

Kimley»»Horn

2828 Colby Avenue
Suite 200
Everett, WA 98201
425.708.8725

Amber Grove Development Traffic Impact Analysis

Jurisdiction: City of Arlington

October 2022



090222254

TABLE OF CONTENTS

1. DEVELOPMENT IDENTIFICATION 1

2. METHODOLOGY 1

3. TRIP GENERATION..... 4

4. TRIP DISTRIBUTION 4

5. INTERSECTION ANALYSIS..... 4

 5.1 Turning Movement Calculations..... 5

 5.2 Level of Service Analysis 5

6. TRAFFIC MITIGATION FEES 11

 6.1 City of Arlington 11

 6.2 Snohomish County 11

 6.3 Washington State Department of Transportation..... 12

7. CONCLUSIONS 12

LIST OF FIGURES

Figure 1: Site Vicinity Map 2

Figure 2: Development Trip Distribution – AM Peak-Hour 6

Figure 3: Development Trip Distribution – PM Peak-Hour 7

Figure 4: 2022 Existing Turning Movements..... 8

Figure 5: 2028 Baseline Turning Movements 9

Figure 6: 2028 Future with Development Turning Movements 10

LIST OF TABLES

Table 1: Level of Service Criteria for Intersections..... 3

Table 2: Trip Generation Calculations..... 4

Table 3: Level of Service Summary – PM Peak-Hour 5

ATTACHMENTS

Trip Generation Calculations A

Counts and Turning Movement Calculations B

Level of Service Calculations C

1. DEVELOPMENT IDENTIFICATION

Kimley-Horn and Associates, Inc. has been retained to provide a traffic impact analysis for the proposed Amber Grove Development to address the City of Arlington, Snohomish County, and Washington State Department of Transportation (WSDOT) traffic impacts. The Amber Grove Development is proposed to consist of 84 residential units. The site is located along the west side of SR-9, south of 204th Street NE and east of 74th Avenue NE. A site vicinity map has been included in Figure 1. The site has access to 74th Avenue NE.

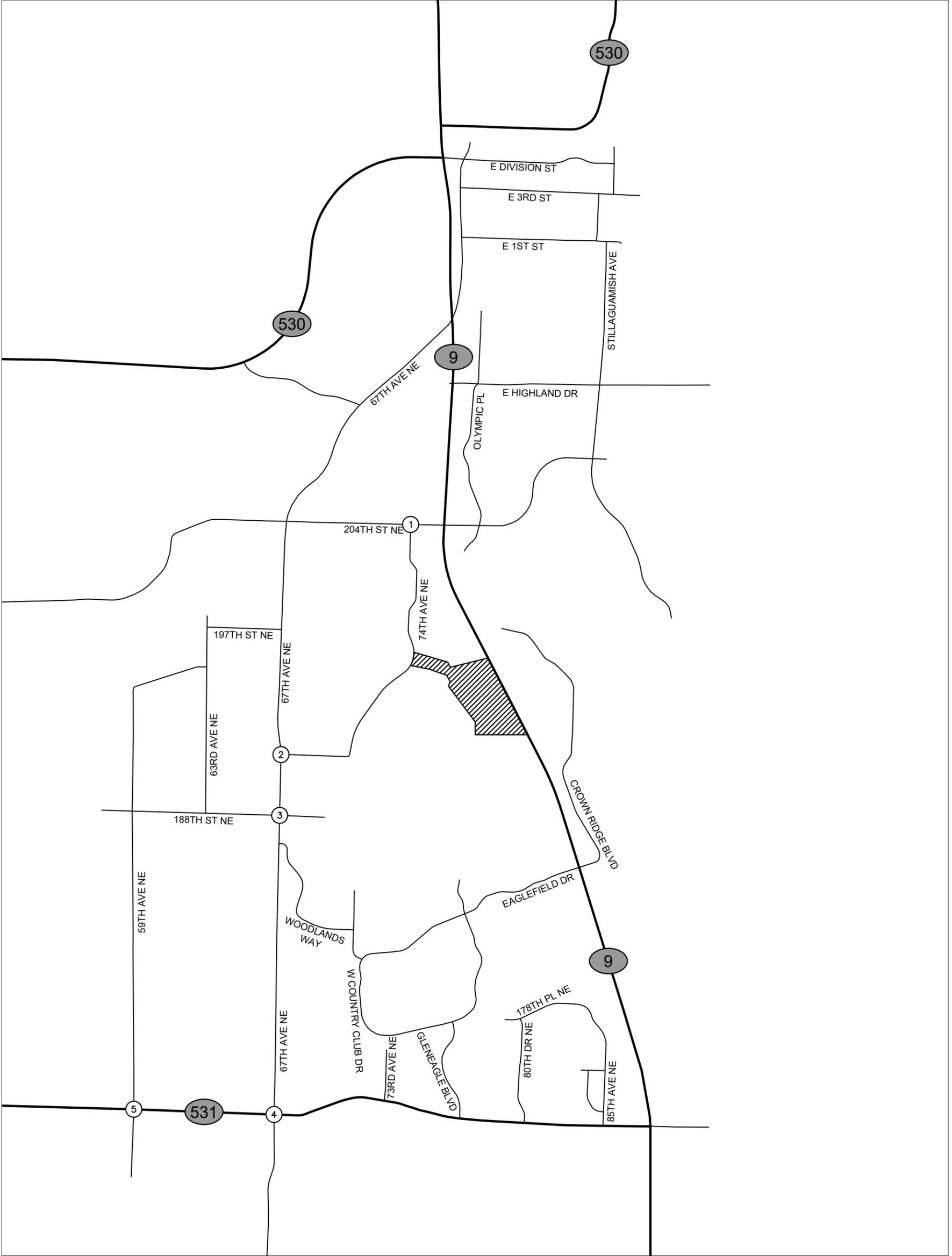
Brad Lincoln, responsible for this report, is a licensed professional engineer (Civil) in the State of Washington and member of the Washington State section of the Institute of Transportation Engineers (ITE).

2. METHODOLOGY

Trip generation calculations for the Amber Grove Development have been performed according to data contained in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 11th Edition (2021)*. The following intersections have been analyzed as part of this report:

1. 74th Avenue NE at 204th Street NE- Two -Way Stop-Control
2. 67th Ave NE at 191st PI NE – Two -Way Stop-Control
3. 67th Avenue NE at 188th Avenue NE - Two-Way Stop-Control (Future Signal)
4. 67th Avenue NE at 172nd Street NE (SR-531) – Signal
5. 59th Avenue NE at 172nd Street NE (SR-531) – Signal

The intersections have been analyzed for the 2022 existing, 2028 baseline, and 2028 future with development conditions for the PM peak-hour. The 2028 future year has been utilized to represent a 6-year horizon period, which is past when the development is anticipated to be constructed. The future year 2028 has been chosen to represent a conservatively high calculation of future operations of the study intersections.



AMBER GROVE

CITY OF ARLINGTON

LEGEND



DEVELOPMENT SITE



STUDY INTERSECTION

FIGURE 1
VICINITY MAP

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The peak-hour level of service (LOS) analysis calculations have been completed using the *Synchro 11.1, Build 0* software. This software applies the operational analysis methodology of the current *Highway Capacity Manual 6th Edition (HCM)*. Traffic congestion is generally measured in terms of level of service. In accordance with the HCM, 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 average delay. The level of service at signalized and all-way stop-controlled intersections is based on the average delay for all approaches. Geometric characteristics and conflicting traffic movements are taken into consideration when determining level of service values. A summary of the level of service criteria has been included in Table 1.

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 Arlington has established an acceptable level of service of LOS D.

The City of Arlington and Snohomish County have an interlocal agreement that provides for reciprocal mitigation fees. Snohomish County mitigation fees can be calculated based on the default percentage in the interlocal agreement or based on actual impacts. The City of Arlington also has an understanding with WSDOT that provides for mitigation fees to WSDOT for impacts to WSDOT improvement projects. WSDOT improvement projects and their associated fees are based on the most recent Exhibit C list.

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 Amber Grove development are based on data published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual, 11th Edition (2021)*. The average trip generation rates for ITE Land Use Code 215, Single-Family Attached Housing, have been used for the trip generation calculations. The trip generation of the Amber Grove development is summarized in Table 2.

Table 2: Trip Generation Calculations

84 New Single-Family Attached Units	Average Daily Trips			AM Peak-Hour Trips			PM Peak-Hour Trips		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Generation Rate	7.20 trips per unit			0.48 trips per unit			0.57 trips per unit		
Splits	50%	50%	100%	31%	69%	100%	57%	43%	100%
Trips	302.40	302.40	604.80	12.50	27.82	40.32	27.29	20.59	47.88

The Amber Grove development is anticipated to generate 605 new average daily trips with 40 new AM peak-hour trips and 48 new PM peak-hour trips.

4. TRIP DISTRIBUTION

The trip distribution for the Amber Grove development is based on surrounding land uses and approved distributions for similar developments in the site vicinity. It is anticipated that 30% of the trips generated by the development will travel to and from the north along 204th Street NE, 67th Avenue NE, and SR-9. Approximately 30% of the trips generated by the development will travel to and from the west along SR-531. It is estimated that 25% of the trips generated by the development will travel to and from the south, ten percent along 67th Avenue NE and fifteen percent along SR-9. The remaining 15% of the trips generated by the development will travel to and from local areas south of the site. Detailed trip distributions for the AM and PM peak-hours are shown in Figure 2 and Figure 3, respectively.

5. INTERSECTION ANALYSIS

The following intersections have been analyzed as part of this report:

1. 74th Avenue NE at 204th Street NE- Two-Way Stop-Control
2. 67th Ave NE at 191st Pl NE – Two-Way Stop-Control
3. 67th Avenue NE at 188th Avenue NE - Two-Way Stop-Control (Future Signal)
4. 67th Avenue NE at 172nd Street NE (SR-531) – Signal
5. 59th Avenue NE at 172nd Street NE (SR-531) – Signal

The development is anticipated to be completed before the year 2028. However, the future analysis has been performed for the year 2028 to account for a conservative 6-year horizon period. The intersections have been analyzed for the 2022 existing conditions, 2028 baseline, and 2028 future with development conditions.

5.1 Turning Movement Calculations

The 2022 existing peak-hour turning movement counts for the study intersections were collected by the independent count firm Traffic Data Gathering in September 2022. The 2022 existing turning movements at the study intersections for the PM peak-hour are shown in Figure 4. The 2028 baseline turning movements at the study intersections have been calculated using a 2.0% annually compounding growth rate. The 2028 baseline turning movements for the PM peak-hour are shown in Figure 5. The 2028 future with development conditions were analyzed by adding the trips generated by the Amber Grove Development to the 2028 baseline turning movements. The 2028 future with development turning movements for the PM peak-hour are shown in Figure 6. The existing counts and turning movement calculations are included in the attachments.

5.2 Level of Service Analysis

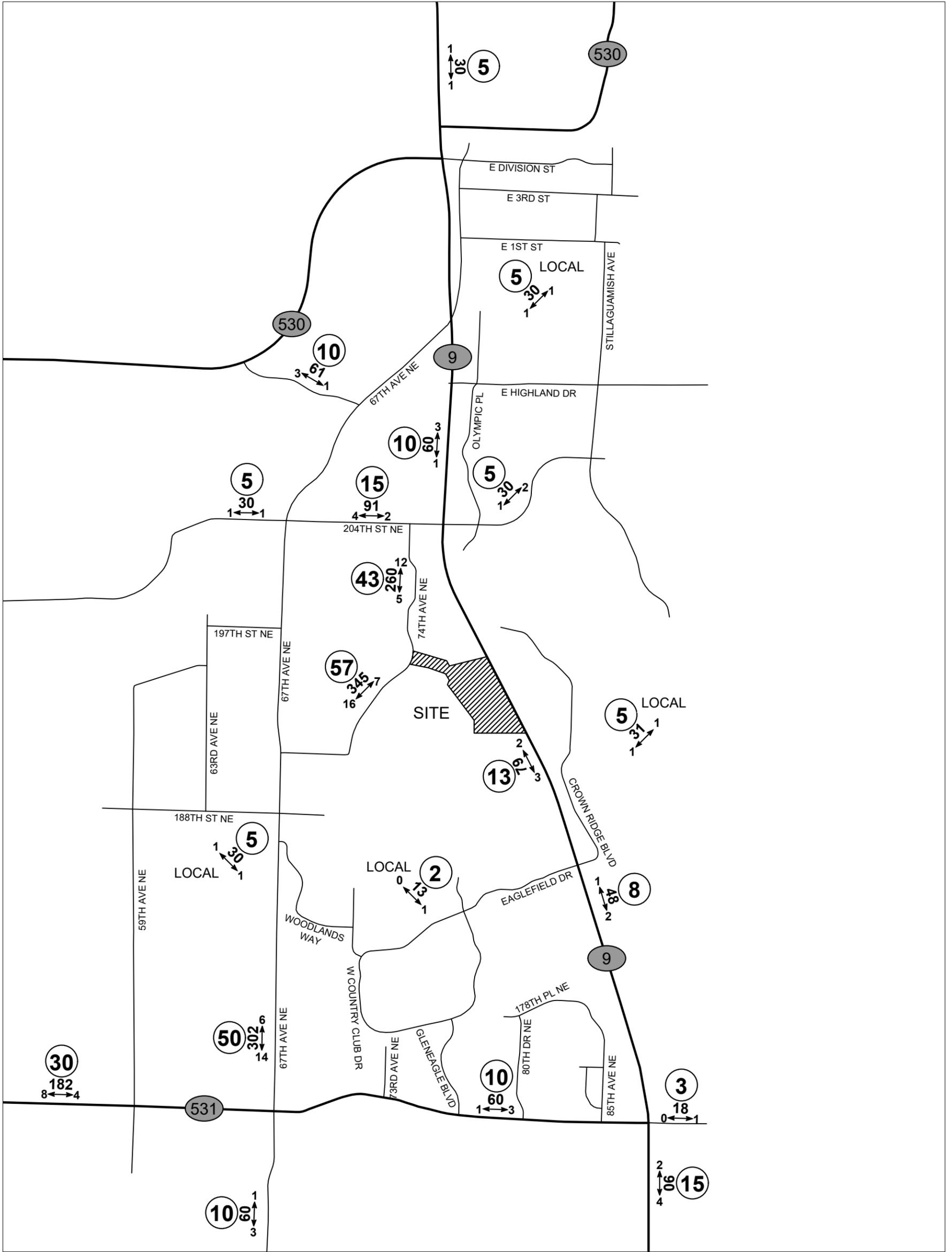
The study intersections have been analyzed using the existing intersection control, channelization, peak-hour factors, and heavy vehicle factors. The level of service results at the study intersections are summarized in Table 3.

