

**Kimley»»Horn**

2828 Colby Avenue  
Suite 200  
Everett, WA 98201  
425.708.8275

# **Zahradnik Development Traffic Impact Analysis**

**Jurisdiction: City of Arlington**

**November 2022**



090221216

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## 1. DEVELOPMENT IDENTIFICATION

Kimley-Horn and Associates, Inc. has been retained to provide a traffic impact analysis for the proposed Zahradnik Development to address the City of Arlington, Snohomish County, and Washington State Department of Transportation (WSDOT) traffic impacts. This report includes revisions based on comments City of Arlington staff made in November 2022. The Zahradnik Development is proposed to consist of 334 residential units with 51,500 square-feet (SF) of commercial space. The site is located along the north side of 172<sup>nd</sup> Street NE (SR-531) between 85<sup>th</sup> Avenue NE and SR-9. A site vicinity map has been included in Figure 1. The development is anticipated to be constructed and occupied in the year 2026.

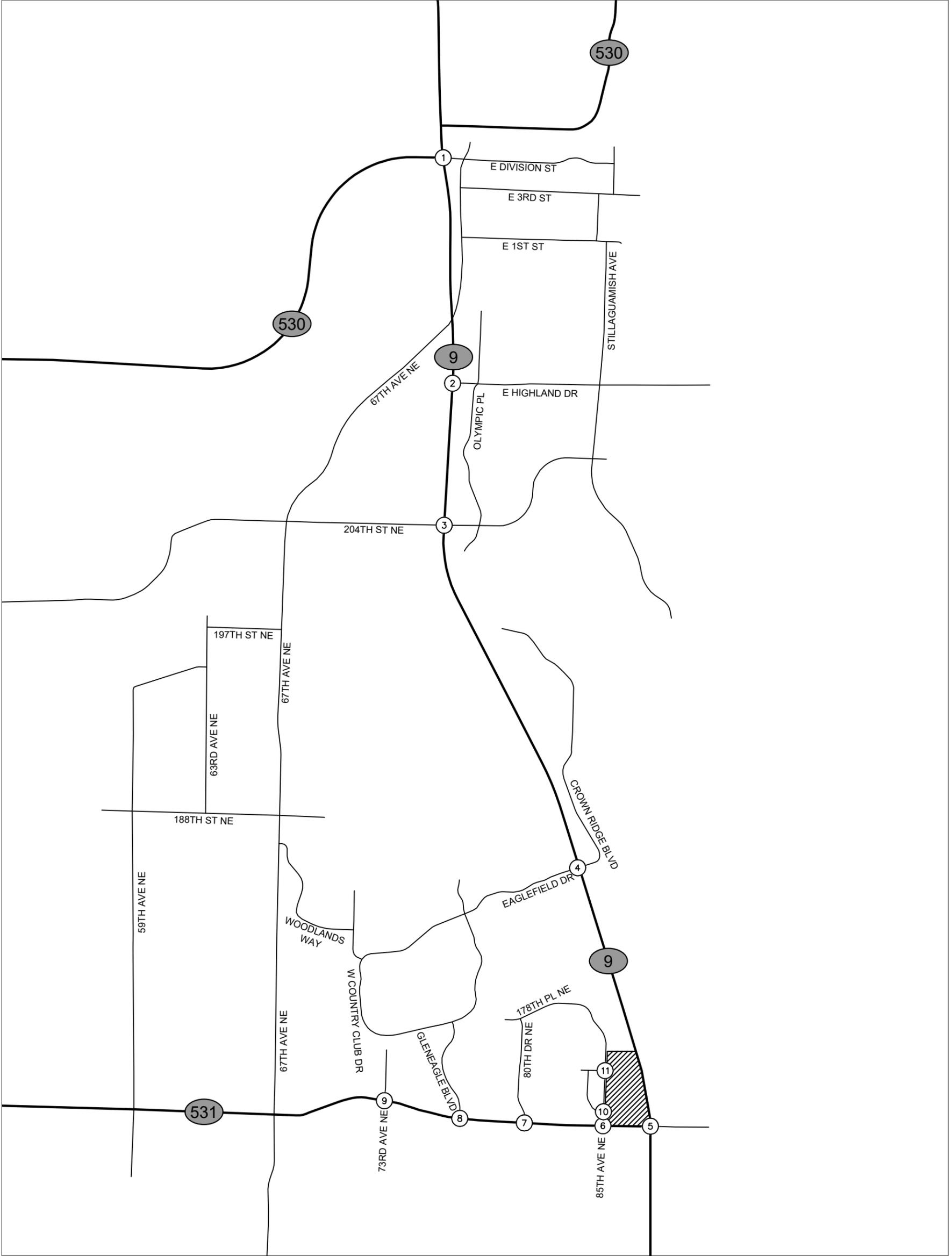
Brad Lincoln, responsible for this report, is a licensed professional engineer (Civil) in the State of Washington and member of the Washington State section of the Institute of Transportation Engineers (ITE).

## 2. METHODOLOGY

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

1. SR-9 at Division Street (SR-530) – Signal
2. SR-9 at Highland Drive - Signal
3. SR-9 at 204<sup>th</sup> Street NE – Signal
4. SR-9 at Eaglefield Drive/Crown Ridge Boulevard – Signal
5. SR-9 at 172<sup>nd</sup> Street NE (SR-531) – Roundabout
6. 85<sup>th</sup> Avenue NE at 172<sup>nd</sup> Street NE (SR-531) – Two-Way Stop-Control
7. 80<sup>th</sup> Drive NE at 172<sup>nd</sup> Street NE (SR-531) – Two-Way Stop-Control
8. Gleneagle Boulevard at 172<sup>nd</sup> Street NE (SR-531) – Two-Way Stop-Control
9. 73<sup>rd</sup> Avenue NE at 172<sup>nd</sup> Street NE (SR-531) – Two-Way Stop-Control
10. 85<sup>th</sup> Avenue NE at 84<sup>th</sup> Avenue NE – Two-Way Stop-Control
11. 85<sup>th</sup> Avenue NE at 175<sup>th</sup> Street NE (SR-531) – Two-Way Stop-Control

These intersections were identified by City of Arlington staff during the scoping process. 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.



ZAHRADNIK

**LEGEND**



DEVELOPMENT SITE



STUDY INTERSECTION

**FIGURE 1**  
VICINITY MAP

CITY OF ARLINGTON

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The peak-hour level of service (LOS) analysis calculations have been completed using the *Synchro 11.1, Build 1* software. This software applies the operational analysis methodology of the current *Highway Capacity Manual 6<sup>th</sup> 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 <sup>1</sup> 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 <sup>2</sup>	>50	>80

The City of Arlington has established an acceptable level of service of LOS D. Additionally, WSDOT typically utilized a volume-to-capacity (v/c) ratio to evaluate the operations of roundabouts. The threshold for roundabouts is typically a v/c of 0.92.

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.

<sup>1</sup> **Source:** *Highway Capacity Manual 6<sup>th</sup> 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.

<sup>2</sup> 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 Zahradnik development are based on data published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual, 11<sup>th</sup> Edition (2021)*. The average trip generation rates for the following ITE Land Use Codes have been used for the trip generation calculations:

- 23 townhouse style units – ITE Land Use Code 215, Single-Family Attached Housing
- 311 multifamily units – ITE Land Use Code 220, Multifamily Housing (Low-Rise)
- 51,500 SF retail space – ITE Land Use Code 821, Shopping Center Plaza (40-150k)

ITE Land Use Code 821 has been used for the commercial spaces since specific commercial uses could change over time and ITE Land Use Code 821 provides data for general commercial and retail areas. Internal crossover reductions have been applied to the trip generation calculations to account for trips between the residential and commercial uses on the site. These trips do not impact the surrounding roadways. The internal crossover reductions have been calculated using the NCHRP 684 Trip Capture Estimation Tool<sup>3</sup>. The internal crossover reduction was calculated to be 22%. This percentage has been applied to the daily and peak-hour trip generation. Additionally, ITE publishes pass-by data for ITE Land Use Code 821. This rate accounts for vehicles currently on the adjacent roadways that will utilize the site. These trips are not new trips to the adjacent roadways. The pass-by rate for ITE Land Use Code 821 is 40%. This pass-by rate has been applied to the daily and peak-hour trip generation calculations. The trip generation of the Zahradnik development is summarized in Table 2.

**Table 2: Trip Generation Calculations**

Land Use	Units/Size	Average Daily Trips	AM Peak-Hour Trips			PM Peak-Hour Trips		
			In	Out	Total	In	Out	Total
Attached Units ITE LUC 215	23 units	166	3	8	11	7	6	13
Multifamily Units ITE LUC 220	311 units	2,096	30	94	124	100	59	159
Retail Use ITE LUC 821	51,500 SF	3,477	55	34	89	131	136	267
Internal Crossover Reduction	---	-1,263	-20	-29	-49	-52	-45	-97
Pass-By Reduction	---	-1,085	-17	-11	-28	-41	-42	-83
<b>TOTAL</b>		<b>3,391</b>	<b>51</b>	<b>96</b>	<b>147</b>	<b>145</b>	<b>114</b>	<b>259</b>

The Zahradnik development is anticipated to generate 3,391 new average daily trips with 147 new AM peak-hour trips and 259 new PM peak-hour trips. The trip generation calculations are included in the attachments.

<sup>3</sup> *Trip Generation Handbook (3<sup>rd</sup> Edition), Institute of Transportation Engineers (ITE), September 2017*

The site is split into three distinct areas, residential only, residential over commercial, and commercial only. The uses and trip generation of the three areas are summarized below:

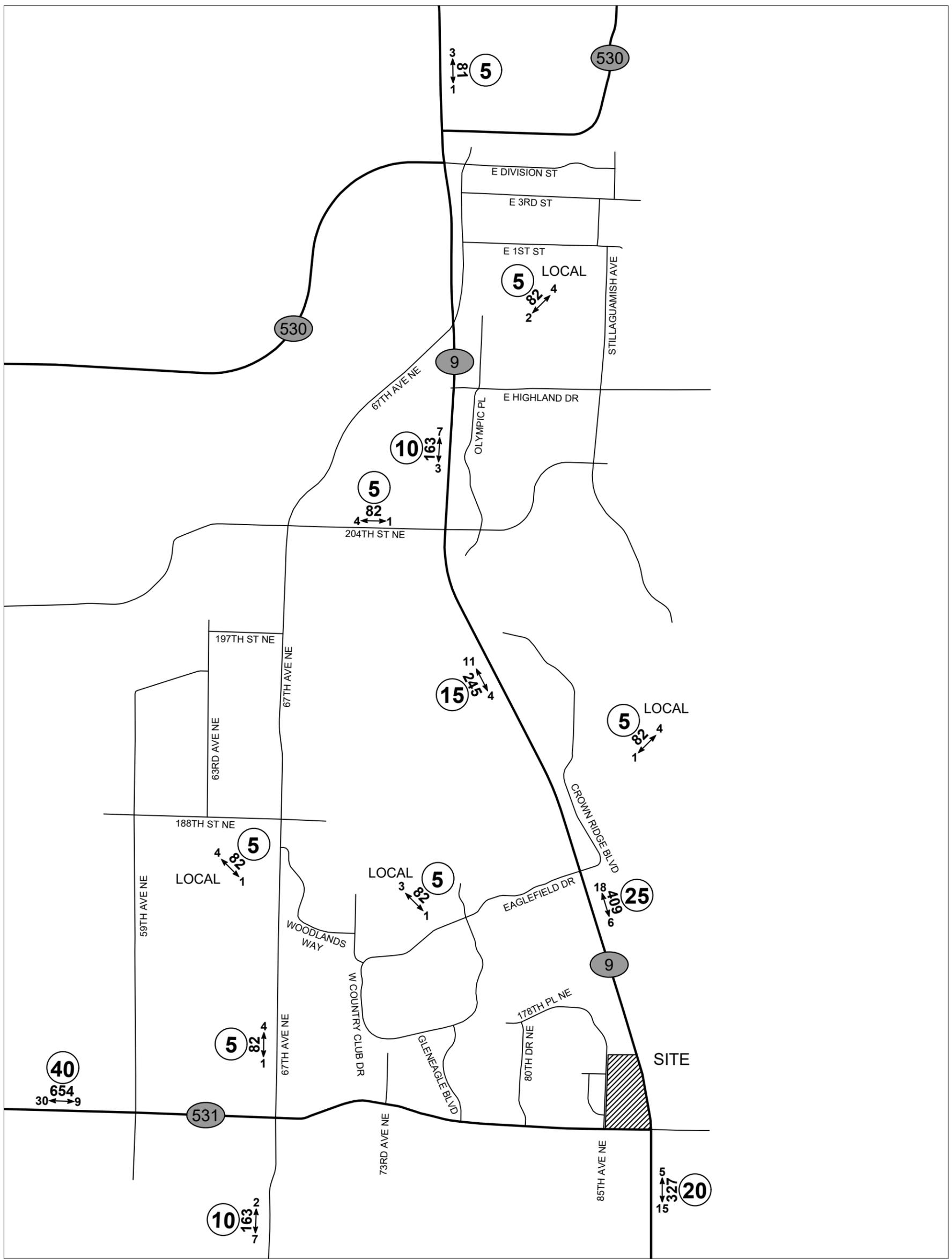
- Residential Only - 23 Townhouse Style Units and 227 Multifamily Units
  - 1,322 Average Daily Trips
  - 80 AM Peak-Hour Trips (20 inbound/60 outbound)
  - 100 PM Peak-Hour Trips (63 inbound/37 outbound)
- Residential Over Commercial - 84 Multifamily Units and 24,000 SF Commercial
  - 1,199 Average Daily Trips
  - 47 AM Peak-Hour Trips (18 inbound/29 outbound)
  - 92 PM Peak-Hour Trips (49 inbound/43 outbound)
- Commercial Only – 27,500 SF Commercial
  - 869 Average Daily Trips
  - 22 AM Peak-Hour Trips (14 inbound/8 outbound)
  - 67 PM Peak-Hour Trips (33 inbound/34 outbound)

It is important to note that there is a minor difference between the trip generation shown in Table 2 and the trip generation summary above for each of the three areas. This is due to rounding of the trip generation calculations for each of the three areas.

#### **4. TRIP DISTRIBUTION**

The trip distribution for the Zahradnik development is based on surrounding land uses and approved distributions for similar developments in the site vicinity. It is anticipated that 45% of the trips generated by the development will travel along SR-9, twenty-five percent to and from the north and twenty percent to and from the south. It is estimated that 40% of the trips generated by the development will travel to and from the west along 172<sup>nd</sup> Street NE/SR-531. The remaining 15% of the trips generated by the development will travel along 67<sup>th</sup> Avenue NE, five percent to and from the north and ten percent to and from the south. Detailed trip distribution for the AM and PM peak-hours are shown in Figure 2 and Figure 3, respectively.

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CITY OF ARLINGTON

**LEGEND**

**AWDT**  
 AM ← PEAK

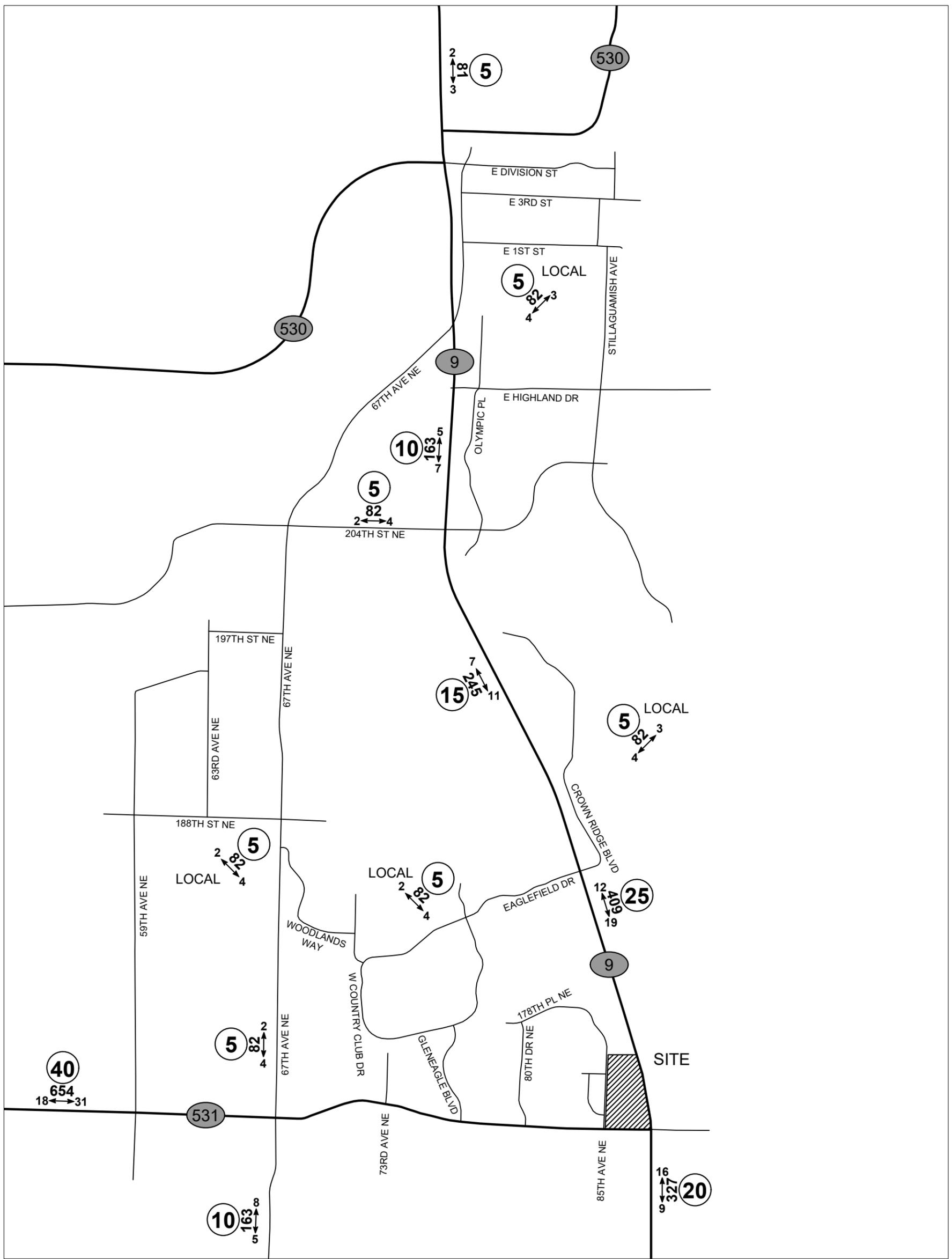


NEW DAILY TRAFFIC  
 NEW PEAK-HOUR TRIPS

TRIP DISTRIBUTION %

**FIGURE 2**  
 DEVELOPMENT  
 TRIP DISTRIBUTION  
 AM PEAK-HOUR

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

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

## 5. INTERSECTION ANALYSIS

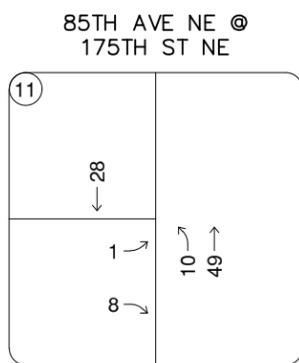
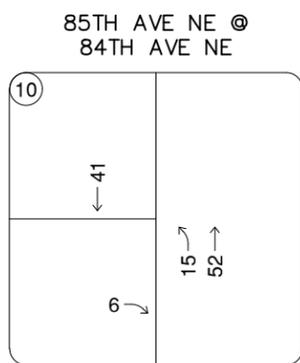
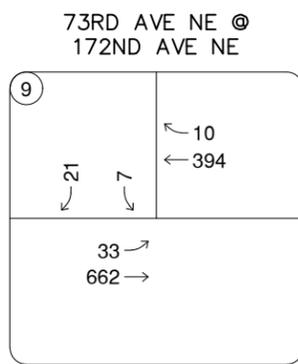
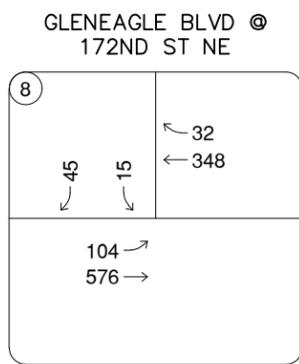
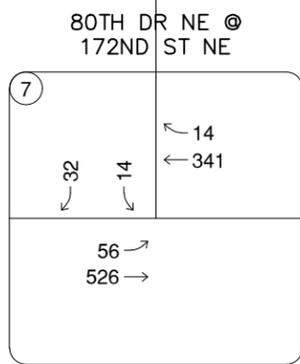
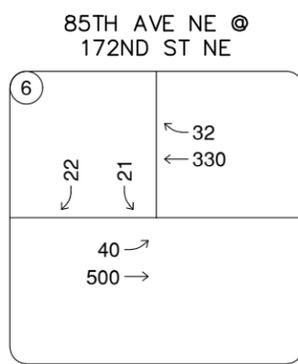
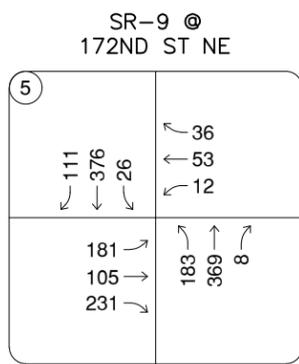
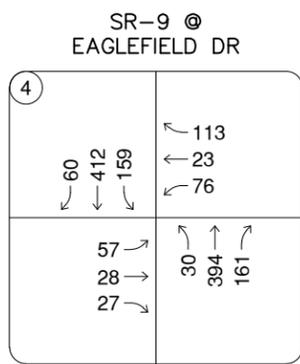
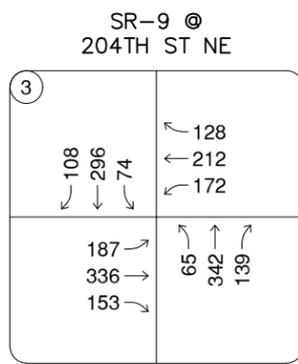
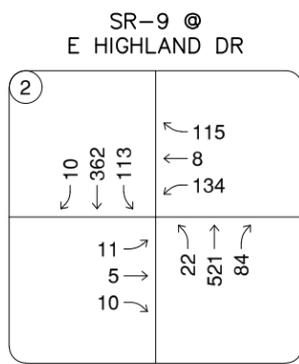
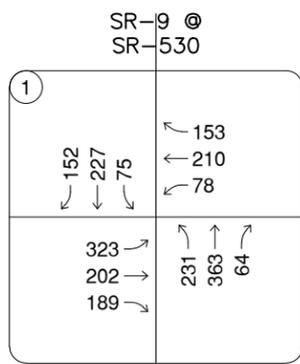
The following intersections have been analyzed as part of this report:

1. SR-9 at Division Street (SR-530) – Signal
2. SR-9 at Highland Drive - Signal
3. SR-9 at 204<sup>th</sup> Street NE – Signal
4. SR-9 at Eaglefield Drive/Crown Ridge Boulevard – Signal
5. SR-9 at 172<sup>nd</sup> Street NE (SR-531) – Roundabout
6. 85<sup>th</sup> Avenue NE at 172<sup>nd</sup> Street NE (SR-531) – Two-Way Stop-Control
7. 80<sup>th</sup> Drive NE at 172<sup>nd</sup> Street NE (SR-531) – Two-Way Stop-Control
8. Gleneagle Boulevard at 172<sup>nd</sup> Street NE (SR-531) – Two-Way Stop-Control
9. 73<sup>rd</sup> Avenue NE at 172<sup>nd</sup> Street NE (SR-531) – Two-Way Stop-Control
10. 85<sup>th</sup> Avenue NE at 84<sup>th</sup> Avenue NE – Two-Way Stop-Control
11. 85<sup>th</sup> Avenue NE at 175<sup>th</sup> Street NE (SR-531) – Two-Way Stop-Control

These intersections were identified during the scoping process with the City of Arlington. The development is anticipated to be completed by the year 2026. 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 June 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 Zahradnik Development to the 2028 baseline turning movements. The 2027 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.



