458	474	0	0
Stage 1	458	-	-	-	-
Stage 2	1479	-	-	-	-
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	72	603	1088	-	-
Stage 1	637	-	-	-	-
Stage 2	209	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	46	601	1084	-	-
Mov Cap-2 Maneuver	46	-	-	-	-
Stage 1	410	-	-	-	-
Stage 2	208	-	-	-	-

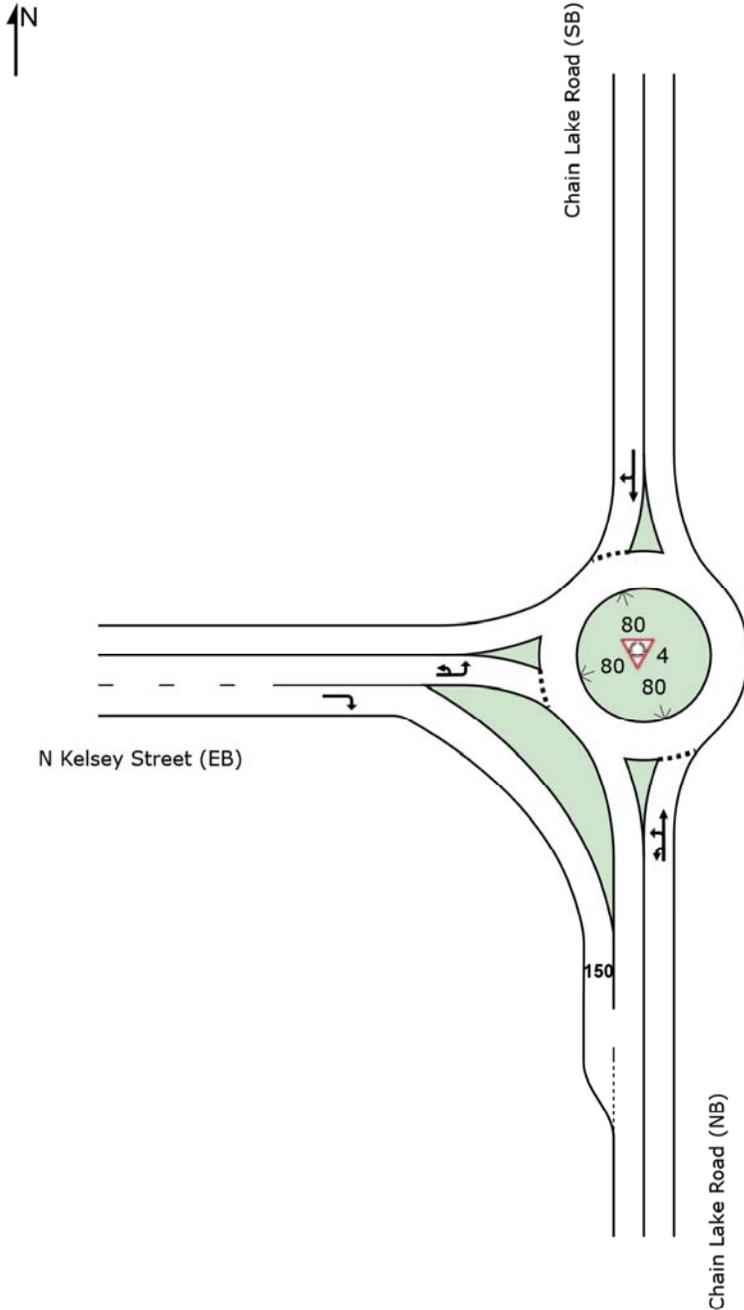
Approach	EB	NB	SB
HCM Control Delay, s	63.5	3.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1084	-	316	-	-
HCM Lane V/C Ratio	0.353	-	0.889	-	-
HCM Control Delay (s)	10.1	-	63.5	-	-
HCM Lane LOS	B	-	F	-	-
HCM 95th %tile Q(veh)	1.6	-	8.3	-	-

SITE LAYOUT

Site: 4 [2031 Future Conditions w Development]

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



MOVEMENT SUMMARY

Site: 4 [2031 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	0.952	44.5	LOS E	22.9	587.4	1.00	1.61	2.54	24.3
3	L2	189	3.0	0.952	42.2	LOS E	22.9	587.4	1.00	1.61	2.54	23.9
8	T1	471	3.0	0.952	37.0	LOS E	22.9	587.4	1.00	1.61	2.54	24.0
Approach		665	3.0	0.952	38.5	LOS D	22.9	587.4	1.00	1.61	2.54	24.0
North: Chain Lake Road (SB)												
4	T1	237	3.0	0.708	7.1	LOS A	8.7	223.5	0.81	0.69	0.85	35.3
14	R2	535	3.0	0.708	7.0	LOS A	8.7	223.5	0.81	0.69	0.85	34.4
Approach		772	3.0	0.708	7.0	LOS A	8.7	223.5	0.81	0.69	0.85	34.6
West: N Kelsey Street (EB)												
5u	U	6	3.0	0.526	13.2	LOS B	4.7	119.6	0.64	0.68	0.64	33.8
5	L2	670	3.0	0.526	11.0	LOS B	4.7	119.6	0.64	0.68	0.64	33.1
12	R2	252	3.0	0.155	3.8	LOS A	0.0	0.0	0.00	0.47	0.00	36.8
Approach		928	3.0	0.526	9.1	LOS A	4.7	119.6	0.46	0.63	0.46	34.0
All Vehicles		2365	3.0	0.952	16.7	LOS B	22.9	587.4	0.73	0.92	1.17	30.6

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.

Existing Conditions

	Total Volume	Delay (Sec)	Vol* Delay
Rainer	909	11	9999
Country Crescent	813	16	13008
Brown	543	12	6516
Totals	2265		29523
Level of Service		13 B	

2031 Baseline Conditions

	Total Volume	Delay (Sec)	Vol* Delay
Rainer	1722	50	86100
Country Crescent	1324	37	48988
Brown	779	19	14801
Totals	3825		149889
Level of Service		39 D	

2031 Future with Development Conditions

	Total Volume	Delay (Sec)	Vol* Delay
Rainer	1754	64	112256
Country Crescent	1327	38	50426
Brown	781	19	14839
Totals	3862		177521
Level of Service		46 D	