Table 3: Level of Service Summary – PM Peak-Hour

Intersection	Control	2022 Existing Conditions		2028 Baseline Conditions		2028 Future with Development Conditions	
		LOS	Delay	LOS	Delay	LOS	Delay
1. 74 th Avenue NE at 204 th Street NE	Two-Way Stop-Control	B	14.6	C	16.3	C	16.8
2. 67 th Avenue NE at 191 st Place NE	Two-Way Stop-Control	C	20.8	D	26.5	D	30.8
3. 67 th Avenue NE at 188 th Avenue NE	Two-Way Stop-Control	E	48.8	F	107.8	F	122.7
	Future Signal	-	-	A	9.7	A	9.8
4. 67 th Avenue NE at 172 nd Street NE (SR-531)	Signal	E	55.5	E	75.5	E	77.9
5. 59 th Avenue NE at 172 nd Street NE (SR-531)	Signal	E	65.0	F	91.5	F	93.8

There are three intersections that are anticipated to operate at deficient levels of service under the 2028 baseline and 2028 future with development conditions. These intersections are:

- 3. 67th Avenue NE at 188th Avenue NE
- 4. 67th Avenue NE at 172nd Street NE (SR-531)
- 5. 59th Avenue NE at 172nd Street NE (SR-531)



AMBER GROVE

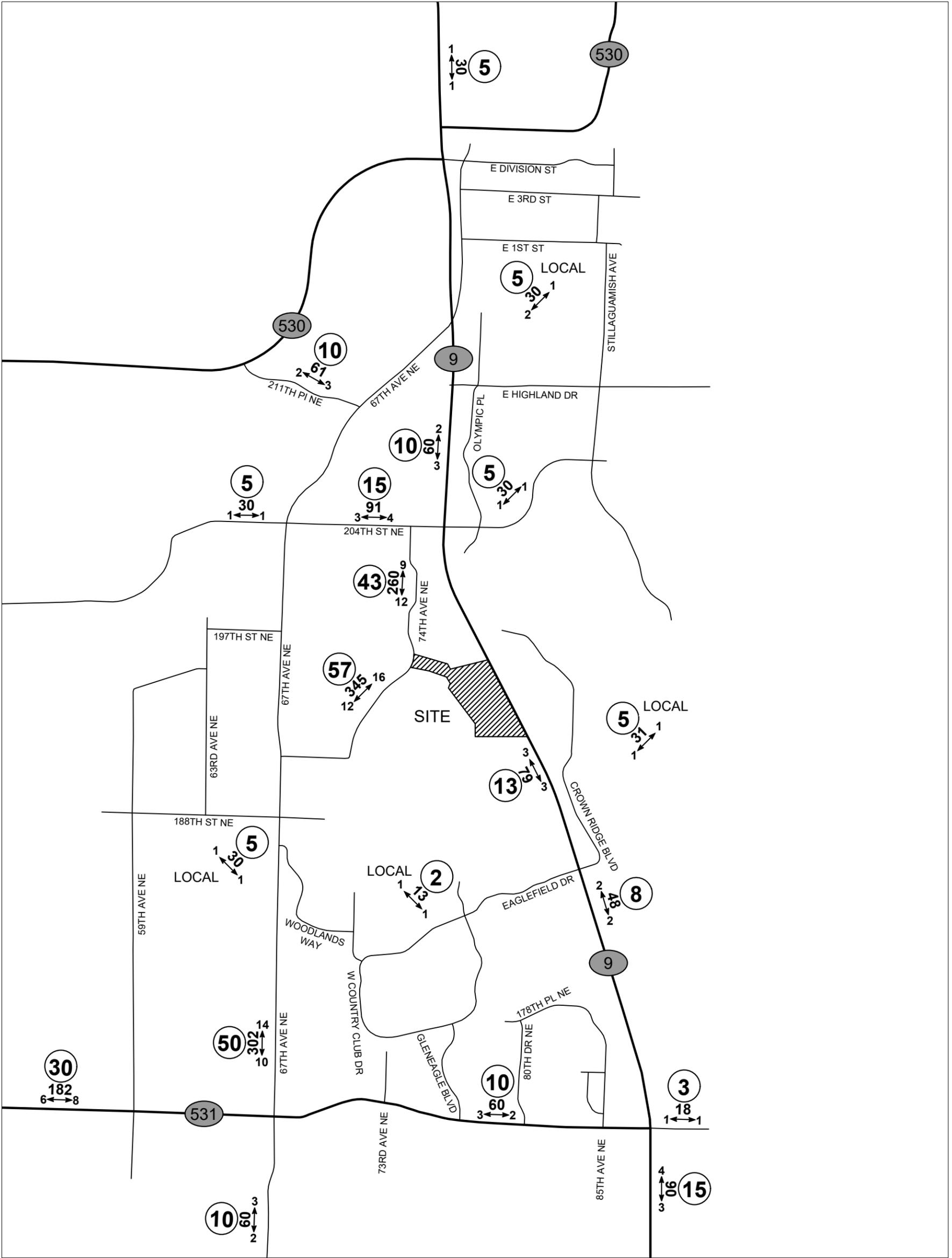
CITY OF ARLINGTON

LEGEND

- AWDT** NEW DAILY TRAFFIC
- AM ← PEAK** NEW PEAK-HOUR TRIPS
- (XX)** TRIP DISTRIBUTION

FIGURE 2
DEVELOPMENT
TRIP DISTRIBUTION
AM PEAK-HOUR

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AMBER GROVE

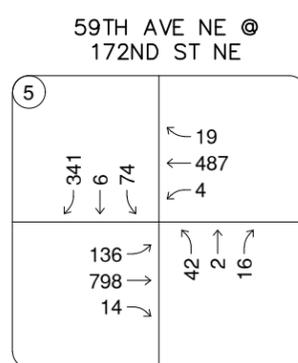
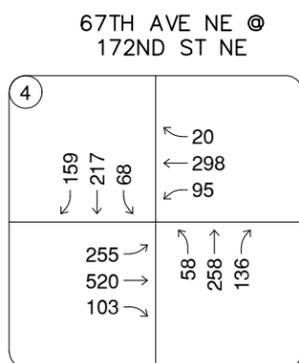
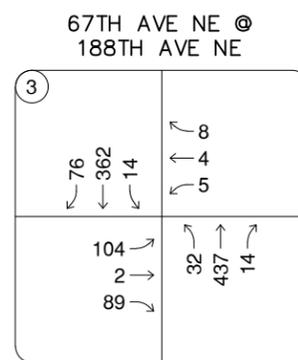
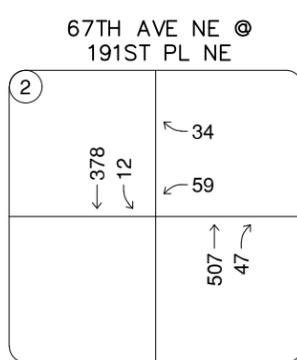
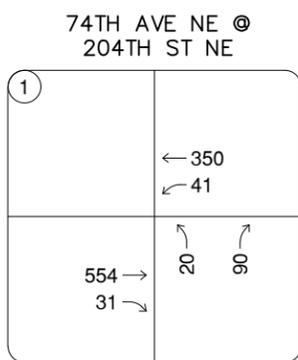
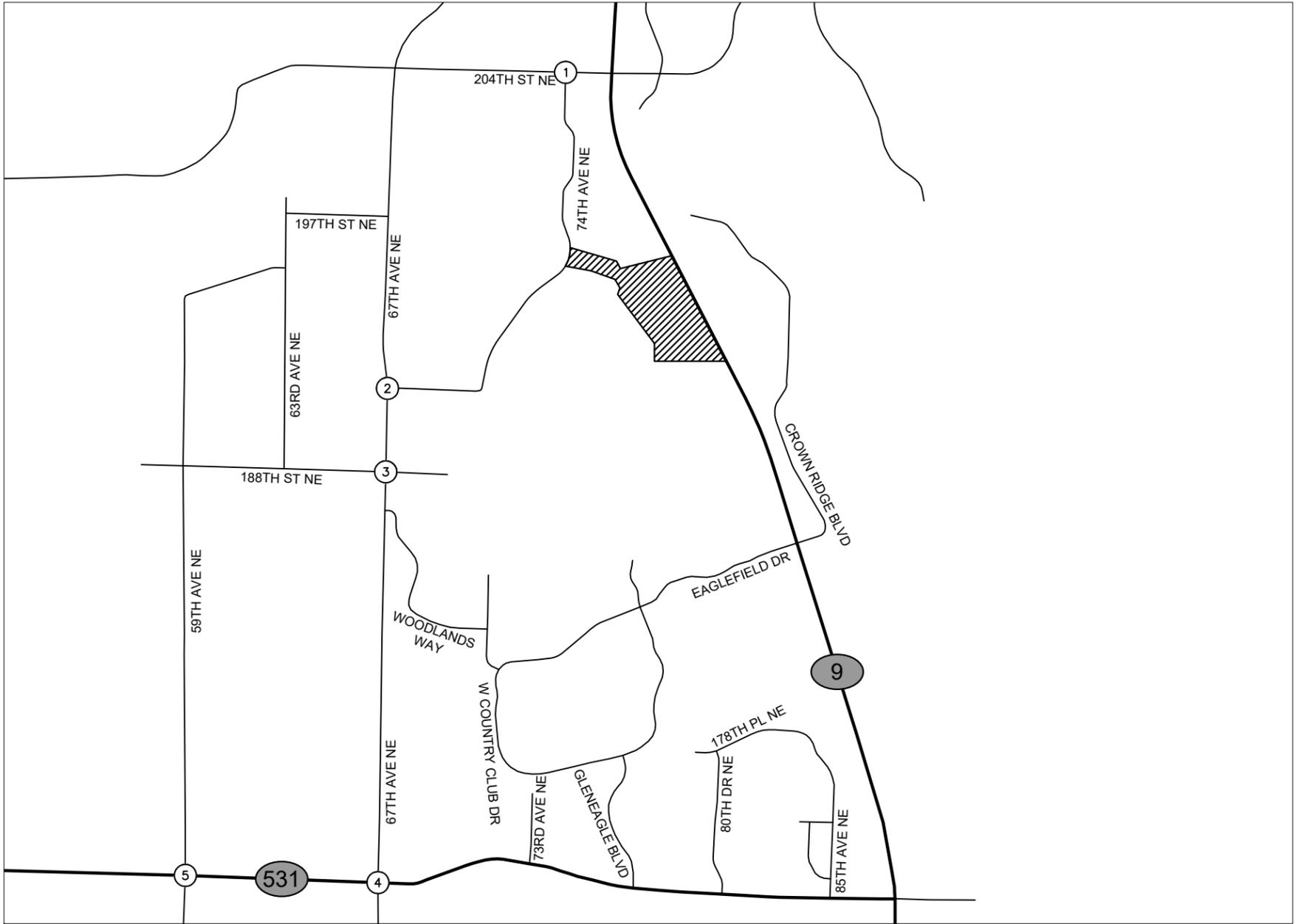
CITY OF ARLINGTON