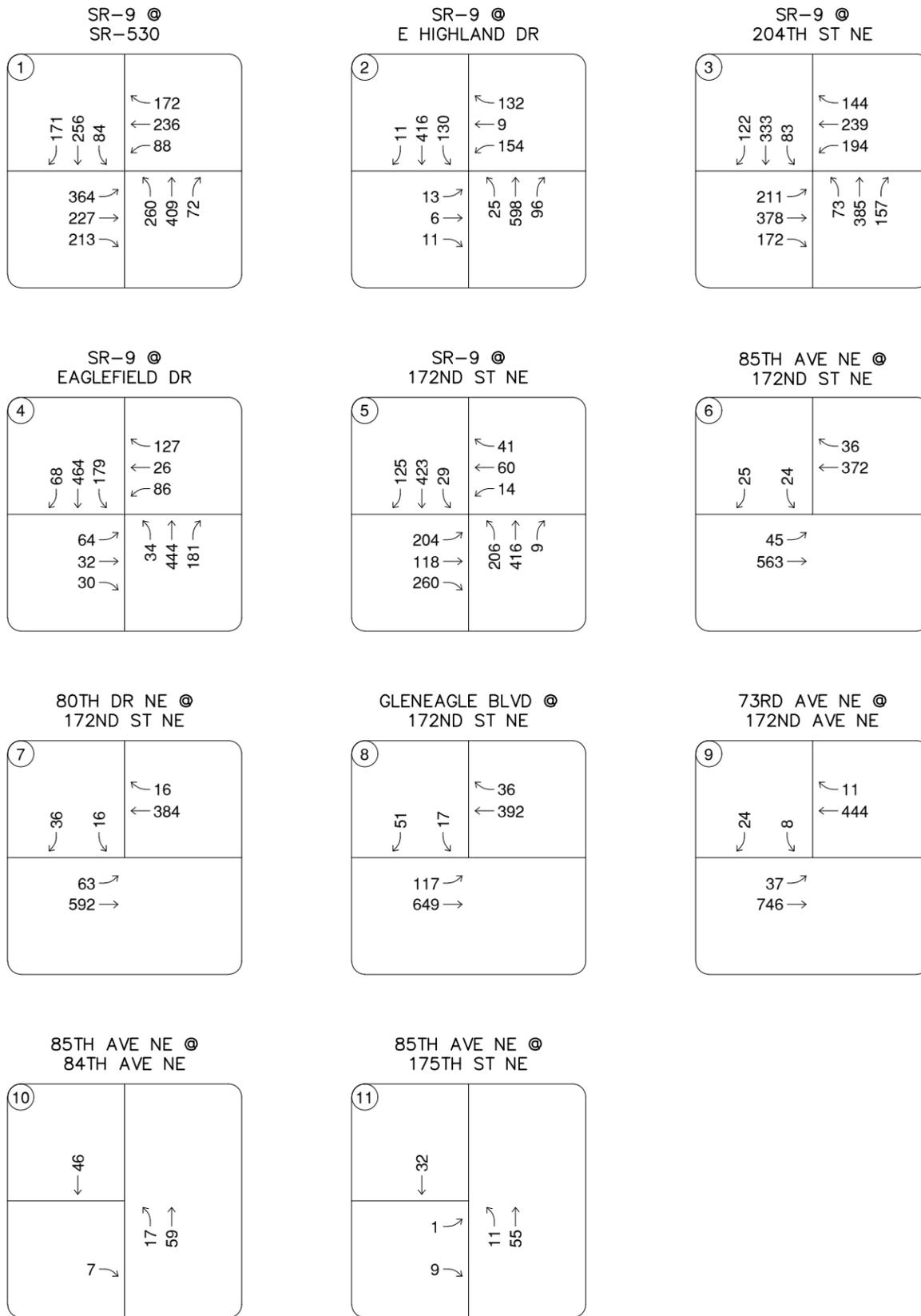
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XXX → PM PEAK-HOUR TURNING MOVEMENT VOLUMES

FIGURE 4  
2022 EXISTING  
TURNING MOVEMENTS

CITY OF ARLINGTON



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XXX → PM PEAK-HOUR TURNING MOVEMENT VOLUMES

**FIGURE 5**  
 2028 BASELINE  
 TURNING MOVEMENTS

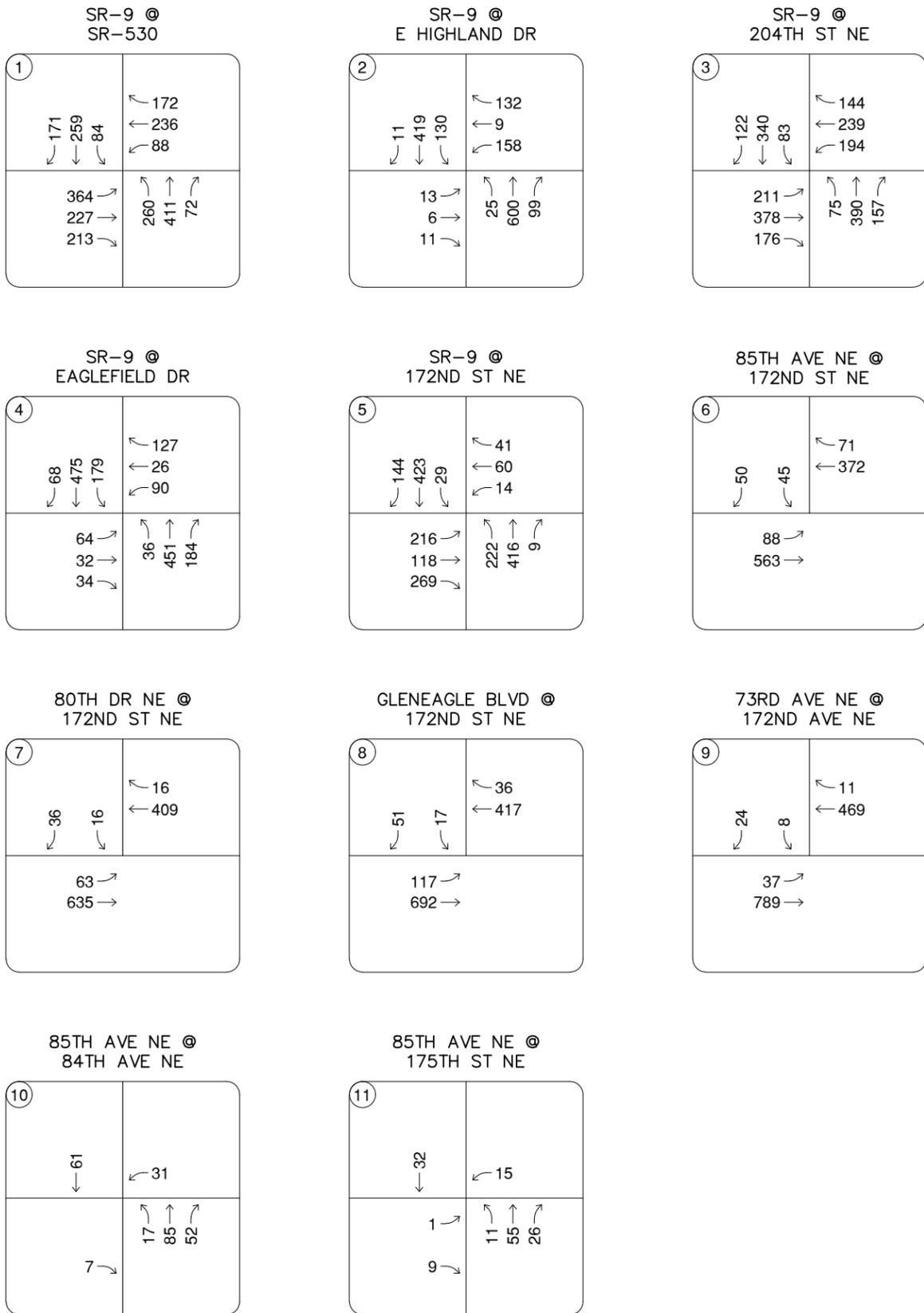
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**LEGEND**  
 XXX → PM PEAK-HOUR TURNING MOVEMENT VOLUMES



**FIGURE 6**  
 2028 FUTURE WITH DEVELOPMENT  
 TURNING MOVEMENTS

## 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	2022 Existing Conditions		2028 Baseline Conditions		2028 Future with Development Conditions	
	LOS	Delay	LOS	Delay	LOS	Delay
1. SR-9 at Division Street/SR-530	C	34.8 sec	D	37.8 sec	D	38.0 sec
2. SR-9 at Highland Drive	B	19.5 sec	C	30.1 sec	C	31.6 sec
3. SR-9 at 204 <sup>th</sup> Street NE	C	33.9 sec	D	39.7 sec	D	40.1 sec
4. SR-9 at Eaglefield Dr/Crown Ridge Blvd	C	20.4 sec	C	22.1 sec	C	22.2 sec
5. SR-9 at 172 <sup>nd</sup> Street NE (SR-531)	A V/C	8.5 sec 0.579	B V/C	10.4 sec 0.696	B V/C	11.1 sec 0.726
6. 85 <sup>th</sup> Avenue NE at 172 <sup>nd</sup> Street NE (SR-531)	B	14.4 sec	C	16.0 sec	C	18.9 sec
7. 80 <sup>th</sup> Drive NE at 172 <sup>nd</sup> Street NE (SR-531)	B	14.0 sec	C	15.7 sec	C	16.6 sec
8. 73 <sup>rd</sup> Avenue NE at 172 <sup>nd</sup> Street NE (SR-531)	C	15.5 sec	C	18.0 sec	C	19.3 sec
9. Gleneagle Boulevard at 172 <sup>nd</sup> Street NE (SR-531)	B	14.0 sec	C	15.4 sec	C	16.2 sec
10. 85 <sup>th</sup> Avenue NE at 84 <sup>th</sup> Avenue NE/Site Access	A	8.6 sec	A	8.6 sec	B	10.4 sec
11. 85 <sup>th</sup> Avenue NE at 175 <sup>th</sup> Street NE/Site Access	A	8.6 sec	A	8.6 sec	A	9.6 sec

The level of service analysis shows that the study intersections are all anticipated to operate at acceptable levels of service under the 2022 exiting, 2028 baseline, and 2028 future with development conditions. The level of service calculations are included in the attachments.

It is important to note that the level of service results could change if the commercial uses generate more trips than what has been evaluated in this report. The City of Arlington will require additional analysis for each of the commercial uses as part of the building permit process.

## **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 Zahradnik Development is anticipated to generate 259 new PM peak-hour trips. These trips result in a City of Arlington traffic mitigation fee of \$868,945.00.

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 30% of the trips generated by the development traveling to and from the south along 67<sup>th</sup> Avenue NE and SR-9. The Snohomish County fee is \$185 per daily trip for residential uses and \$157 per daily tri for commercial uses. The residential uses are anticipated to generate 1,764 new daily trips and the commercial uses are anticipated to generate 1,627 new daily trips. The residential uses are therefore anticipated to have Snohomish County fees of \$97,902.00 and the commercial uses are therefore anticipated to have Snohomish County fees of \$76,631.70.

### **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 WSDOT and included in the attachments. City of Arlington developments are required to pay for WSDOT improvement projects on the Exhibit C list impacted with 10 or more PM peak-hour trips.

There are several intersections along SR-9 and SR-531 that have been analyzed as part of this report and are shown to operate acceptably. The intersections along SR-531 west of the site, particularly from 43<sup>rd</sup> Avenue NE to 67<sup>th</sup> Avenue NE, are included in the Connecting Washington legislation for fully funded improvements. The improvements for the intersection of 172<sup>nd</sup> Street NE (SR-531) at 43<sup>rd</sup> Avenue NE are currently under construction. WSDOT mitigation fees should therefore not be a condition of the Zahradnik Development.

## 7. CONCLUSIONS

The Zahradnik Development is proposed to include 334 residential units and 51,500 SF of commercial space. The Zahradnik Development is anticipated to generate 3,391 new average daily trips with 147 new AM peak-hour trips and 259 new PM peak-hour trips. The analysis shows the study intersections will operate at acceptable levels of service. 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 \$868,945.00, based on the current fee. The Snohomish County fees should be a total of \$174,533.70. WSDOT traffic mitigation fees should not be required.

It is important to note that the commercial space has been evaluated as general commercial uses. The City of Arlington will require additional analysis of the commercial uses that are proposed as part of the building permit process.

# **Trip Generation Calculations**

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

LAND USES	VARIABLE	ITE LU code	Gross Trips				Internal Crossover		NET EXTERNAL TRIPS BY TYPE											
			Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	Trips In+Out (Total)	IN BOTH DIRECTIONS		DIRECTIONAL ASSIGNMENTS									
									TOTAL In+Out (Total)	PASS-BY % of Ext. Trips	In+Out (Total)	NEW In+Out (Total)	DIVERTED LINK % of Ext. Trips	DIVERTED LINK In+Out (Total)	PASS-BY In	PASS-BY Out	DIVERTED LINK In	DIVERTED LINK Out	NEW In	NEW Out
Single-Family Attached Housing	23 units	215	7.20	50%	50%	166	22%	37	129	0%	0	129	0	0	0	0	0	0	65	64
Multifamily Housing (Low-Rise)	311 units	220	6.74	50%	50%	2096	22%	461	1635	0%	0	1635	0	0	0	0	0	0	818	817
Shopping Center Plaza (40-150k)	51.500 ksf	821	67.52	50%	50%	3477	22%	765	2712	40%	1085	1627	543	542	0	0	0	0	814	813
<b>Totals</b>						5739		1263	4476		1085	3391	543	542	0	0	0	0	1697	1694



Zahradnik  
090221216

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	Trip Rate	Gross Trips			Internal Crossover		NET EXTERNAL TRIPS BY TYPE										
				% IN	% OUT	In+Out (Total)	% of Gross Trips	Trips In+Out (Total)	IN BOTH DIRECTIONS		DIRECTIONAL ASSIGNMENTS								
									TOTAL In+Out (Total)	PASS-BY % of Ext. Trips	In+Out (Total)	NEW In+Out (Total)	DIVERTED LINK In	DIVERTED LINK Out	PASS-BY In	PASS-BY Out	DIVERTED LINK In	DIVERTED LINK Out	NEW In
Single-Family Attached Housing	23 units	215	0.57	57%	43%	13	22%	3	0%	0	0	10	0	0	0	0	0	6	4
Multifamily Housing (Low-Rise)	311 units	220	0.51	63%	37%	159	22%	35	0%	0	0	124	0	0	0	0	0	78	46
Shopping Center Plaza (40-150k)	51.500 ksf	821	5.19	49%	51%	267	22%	59	40%	83	208	0	0	0	41	42	0	61	64
<b>Totals</b>						439		97		83	342	0	0	0	41	42	0	145	114

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Zahradnik	Organization:	Kimley-Horn
Project Location:	Arlington, WA	Performed By:	Brad Lincoln
Scenario Description:	Full Build-Out	Date:	2/18/2022
Analysis Year:	---	Checked By:	-
Analysis Period:	PM Street Peak Hour	Date:	-

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips <sup>3</sup>		
	ITE LUCs <sup>1</sup>	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				267	131	136
Restaurant				0		
Cinema/Entertainment				0		
Residential				172	107	65
Hotel				0		
All Other Land Uses <sup>2</sup>				0		
				439	238	201

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. <sup>4</sup>	% Transit	% Non-Motorized	Veh. Occ. <sup>4</sup>	% Transit	% Non-Motorized
Office	1.00	0%	0%	1.00	0.00	0.00
Retail	1.00	0%	0%	1.00	0.00	0.00
Restaurant	1.00	0%	0%	1.00	0.00	0.00
Cinema/Entertainment						
Residential	1.00	0%	0%	1.00	0.00	0.00
Hotel						
All Other Land Uses <sup>2</sup>						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	35	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	13	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	439	238	201
Internal Capture Percentage	22%	20%	24%
External Vehicle-Trips <sup>5</sup>	343	190	153
External Transit-Trips <sup>6</sup>	0	0	0
External Non-Motorized Trips <sup>6</sup>	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	10%	26%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	33%	20%
Hotel	N/A	N/A

<sup>1</sup>Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

<sup>2</sup>Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

<sup>3</sup>Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

<sup>4</sup>Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made.

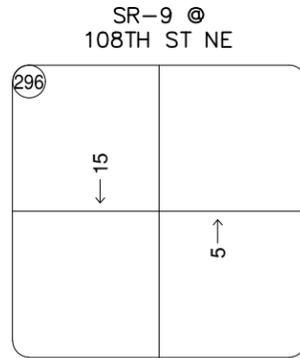
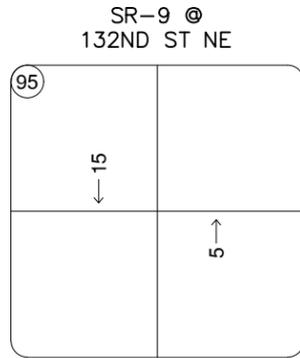
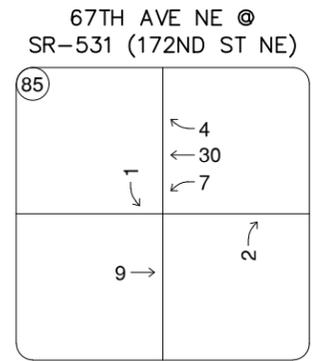
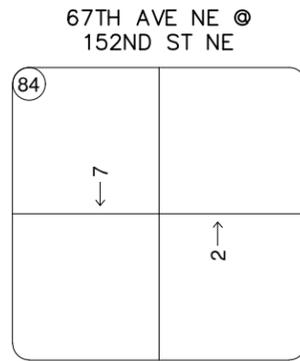
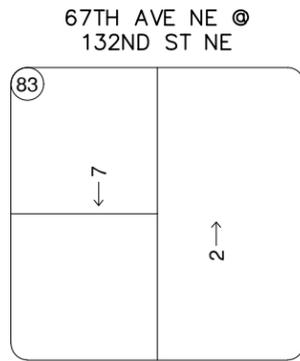
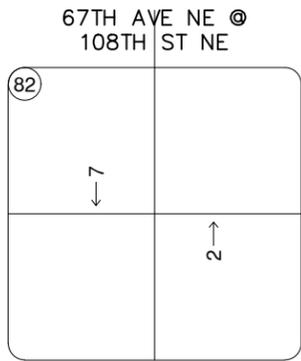
<sup>5</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

<sup>6</sup>Person-Trips

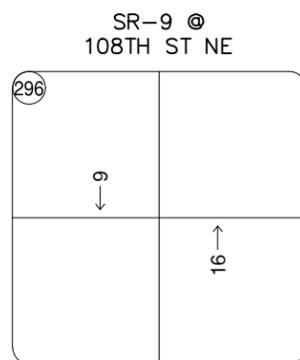
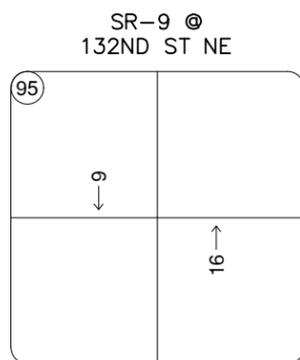
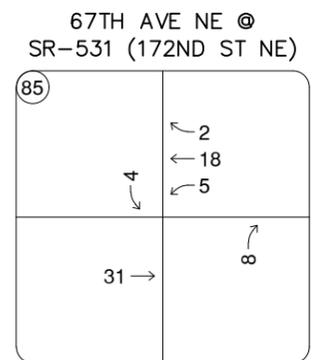
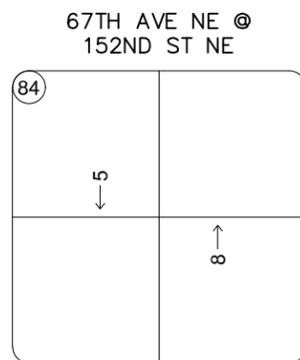
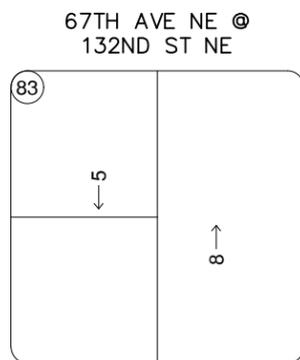
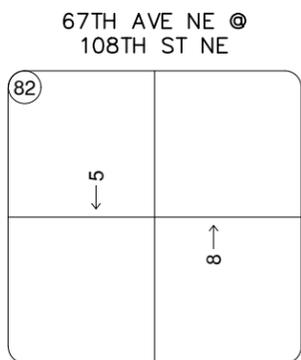
\*Indicates computation that has been rounded to the nearest whole number.