LEGEND

- AWDT** NEW DAILY TRAFFIC
- PM ← PEAK** NEW PEAK-HOUR TRIPS
- XX** TRIP DISTRIBUTION %

FIGURE 3
DEVELOPMENT
TRIP DISTRIBUTION
PM PEAK-HOUR

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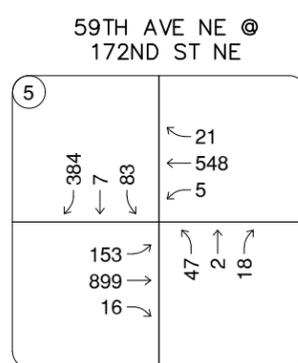
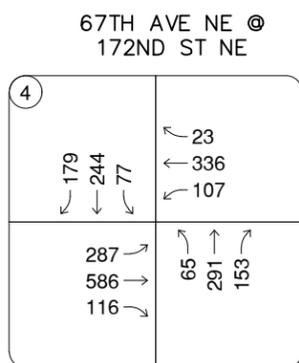
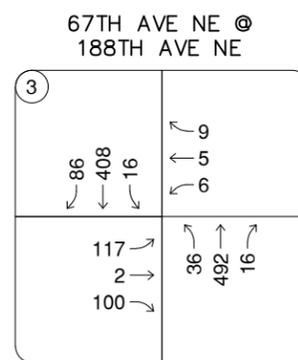
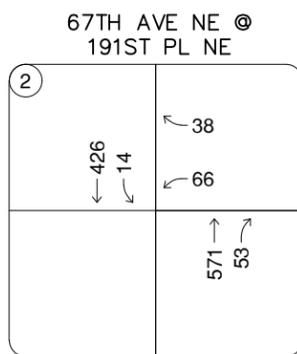
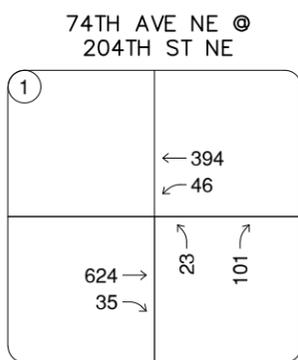
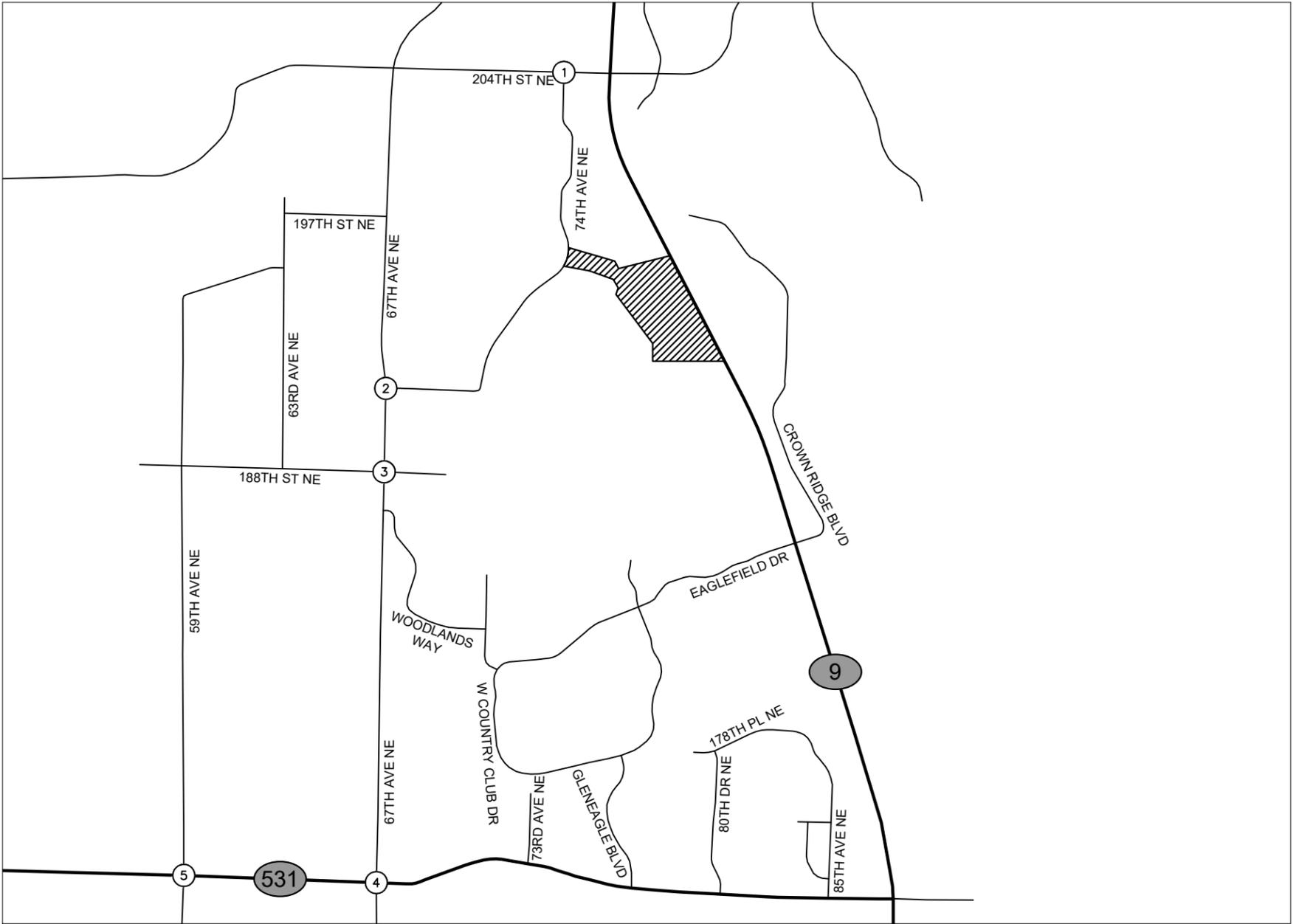
AMBER GROVE

LEGEND

XXX → PM PEAK-HOUR TURNING MOVEMENT VOLUMES

FIGURE 4
2022 EXISTING
TURNING MOVEMENTS

CITY OF ARLINGTON



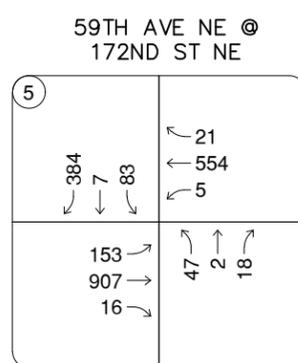
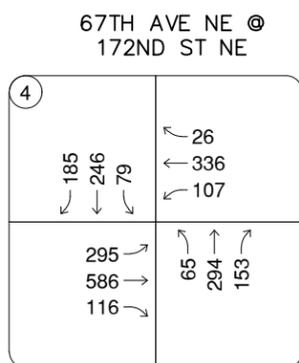
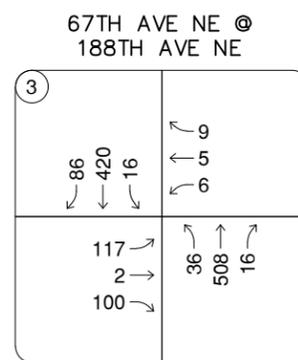
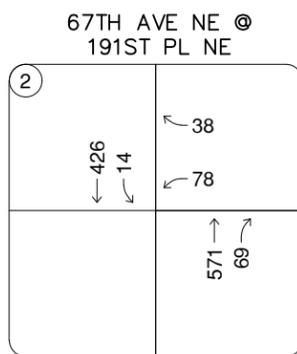
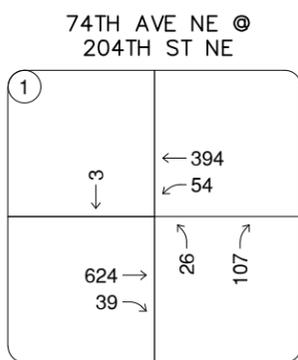
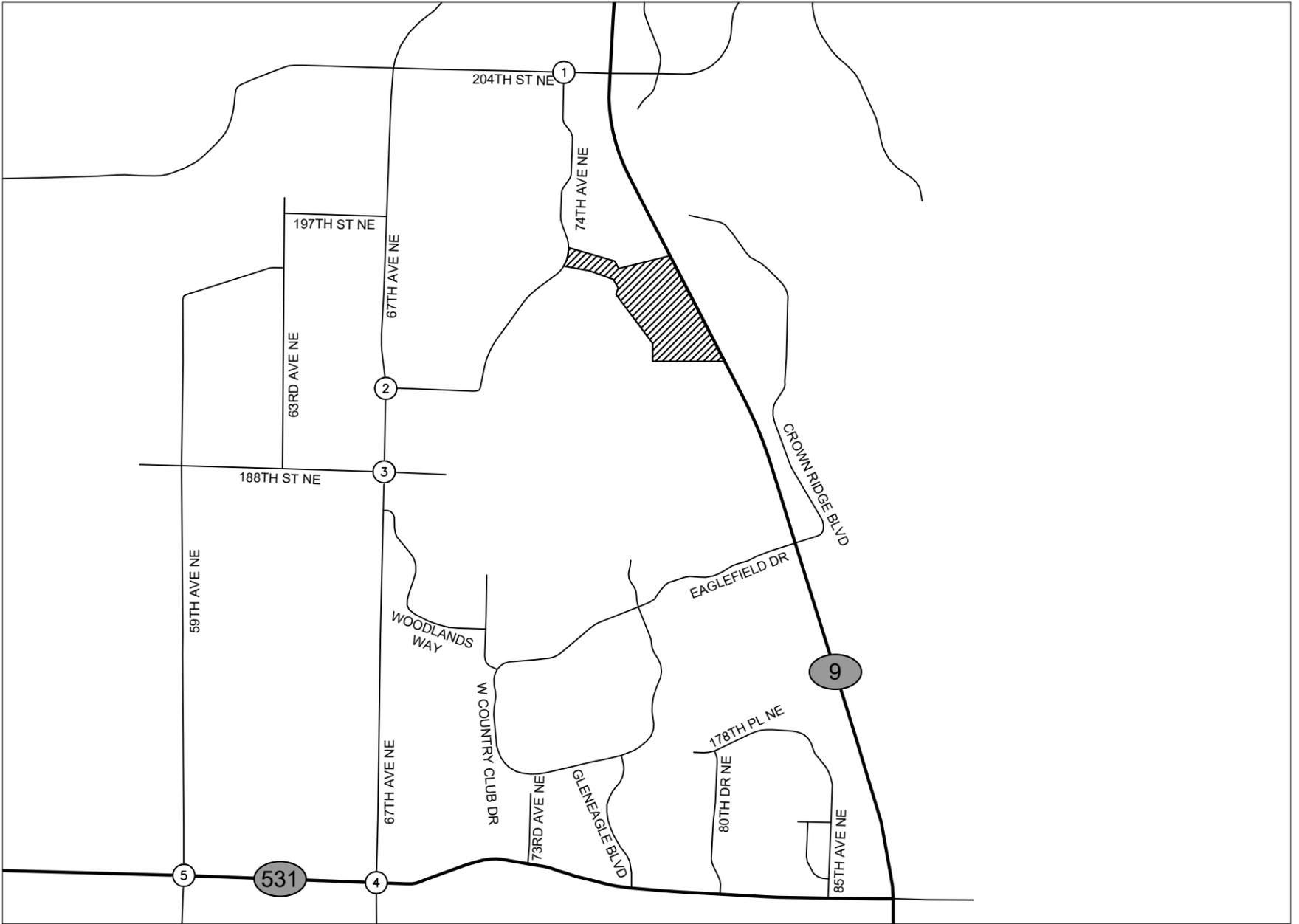
AMBER GROVE

LEGEND

XXX → PM PEAK-HOUR TURNING MOVEMENT VOLUMES

FIGURE 5
2028 BASELINE
TURNING MOVEMENTS

CITY OF ARLINGTON



AMBER GROVE

LEGEND

XXX → PM PEAK-HOUR TURNING MOVEMENT VOLUMES

FIGURE 6
2028 FUTURE WITH DEVELOPMENT
TURNING MOVEMENTS

CITY OF ARLINGTON

The City of Arlington has identified that the intersection of 67th Avenue NE at 188th Street NE will be improved, likely to a signalized intersection. The analysis shows that the intersection is anticipated to operate at LOS A with a signal. The traffic mitigation fee to the City of Arlington, discussed in more detail later in this report, should help fund this improvement and therefore mitigate the impacts of the development on this intersection. The two intersections along 172nd Street NE (SR-531) are proposed to be improved to roundabouts by WSDOT and are fully funded under the Connecting Washington legislation. These intersections are anticipated to operate at acceptable levels of service with these WSDOT improvements. The level of service calculations are included in the attachments.

6. TRAFFIC MITIGATION FEES

The City of Arlington collects traffic mitigation fees based on the number of PM peak-hour trips generated by a development. The City of Arlington also has interlocal agreements with Snohomish County and WSDOT for traffic mitigation fees.

6.1 City of Arlington

The City of Arlington currently has a standard traffic mitigation fee of \$3,355 per PM peak-hour trip. The Amber Grove Development is anticipated to generate 47.88 new PM peak-hour trips. These trips result in a City of Arlington traffic mitigation fee of \$160,637.40. The City of Arlington fee is equivalent to \$1,912.35 for each of the 84 residential units.

It is important to note that City of Arlington traffic mitigation fees do not vest to the time of application. It is possible that the City of Arlington mitigation fees will increase between the time of this report and when the traffic mitigation fees are required to be paid.

6.2 Snohomish County

The City of Arlington has an interlocal agreement with Snohomish County that provides for mitigation payments for impacts to Snohomish County arterials. The interlocal agreement allows Snohomish County fees for City of Arlington developments to be based on the actual percentage of trips impacting Snohomish County roadways. The trip distribution shows 40% of the trips generated by the development traveling outside the City of Arlington. This is based on the following trips:

- 5% along SR-9, north of the City of Arlington
- 10% along SR-530, west of the City of Arlington
- 10% along 67th Avenue NE, south of the City of Arlington
- 25% along SR-9, south of the City of Arlington

The Snohomish County fee is \$185 per daily trip for residential uses. The Amber Grove Development is anticipated to generate 604.80 daily trips, resulting in Snohomish County fees of \$47,419.20. The Snohomish County fee is equivalent to \$564.51 for each of the 84 residential units.