# **Snohomish County Key Intersections**





AM PEAK-HOUR



PM PEAK-HOUR

ZAHRADNIK

**LEGEND**

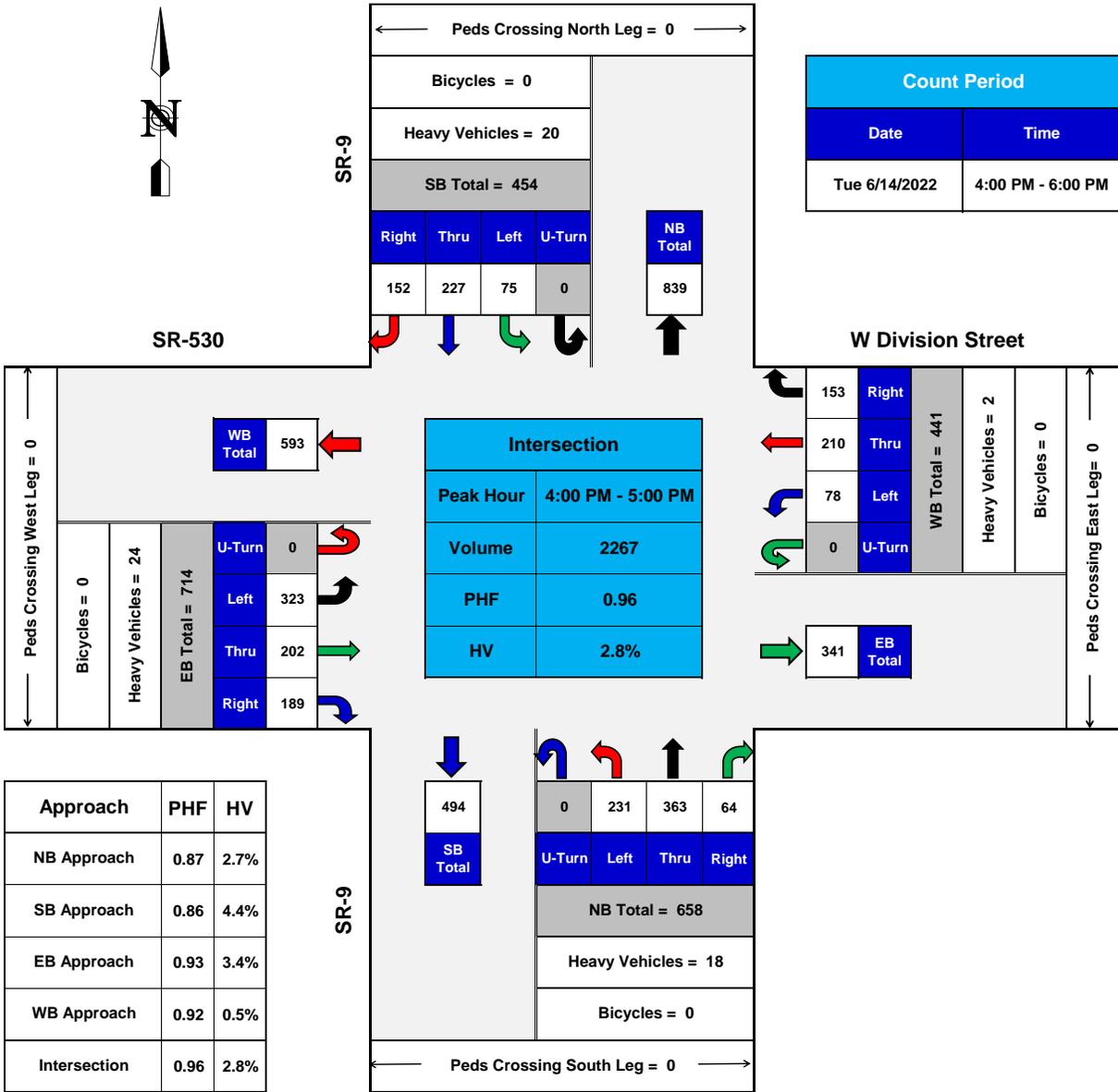
XXX → PEAK-HOUR  
TURNING MOVEMENT VOLUME

**FIGURE B**  
DEVELOPMENT  
KEY INTERSECTION  
VOLUMES

CITY OF ARLINGTON

# Counts and Turning Movement Calculations

**SR-9 @ SR-530**  
**Arlington, WA**

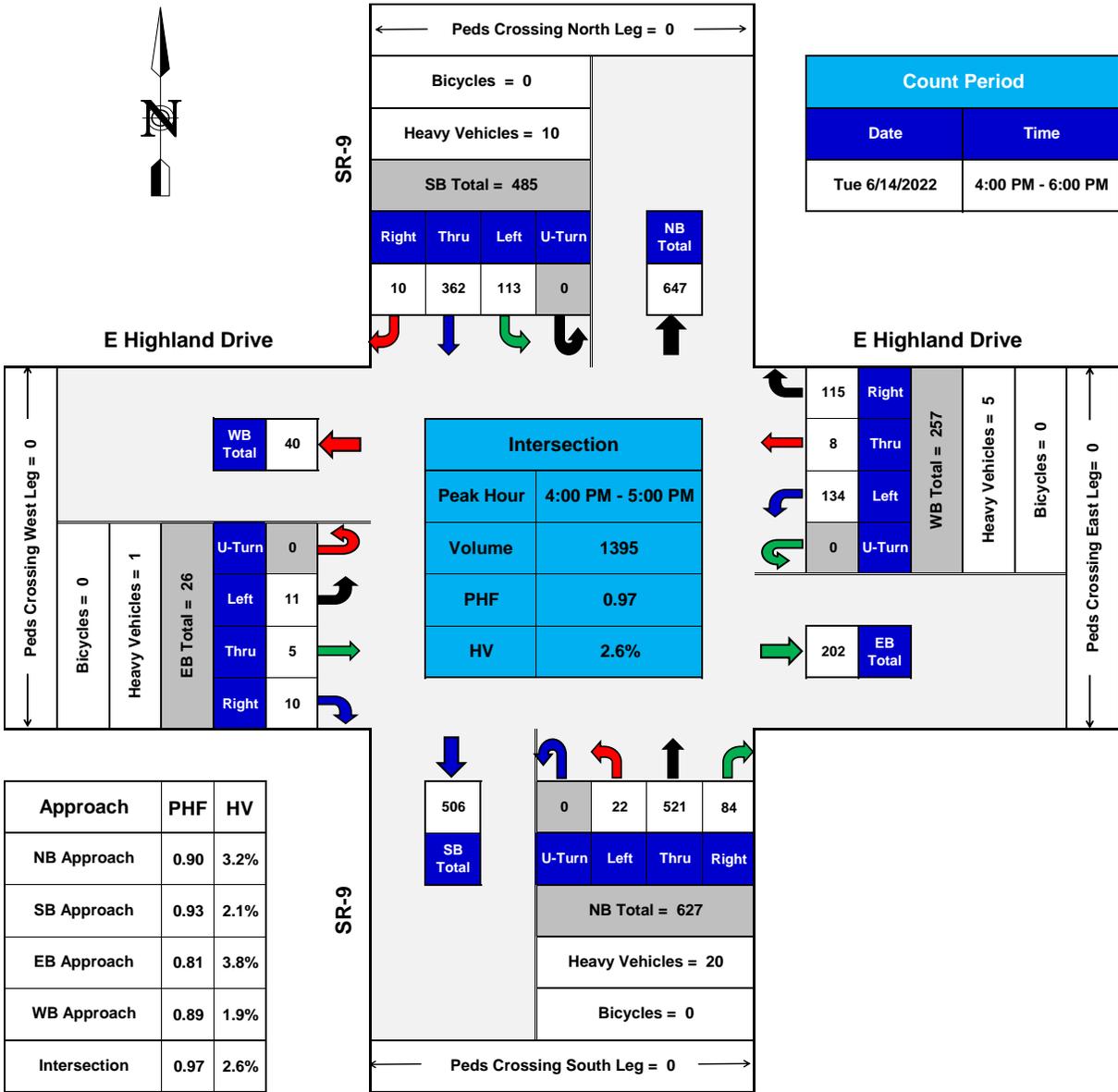


PHF = Peak Hour Factor  
 HV = Heavy Vehicles

**TURNING MOVEMENTS DIAGRAM**  
**PEAK HOUR SUMMARY**



**SR-9 @ E Highland Drive**  
**Arlington, WA**

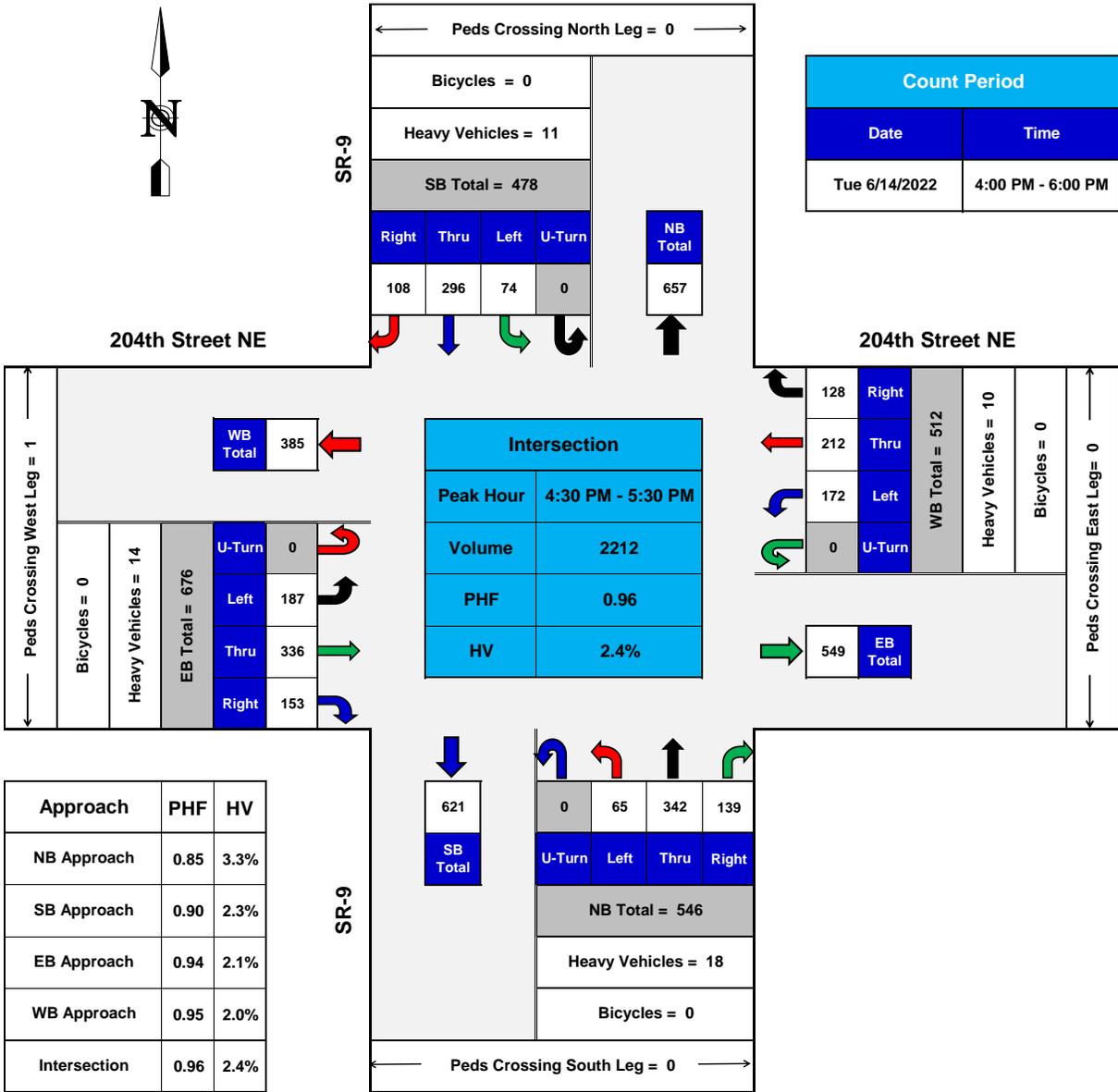


PHF = Peak Hour Factor  
 HV = Heavy Vehicles

**TURNING MOVEMENTS DIAGRAM**  
**PEAK HOUR SUMMARY**



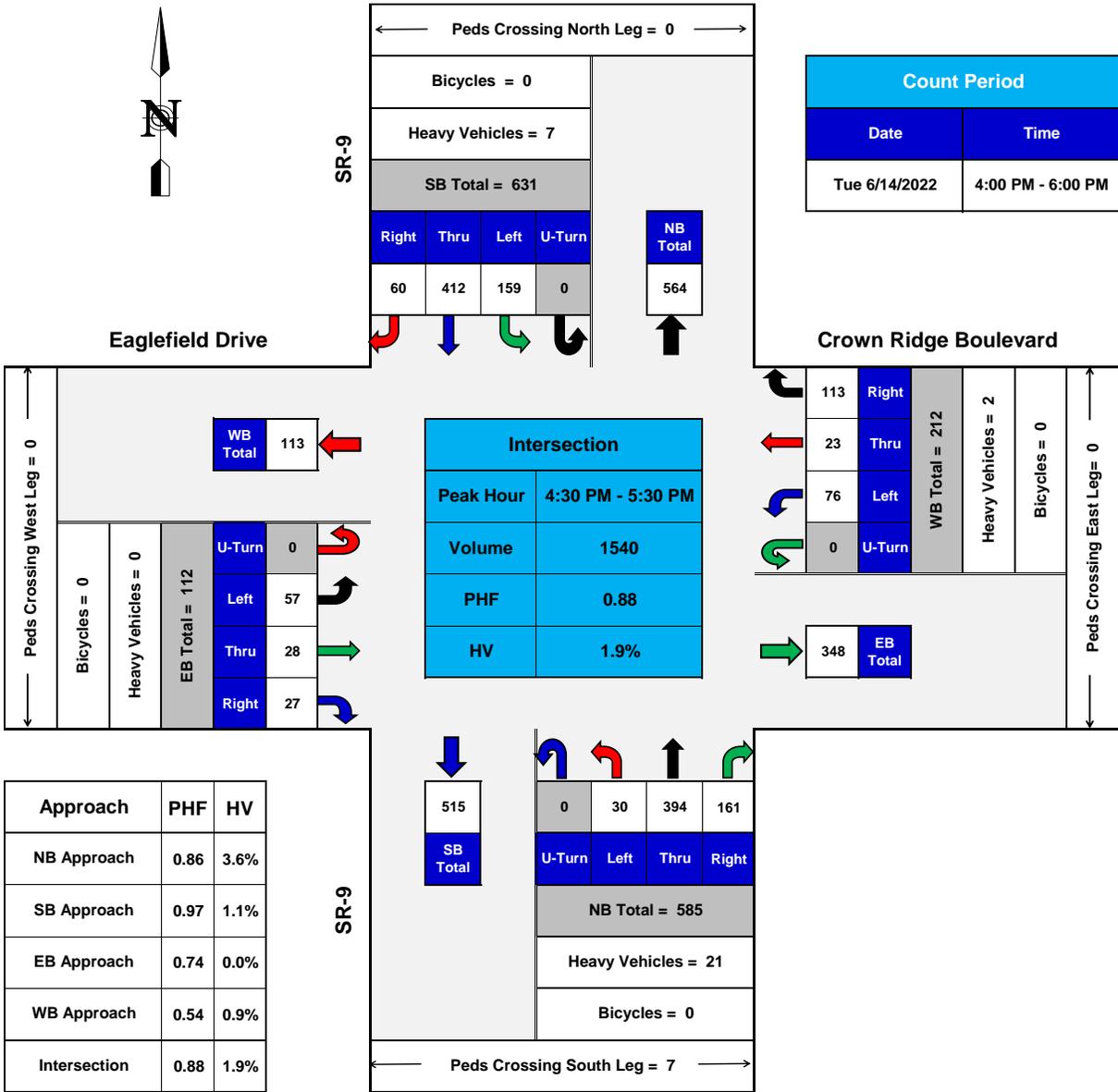
**SR-9 @ 204th Street NE**  
**Arlington, WA**



**TURNING MOVEMENTS DIAGRAM**  
**PEAK HOUR SUMMARY**



**SR-9 @ Crown Ridge Boulevard**  
**Arlington, WA**

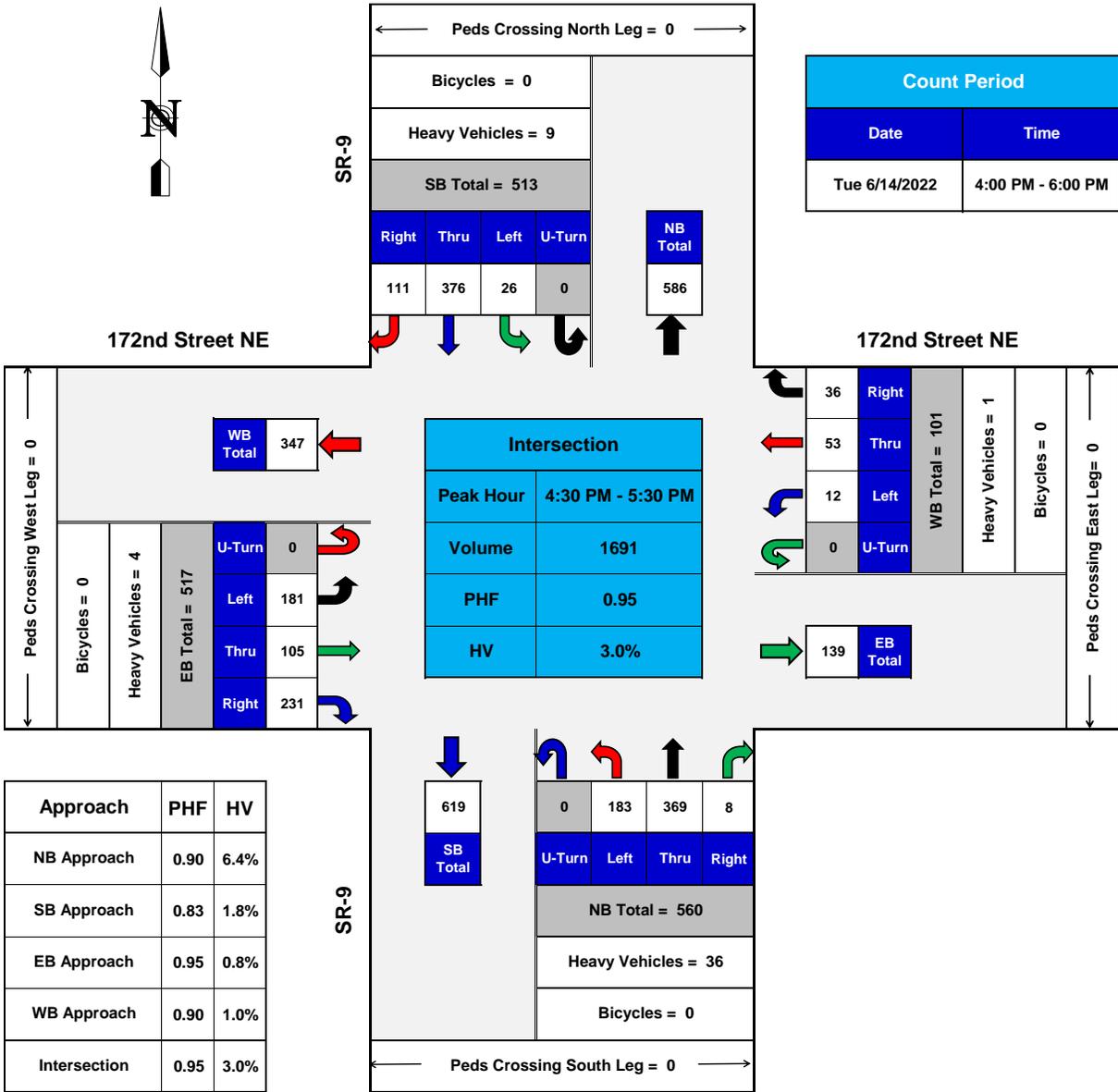


PHF = Peak Hour Factor  
 HV = Heavy Vehicles

**TURNING MOVEMENTS DIAGRAM**  
**PEAK HOUR SUMMARY**



**SR-9 @ 172nd Street NE**  
**Arlington, WA**



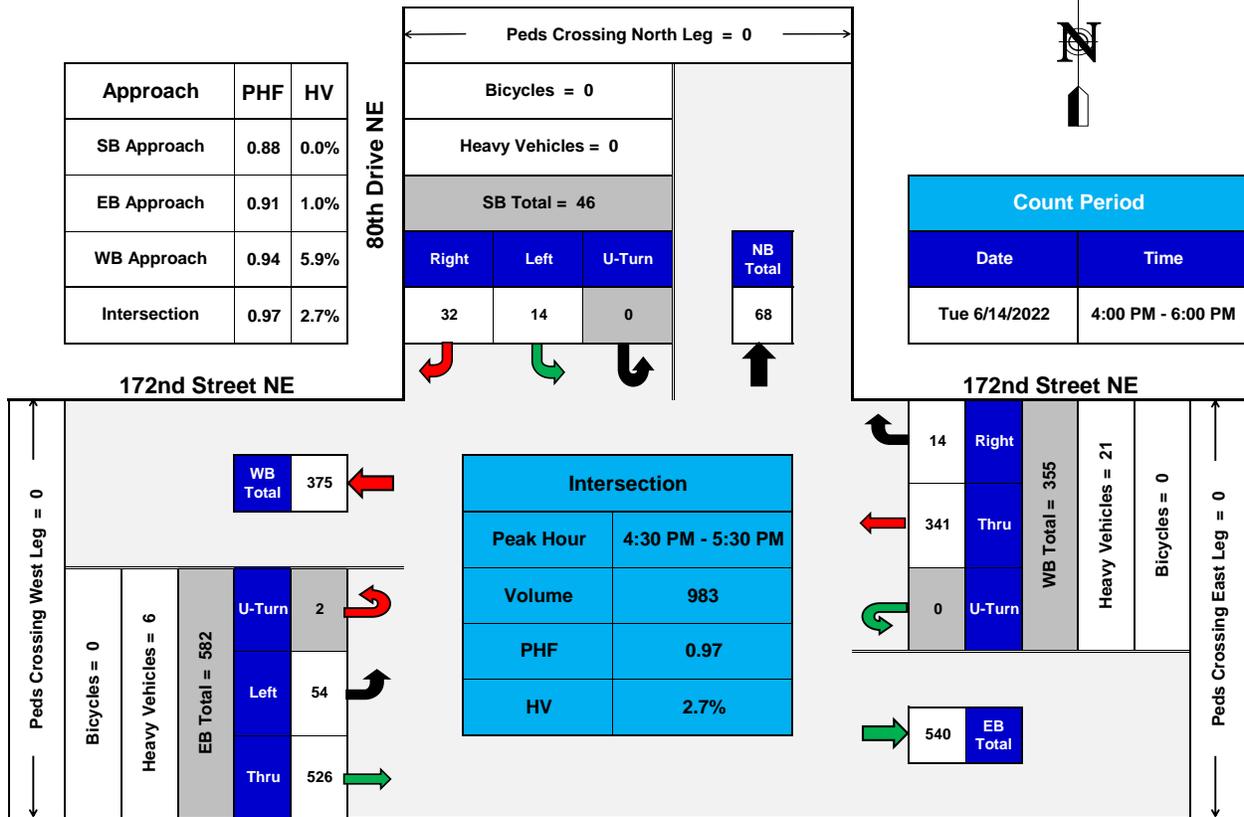
PHF = Peak Hour Factor  
 HV = Heavy Vehicles