6.3 Washington State Department of Transportation

WSDOT improvement projects and their associated fees are based on the most recent Exhibit C list, which is part of the interlocal agreement between Snohomish County and. The only impacted WSDOT intersections that are impacted with 10 or more PM peak-hour trips are along the 172nd Street NE (SR-531) corridor. The improvements to intersections along this corridor are funded as part of the Connecting Washington legislation and therefore WSDOT traffic mitigation fees should not be a condition of the Amber Grove development.

7. CONCLUSIONS

The Amber Grove Development is proposed to include 84 residential units and is anticipated to generate 605 new average daily trips with 40 new AM peak-hour trips and 48 new PM peak-hour trips. The analysis shows the study intersections will operate at acceptable levels of service with planned improvements. Intersection improvements at off-site intersections should therefore not be a condition of the development. The traffic mitigation fees to the City of Arlington should total \$160,637.40, based on the current fee. The Snohomish County fees should be a total of \$47,419.20 based on the actual impacts of the development. WSDOT traffic mitigation fees should not be required.

Trip Generation Calculations

Amber Grove
090222254

Trip Generation for: Weekday
(a.k.a.): Average Weekday Daily Trips (AWDT)

LAND USES	VARIABLE	ITE LU code	Trip Rate	Gross Trips			Internal Crossover		IN BOTH DIRECTIONS		NET EXTERNAL TRIPS BY TYPE				
				Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	In+Out (Total)	TOTAL	PASS-BY	NEW	DIRECTIONAL ASSIGNMENTS		
													In	Out	In
Single-Family Attached	84 units	215	7.20	50%	50%	604.80	0%	0.00	604.80	0.00	604.80	0.00	0.00	302.40	302.40
Total						604.80	0.00	0.00	604.80	0.00	604.80	0.00	0.00	302.40	302.40

Amber Grove
090222254

Trip Generation for: Weekday, Peak Hour of Adjacent Street Traffic, One Hour between 7 and 9 AM
(a.k.a.): Weekday AM Peak Hour

LAND USES	VARIABLE	ITE LU code	Gross Trips				Internal Crossover		IN BOTH DIRECTIONS		NET EXTERNAL TRIPS BY TYPE					
			Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	In+Out (Total)	TOTAL	PASS-BY	NEW	DIRECTIONAL ASSIGNMENTS				
								In+Out (Total)	% of Ext. Trips	In+Out (Total)	In	Out	In	Out		
Single-Family Attached	84 units	215	0.48	31%	69%	40.32	0.00	0.00	40.32	0.00	0.00	40.32	0.00	0.00	12.50	27.82
Total						40.32	0.00	0.00	40.32	0.00	0.00	40.32	0.00	0.00	12.50	27.82

Amber Grove
090222254

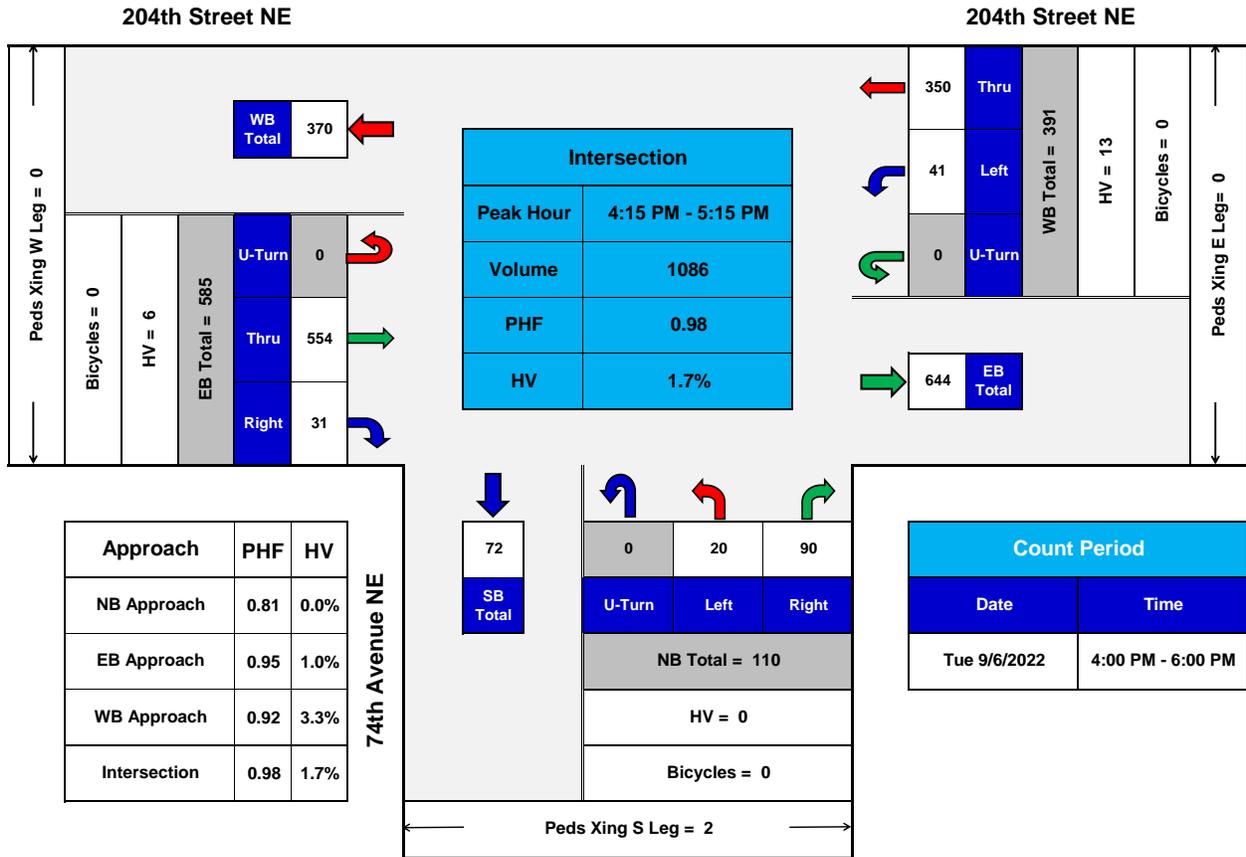
Trip Generation for: Weekday, Peak Hour of Adjacent Street Traffic, One Hour between 4 and 6 PM
(a.k.a.): Weekday PM Peak Hour

LAND USES	VARIABLE	ITE LU code	Gross Trips				Internal Crossover		PASS-BY		NEW		PASS-BY		NEW		
			Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	In+Out (Total)	% of Ext. Trips	In+Out (Total)	In+Out (Total)	In	Out	In	Out		
Single-Family Attached	84 units	215	0.57	57%	43%	47.88	47.88	0.00	0.00	0.00	0.00	47.88	47.88	0.00	0.00	27.29	20.59
Total						47.88	47.88	0.00	0.00	0.00	0.00	47.88	47.88	0.00	0.00	27.29	20.59

Counts and Turning Movement Calculations



74th Avenue NE @ 204th Street NE
Arlington, WA



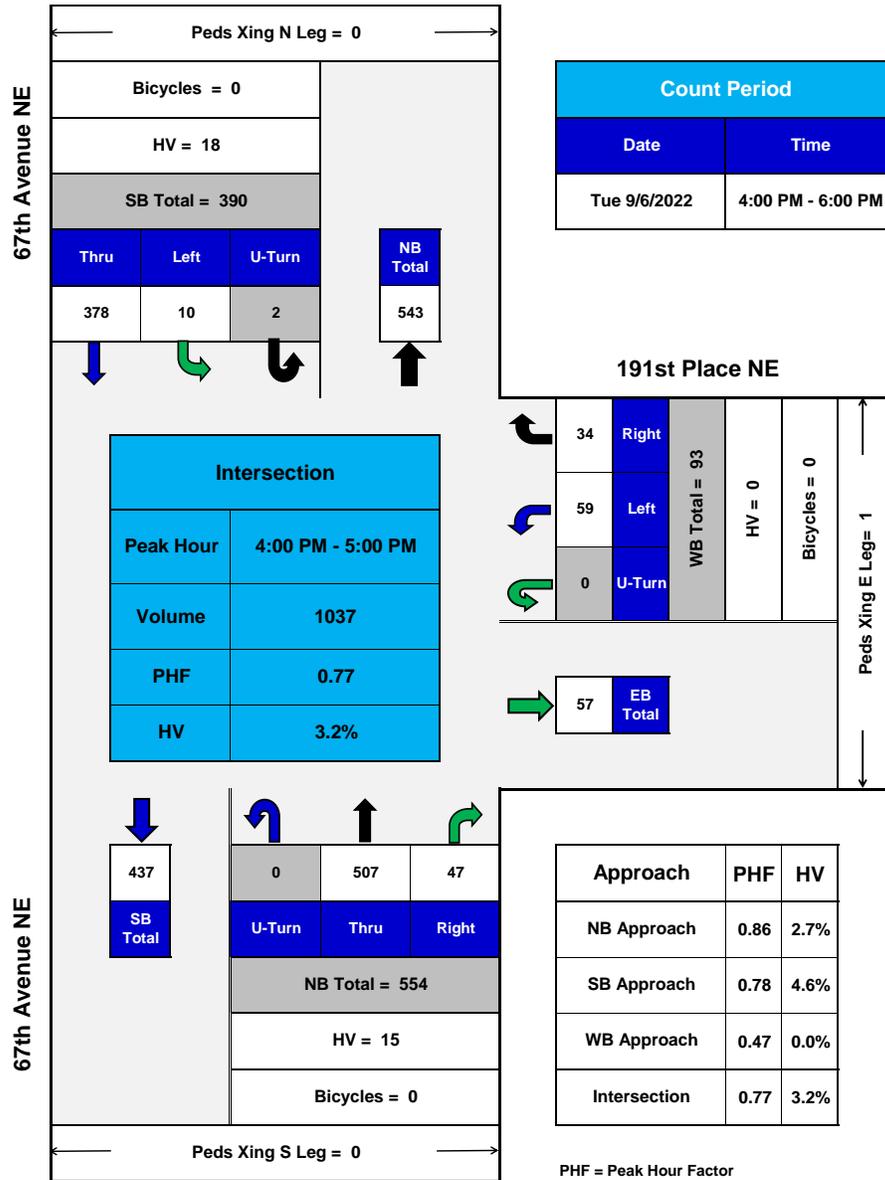
PHF = Peak Hour Factor
HV = Heavy Vehicles