**TURNING MOVEMENTS DIAGRAM**  
**PEAK HOUR SUMMARY**





**172nd Street NE @ 80th Drive NE  
Arlington, WA**

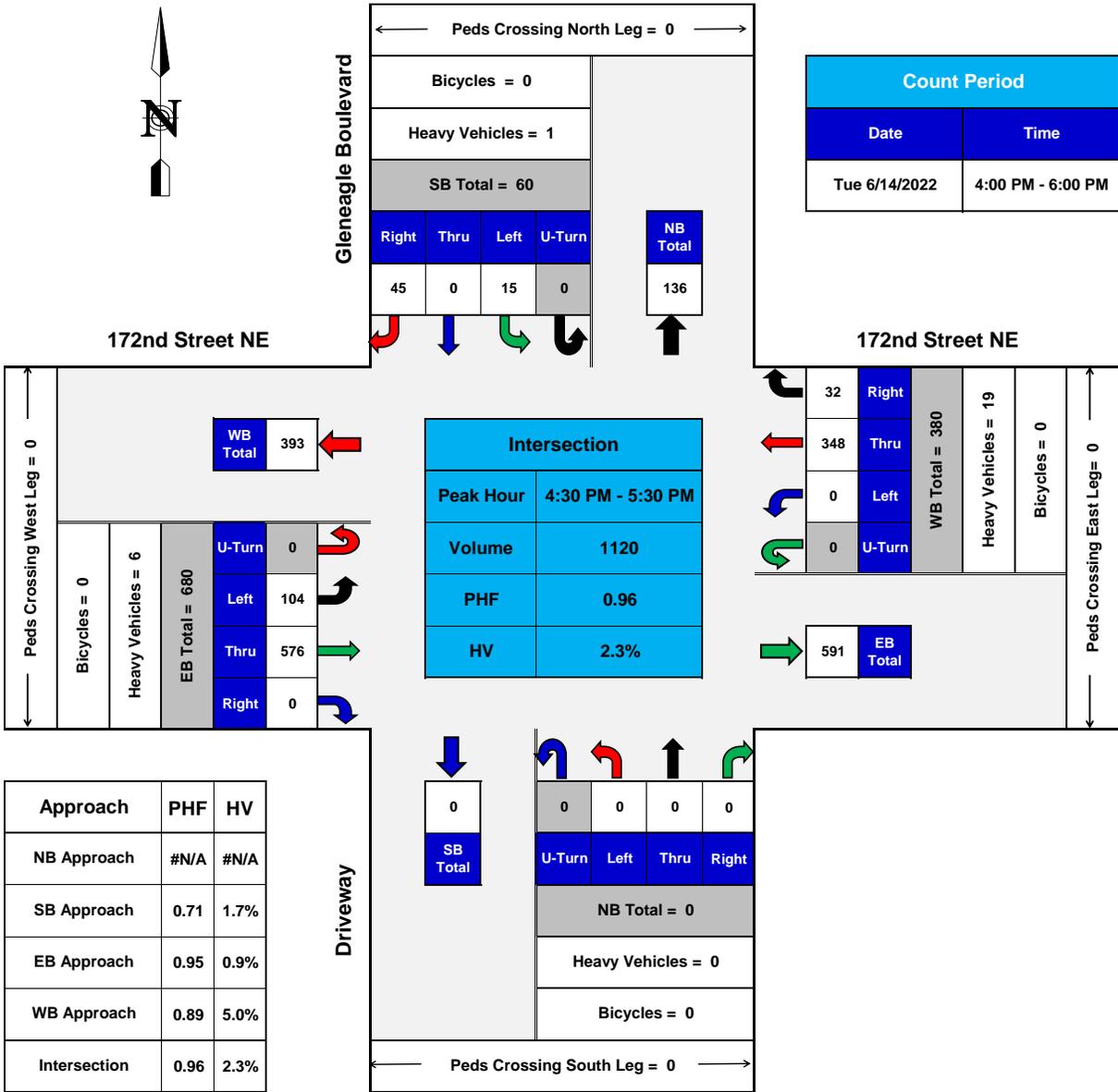


PHF = Peak Hour Factor  
HV = Heavy Vehicles

**TURNING MOVEMENTS DIAGRAM  
PEAK HOUR SUMMARY**



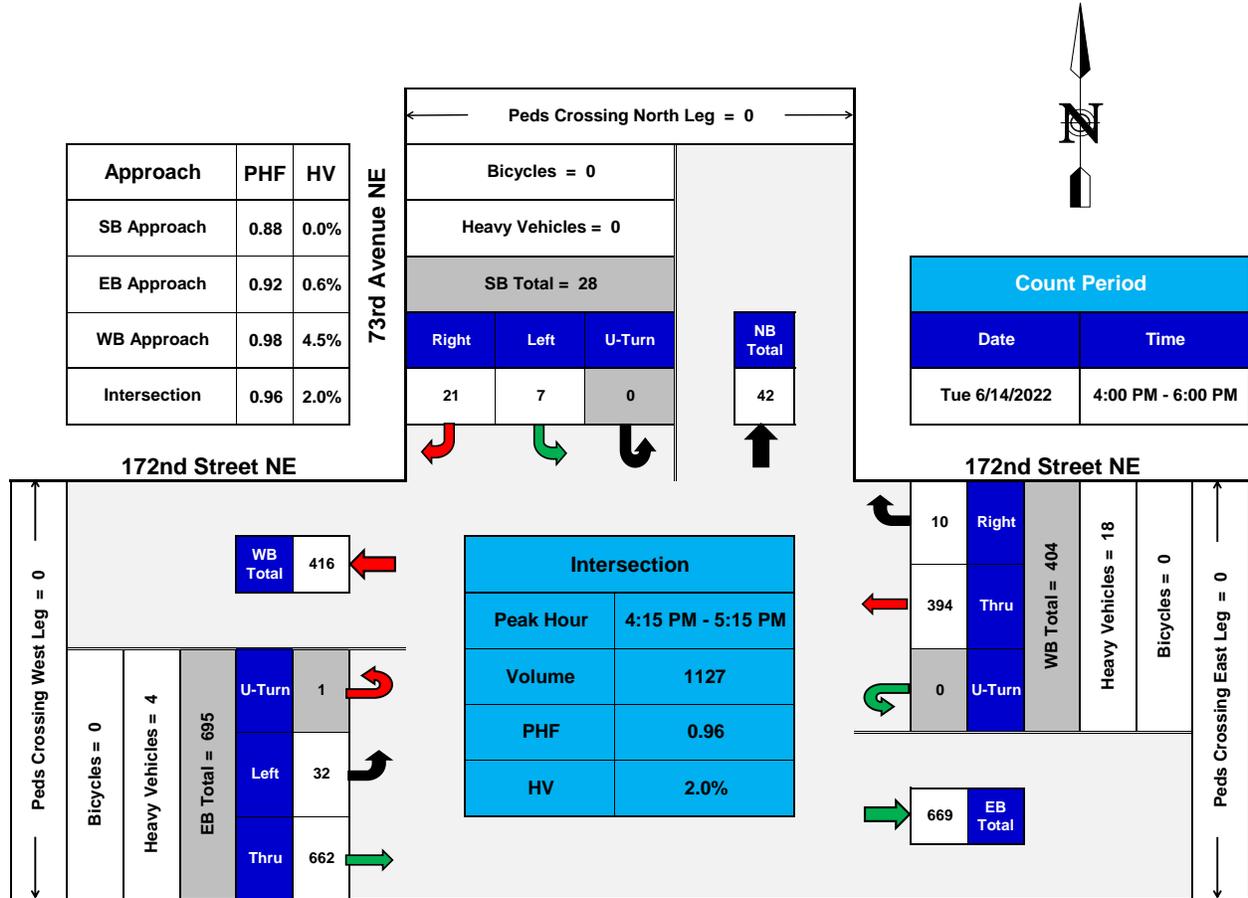
**172nd Street NE @ Gleneagle Boulevard**  
**Arlington, WA**



**TURNING MOVEMENTS DIAGRAM**  
**PEAK HOUR SUMMARY**



**172nd Street NE @ 73rd Avenue NE  
Arlington, WA**

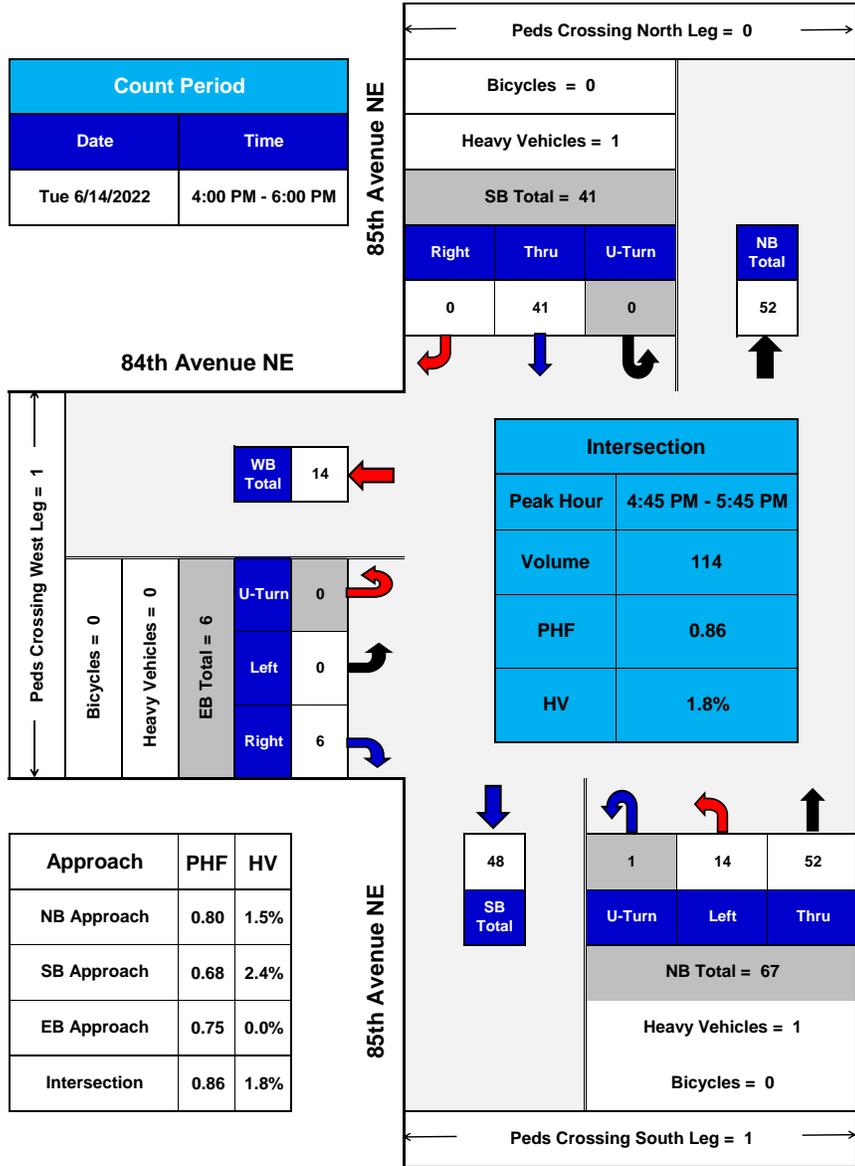


PHF = Peak Hour Factor  
HV = Heavy Vehicles

**TURNING MOVEMENTS DIAGRAM  
PEAK HOUR SUMMARY**



**84th Avenue NE @ 85th Avenue NE**  
**Arlington, WA**

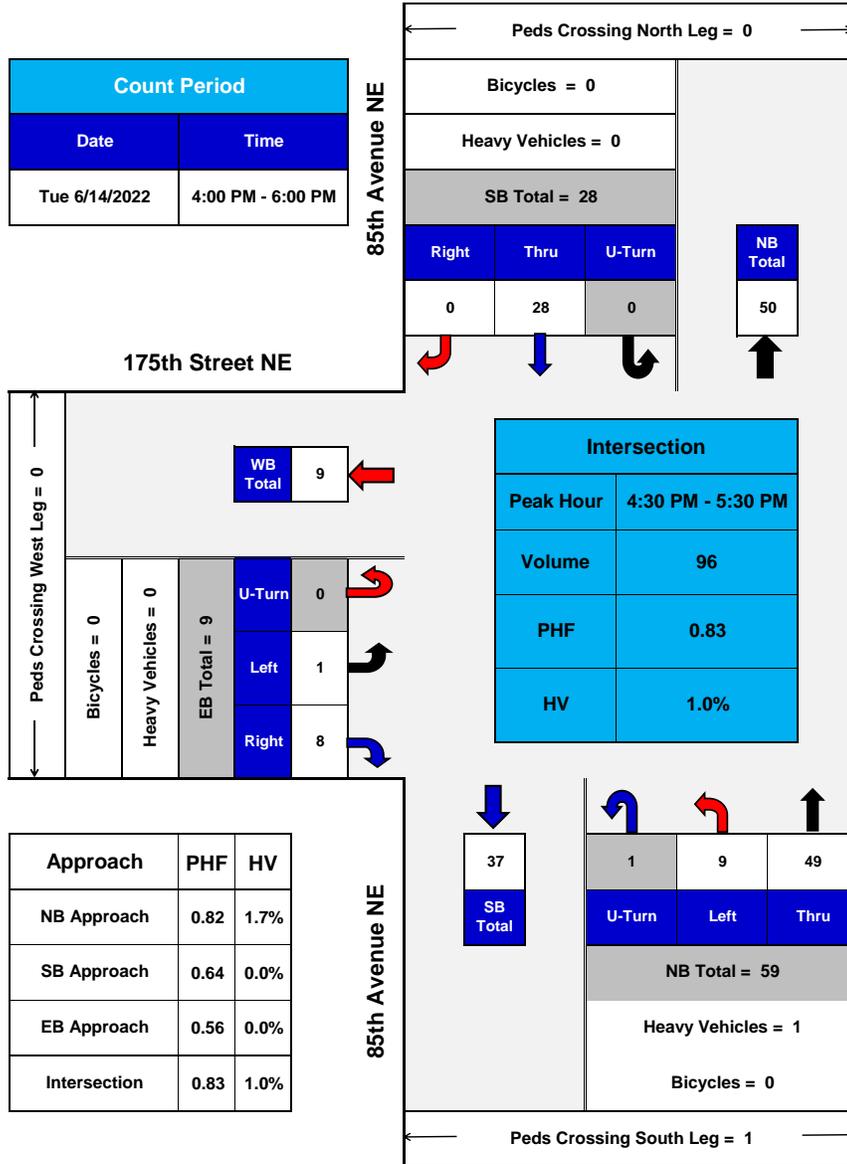


PHF = Peak Hour Factor  
 HV = Heavy Vehicles

**TURNING MOVEMENTS DIAGRAM**  
**PEAK HOUR SUMMARY**



**175th Street NE @ 85th Avenue NE**  
**Arlington, WA**



PHF = Peak Hour Factor  
 HV = Heavy Vehicles

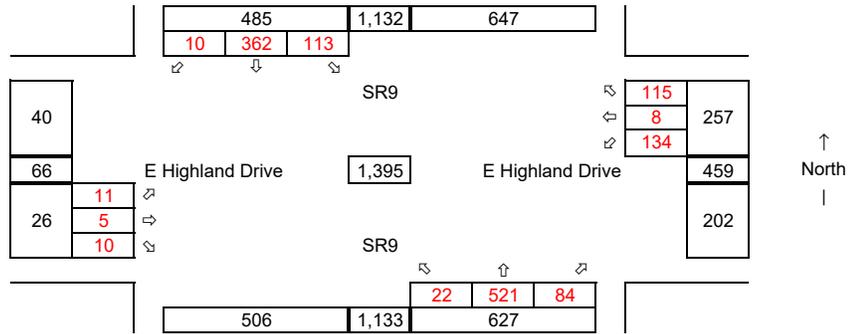
**TURNING MOVEMENTS DIAGRAM**  
**PEAK HOUR SUMMARY**



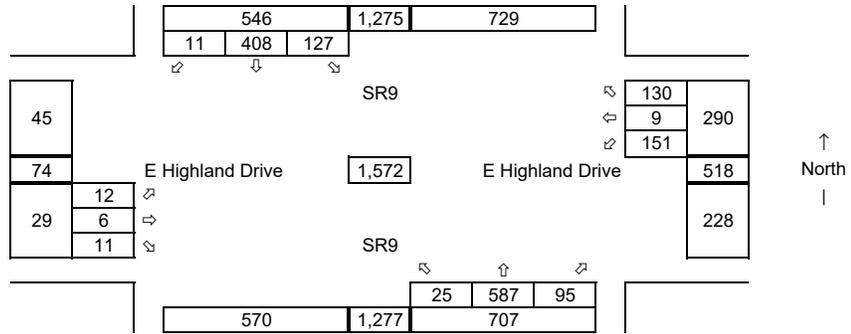


2 SR9 @ E Highland Dr\_PM

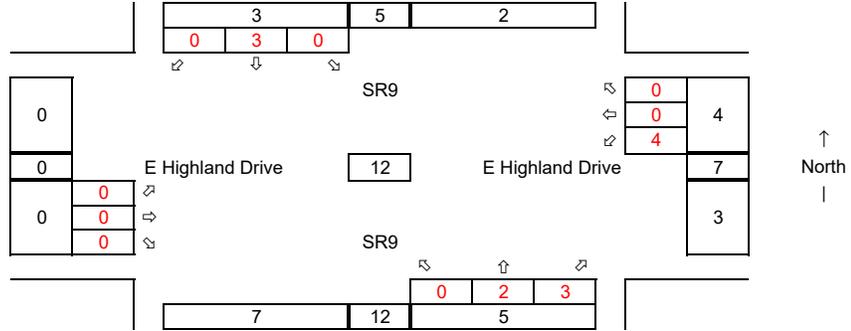
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**Existing**  
 Average Weekday  
 PM Peak Hour  
 Year: 6/14/2022  
 Data Source: TDG



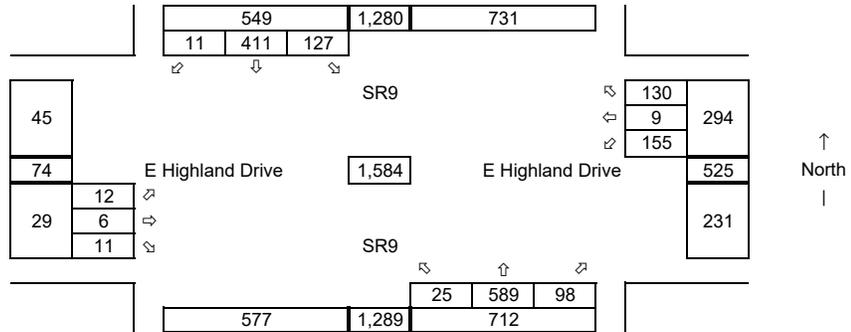
**Baseline**  
 Average Weekday  
 PM Peak Hour  
 Year: 2028  
 Growth Rate = 2.0%  
 Years of Growth = 6  
 Total Growth = 1.1262



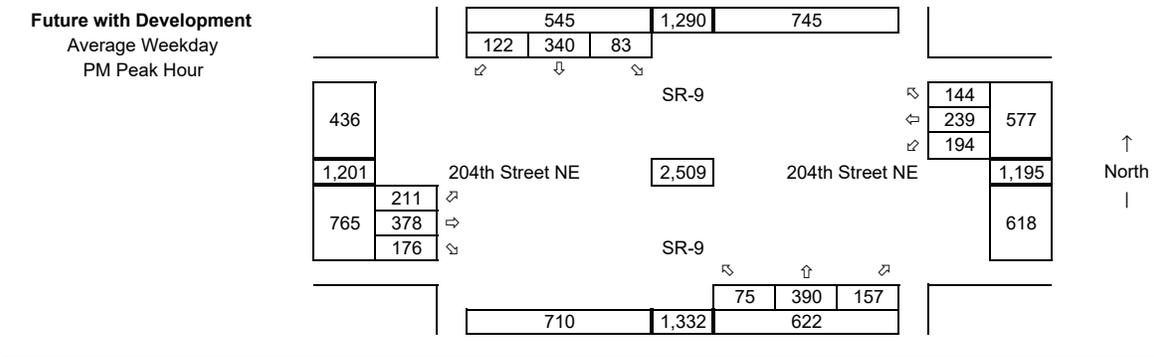
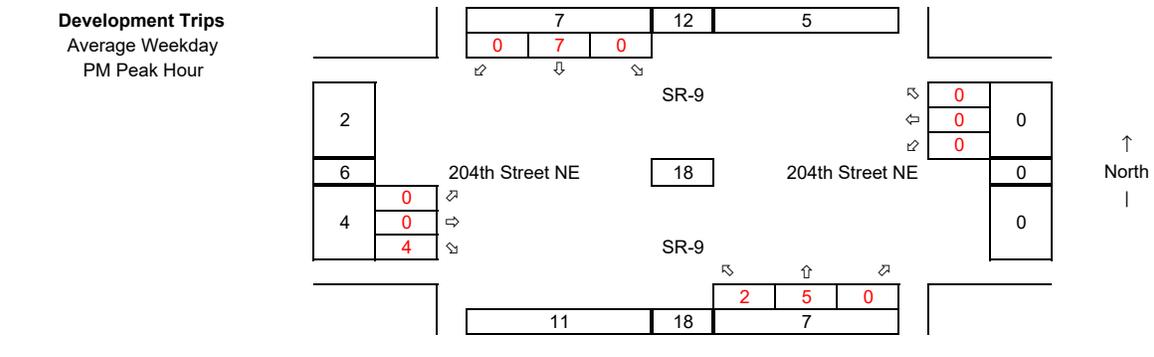
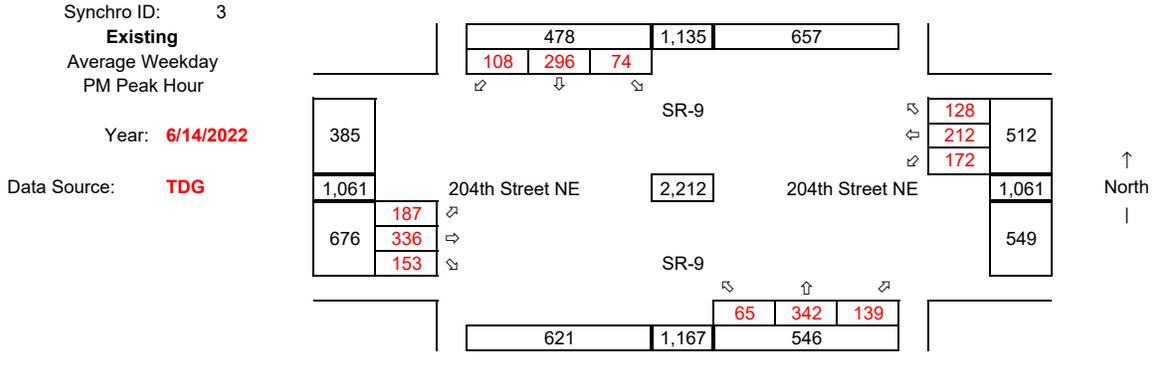
**Development Trips**  
 Average Weekday  
 PM Peak Hour