TURNING MOVEMENTS DIAGRAM
PEAK HOUR SUMMARY



67th Avenue NE @ 191st Place NE

Arlington, WA

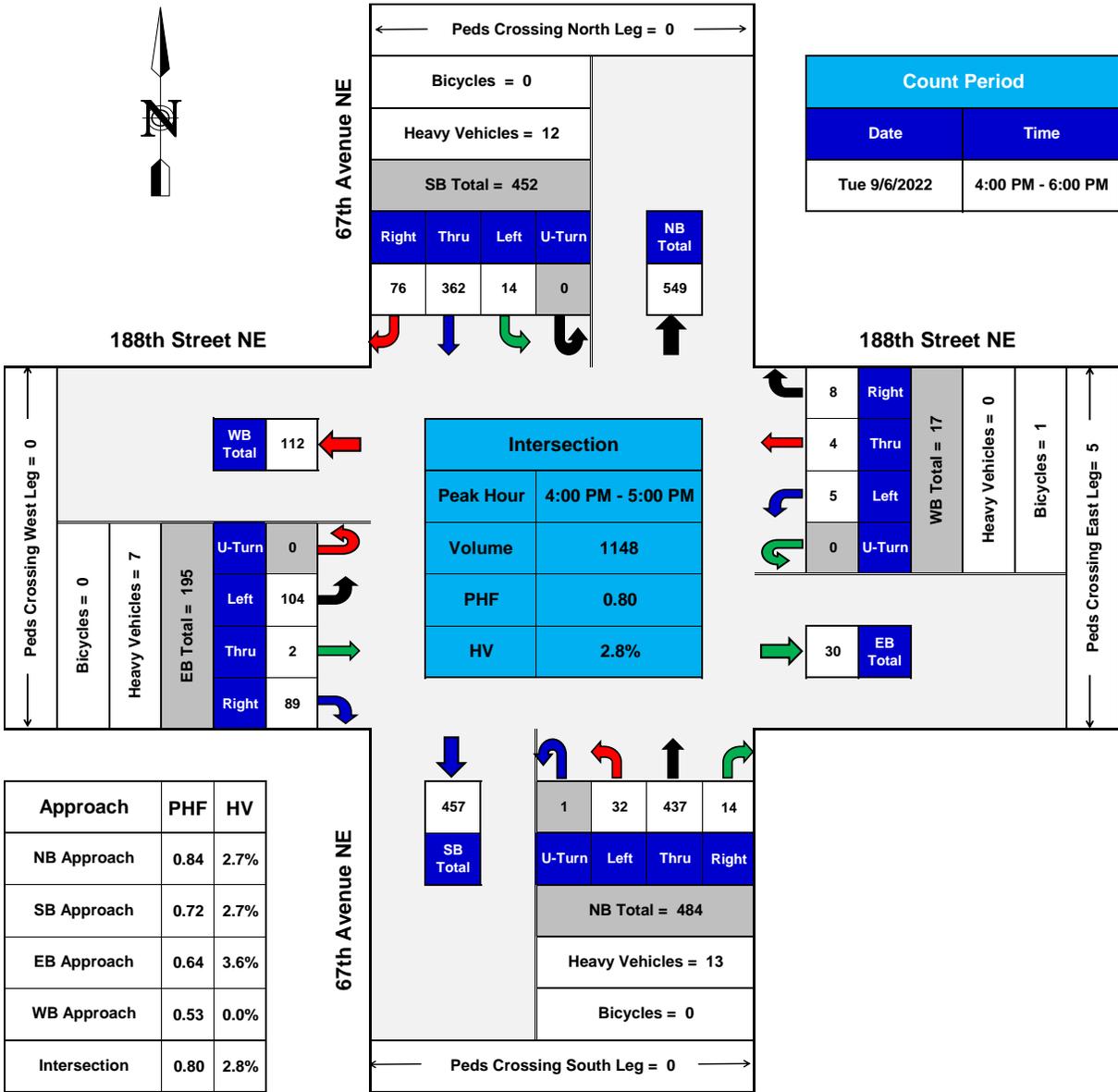


TURNING MOVEMENTS DIAGRAM

PEAK HOUR SUMMARY



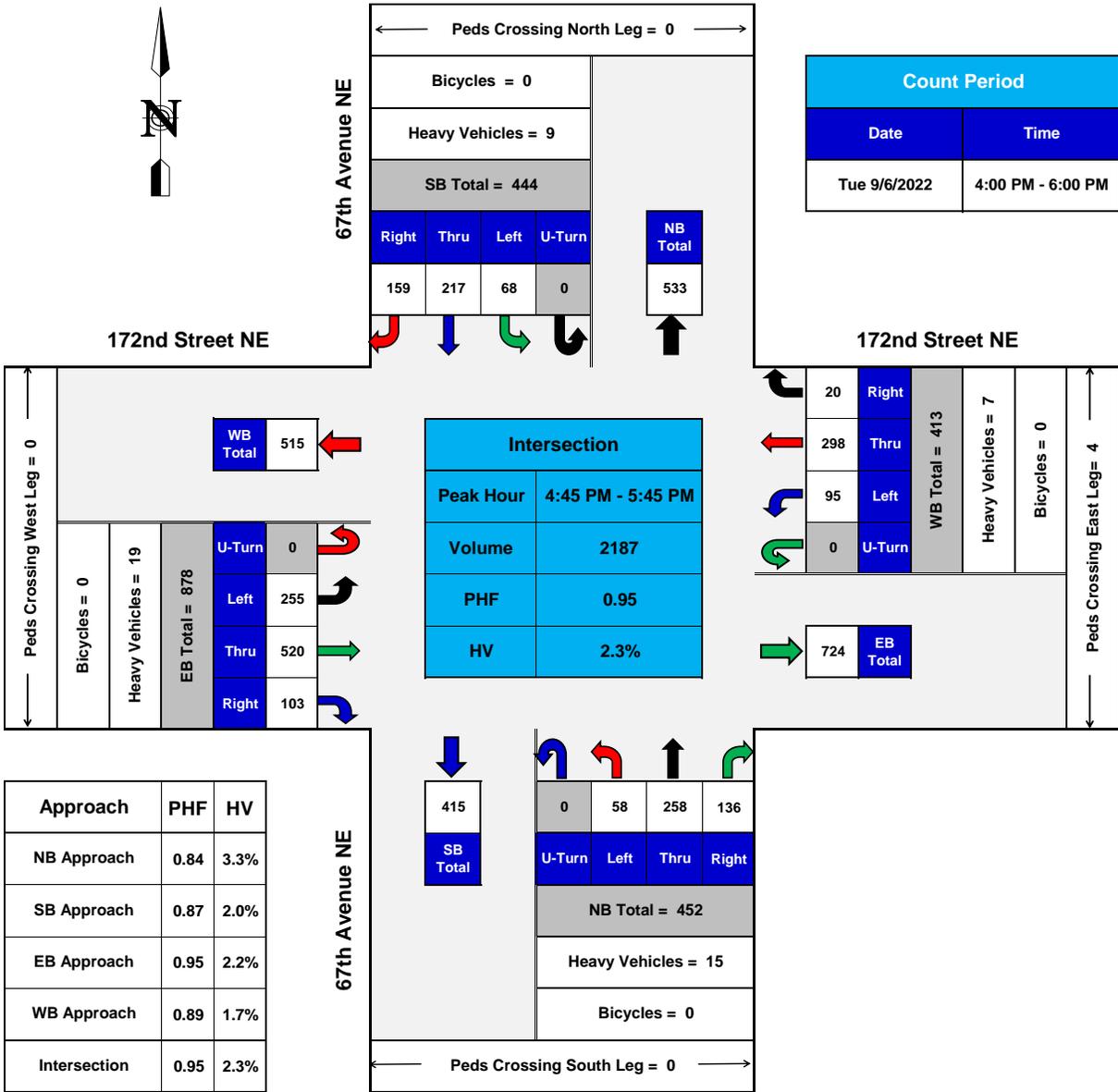
67th Avenue NE @ 188th Street NE
Arlington, WA



TURNING MOVEMENTS DIAGRAM
PEAK HOUR SUMMARY



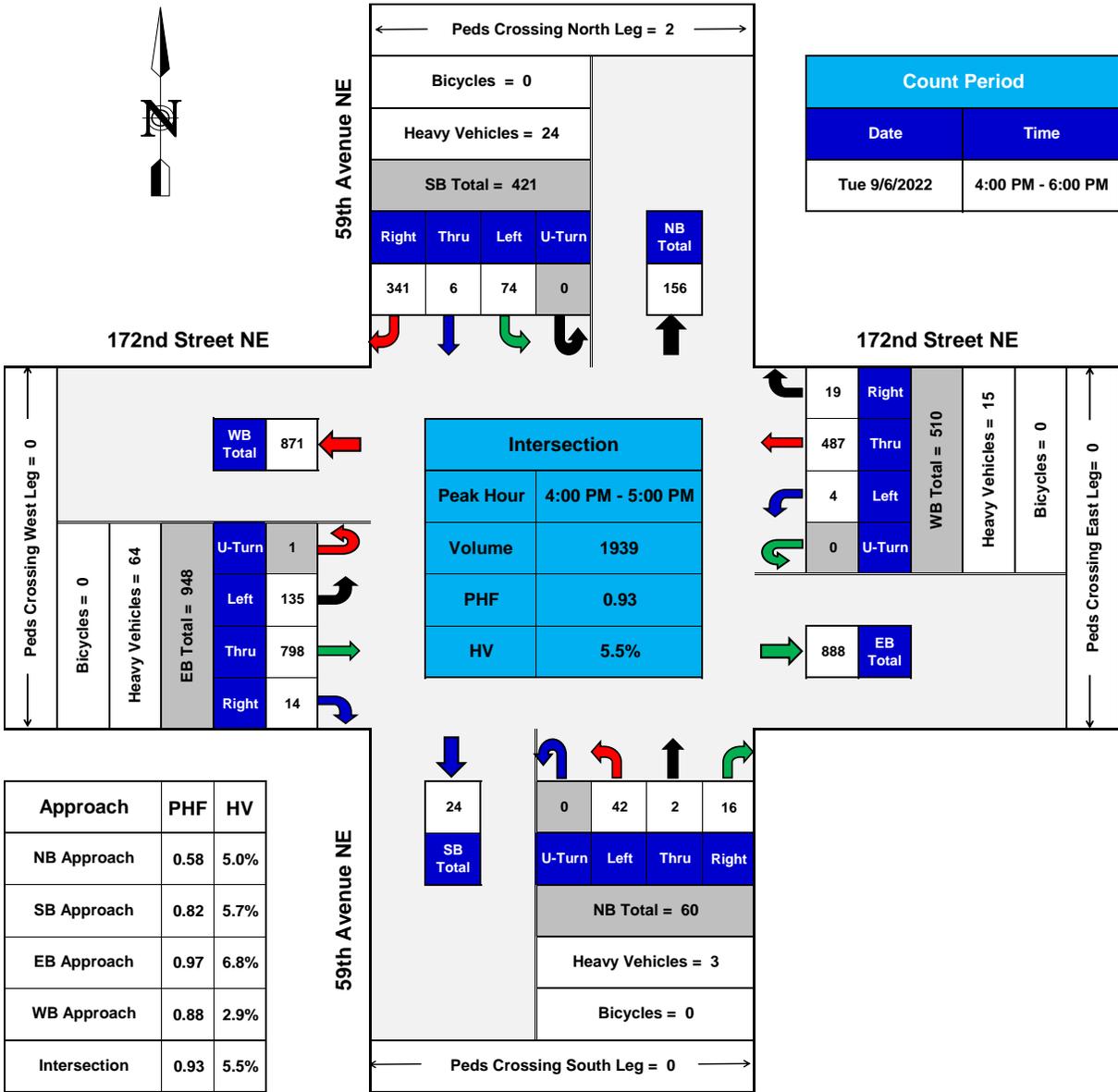
67th Avenue NE @ 172nd Street NE
Arlington, WA



TURNING MOVEMENTS DIAGRAM
PEAK HOUR SUMMARY



59th Avenue NE @ 172nd Street NE
Arlington, WA



TURNING MOVEMENTS DIAGRAM
PEAK HOUR SUMMARY



1 74th Ave NE @ 204th St NE_PM

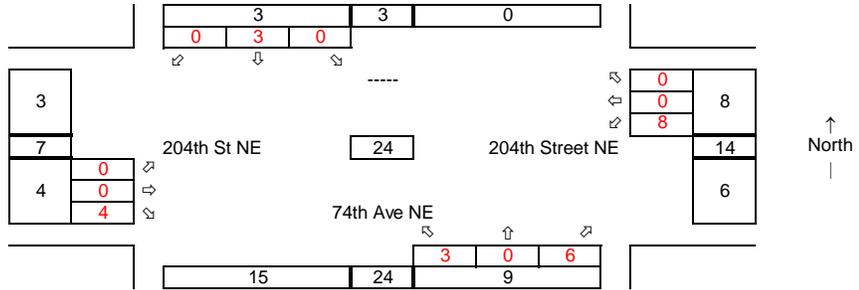
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Existing
 Average Weekday
 PM Peak Hour
 Year: 9/6/2022
 Data Source: TDG



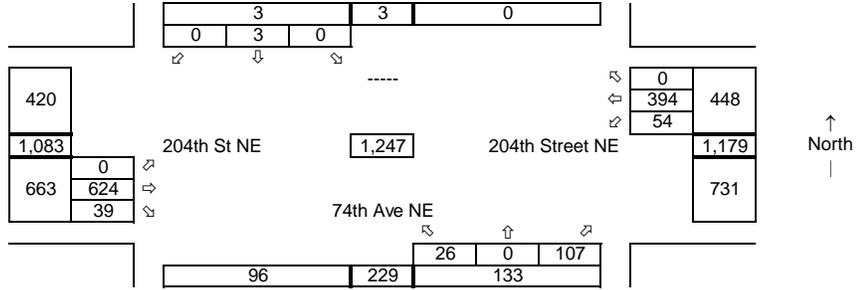
Baseline
 Average Weekday
 PM Peak Hour
 Year: 2028
 Growth Rate = 2.0%
 Years of Growth = 6
 Total Growth = 1.1262



Development Trips
 Average Weekday
 PM Peak Hour

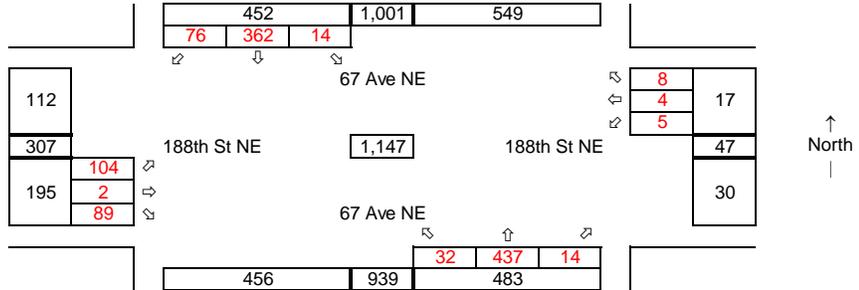


Future with Development
 Average Weekday
 PM Peak Hour

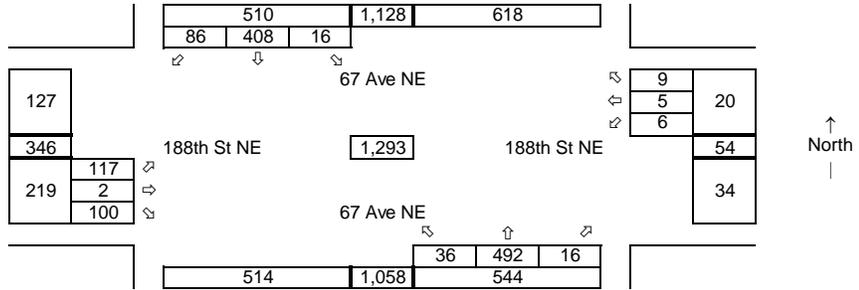


3 67th Ave NE @ 188th Ave NE_PM

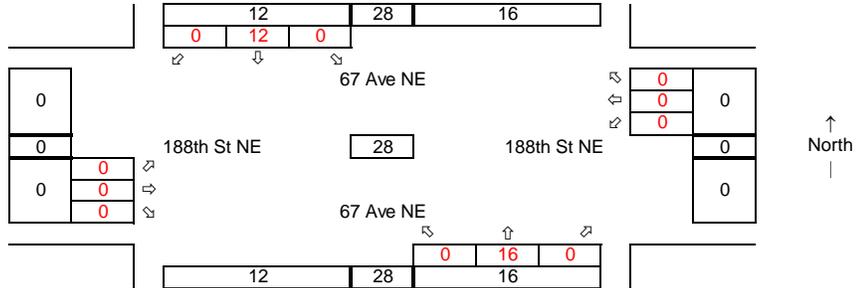
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Existing
 Average Weekday
 PM Peak Hour
 Year: 9/6/2022
 Data Source: TDG