**Future with Development**  
 Average Weekday  
 PM Peak Hour



3 SR9 @ 204TH St NE\_PM



4 SR9 @ Crown Ridge Blvd\_PM

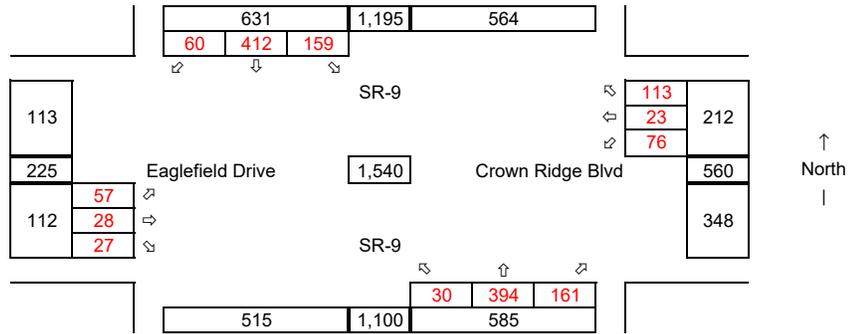
Synchro ID: 4

**Existing**

Average Weekday  
PM Peak Hour

Year: 6/14/2022

Data Source: TDG



**Baseline**

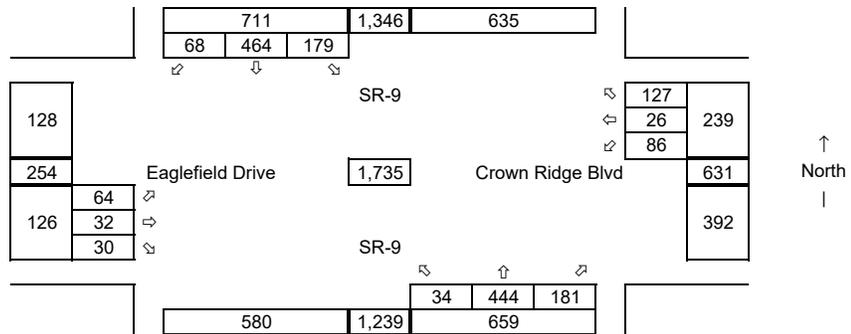
Average Weekday  
PM Peak Hour

Year: 2028

Growth Rate = 2.0%

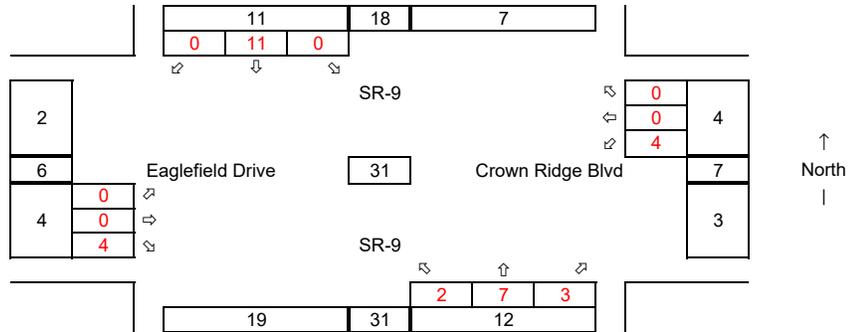
Years of Growth = 6

Total Growth = 1.1262



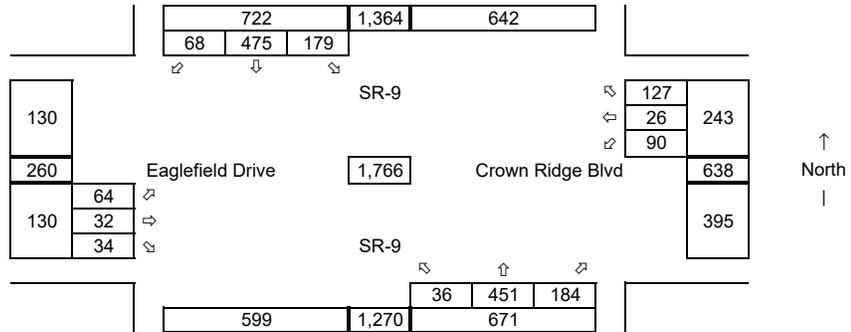
**Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



5 SR9 @ 172ND St NE\_PM

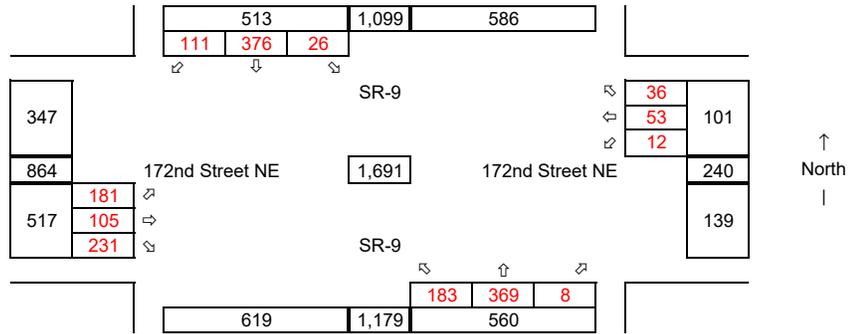
Synchro ID: 5

**Existing**

Average Weekday  
PM Peak Hour

Year: 6/14/2022

Data Source: TDG



**Baseline**

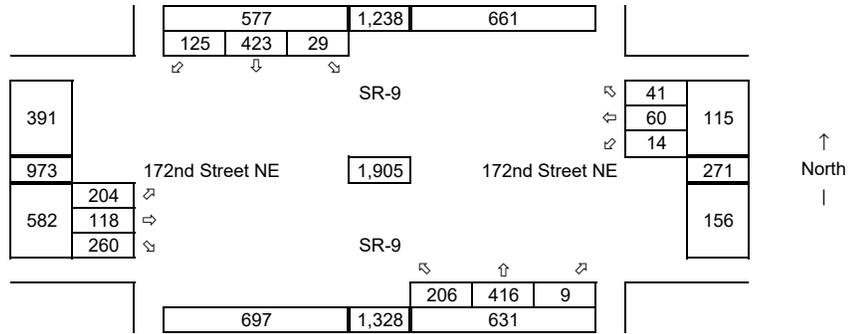
Average Weekday  
PM Peak Hour

Year: 2028

Growth Rate = 2.0%

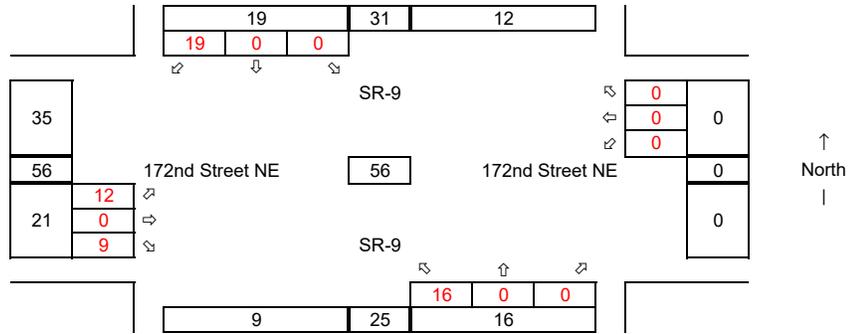
Years of Growth = 6

Total Growth = 1.1262



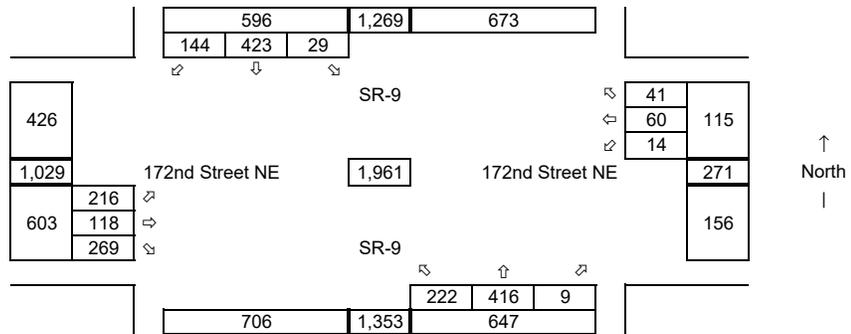
**Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



6 172nd St NE @ 85th Ave NE\_PM

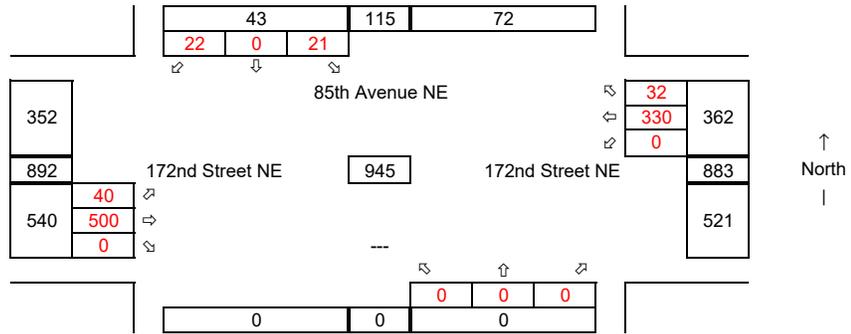
Synchro ID: 6

**Existing**

Average Weekday  
PM Peak Hour

Year: 6/14/2022

Data Source: TDG



**Baseline**

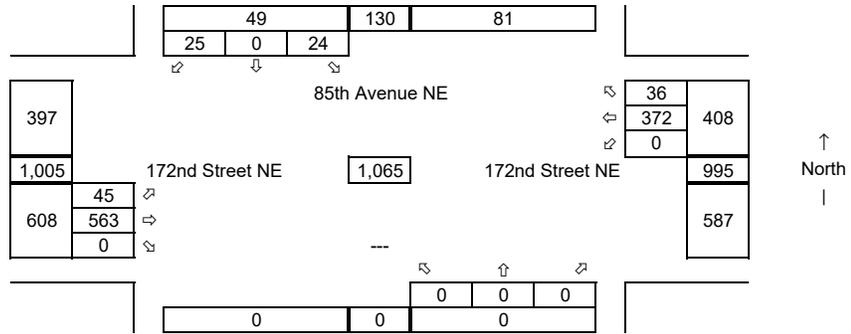
Average Weekday  
PM Peak Hour

Year: 2028

Growth Rate = 2.0%

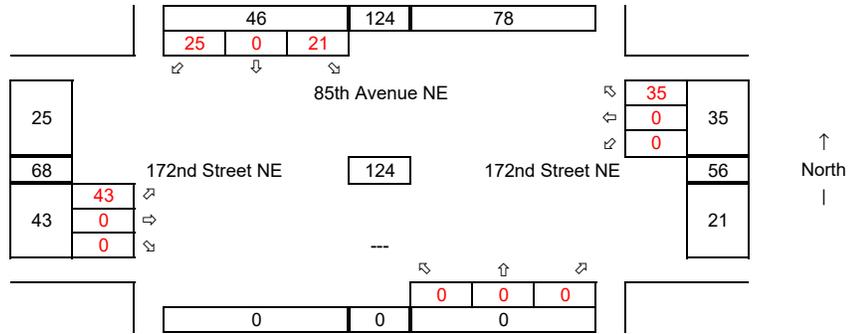
Years of Growth = 6

Total Growth = 1.1262



**Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



7 172nd St NE @ 80th Dr NE\_PM

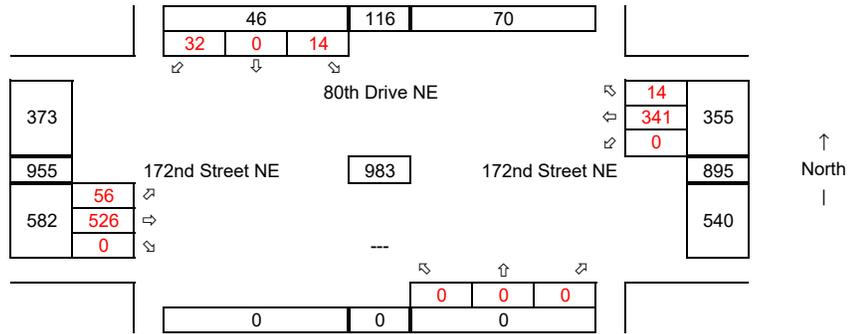
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**Existing**

Average Weekday  
PM Peak Hour

Year: 6/14/2022

Data Source: TDG



**Baseline**

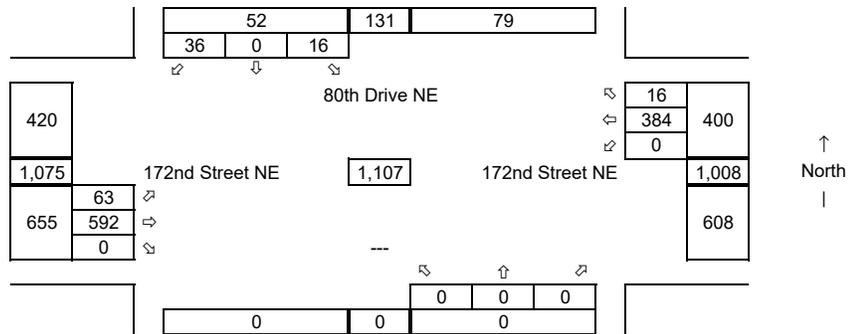
Average Weekday  
PM Peak Hour

Year: 2028

Growth Rate = 2.0%

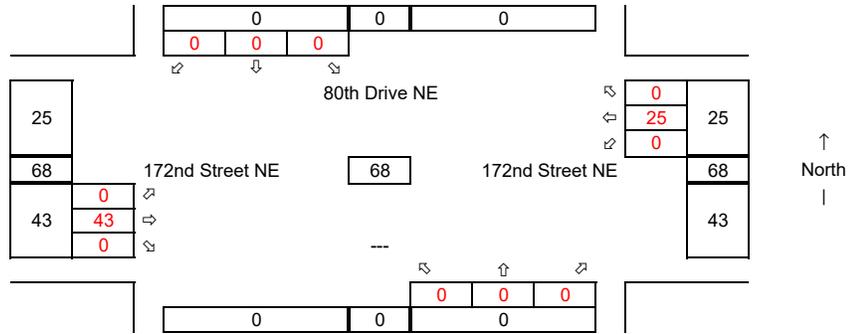
Years of Growth = 6

Total Growth = 1.1262



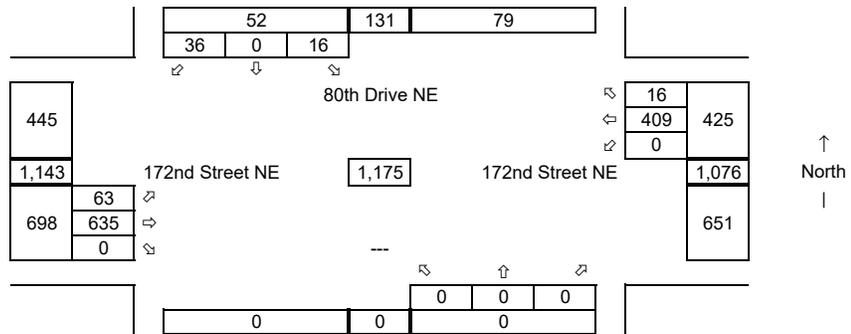
**Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



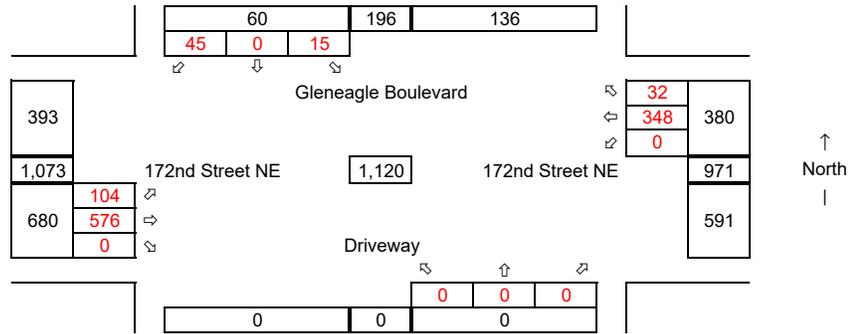
8 172nd St NE @ Gleneagle Blvd\_

Synchro ID: 8

**Existing**  
Average Weekday  
PM Peak Hour

Year: 6/14/2022

Data Source: TDG



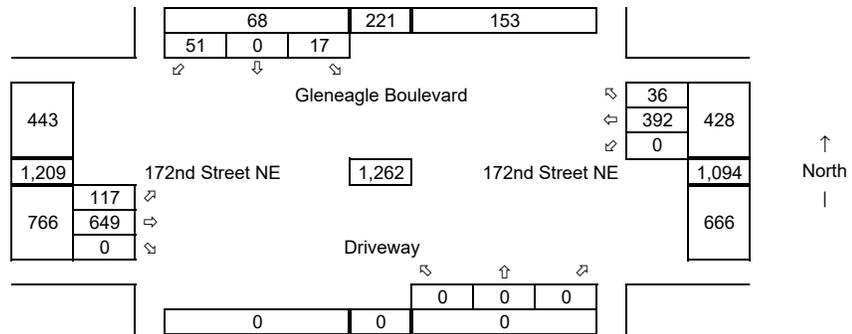
**Baseline**  
Average Weekday  
PM Peak Hour

Year: 2028

Growth Rate = 2.0%

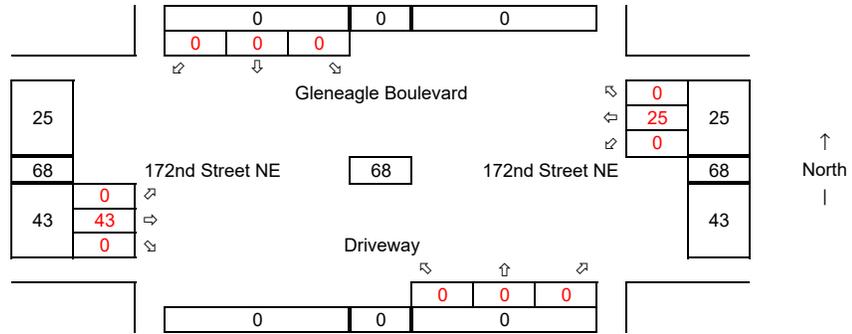
Years of Growth = 6

Total Growth = 1.1262



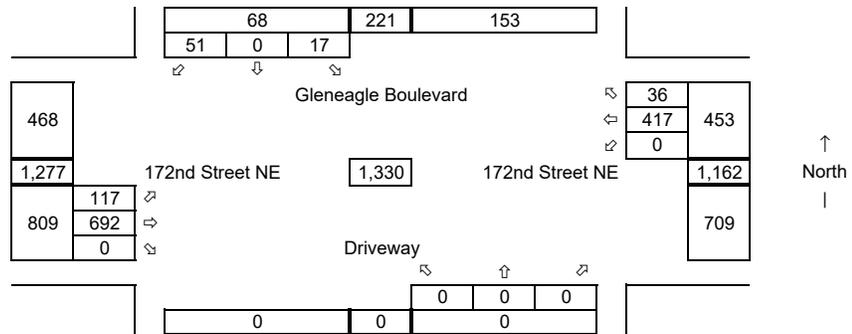
**Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



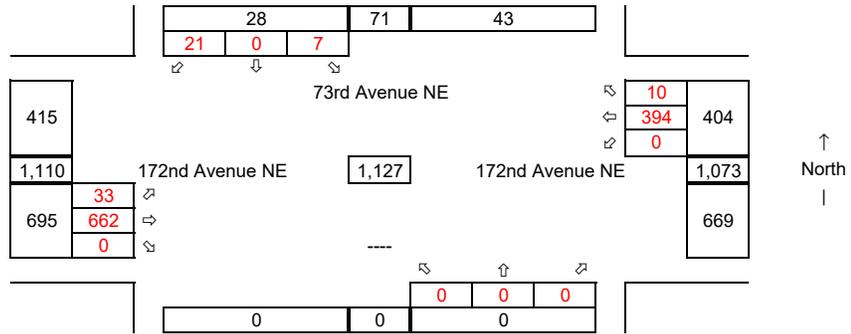
9 172nd St NE @ 73rd Ave NE\_PM

Synchro ID: 9

**Existing**  
Average Weekday  
PM Peak Hour

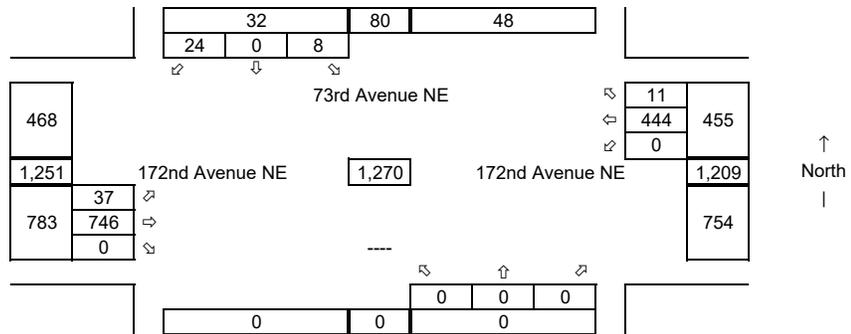
Year: 6/14/2022

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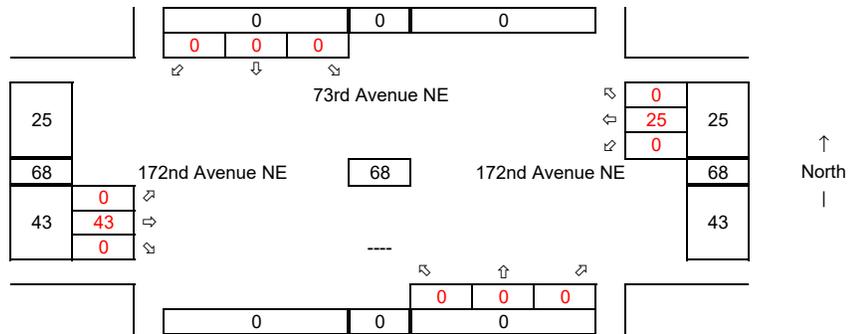


**Baseline**  
Average Weekday  
PM Peak Hour

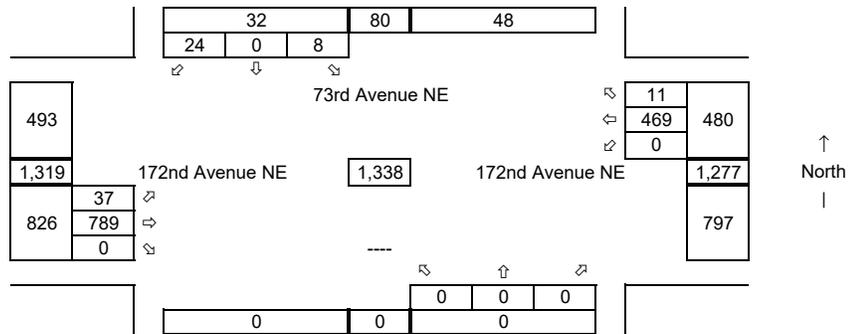
Year: 2028  
Growth Rate = 2.0%  
Years of Growth = 6  
Total Growth = 1.1262



**Development Trips**  
Average Weekday  
PM Peak Hour



**Future with Development**  
Average Weekday  
PM Peak Hour



10 84th Ave NE @ 85th Ave NE\_PM

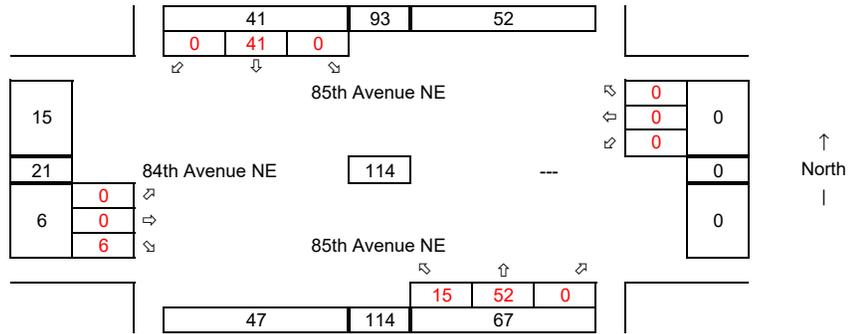
Synchro ID: 10

**Existing**

Average Weekday  
PM Peak Hour

Year: 6/14/2022

Data Source: TDG



**Baseline**

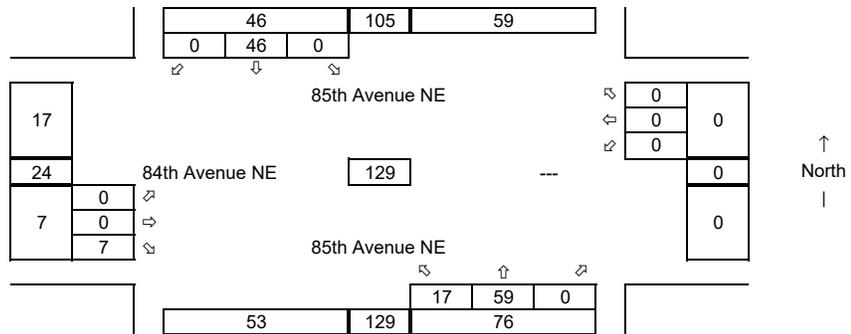
Average Weekday  
PM Peak Hour

Year: 2028

Growth Rate = 2.0%

Years of Growth = 6

Total Growth = 1.1262



**Development Trips**

Average Weekday  
PM Peak Hour



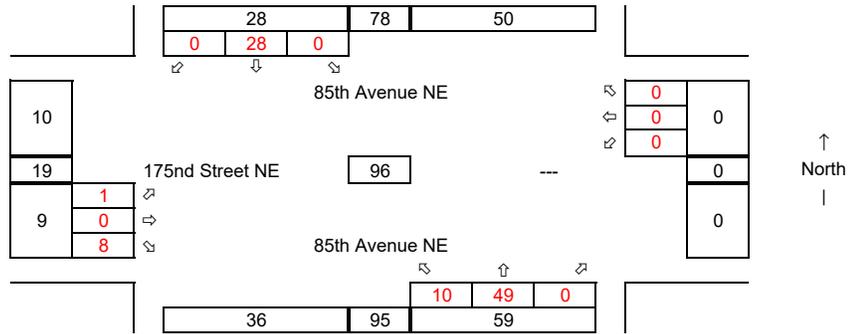
**Future with Development**

Average Weekday  
PM Peak Hour

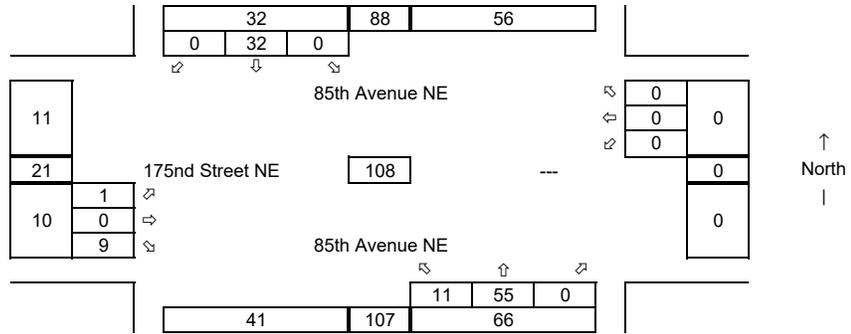


11 175nd St NE @ 85th Ave NE\_PM

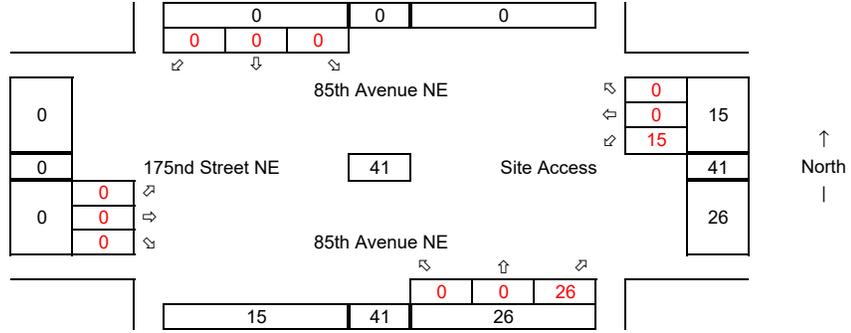
Synchro ID: 11  
**Existing**  
 Average Weekday  
 PM Peak Hour  
 Year: 6/14/2022  
 Data Source: TDG



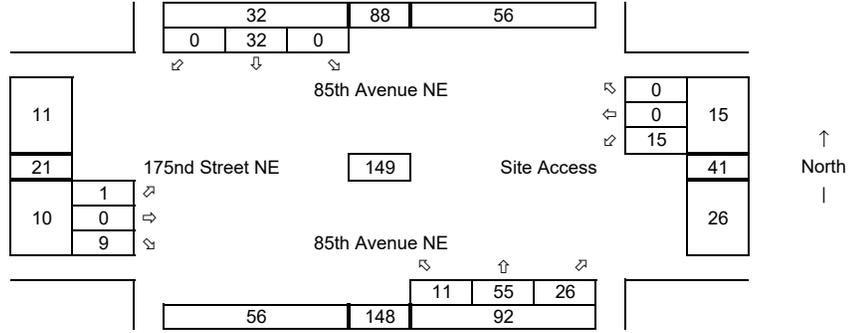
**Baseline**  
 Average Weekday  
 PM Peak Hour  
 Year: 2028  
 Growth Rate = 2.0%  
 Years of Growth = 6  
 Total Growth = 1.1262



**Development Trips**  
 Average Weekday  
 PM Peak Hour



**Future with Development**  
 Average Weekday  
 PM Peak Hour



# **Level of Service Calculations**

Lanes, Volumes, Timings  
1: SR-9 & SR-530/E Division Street

Zharadnik Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	323	202	189	78	210	153	231	363	64	75	227	152
Future Volume (vph)	323	202	189	78	210	153	231	363	64	75	227	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		50	75		100	175		175	150		50
Storage Lanes	1		1	1		1	1		1	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			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1845	1568	1752	1845	1568
Flt Permitted	0.492			0.626			0.305			0.268		
Satd. Flow (perm)	908	1845	1568	1155	1845	1568	563	1845	1568	494	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			100			119			89			89
Link Speed (mph)		35			30			45			45	
Link Distance (ft)		2992			1312			4028			1333	
Travel Time (s)		58.3			29.8			61.0			20.2	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	336	210	197	81	219	159	241	378	67	78	236	158
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.1	42.1	42.1	10.4	22.5	22.5	10.5	34.7	34.7	10.5	40.7	40.7
Total Split (s)	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0
Total Split (%)	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%
Yellow Time (s)	3.1	3.1	3.1	3.4	3.1	3.1	3.5	4.7	4.7	3.5	4.7	4.7
All-Red Time (s)	2.0	2.0	2.0	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	0.0	0.0	0.0
Total Lost Time (s)	5.1	5.1	5.1	5.4	5.1	5.1	5.5	6.7	6.7	5.5	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	74.0	59.9	59.9	58.7	50.3	50.3	48.9	32.5	32.5	35.6	24.8	24.8
Actuated g/C Ratio	0.55	0.45	0.45	0.44	0.38	0.38	0.37	0.24	0.24	0.27	0.19	0.19
v/c Ratio	0.54	0.25	0.26	0.15	0.32	0.24	0.67	0.84	0.15	0.35	0.69	0.44
Control Delay	22.0	26.5	13.9	18.0	33.5	10.9	40.3	65.7	4.0	32.6	61.9	25.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	26.5	13.9	18.0	33.5	10.9	40.3	65.7	4.0	32.6	61.9	25.1
LOS	C	C	B	B	C	B	D	E	A	C	E	C
Approach Delay		21.1			22.9			50.8			44.7	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	154	110	48	32	135	22	154	316	0	45	198	53
Queue Length 95th (ft)	283	212	128	73	241	84	224	449	22	80	287	120

2022 Existing Conditions  
Kimley-Horn and Associates, Inc. [BJL 0902251216]

PM Peak-Hour

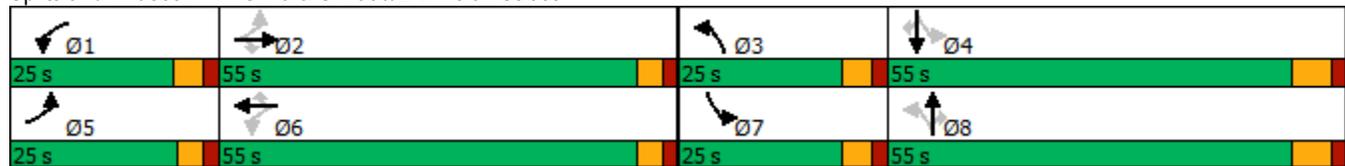
Lanes, Volumes, Timings  
 1: SR-9 & SR-530/E Division Street

Zharadnik Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)	2912			1232			3948			1253		
Turn Bay Length (ft)	350		50	75		100	175		175	150		50
Base Capacity (vph)	629	827	758	691	694	664	380	672	628	352	672	628
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.25	0.26	0.12	0.32	0.24	0.63	0.56	0.11	0.22	0.35	0.25

Intersection Summary	
Area Type:	Other
Cycle Length:	160
Actuated Cycle Length:	133.6
Natural Cycle:	105
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.84
Intersection Signal Delay:	34.8
Intersection LOS:	C
Intersection Capacity Utilization	72.4%
ICU Level of Service	C
Analysis Period (min)	15

Splits and Phases: 1: SR-9 & SR-530/E Division Street



Lanes, Volumes, Timings  
2: SR-9 & E Highland Drive

Zharadnik Development

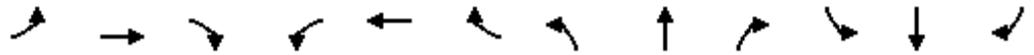
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	5	10	134	8	115	22	521	84	113	362	10
Future Volume (vph)	11	5	10	134	8	115	22	521	84	113	362	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	175		0
Storage Lanes	0		0	0		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
Frt		0.948			0.939			0.979			0.996	
Flt Protected		0.979			0.975		0.950			0.950		
Satd. Flow (prot)	0	1712	0	0	1689	0	1752	1806	0	1752	1837	0
Flt Permitted		0.884			0.823		0.535			0.203		
Satd. Flow (perm)	0	1546	0	0	1426	0	987	1806	0	374	1837	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			80			16			3	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		577			2759			2515			4028	
Travel Time (s)		13.1			62.7			38.1			61.0	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	26	0	0	265	0	23	624	0	116	383	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	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		9.5	22.5		9.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		9.5	22.5		9.5	22.5	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		17.4%	41.3%		17.4%	41.3%	
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	
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effct Green (s)		11.6			11.6		24.5	20.6		27.3	26.4	
Actuated g/C Ratio		0.24			0.24		0.50	0.42		0.56	0.54	
v/c Ratio		0.07			0.66		0.04	0.81		0.33	0.38	
Control Delay		10.8			19.7		6.4	27.8		8.8	10.5	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		10.8			19.7		6.4	27.8		8.8	10.5	
LOS		B			B		A	C		A	B	
Approach Delay		10.8			19.7			27.0			10.1	
Approach LOS		B			B			C			B	
Queue Length 50th (ft)		3			45		2	156		13	49	
Queue Length 95th (ft)		17			103		12	#395		39	179	

2022 Existing Conditions  
Kimley-Horn and Associates, Inc. [BJL 0902251216]

PM Peak-Hour

Lanes, Volumes, Timings  
2: SR-9 & E Highland Drive

Zharadnik Development

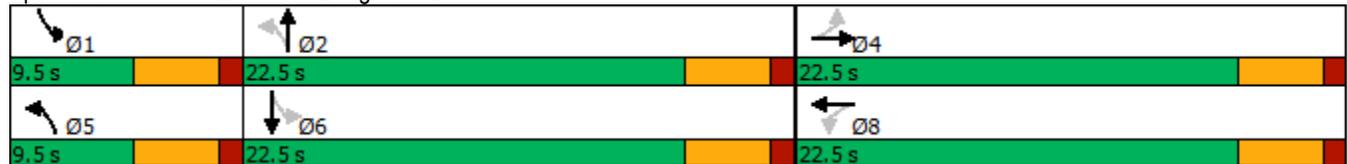


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		497			2679			2435			3948	
Turn Bay Length (ft)							250			175		
Base Capacity (vph)		580			579		576	773		351	996	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.04			0.46		0.04	0.81		0.33	0.38	

Intersection Summary

Area Type:	Other
Cycle Length:	54.5
Actuated Cycle Length:	48.7
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.81
Intersection Signal Delay:	19.5
Intersection LOS:	B
Intersection Capacity Utilization:	70.8%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 2: SR-9 & E Highland Drive



Lanes, Volumes, Timings  
3: SR-9 & 204th Street NE

Zharadnik Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	187	336	153	172	212	128	65	342	139	74	296	108
Future Volume (vph)	187	336	153	172	212	128	65	342	139	74	296	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		200	200		0	200		0	300		425
Storage Lanes	1		1	1		1	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
Ped Bike Factor							1.00					0.98
Fr <sub>t</sub>			0.850			0.850		0.957				0.850
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1783	0	1770	1863	1583
Fl <sub>t</sub> Permitted	0.502			0.384			0.444			0.171		
Satd. Flow (perm)	935	1863	1583	715	1863	1583	826	1783	0	319	1863	1548
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			150			152		14				149
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		2126			1282			6607			2515	
Travel Time (s)		48.3			29.1			100.1			38.1	
Confl. Peds. (#/hr)							1					1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	195	350	159	179	221	133	68	501	0	77	308	113
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0
Minimum Split (s)	10.5	41.9	41.9	9.5	10.5	10.5	9.5	42.3		9.5	40.3	40.3
Total Split (s)	45.0	45.0	45.0	25.0	30.0	30.0	25.0	42.3		25.0	40.3	40.3
Total Split (%)	31.6%	31.6%	31.6%	17.6%	21.1%	21.1%	17.6%	29.7%		17.6%	28.3%	28.3%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.5	3.5	3.5	4.3		3.5	4.3	4.3
All-Red Time (s)	2.0	2.0	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	0.0	0.0
Total Lost Time (s)	5.5	5.9	5.9	5.5	5.5	5.5	5.5	6.3		5.5	6.3	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes		Yes	Yes	Yes							
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max		None	Max	Max
Act Effct Green (s)	65.8	50.8	50.8	62.2	49.4	49.4	55.4	46.8		58.2	49.9	49.9
Actuated g/C Ratio	0.46	0.36	0.36	0.44	0.35	0.35	0.39	0.33		0.41	0.35	0.35
v/c Ratio	0.38	0.53	0.24	0.44	0.34	0.21	0.18	0.84		0.35	0.47	0.18
Control Delay	23.3	40.5	6.8	24.7	37.1	4.1	25.2	57.2		28.6	40.1	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	23.3	40.5	6.8	24.7	37.1	4.1	25.2	57.2		28.6	40.1	2.6
LOS	C	D	A	C	D	A	C	E		C	D	A
Approach Delay		28.1			24.7			53.4			29.8	
Approach LOS		C			C			D			C	
Queue Length 50th (ft)	102	255	5	92	151	0	37	420		42	227	0

2022 Existing Conditions  
Kimley-Horn and Associates, Inc. [BJL 0902251216]

PM Peak-Hour

Lanes, Volumes, Timings  
3: SR-9 & 204th Street NE

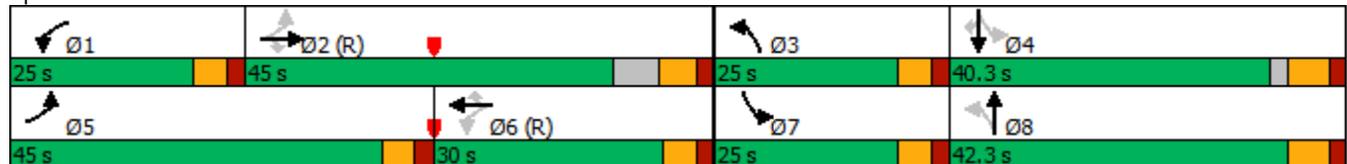
Zharadnik Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	154	376	58	142	237	35	68	#639		76	331	21
Internal Link Dist (ft)		2046			1202			6527			2435	
Turn Bay Length (ft)	150		200	200			200			300		425
Base Capacity (vph)	688	665	661	485	646	648	488	596		337	653	639
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.28	0.53	0.24	0.37	0.34	0.21	0.14	0.84		0.23	0.47	0.18

Intersection Summary

Area Type: Other  
 Cycle Length: 142.3  
 Actuated Cycle Length: 142.3  
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 105  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 33.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 78.5%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: SR-9 & 204th Street NE



Lanes, Volumes, Timings  
4: SR-9 & Eaglefield Drive

Zharadnik Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	28	27	76	23	113	30	394	161	159	412	60
Future Volume (vph)	57	28	27	76	23	113	30	394	161	159	412	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	450		0	250		450	200		450
Storage Lanes	1		0	1		0	1		1	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
Ped Bike Factor		0.98		0.98								
Fr <sub>t</sub>		0.926			0.875				0.850			0.850
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1690	0	1770	1630	0	1770	1863	1583	1770	1863	1583
Fl <sub>t</sub> Permitted	0.560			0.716			0.950			0.950		
Satd. Flow (perm)	1043	1690	0	1308	1630	0	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31			128				183			104
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		540			446			4765			6607	
Travel Time (s)		12.3			10.1			72.2			100.1	
Confl. Peds. (#/hr)			7	7								
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	63	0	86	154	0	34	448	183	181	468	68
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phase	7	4		3	8		5	2	2	1	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	5.0
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	12.0	25.0		12.0	25.0		13.0	53.0	53.0	20.0	60.0	60.0
Total Split (%)	10.9%	22.7%		10.9%	22.7%		11.8%	48.2%	48.2%	18.2%	54.5%	54.5%
Yellow Time (s)	3.5	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	1.0
Lost Time Adjust (s)	0.0	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	4.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)	14.1	8.7		14.3	8.8		7.2	22.5	22.5	12.7	36.2	36.2
Actuated g/C Ratio	0.21	0.13		0.21	0.13		0.11	0.33	0.33	0.19	0.54	0.54
v/c Ratio	0.22	0.26		0.26	0.48		0.18	0.72	0.28	0.54	0.47	0.08
Control Delay	23.2	21.6		23.6	15.1		37.1	28.6	4.5	36.3	14.8	1.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.2	21.6		23.6	15.1		37.1	28.6	4.5	36.3	14.8	1.4
LOS	C	C		C	B		D	C	A	D	B	A
Approach Delay		22.4			18.2			22.4			18.9	
Approach LOS		C			B			C			B	
Queue Length 50th (ft)	20	13		27	10		13	161	0	68	95	0

2022 Existing Conditions  
Kimley-Horn and Associates, Inc. [BJL 0902251216]

PM Peak-Hour

Lanes, Volumes, Timings  
4: SR-9 & Eaglefield Drive

Zharadnik Development



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	57	50		72	64		49	312	39	171	286	9
Internal Link Dist (ft)		460			366			4685			6527	
Turn Bay Length (ft)	150			450			250		450	200		450
Base Capacity (vph)	320	583		347	628		244	1369	1212	445	1512	1304
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.11		0.25	0.25		0.14	0.33	0.15	0.41	0.31	0.05

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 67.5

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 20.4

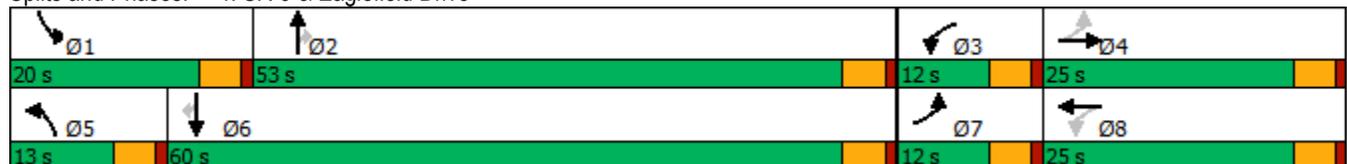
Intersection LOS: C

Intersection Capacity Utilization 56.9%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: SR-9 & Eaglefield Drive