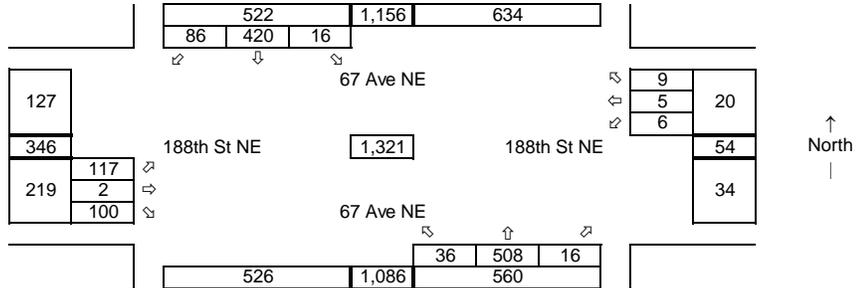
Baseline
 Average Weekday
 PM Peak Hour
 Year: 2028
 Growth Rate = 2.0%
 Years of Growth = 6
 Total Growth = 1.1262



Development Trips
 Average Weekday
 PM Peak Hour

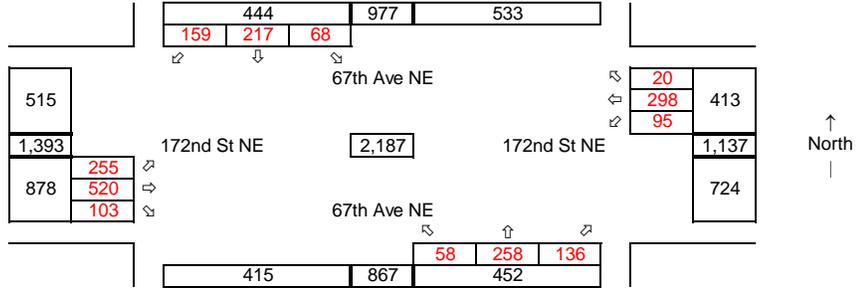


Future with Development
 Average Weekday
 PM Peak Hour

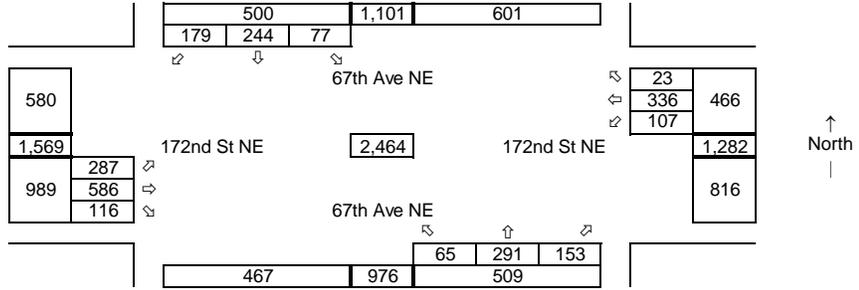


4 67th Ave NE @ 172nd St NE _PM

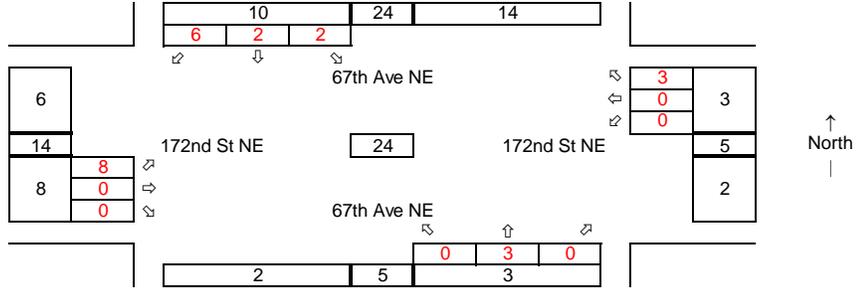
Synchro ID: 4
Existing
 Average Weekday
 PM Peak Hour
 Year: 9/6/2022
 Data Source: TDG



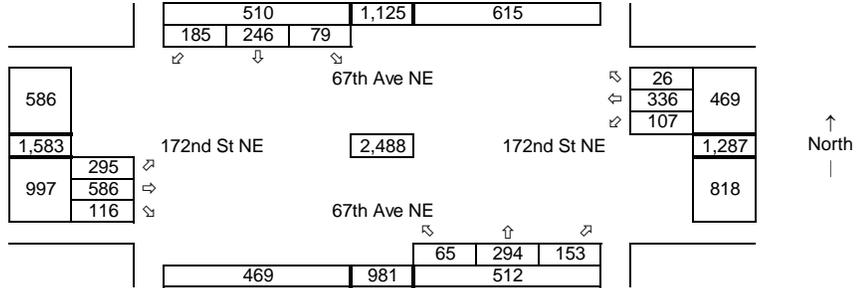
Baseline
 Average Weekday
 PM Peak Hour
 Year: 2028
 Growth Rate = 2.0%
 Years of Growth = 6
 Total Growth = 1.1262



Development Trips
 Average Weekday
 PM Peak Hour



Future with Development
 Average Weekday
 PM Peak Hour



Level of Service Calculations

HCM 6th TWSC
 1: 188th St NE & 204th Street NE

Amber Grove Development

Intersection						
Int Delay, s/veh	1.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	554	31	41	350	20	90
Future Vol, veh/h	554	31	41	350	20	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	0	-	200	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	565	32	42	357	20	92

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	597	0	1006
Stage 1	-	-	-	-	565
Stage 2	-	-	-	-	441
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	980	-	267
Stage 1	-	-	-	-	569
Stage 2	-	-	-	-	648
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	980	-	256
Mov Cap-2 Maneuver	-	-	-	-	256
Stage 1	-	-	-	-	569
Stage 2	-	-	-	-	620

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	14.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	256	524	-	-	980	-
HCM Lane V/C Ratio	0.08	0.175	-	-	0.043	-
HCM Control Delay (s)	20.3	13.3	-	-	8.8	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.3	0.6	-	-	0.1	-

HCM 6th TWSC
2: 67th Ave NE & 188th St NE

Amber Grove Development

Intersection						
Int Delay, s/veh	2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	59	34	507	47	12	378
Future Vol, veh/h	59	34	507	47	12	378
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	77	44	658	61	16	491

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	967	360	0	0	719
Stage 1	689	-	-	-	-
Stage 2	278	-	-	-	-
Critical Hdwy	6.88	6.98	-	-	4.18
Critical Hdwy Stg 1	5.88	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-
Follow-up Hdwy	3.54	3.34	-	-	2.24
Pot Cap-1 Maneuver	248	631	-	-	865
Stage 1	454	-	-	-	-
Stage 2	738	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	244	631	-	-	865
Mov Cap-2 Maneuver	244	-	-	-	-
Stage 1	454	-	-	-	-
Stage 2	725	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.8	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	244	631	865
HCM Lane V/C Ratio	-	-	0.314	0.07	0.018
HCM Control Delay (s)	-	-	26.4	11.1	9.2
HCM Lane LOS	-	-	D	B	A
HCM 95th %tile Q(veh)	-	-	1.3	0.2	0.1

HCM 6th TWSC
3: 67th Ave NE & 188th St NE

Amber Grove Development

Intersection												
Int Delay, s/veh	9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
Traffic Vol, veh/h	104	2	89	5	4	8	32	437	14	14	362	76
Future Vol, veh/h	104	2	89	5	4	8	32	437	14	14	362	76
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	200	-	-	200	-	-	200	-	-	200	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	130	3	111	6	5	10	40	546	18	18	453	95

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1132	1133	453	1229	1219	555	548	0	0	564	0	0
Stage 1	489	489	-	635	635	-	-	-	-	-	-	-
Stage 2	643	644	-	594	584	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	179	202	605	154	179	529	1016	-	-	1003	-	-
Stage 1	559	548	-	465	471	-	-	-	-	-	-	-
Stage 2	460	466	-	490	496	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	164	191	605	119	169	529	1016	-	-	1003	-	-
Mov Cap-2 Maneuver	164	191	-	119	169	-	-	-	-	-	-	-
Stage 1	537	538	-	447	453	-	-	-	-	-	-	-
Stage 2	429	448	-	391	487	-	-	-	-	-	-	-

Approach	EB		WB		NB			SB		
HCM Control Delay, s	48.8		23		0.6			0.3		
HCM LOS	E		C							

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1016	-	-	164	577	119	309	1003	-	-
HCM Lane V/C Ratio	0.039	-	-	0.793	0.197	0.053	0.049	0.017	-	-
HCM Control Delay (s)	8.7	-	-	80.3	12.8	36.9	17.2	8.7	-	-
HCM Lane LOS	A	-	-	F	B	E	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	5.2	0.7	0.2	0.2	0.1	-	-

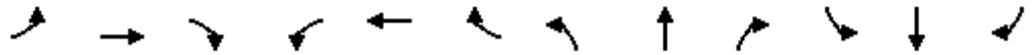
Lanes, Volumes, Timings
4: 67th Avenue NE & 172nd Street NE

Amber Grove Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	520	103	95	298	20	58	258	136	68	217	159
Future Volume (vph)	255	520	103	95	298	20	58	258	136	68	217	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		80	125		0	150		0	200		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								0.99				
Frt			0.850		0.991			0.948				0.937
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1828	0	1752	1735	0	1752	1728	0
Flt Permitted	0.469			0.323			0.116			0.110		
Satd. Flow (perm)	865	1845	1568	596	1828	0	214	1735	0	203	1728	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			88		3			15				21
Link Speed (mph)		30			30			30				30
Link Distance (ft)		1109			1951			1426				2074
Travel Time (s)		25.2			44.3			32.4				47.1
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	268	547	108	100	335	0	61	415	0	72	395	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8			4		
Detector Phase	5	2	2	1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	7.0		5.0	7.0	
Minimum Split (s)	10.0	31.9	31.9	10.0	34.9		10.0	33.9		10.0	35.9	
Total Split (s)	16.0	90.0	90.0	16.0	90.0		16.0	38.0		16.0	38.0	
Total Split (%)	10.0%	56.3%	56.3%	10.0%	56.3%		10.0%	23.8%		10.0%	23.8%	
Yellow Time (s)	3.0	3.9	3.9	3.0	3.9		3.0	3.9		3.0	3.9	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.9	5.9	5.0	5.9		5.0	5.9		5.0	5.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Max		None	Min	
Act Effct Green (s)	98.0	86.1	86.1	94.0	84.1		43.6	33.6		45.3	36.2	
Actuated g/C Ratio	0.61	0.54	0.54	0.59	0.53		0.27	0.21		0.28	0.23	
v/c Ratio	0.45	0.55	0.12	0.24	0.35		0.42	1.11		0.48	0.97	
Control Delay	16.1	27.2	5.4	13.2	23.1		49.0	132.0		51.4	94.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	16.1	27.2	5.4	13.2	23.1		49.0	132.0		51.4	94.9	
LOS	B	C	A	B	C		D	F		D	F	
Approach Delay		21.4			20.8			121.3			88.2	
Approach LOS		C			C			F			F	

Lanes, Volumes, Timings
 4: 67th Avenue NE & 172nd Street NE

Amber Grove Development



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	116	367	10	39	197		46	~488		55	~427	
Queue Length 95th (ft)	165	494	42	65	271		86	#721		97	#664	
Internal Link Dist (ft)		1029			1871			1346			1994	
Turn Bay Length (ft)	350		80	125			150			200		
Base Capacity (vph)	590	993	884	437	962		166	375		164	407	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.45	0.55	0.12	0.23	0.35		0.37	1.11		0.44	0.97	

Intersection Summary

Area Type: Other
 Cycle Length: 160
 Actuated Cycle Length: 160
 Offset: 9.5 (6%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 95
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.11
 Intersection Signal Delay: 55.5
 Intersection LOS: E
 Intersection Capacity Utilization 78.3%
 ICU Level of Service D
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 4: 67th Avenue NE & 172nd Street NE



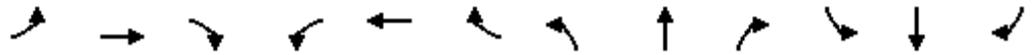
Lanes, Volumes, Timings
5: 59th Ave NE & 172nd Street NE

Amber Grove Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	798	14	4	487	19	42	2	16	74	6	341
Future Volume (vph)	136	798	14	4	487	19	42	2	16	74	6	341
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.994			0.866			0.852	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1787	0	1703	1782	0	1703	1552	0	1703	1527	0
Flt Permitted	0.277			0.222			0.463			0.745		
Satd. Flow (perm)	497	1787	0	398	1782	0	830	1552	0	1335	1527	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			5			17			196	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		440			1402			604			1248	
Travel Time (s)		10.0			31.9			13.7			28.4	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	146	873	0	4	544	0	45	19	0	80	373	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Act Effect Green (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.40	0.40		0.40	0.40	
v/c Ratio	0.74	1.22		0.03	0.76		0.14	0.03		0.15	0.51	
Control Delay	40.0	130.4		8.8	21.1		9.9	5.1		9.6	7.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.0	130.4		8.8	21.1		9.9	5.1		9.6	7.8	
LOS	D	F		A	C		A	A		A	A	
Approach Delay		117.4			21.0			8.5			8.1	
Approach LOS		F			C			A			A	
Queue Length 50th (ft)	30	-298		1	113		7	0		12	29	
Queue Length 95th (ft)	#110	#479		5	#252		23	9		33	81	
Internal Link Dist (ft)		360			1322			524			1168	
Turn Bay Length (ft)												
Base Capacity (vph)	198	716		159	715		332	631		534	728	

Lanes, Volumes, Timings
 5: 59th Ave NE & 172nd Street NE

Amber Grove Development

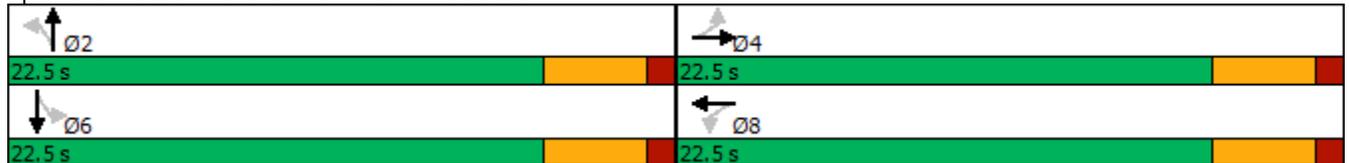


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.74	1.22		0.03	0.76		0.14	0.03		0.15	0.51	

Intersection Summary

Area Type: Other
 Cycle Length: 45
 Actuated Cycle Length: 45
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.22
 Intersection Signal Delay: 65.0
 Intersection LOS: E
 Intersection Capacity Utilization 87.6%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: 59th Ave NE & 172nd Street NE



HCM 6th TWSC
 1: 188th St NE & 204th Street NE

Amber Grove Development

Intersection						
Int Delay, s/veh	2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	624	35	46	394	23	101
Future Vol, veh/h	624	35	46	394	23	101
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	0	-	200	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	637	36	47	402	23	103

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	673	0	1133
Stage 1	-	-	-	-	637
Stage 2	-	-	-	-	496
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	918	-	224
Stage 1	-	-	-	-	527
Stage 2	-	-	-	-	612
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	918	-	213
Mov Cap-2 Maneuver	-	-	-	-	213
Stage 1	-	-	-	-	527
Stage 2	-	-	-	-	581

Approach	EB	WB	NB
HCM Control Delay, s	0	1	16.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	213	477	-	-	918	-
HCM Lane V/C Ratio	0.11	0.216	-	-	0.051	-
HCM Control Delay (s)	24	14.6	-	-	9.1	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.4	0.8	-	-	0.2	-

HCM 6th TWSC
2: 67th Ave NE & 188th St NE

Amber Grove Development

Intersection						
Int Delay, s/veh	2.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↵	↶	↕		↵	↕
Traffic Vol, veh/h	66	38	571	53	14	426
Future Vol, veh/h	66	38	571	53	14	426
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	86	49	742	69	18	553

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1090	406	0	0	811
Stage 1	777	-	-	-	-
Stage 2	313	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16
Critical Hdwy Stg 1	5.86	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23
Pot Cap-1 Maneuver	208	592	-	-	805
Stage 1	411	-	-	-	-
Stage 2	712	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	203	592	-	-	805
Mov Cap-2 Maneuver	203	-	-	-	-
Stage 1	411	-	-	-	-
Stage 2	696	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26.5	0	0.3
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	203	592	805	-
HCM Lane V/C Ratio	-	-	0.422	0.083	0.023	-
HCM Control Delay (s)	-	-	35.1	11.6	9.6	-
HCM Lane LOS	-	-	E	B	A	-
HCM 95th %tile Q(veh)	-	-	1.9	0.3	0.1	-

HCM 6th TWSC
3: 67th Ave NE & 188th St NE

Amber Grove Development

Intersection												
Int Delay, s/veh	19.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
Traffic Vol, veh/h	117	2	100	6	5	9	36	492	16	16	408	86
Future Vol, veh/h	117	2	100	6	5	9	36	492	16	16	408	86
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	200	-	-	200	-	-	200	-	-	200	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	146	3	125	8	6	11	45	615	20	20	510	108

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1274	1275	510	1383	1373	625	618	0	0	635	0	0
Stage 1	550	550	-	715	715	-	-	-	-	-	-	-
Stage 2	724	725	-	668	658	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	~ 143	166	561	120	145	483	957	-	-	943	-	-
Stage 1	518	514	-	420	433	-	-	-	-	-	-	-
Stage 2	415	428	-	446	460	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	~ 128	155	561	87	135	483	957	-	-	943	-	-
Mov Cap-2 Maneuver	~ 128	155	-	87	135	-	-	-	-	-	-	-
Stage 1	494	503	-	400	413	-	-	-	-	-	-	-
Stage 2	380	408	-	338	450	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	107.8		29.3		0.6		0.3	
HCM LOS	F		D					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	957	-	-	128	534	87	251	943	-	-
HCM Lane V/C Ratio	0.047	-	-	1.143	0.239	0.086	0.07	0.021	-	-
HCM Control Delay (s)	8.9	-	-	189.7	13.8	50.2	20.4	8.9	-	-
HCM Lane LOS	A	-	-	F	B	F	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	8.6	0.9	0.3	0.2	0.1	-	-

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

Lanes, Volumes, Timings
3: 67th Ave NE & 188th St NE

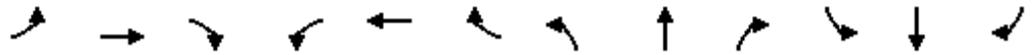
Amber Grove Development



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	2	100	6	5	9	36	492	16	16	408	86
Future Volume (vph)	117	2	100	6	5	9	36	492	16	16	408	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	200		0	200		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.854			0.903			0.995				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1575	0	1752	1666	0	1752	1835	0	1752	1845	1568
Flt Permitted	0.746			0.675			0.425			0.325		
Satd. Flow (perm)	1376	1575	0	1245	1666	0	784	1835	0	600	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		125			11			4				108
Link Speed (mph)		30			30			30				30
Link Distance (ft)		681			668			1337				1074
Travel Time (s)		15.5			15.2			30.4				24.4
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	146	128	0	8	17	0	45	635	0	20	510	108
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	Min
Act Effect Green (s)	9.3	9.3		9.2	9.2		21.5	21.5		21.5	21.5	21.5
Actuated g/C Ratio	0.26	0.26		0.25	0.25		0.59	0.59		0.59	0.59	0.59
v/c Ratio	0.41	0.26		0.03	0.04		0.10	0.58		0.06	0.47	0.11
Control Delay	15.0	4.3		9.7	7.0		6.8	12.0		6.8	8.8	2.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	15.0	4.3		9.7	7.0		6.8	12.0		6.8	8.8	2.3
LOS	B	A		A	A		A	B		A	A	A
Approach Delay		10.0			7.9			11.7				7.6
Approach LOS		B			A			B				A
Queue Length 50th (ft)	24	1		1	1		4	80		2	59	0
Queue Length 95th (ft)	48	18		6	8		17	#183		10	131	14

Lanes, Volumes, Timings
 3: 67th Ave NE & 188th St NE

Amber Grove Development

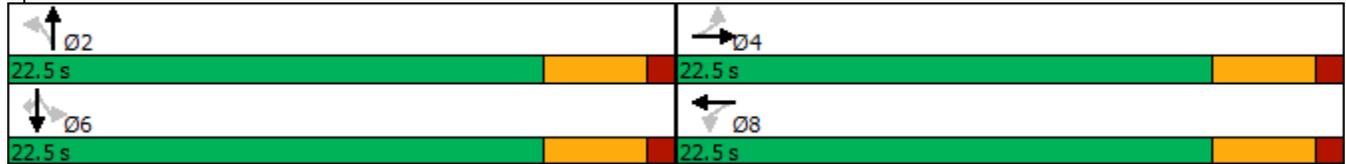


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		601			588			1257			994	
Turn Bay Length (ft)	100			100			200			200		
Base Capacity (vph)	694	856		627	845		465	1089		356	1094	973
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.21	0.15		0.01	0.02		0.10	0.58		0.06	0.47	0.11

Intersection Summary

Area Type: Other
 Cycle Length: 45
 Actuated Cycle Length: 36.2
 Natural Cycle: 55
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.58
 Intersection Signal Delay: 9.7
 Intersection LOS: A
 Intersection Capacity Utilization 50.6%
 ICU Level of Service A
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: 67th Ave NE & 188th St NE



Lanes, Volumes, Timings
4: 67th Avenue NE & 172nd Street NE

Amber Grove Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	287	586	116	107	336	23	65	291	153	77	244	179
Future Volume (vph)	287	586	116	107	336	23	65	291	153	77	244	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		80	125		0	150		0	200		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								0.99				
Frt			0.850		0.990			0.948				0.937
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1826	0	1752	1735	0	1752	1728	0
Flt Permitted	0.437			0.272			0.120			0.119		
Satd. Flow (perm)	806	1845	1568	502	1826	0	221	1735	0	220	1728	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			88		3			15				21
Link Speed (mph)		30			30			30				30
Link Distance (ft)		1109			1951			1426				2074
Travel Time (s)		25.2			44.3			32.4				47.1
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	617	122	113	378	0	68	467	0	81	445	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8			4		
Detector Phase	5	2	2	1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	7.0		5.0	7.0	
Minimum Split (s)	10.0	31.9	31.9	10.0	34.9		10.0	33.9		10.0	35.9	
Total Split (s)	16.0	90.0	90.0	16.0	90.0		16.0	38.0		16.0	38.0	
Total Split (%)	10.0%	56.3%	56.3%	10.0%	56.3%		10.0%	23.8%		10.0%	23.8%	
Yellow Time (s)	3.0	3.9	3.9	3.0	3.9		3.0	3.9		3.0	3.9	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.9	5.9	5.0	5.9		5.0	5.9		5.0	5.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Max		None	Min	
Act Effct Green (s)	97.7	85.8	85.8	94.3	84.1		43.6	33.3		44.4	33.7	
Actuated g/C Ratio	0.61	0.54	0.54	0.59	0.53		0.27	0.21		0.28	0.21	
v/c Ratio	0.54	0.62	0.14	0.31	0.39		0.45	1.26		0.52	1.17	
Control Delay	18.2	29.6	6.6	14.1	24.0		50.2	182.5		53.0	151.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.2	29.6	6.6	14.1	24.0		50.2	182.5		53.0	151.7	
LOS	B	C	A	B	C		D	F		D	F	
Approach Delay		23.6			21.7			165.7			136.5	
Approach LOS		C			C			F			F	

Lanes, Volumes, Timings
 4: 67th Avenue NE & 172nd Street NE

Amber Grove Development



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	134	440	17	45	229		52	~609		62	~541	
Queue Length 95th (ft)	187	586	51	72	311		93	#842		108	#782	
Internal Link Dist (ft)		1029			1871			1346			1994	
Turn Bay Length (ft)	350		80	125			150			200		
Base Capacity (vph)	557	989	881	387	961		167	372		167	380	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.54	0.62	0.14	0.29	0.39		0.41	1.26		0.49	1.17	

Intersection Summary

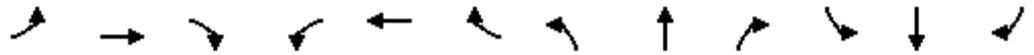
Area Type: Other
 Cycle Length: 160
 Actuated Cycle Length: 160
 Offset: 9.5 (6%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 95
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.26
 Intersection Signal Delay: 75.5
 Intersection LOS: E
 Intersection Capacity Utilization 83.9%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 4: 67th Avenue NE & 172nd Street NE



Lanes, Volumes, Timings
5: 59th Ave NE & 172nd Street NE

Amber Grove Development



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	899	16	5	548	21	47	2	18	83	7	384
Future Volume (vph)	153	899	16	5	548	21	47	2	18	83	7	384
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.997			0.994			0.864				0.853
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1839	0	1752	1834	0	1752	1594	0	1752	1530	0
Fl _t Permitted	0.222			0.222			0.409			0.744		
Satd. Flow (perm)	410	1839	0	410	1834	0	754	1594	0	1372	1530	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			5			19				157
Link Speed (mph)		30			30			30				30
Link Distance (ft)		440			1402			604				1248
Travel Time (s)		10.0			31.9			13.7				28.4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	6%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	165	984	0	5	612	0	51	21	0	89	421	0
Turn Type	Perm	NA										
Protected Phases		4			8			2				6
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Act Effect Green (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.40	0.40		0.40	0.40	
v/c Ratio	1.01	1.34		0.03	0.83		0.17	0.03		0.16	0.60	
Control Delay	96.6	180.3		9.0	25.3		10.5	5.0		9.7	10.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	96.6	180.3		9.0	25.3		10.5	5.0		9.7	10.7	
LOS	F	F		A	C		B	A		A	B	
Approach Delay		168.3			25.2			8.9				10.5
Approach LOS		F			C			A				B
Queue Length 50th (ft)	~41	~357		1	133		8	0		14	47	
Queue Length 95th (ft)	#135	#547		5	#294		25	9		35	114	
Internal Link Dist (ft)		360			1322			524			1168	
Turn Bay Length (ft)												
Base Capacity (vph)	164	736		164	736		301	649		548	706	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	1.01	1.34		0.03	0.83		0.17	0.03		0.16	0.60	