# SITE LAYOUT

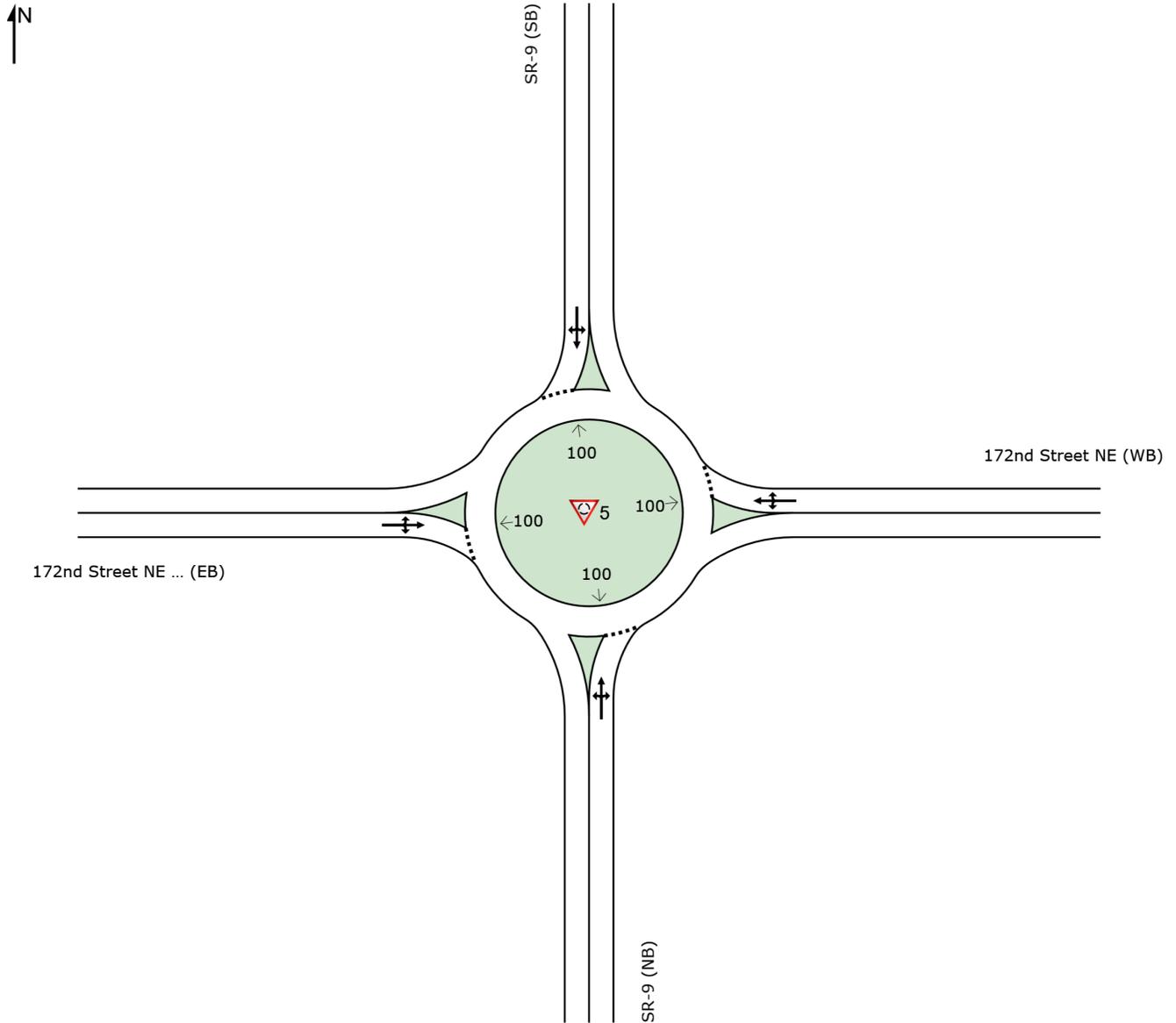
## Site: 5 [2022 Existing Conditions (Site Folder: General)]

SR-9 at 172nd Street NE (SR-531)

Site Category: (None)

Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: K:\SNO\_TPTO\2021\21-216 Zahradnik\Full Analysis\Intersection Analysis\Sidra\#5 - SR-9 at 172nd Street NE-SR-531.sip9

# MOVEMENT FLOWS FOR SITE (INPUT)

Approach movement input flow rates (veh/h)

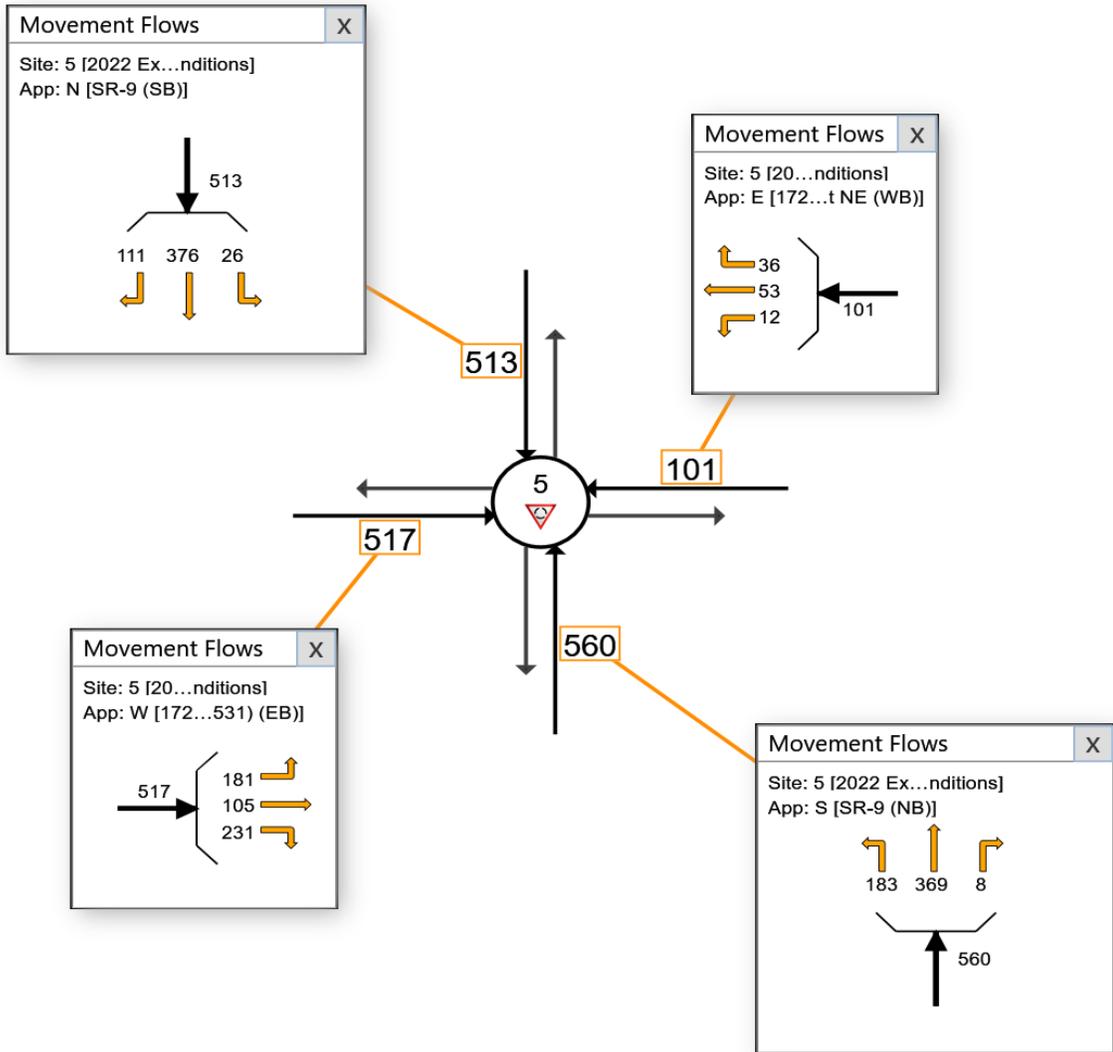
## All Movement Classes

**Site: 5 [2022 Existing Conditions (Site Folder: General)]**

SR-9 at 172nd Street NE (SR-531)  
 Site Category: (None)  
 Roundabout

Use the button below to open or close all popup boxes. Click value labels to open selected ones.  
 Click and drag popup boxes to move to preferred positions.

Close All Popups



# MOVEMENT SUMMARY

## Site: 5 [2022 Existing Conditions (Site Folder: General)]

SR-9 at 172nd Street NE (SR-531)

Site Category: (None)

Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: SR-9 (NB)														
3	L2	183	3.0	193	3.0	0.577	12.9	LOS B	5.3	135.9	0.76	0.74	0.80	34.7
8	T1	369	3.0	388	3.0	0.577	6.9	LOS A	5.3	135.9	0.76	0.74	0.80	34.7
18	R2	8	3.0	8	3.0	0.577	6.9	LOS A	5.3	135.9	0.76	0.74	0.80	33.7
Approach		560	3.0	589	3.0	0.577	8.8	LOS A	5.3	135.9	0.76	0.74	0.80	34.7
East: 172nd Street NE (WB)														
1	L2	12	3.0	13	3.0	0.159	14.8	LOS B	1.1	27.1	0.80	0.78	0.80	34.9
6	T1	53	3.0	56	3.0	0.159	8.8	LOS A	1.1	27.1	0.80	0.78	0.80	34.8
16	R2	36	3.0	38	3.0	0.159	8.9	LOS A	1.1	27.1	0.80	0.78	0.80	33.8
Approach		101	3.0	106	3.0	0.159	9.6	LOS A	1.1	27.1	0.80	0.78	0.80	34.5
North: SR-9 (SB)														
7	L2	26	3.0	27	3.0	0.491	11.7	LOS B	3.8	98.2	0.63	0.59	0.63	35.9
4	T1	376	3.0	396	3.0	0.491	5.8	LOS A	3.8	98.2	0.63	0.59	0.63	35.9
14	R2	111	3.0	117	3.0	0.491	5.8	LOS A	3.8	98.2	0.63	0.59	0.63	34.8
Approach		513	3.0	540	3.0	0.491	6.1	LOS A	3.8	98.2	0.63	0.59	0.63	35.6
West: 172nd Street NE (SR-531) (EB)														
5	L2	181	3.0	191	3.0	0.579	14.3	LOS B	5.4	139.1	0.81	0.85	0.91	34.4
2	T1	105	3.0	111	3.0	0.579	8.3	LOS A	5.4	139.1	0.81	0.85	0.91	34.3
12	R2	231	3.0	243	3.0	0.579	8.3	LOS A	5.4	139.1	0.81	0.85	0.91	33.4
Approach		517	3.0	544	3.0	0.579	10.4	LOS B	5.4	139.1	0.81	0.85	0.91	33.9
All Vehicles		1691	3.0	1780	3.0	0.579	8.5	LOS A	5.4	139.1	0.74	0.73	0.78	34.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula.

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

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

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Project: K:\SNO\_TPTO\2021\21-216 Zahradnik\Full Analysis\Intersection Analysis\Sidra\#5 - SR-9 at 172nd Street NE-SR-531.sip9

HCM 6th TWSC  
6: 172nd Street NE & 85th Avenue NE

Zharadnik Development

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↗	↖	↖	↖
Traffic Vol, veh/h	40	500	330	32	21	22
Future Vol, veh/h	40	500	330	32	21	22
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	350	125	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	41	510	337	33	21	22
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	372	0	-	0	931	339
Stage 1	-	-	-	-	339	-
Stage 2	-	-	-	-	592	-
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	1186	-	-	-	296	703
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	553	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1184	-	-	-	284	702
Mov Cap-2 Maneuver	-	-	-	-	284	-
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	552	-
Approach	EB	WB	SB			
HCM Control Delay, s	0.6	0	14.4			
HCM LOS			B			
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1184	-	-	-	284	702
HCM Lane V/C Ratio	0.034	-	-	-	0.075	0.032
HCM Control Delay (s)	8.1	-	-	-	18.7	10.3
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	0.1

HCM 6th TWSC  
7: 172nd Street NE & 80th Drive NE

Zharadnik Development

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	56	526	341	14	14	32
Future Vol, veh/h	56	526	341	14	14	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	58	542	352	14	14	33

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	366	0	-	0	1017 359
Stage 1	-	-	-	-	359 -
Stage 2	-	-	-	-	658 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1187	-	-	-	262 683
Stage 1	-	-	-	-	704 -
Stage 2	-	-	-	-	513 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1187	-	-	-	249 683
Mov Cap-2 Maneuver	-	-	-	-	249 -
Stage 1	-	-	-	-	670 -
Stage 2	-	-	-	-	513 -

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1187	-	-	-	446
HCM Lane V/C Ratio	0.049	-	-	-	0.106
HCM Control Delay (s)	8.2	-	-	-	14
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.4

HCM 6th TWSC  
 8: 172nd Street NE & Gleneagel Boulevard

Zharadnik Development

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	104	576	348	32	15	45
Future Vol, veh/h	104	576	348	32	15	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	325	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	108	600	363	33	16	47

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	396	0	-	0	1196 380
Stage 1	-	-	-	-	380 -
Stage 2	-	-	-	-	816 -
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	1163	-	-	-	206 667
Stage 1	-	-	-	-	691 -
Stage 2	-	-	-	-	435 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1163	-	-	-	187 667
Mov Cap-2 Maneuver		-	-	-	187 -
Stage 1		-	-	-	627 -
Stage 2		-	-	-	435 -

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1163	-	-	-	406
HCM Lane V/C Ratio	0.093	-	-	-	0.154
HCM Control Delay (s)	8.4	-	-	-	15.5
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	0.5

HCM 6th TWSC  
 9: 172nd Street NE & 73rd Avenue NE

Zharadnik Development

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	33	662	394	10	7	21
Future Vol, veh/h	33	662	394	10	7	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	690	410	10	7	22

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	420	0	-	0	1173 415
Stage 1	-	-	-	-	415 -
Stage 2	-	-	-	-	758 -
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	1139	-	-	-	212 637
Stage 1	-	-	-	-	666 -
Stage 2	-	-	-	-	463 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1139	-	-	-	206 637
Mov Cap-2 Maneuver	-	-	-	-	206 -
Stage 1	-	-	-	-	646 -
Stage 2	-	-	-	-	463 -

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1139	-	-	-	206	637
HCM Lane V/C Ratio	0.03	-	-	-	0.035	0.034
HCM Control Delay (s)	8.3	-	-	-	23.1	10.9
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0.1

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	0	6	15	52	41	0
Future Vol, veh/h	0	6	15	52	41	0
Conflicting Peds, #/hr	0	1	1	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	7	17	60	48	0

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	143	50	49	0	0
Stage 1	49	-	-	-	-
Stage 2	94	-	-	-	-
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	850	1018	1558	-	-
Stage 1	973	-	-	-	-
Stage 2	930	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	839	1016	1557	-	-
Mov Cap-2 Maneuver	839	-	-	-	-
Stage 1	961	-	-	-	-
Stage 2	929	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.6	1.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1557	-	1016	-	-
HCM Lane V/C Ratio	0.011	-	0.007	-	-
HCM Control Delay (s)	7.3	0	8.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

HCM 6th TWSC  
 11: 85th Avenue NE & 175th Street NE

Zharadnik Development

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	1	8	10	49	28	0
Future Vol, veh/h	1	8	10	49	28	0
Conflicting Peds, #/hr	0	1	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	100
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	1	10	12	59	34	0

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	117	35	34	0	0
Stage 1	34	-	-	-	-
Stage 2	83	-	-	-	-
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	881	1041	1584	-	-
Stage 1	991	-	-	-	-
Stage 2	943	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	874	1040	1584	-	-
Mov Cap-2 Maneuver	874	-	-	-	-
Stage 1	983	-	-	-	-
Stage 2	943	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.6	1.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1584	-	1019	-	-
HCM Lane V/C Ratio	0.008	-	0.011	-	-
HCM Control Delay (s)	7.3	0	8.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Lanes, Volumes, Timings  
1: SR-9 & SR-530/E Division Street

Zahradnik Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	364	227	213	88	236	172	260	409	72	84	256	171
Future Volume (vph)	364	227	213	88	236	172	260	409	72	84	256	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		50	75		100	175		175	150		50
Storage Lanes	1		1	1		1	1		1	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			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1845	1568	1752	1845	1568
Flt Permitted	0.452			0.612			0.283			0.209		
Satd. Flow (perm)	834	1845	1568	1129	1845	1568	522	1845	1568	386	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			100			119			89			89
Link Speed (mph)		35			30			45			45	
Link Distance (ft)		2992			1312			4028			1333	
Travel Time (s)		58.3			29.8			61.0			20.2	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	379	236	222	92	246	179	271	426	75	88	267	178
Turn Type	pm+pt	NA	Perm									
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.1	42.1	42.1	10.4	22.5	22.5	10.5	34.7	34.7	10.5	40.7	40.7
Total Split (s)	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0
Total Split (%)	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%
Yellow Time (s)	3.1	3.1	3.1	3.4	3.1	3.1	3.5	4.7	4.7	3.5	4.7	4.7
All-Red Time (s)	2.0	2.0	2.0	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	0.0	0.0	0.0
Total Lost Time (s)	5.1	5.1	5.1	5.4	5.1	5.1	5.5	6.7	6.7	5.5	6.7	6.7
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes											
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	74.8	60.0	60.0	59.3	50.2	50.2	53.7	36.7	36.7	40.2	28.7	28.7
Actuated g/C Ratio	0.54	0.43	0.43	0.43	0.36	0.36	0.39	0.26	0.26	0.29	0.21	0.21
v/c Ratio	0.66	0.30	0.30	0.18	0.37	0.28	0.75	0.88	0.16	0.42	0.70	0.45
Control Delay	27.8	29.7	17.0	19.8	37.0	13.9	44.2	68.8	5.6	33.6	61.3	26.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	29.7	17.0	19.8	37.0	13.9	44.2	68.8	5.6	33.6	61.3	26.9
LOS	C	C	B	B	D	B	D	E	A	C	E	C
Approach Delay		25.5			25.9			54.0			45.3	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	197	137	67	40	165	36	177	371	0	51	229	69
Queue Length 95th (ft)	338	249	158	85	279	107	252	518	29	89	325	142

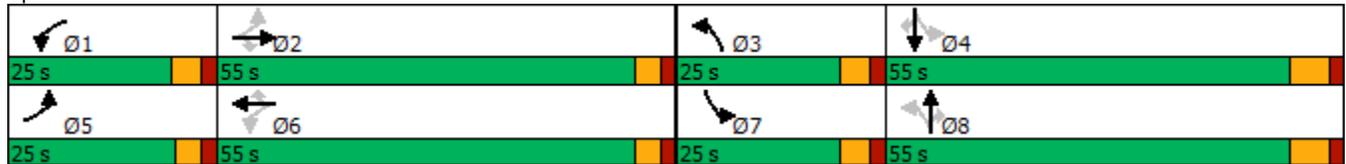
Lanes, Volumes, Timings  
 1: SR-9 & SR-530/E Division Street

Zahradnik Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)	2912			1232			3948			1253		
Turn Bay Length (ft)	350		50	75		100	175		175	150		50
Base Capacity (vph)	580	795	733	653	665	642	374	644	605	330	644	605
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.30	0.30	0.14	0.37	0.28	0.72	0.66	0.12	0.27	0.41	0.29

Intersection Summary	
Area Type:	Other
Cycle Length:	160
Actuated Cycle Length:	139.2
Natural Cycle:	105
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.88
Intersection Signal Delay:	37.8
Intersection LOS:	D
Intersection Capacity Utilization	79.1%
ICU Level of Service	D
Analysis Period (min)	15

Splits and Phases: 1: SR-9 & SR-530/E Division Street



Lanes, Volumes, Timings  
2: SR-9 & E Highland Drive

Zahradnik Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	6	11	154	9	132	25	598	96	130	416	11
Future Volume (vph)	13	6	11	154	9	132	25	598	96	130	416	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	175		0
Storage Lanes	0		0	0		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
Frt		0.950			0.940			0.979				0.996
Flt Protected		0.979			0.975		0.950			0.950		
Satd. Flow (prot)	0	1716	0	0	1691	0	1752	1806	0	1752	1837	0
Flt Permitted		0.873			0.820		0.476			0.159		
Satd. Flow (perm)	0	1530	0	0	1422	0	878	1806	0	293	1837	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			80			16				3
Link Speed (mph)		30			30			45				45
Link Distance (ft)		577			2759			2515				4028
Travel Time (s)		13.1			62.7			38.1				61.0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	30	0	0	304	0	26	715	0	134	440	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	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		9.5	22.5		9.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		9.5	22.5		9.5	22.5	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		17.4%	41.3%		17.4%	41.3%	
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	
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effct Green (s)		12.7			12.7		23.4	19.6		26.0	25.1	
Actuated g/C Ratio		0.26			0.26		0.48	0.40		0.53	0.52	
v/c Ratio		0.07			0.71		0.05	0.97		0.43	0.46	
Control Delay		10.5			21.6		6.8	49.6		11.9	12.7	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		10.5			21.6		6.8	49.6		11.9	12.7	
LOS		B			C		A	D		B	B	
Approach Delay		10.5			21.6			48.1			12.5	
Approach LOS		B			C			D			B	
Queue Length 50th (ft)		4			56		3	~242		16	65	
Queue Length 95th (ft)		18			124		13	#470		#49	#242	

Lanes, Volumes, Timings  
2: SR-9 & E Highland Drive

Zahradnik Development

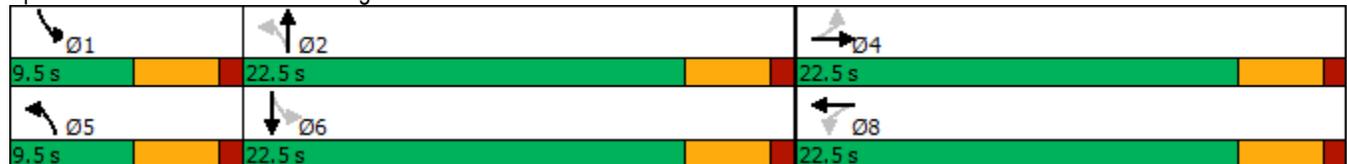


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		497			2679			2435			3948	
Turn Bay Length (ft)							250			175		
Base Capacity (vph)		581			584		513	736		309	950	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.05			0.52		0.05	0.97		0.43	0.46	

Intersection Summary

Area Type:	Other
Cycle Length:	54.5
Actuated Cycle Length:	48.6
Natural Cycle:	65
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.97
Intersection Signal Delay:	30.1
Intersection LOS:	C
Intersection Capacity Utilization	79.3%
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: 2: SR-9 & E Highland Drive