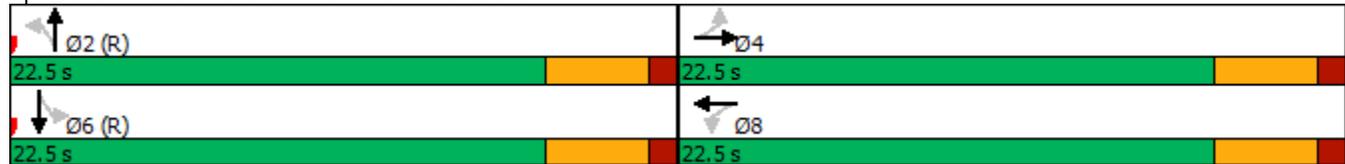
Lanes, Volumes, Timings
 5: 59th Ave NE & 172nd Street NE

Amber Grove Development

Intersection Summary

Area Type:	Other
Cycle Length:	45
Actuated Cycle Length:	45
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	70
Control Type:	Pretimed
Maximum v/c Ratio:	1.34
Intersection Signal Delay:	91.5
Intersection LOS:	F
Intersection Capacity Utilization	95.8%
ICU Level of Service	F
Analysis Period (min)	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 5: 59th Ave NE & 172nd Street NE



HCM 6th TWSC
 1: 188th St NE & 204th Street NE

Amber Grove Development

Intersection						
Int Delay, s/veh	2.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	624	39	54	394	26	107
Future Vol, veh/h	624	39	54	394	26	107
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	0	-	200	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	637	40	55	402	27	109

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	677	0	1149	637
Stage 1	-	-	-	-	637	-
Stage 2	-	-	-	-	512	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	915	-	219	477
Stage 1	-	-	-	-	527	-
Stage 2	-	-	-	-	602	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	915	-	206	477
Mov Cap-2 Maneuver	-	-	-	-	206	-
Stage 1	-	-	-	-	527	-
Stage 2	-	-	-	-	566	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	16.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	206	477	-	-	915	-
HCM Lane V/C Ratio	0.129	0.229	-	-	0.06	-
HCM Control Delay (s)	25	14.8	-	-	9.2	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	0.4	0.9	-	-	0.2	-

HCM 6th TWSC
2: 67th Ave NE & 188th St NE

Amber Grove Development

Intersection						
Int Delay, s/veh	3.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙	↗	↕		↙	↕
Traffic Vol, veh/h	78	38	571	69	14	426
Future Vol, veh/h	78	38	571	69	14	426
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	101	49	742	90	18	553

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1100	416	0	0	832
Stage 1	787	-	-	-	-
Stage 2	313	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16
Critical Hdwy Stg 1	5.86	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23
Pot Cap-1 Maneuver	205	583	-	-	790
Stage 1	406	-	-	-	-
Stage 2	712	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	200	583	-	-	790
Mov Cap-2 Maneuver	200	-	-	-	-
Stage 1	406	-	-	-	-
Stage 2	696	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	30.8	0	0.3
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	200	583	790
HCM Lane V/C Ratio	-	-	0.506	0.085	0.023
HCM Control Delay (s)	-	-	40.1	11.7	9.7
HCM Lane LOS	-	-	E	B	A
HCM 95th %tile Q(veh)	-	-	2.6	0.3	0.1

HCM 6th TWSC
3: 67th Ave NE & 188th St NE

Amber Grove Development

Intersection												
Int Delay, s/veh	21.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
Traffic Vol, veh/h	117	2	100	6	5	9	36	508	16	16	420	86
Future Vol, veh/h	117	2	100	6	5	9	36	508	16	16	420	86
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	200	-	-	200	-	-	200	-	-	200	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	146	3	125	8	6	11	45	635	20	20	525	108

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1309	1310	525	1418	1408	645	633	0	0	655	0	0
Stage 1	565	565	-	735	735	-	-	-	-	-	-	-
Stage 2	744	745	-	683	673	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	~ 136	158	551	114	138	470	945	-	-	927	-	-
Stage 1	508	506	-	410	424	-	-	-	-	-	-	-
Stage 2	405	420	-	438	452	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	~ 121	147	551	82	128	470	945	-	-	927	-	-
Mov Cap-2 Maneuver	~ 121	147	-	82	128	-	-	-	-	-	-	-
Stage 1	484	495	-	390	404	-	-	-	-	-	-	-
Stage 2	371	400	-	330	442	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	122.7		30.8		0.6		0.3	
HCM LOS	F		D					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	945	-	-	121	523	82	241	927	-	-
HCM Lane V/C Ratio	0.048	-	-	1.209	0.244	0.091	0.073	0.022	-	-
HCM Control Delay (s)	9	-	-	217.3	14.1	53.3	21.1	9	-	-
HCM Lane LOS	A	-	-	F	B	F	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	9.2	0.9	0.3	0.2	0.1	-	-

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

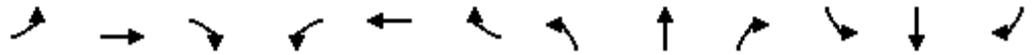
Lanes, Volumes, Timings
3: 67th Ave NE & 188th St NE

Amber Grove Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	2	100	6	5	9	36	508	16	16	420	86
Future Volume (vph)	117	2	100	6	5	9	36	508	16	16	420	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	200		0	200		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.854			0.903			0.995				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1575	0	1752	1666	0	1752	1835	0	1752	1845	1568
Flt Permitted	0.746			0.675			0.404			0.308		
Satd. Flow (perm)	1376	1575	0	1245	1666	0	745	1835	0	568	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		125			11			3				108
Link Speed (mph)		30			30			30				30
Link Distance (ft)		681			668			1337				1074
Travel Time (s)		15.5			15.2			30.4				24.4
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	146	128	0	8	17	0	45	655	0	20	525	108
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	28.0	28.0		28.0	28.0		62.0	62.0		62.0	62.0	62.0
Total Split (%)	31.1%	31.1%		31.1%	31.1%		68.9%	68.9%		68.9%	68.9%	68.9%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	Min
Act Effect Green (s)	10.7	10.7		10.7	10.7		26.0	26.0		26.0	26.0	26.0
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.57	0.57		0.57	0.57	0.57
v/c Ratio	0.46	0.28		0.03	0.04		0.11	0.63		0.06	0.50	0.12
Control Delay	21.3	6.2		15.8	11.4		6.0	10.5		5.8	8.5	1.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	21.3	6.2		15.8	11.4		6.0	10.5		5.8	8.5	1.7
LOS	C	A		B	B		A	B		A	A	A
Approach Delay		14.2			12.8			10.2			7.3	
Approach LOS		B			B			B			A	
Queue Length 50th (ft)	28	1		1	1		4	92		2	67	0
Queue Length 95th (ft)	81	27		10	12		16	183		9	136	12

Lanes, Volumes, Timings
 3: 67th Ave NE & 188th St NE

Amber Grove Development



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		601			588			1257			994	
Turn Bay Length (ft)	100			100			200			200		
Base Capacity (vph)	729	894		660	888		731	1802		558	1812	1542
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.20	0.14		0.01	0.02		0.06	0.36		0.04	0.29	0.07

Intersection Summary	
Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	46
Natural Cycle:	55
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	9.8
Intersection LOS:	A
Intersection Capacity Utilization	50.6%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 3: 67th Ave NE & 188th St NE



Lanes, Volumes, Timings
4: 67th Avenue NE & 172nd Street NE

Amber Grove Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	295	586	116	107	336	26	65	294	153	79	246	185
Future Volume (vph)	295	586	116	107	336	26	65	294	153	79	246	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		80	125		0	150		0	200		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								0.99				
Frt			0.850		0.989			0.949				0.936
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1824	0	1752	1737	0	1752	1727	0
Flt Permitted	0.435			0.272			0.120			0.119		
Satd. Flow (perm)	802	1845	1568	502	1824	0	221	1737	0	220	1727	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			88		4			15				21
Link Speed (mph)		30			30			30				30
Link Distance (ft)		1109			1951			1426				2074
Travel Time (s)		25.2			44.3			32.4				47.1
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	311	617	122	113	381	0	68	470	0	83	454	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8			4		
Detector Phase	5	2	2	1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	7.0		5.0	7.0	
Minimum Split (s)	10.0	31.9	31.9	10.0	34.9		10.0	33.9		10.0	35.9	
Total Split (s)	16.0	90.0	90.0	16.0	90.0		16.0	38.0		16.0	38.0	
Total Split (%)	10.0%	56.3%	56.3%	10.0%	56.3%		10.0%	23.8%		10.0%	23.8%	
Yellow Time (s)	3.0	3.9	3.9	3.0	3.9		3.0	3.9		3.0	3.9	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.9	5.9	5.0	5.9		5.0	5.9		5.0	5.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Max		None	Min	
Act Effct Green (s)	97.7	85.8	85.8	94.3	84.1		43.5	33.2		44.5	33.7	
Actuated g/C Ratio	0.61	0.54	0.54	0.59	0.53		0.27	0.21		0.28	0.21	
v/c Ratio	0.56	0.62	0.14	0.31	0.40		0.46	1.27		0.53	1.19	
Control Delay	18.7	29.6	6.6	14.1	24.0		50.3	186.8		53.4	160.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.7	29.6	6.6	14.1	24.0		50.3	186.8		53.4	160.3	
LOS	B	C	A	B	C		D	F		D	F	
Approach Delay		23.7			21.7			169.6			143.8	
Approach LOS		C			C			F			F	

Lanes, Volumes, Timings
 4: 67th Avenue NE & 172nd Street NE

Amber Grove Development

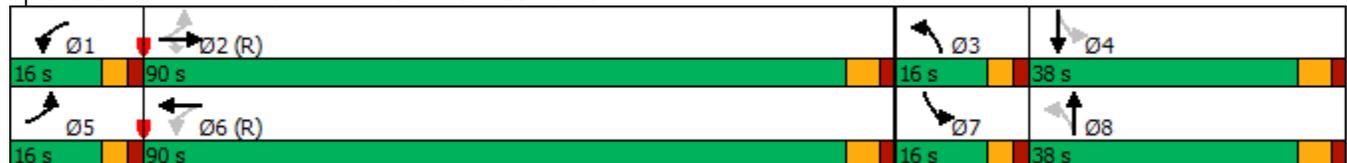


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	139	440	17	45	231		52	~618		64	~561	
Queue Length 95th (ft)	193	586	51	72	313		93	#848		110	#802	
Internal Link Dist (ft)		1029			1871			1346			1994	
Turn Bay Length (ft)	350		80	125			150			200		
Base Capacity (vph)	555	989	881	387	960		167	371		167	380	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.56	0.62	0.14	0.29	0.40		0.41	1.27		0.50	1.19	

Intersection Summary

Area Type:	Other
Cycle Length:	160
Actuated Cycle Length:	160
Offset:	9.5 (6%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	95
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.27
Intersection Signal Delay:	77.9
Intersection LOS:	E
Intersection Capacity Utilization	84.2%
ICU Level of Service	E
Analysis Period (min)	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 4: 67th Avenue NE & 172nd Street NE



Lanes, Volumes, Timings
5: 59th Ave NE & 172nd Street NE

Amber Grove Development



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	907	16	5	554	21	47	2	18	83	7	384
Future Volume (vph)	153	907	16	5	554	21	47	2	18	83	7	384
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frts		0.997			0.994			0.864				0.853
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1839	0	1752	1834	0	1752	1594	0	1752	1530	0
Flt Permitted	0.222			0.222			0.409			0.744		
Satd. Flow (perm)	410	1839	0	410	1834	0	754	1594	0	1372	1530	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			5			19				153
Link Speed (mph)		30			30			30				30
Link Distance (ft)		440			1402			604				1248
Travel Time (s)		10.0			31.9			13.7				28.4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	6%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	165	992	0	5	619	0	51	21	0	89	421	0
Turn Type	Perm	NA										
Protected Phases		4			8			2				6
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Act Effect Green (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.40	0.40		0.40	0.40	
v/c Ratio	1.01	1.35		0.03	0.84		0.17	0.03		0.16	0.60	
Control Delay	96.6	185.0		9.0	26.1		10.5	5.0		9.7	10.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	96.6	185.0		9.0	26.1		10.5	5.0		9.7	10.9	
LOS	F	F		A	C		B	A		A	B	
Approach Delay		172.4			25.9			8.9				10.7
Approach LOS		F			C			A				B
Queue Length 50th (ft)	~41	~362		1	135		8	0		14	47	
Queue Length 95th (ft)	#135	#552		5	#299		25	9		35	115	
Internal Link Dist (ft)		360			1322			524			1168	
Turn Bay Length (ft)												
Base Capacity (vph)	164	736		164	736		301	649		548	703	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	1.01	1.35		0.03	0.84		0.17	0.03		0.16	0.60	

Lanes, Volumes, Timings
 5: 59th Ave NE & 172nd Street NE

Amber Grove Development

Intersection Summary

Area Type:	Other
Cycle Length:	45
Actuated Cycle Length:	45
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	70
Control Type:	Pretimed
Maximum v/c Ratio:	1.35
Intersection Signal Delay:	93.8
Intersection LOS:	F
Intersection Capacity Utilization	96.2%
ICU Level of Service	F
Analysis Period (min)	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
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Splits and Phases: 5: 59th Ave NE & 172nd Street NE