Lanes, Volumes, Timings  
3: SR-9 & 204th Street NE

Zahradnik Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	211	378	172	194	239	144	73	385	157	83	333	122
Future Volume (vph)	211	378	172	194	239	144	73	385	157	83	333	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		200	200		0	200		0	300		425
Storage Lanes	1		1	1		1	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
Ped Bike Factor							1.00					0.98
Frt			0.850			0.850		0.956				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1781	0	1770	1863	1583
Flt Permitted	0.464			0.329			0.370			0.084		
Satd. Flow (perm)	864	1863	1583	613	1863	1583	689	1781	0	156	1863	1548
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			150			152		14				149
Link Speed (mph)		30			30			45				45
Link Distance (ft)		2126			1282			6607				2515
Travel Time (s)		48.3			29.1			100.1				38.1
Confl. Peds. (#/hr)							1					1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	220	394	179	202	249	150	76	565	0	86	347	127
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0
Minimum Split (s)	10.5	41.9	41.9	9.5	10.5	10.5	9.5	42.3		9.5	40.3	40.3
Total Split (s)	45.0	45.0	45.0	25.0	30.0	30.0	25.0	42.3		25.0	40.3	40.3
Total Split (%)	31.6%	31.6%	31.6%	17.6%	21.1%	21.1%	17.6%	29.7%		17.6%	28.3%	28.3%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.5	3.5	3.5	4.3		3.5	4.3	4.3
All-Red Time (s)	2.0	2.0	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	0.0	0.0
Total Lost Time (s)	5.5	5.9	5.9	5.5	5.5	5.5	5.5	6.3		5.5	6.3	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max		None	Max	Max
Act Effct Green (s)	65.9	49.6	49.6	62.1	48.1	48.1	55.3	46.4		57.3	47.4	47.4
Actuated g/C Ratio	0.46	0.35	0.35	0.44	0.34	0.34	0.39	0.33		0.40	0.33	0.33
v/c Ratio	0.44	0.61	0.28	0.53	0.40	0.24	0.23	0.96		0.52	0.56	0.21
Control Delay	24.4	43.9	9.1	26.9	39.3	6.0	25.9	74.1		36.0	43.6	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	24.4	43.9	9.1	26.9	39.3	6.0	25.9	74.1		36.0	43.6	4.0
LOS	C	D	A	C	D	A	C	E		D	D	A
Approach Delay		30.6			26.8			68.4			33.4	
Approach LOS		C			C			E			C	
Queue Length 50th (ft)	117	300	18	106	176	0	41	503		47	263	0

Lanes, Volumes, Timings  
3: SR-9 & 204th Street NE

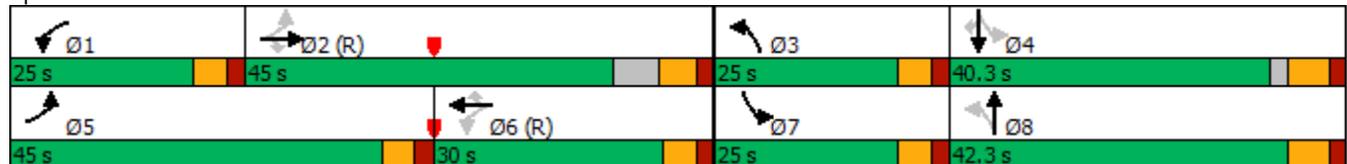
Zahradnik Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	174	438	77	160	272	51	74	#782		85	379	32
Internal Link Dist (ft)		2046			1202			6527			2435	
Turn Bay Length (ft)	150		200	200			200			300		425
Base Capacity (vph)	673	649	649	446	629	635	447	589		288	620	615
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.33	0.61	0.28	0.45	0.40	0.24	0.17	0.96		0.30	0.56	0.21

Intersection Summary

Area Type: Other  
 Cycle Length: 142.3  
 Actuated Cycle Length: 142.3  
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 105  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.96  
 Intersection Signal Delay: 39.7  
 Intersection LOS: D  
 Intersection Capacity Utilization 84.4%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: SR-9 & 204th Street NE



Lanes, Volumes, Timings  
4: SR-9 & Eaglefield Drive

Zahradnik Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	32	30	86	26	127	34	444	181	179	464	68
Future Volume (vph)	64	32	30	86	26	127	34	444	181	179	464	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	450		0	250		450	200		450
Storage Lanes	1		0	1		0	1		1	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
Ped Bike Factor		0.98		0.98								
Fr <sub>t</sub>		0.927			0.876				0.850			0.850
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1692	0	1770	1632	0	1770	1863	1583	1770	1863	1583
Fl <sub>t</sub> Permitted	0.467			0.704			0.950			0.950		
Satd. Flow (perm)	870	1692	0	1286	1632	0	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		34			144				206			104
Link Speed (mph)		30			30			45				45
Link Distance (ft)		540			446			4765				6607
Travel Time (s)		12.3			10.1			72.2				100.1
Confl. Peds. (#/hr)			7	7								
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	70	0	98	174	0	39	505	206	203	527	77
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phase	7	4		3	8		5	2	2	1	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	5.0
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	12.0	25.0		12.0	25.0		13.0	53.0	53.0	20.0	60.0	60.0
Total Split (%)	10.9%	22.7%		10.9%	22.7%		11.8%	48.2%	48.2%	18.2%	54.5%	54.5%
Yellow Time (s)	3.5	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	1.0
Lost Time Adjust (s)	0.0	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	4.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)	14.4	8.9		14.7	9.0		7.4	26.2	26.2	14.0	38.7	38.7
Actuated g/C Ratio	0.20	0.12		0.20	0.12		0.10	0.36	0.36	0.19	0.53	0.53
v/c Ratio	0.28	0.30		0.32	0.53		0.22	0.75	0.29	0.60	0.53	0.09
Control Delay	26.6	23.8		27.0	16.5		40.4	29.4	4.0	40.4	16.7	1.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	23.8		27.0	16.5		40.4	29.4	4.0	40.4	16.7	1.8
LOS	C	C		C	B		D	C	A	D	B	A
Approach Delay		25.3			20.3			23.0			21.2	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	25	15		35	13		17	201	0	83	172	0



# SITE LAYOUT

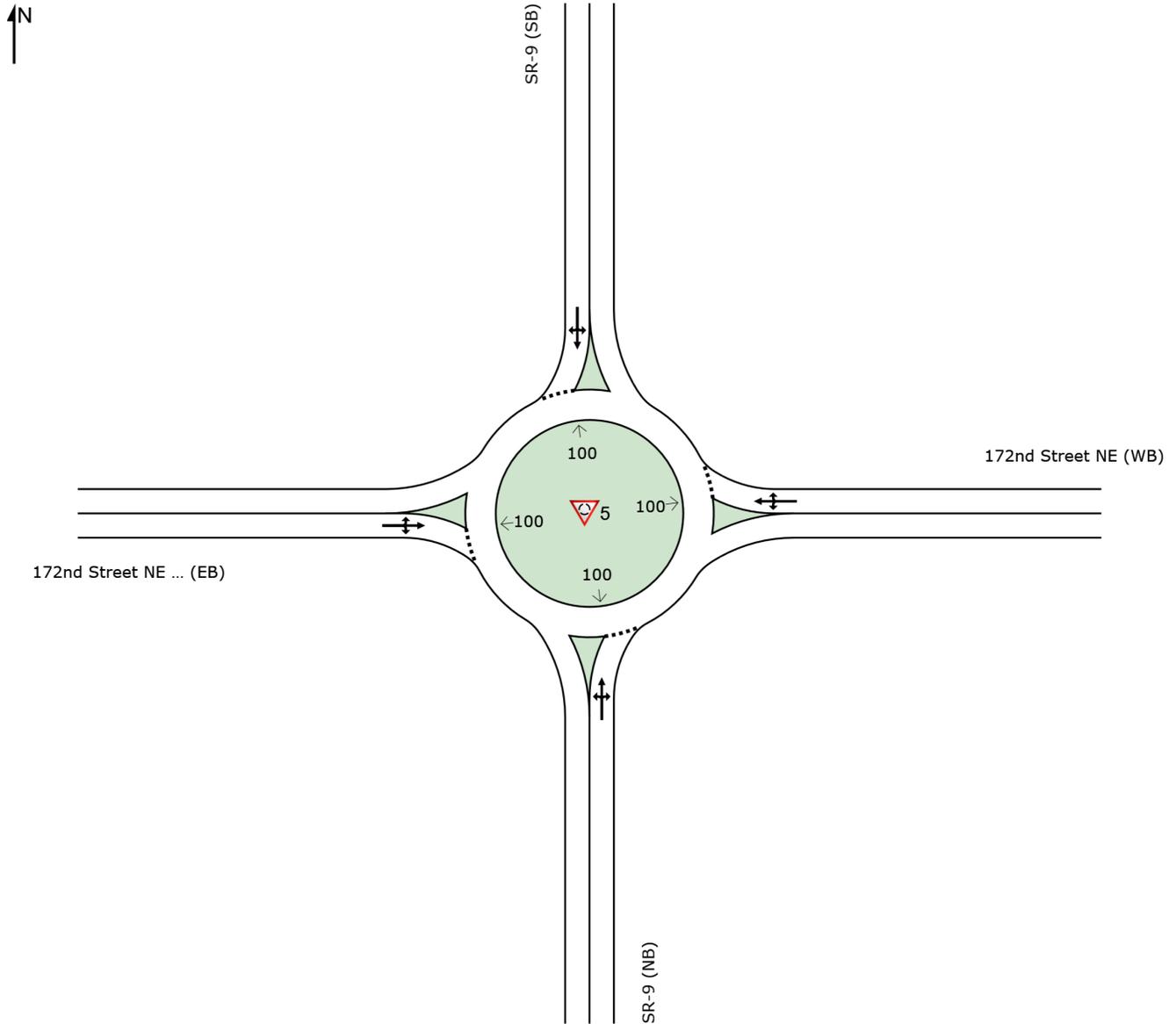
## Site: 5 [2028 Baseline Conditions (Site Folder: General)]

SR-9 at 172nd Street NE (SR-531)

Site Category: (None)

Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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# MOVEMENT FLOWS FOR SITE (INPUT)

Approach movement input flow rates (veh/h)

## All Movement Classes

**Site: 5 [2028 Baseline Conditions (Site Folder: General)]**

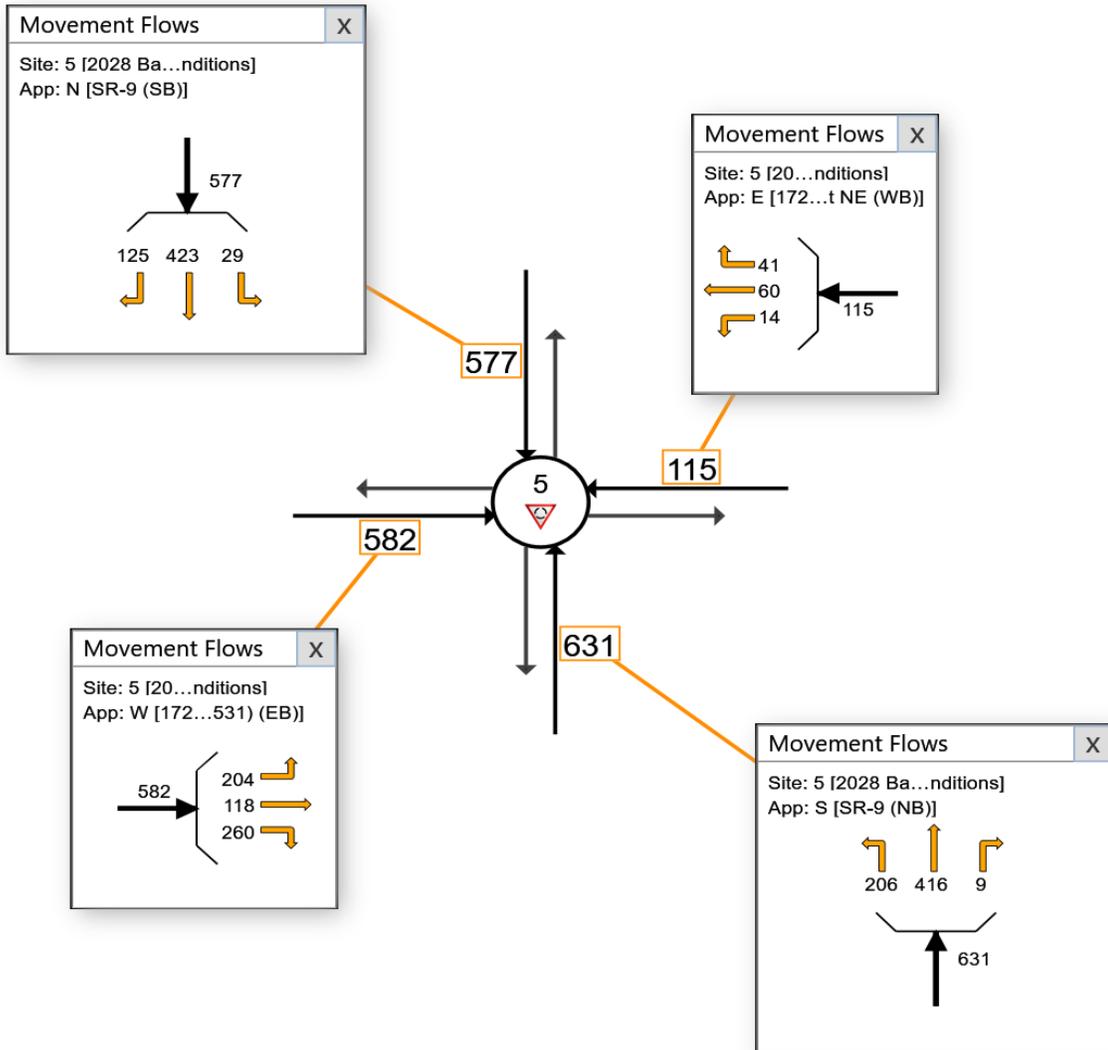
SR-9 at 172nd Street NE (SR-531)

Site Category: (None)

Roundabout

Use the button below to open or close all popup boxes. Click value labels to open selected ones. Click and drag popup boxes to move to preferred positions.

Close All Popups



# MOVEMENT SUMMARY

 Site: 5 [2028 Baseline Conditions (Site Folder: General)]

SR-9 at 172nd Street NE (SR-531)  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: SR-9 (NB)														
3	L2	206	3.0	217	3.0	0.684	15.0	LOS B	8.1	206.9	0.88	0.88	1.04	34.1
8	T1	416	3.0	438	3.0	0.684	9.0	LOS A	8.1	206.9	0.88	0.88	1.04	34.1
18	R2	9	3.0	9	3.0	0.684	9.1	LOS A	8.1	206.9	0.88	0.88	1.04	33.1
Approach		631	3.0	664	3.0	0.684	11.0	LOS B	8.1	206.9	0.88	0.88	1.04	34.1
East: 172nd Street NE (WB)														
1	L2	14	3.0	15	3.0	0.212	16.1	LOS B	1.5	38.6	0.88	0.85	0.88	34.2
6	T1	60	3.0	63	3.0	0.212	10.1	LOS B	1.5	38.6	0.88	0.85	0.88	34.1
16	R2	41	3.0	43	3.0	0.212	10.2	LOS B	1.5	38.6	0.88	0.85	0.88	33.2
Approach		115	3.0	121	3.0	0.212	10.9	LOS B	1.5	38.6	0.88	0.85	0.88	33.8
North: SR-9 (SB)														
7	L2	29	3.0	31	3.0	0.573	12.4	LOS B	5.1	129.5	0.72	0.66	0.74	35.6
4	T1	423	3.0	445	3.0	0.573	6.4	LOS A	5.1	129.5	0.72	0.66	0.74	35.5
14	R2	125	3.0	132	3.0	0.573	6.5	LOS A	5.1	129.5	0.72	0.66	0.74	34.5
Approach		577	3.0	607	3.0	0.573	6.7	LOS A	5.1	129.5	0.72	0.66	0.74	35.3
West: 172nd Street NE (SR-531) (EB)														
5	L2	204	3.0	215	3.0	0.696	17.2	LOS B	8.4	214.5	0.93	1.00	1.20	33.0
2	T1	118	3.0	124	3.0	0.696	11.2	LOS B	8.4	214.5	0.93	1.00	1.20	32.9
12	R2	260	3.0	274	3.0	0.696	11.3	LOS B	8.4	214.5	0.93	1.00	1.20	32.0
Approach		582	3.0	613	3.0	0.696	13.3	LOS B	8.4	214.5	0.93	1.00	1.20	32.6
All Vehicles		1905	3.0	2005	3.0	0.696	10.4	LOS B	8.4	214.5	0.85	0.85	0.99	33.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula.

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

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

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HCM 6th TWSC  
6: 172nd Street NE & 85th Avenue NE

Zahradnik Development

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↗	↗	↘	↘	↘
Traffic Vol, veh/h	45	563	372	36	24	25
Future Vol, veh/h	45	563	372	36	24	25
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	350	125	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	46	574	380	37	24	26

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	419	0	-	0	1048 382
Stage 1	-	-	-	-	382 -
Stage 2	-	-	-	-	666 -
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	1140	-	-	-	252 665
Stage 1	-	-	-	-	690 -
Stage 2	-	-	-	-	511 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1138	-	-	-	241 664
Mov Cap-2 Maneuver	-	-	-	-	241 -
Stage 1	-	-	-	-	661 -
Stage 2	-	-	-	-	510 -

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	16
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1138	-	-	-	241	664
HCM Lane V/C Ratio	0.04	-	-	-	0.102	0.038
HCM Control Delay (s)	8.3	-	-	-	21.6	10.6
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3	0.1

HCM 6th TWSC  
 7: 172nd Street NE & 80th Drive NE

Zahradnik Development

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	63	592	384	16	16	36
Future Vol, veh/h	63	592	384	16	16	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	65	610	396	16	16	37

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	412	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.13	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.227	-	-
Pot Cap-1 Maneuver	1142	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1142	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	15.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1142	-	-	-	390
HCM Lane V/C Ratio	0.057	-	-	-	0.137
HCM Control Delay (s)	8.3	-	-	-	15.7
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	0.5

HCM 6th TWSC  
 8: 172nd Street NE & Gleneagel Boulevard

Zahradnik Development

Intersection						
Int Delay, s/veh	1.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	117	649	392	36	17	51
Future Vol, veh/h	117	649	392	36	17	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	325	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	122	676	408	38	18	53

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	446	0	-	0	1347 427
Stage 1	-	-	-	-	427 -
Stage 2	-	-	-	-	920 -
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	1114	-	-	-	167 628
Stage 1	-	-	-	-	658 -
Stage 2	-	-	-	-	388 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1114	-	-	-	149 628
Mov Cap-2 Maneuver	-	-	-	-	149 -
Stage 1	-	-	-	-	586 -
Stage 2	-	-	-	-	388 -

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	18
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1114	-	-	-	348
HCM Lane V/C Ratio	0.109	-	-	-	0.204
HCM Control Delay (s)	8.6	-	-	-	18
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.4	-	-	-	0.8

HCM 6th TWSC  
 9: 172nd Street NE & 73rd Avenue NE

Zahradnik Development

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	37	746	444	11	8	24
Future Vol, veh/h	37	746	444	11	8	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	777	463	11	8	25

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	474	0	-	0	1324 469
Stage 1	-	-	-	-	469 -
Stage 2	-	-	-	-	855 -
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	1088	-	-	-	172 594
Stage 1	-	-	-	-	630 -
Stage 2	-	-	-	-	417 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1088	-	-	-	166 594
Mov Cap-2 Maneuver	-	-	-	-	166 -
Stage 1	-	-	-	-	607 -
Stage 2	-	-	-	-	417 -

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	15.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1088	-	-	-	166	594
HCM Lane V/C Ratio	0.035	-	-	-	0.05	0.042
HCM Control Delay (s)	8.4	-	-	-	27.8	11.3
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	0.1

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	0	7	17	59	46	0
Future Vol, veh/h	0	7	17	59	46	0
Conflicting Peds, #/hr	0	1	1	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	8	20	69	53	0

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	163	55	54	0	0
Stage 1	54	-	-	-	-
Stage 2	109	-	-	-	-
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	828	1012	1551	-	-
Stage 1	969	-	-	-	-
Stage 2	916	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	816	1010	1550	-	-
Mov Cap-2 Maneuver	816	-	-	-	-
Stage 1	955	-	-	-	-
Stage 2	915	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.6	1.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1550	-	1010	-	-
HCM Lane V/C Ratio	0.013	-	0.008	-	-
HCM Control Delay (s)	7.4	0	8.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

HCM 6th TWSC  
 11: 85th Avenue NE & 175th Street NE

Zahradnik Development

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	1	9	11	55	32	0
Future Vol, veh/h	1	9	11	55	32	0
Conflicting Peds, #/hr	0	1	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	100
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	1	11	13	66	39	0

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	131	40	39	0	0
Stage 1	39	-	-	-	-
Stage 2	92	-	-	-	-
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	865	1034	1577	-	-
Stage 1	986	-	-	-	-
Stage 2	934	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	857	1033	1577	-	-
Mov Cap-2 Maneuver	857	-	-	-	-
Stage 1	977	-	-	-	-
Stage 2	934	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.6	1.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1577	-	1012	-	-
HCM Lane V/C Ratio	0.008	-	0.012	-	-
HCM Control Delay (s)	7.3	0	8.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Lanes, Volumes, Timings  
1: SR-9 & SR-530/E Division Street

Zahradnik Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	364	227	213	88	236	172	260	411	72	84	259	171
Future Volume (vph)	364	227	213	88	236	172	260	411	72	84	259	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		50	75		100	175		175	150		50
Storage Lanes	1		1	1		1	1		1	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			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1845	1568	1752	1845	1568
Flt Permitted	0.452			0.612			0.279			0.207		
Satd. Flow (perm)	834	1845	1568	1129	1845	1568	515	1845	1568	382	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			100			119			89			89
Link Speed (mph)		35			30			45			45	
Link Distance (ft)		2992			1312			4028			1333	
Travel Time (s)		58.3			29.8			61.0			20.2	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	379	236	222	92	246	179	271	428	75	88	270	178
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.1	42.1	42.1	10.4	22.5	22.5	10.5	34.7	34.7	10.5	40.7	40.7
Total Split (s)	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0	25.0	55.0	55.0
Total Split (%)	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%	15.6%	34.4%	34.4%
Yellow Time (s)	3.1	3.1	3.1	3.4	3.1	3.1	3.5	4.7	4.7	3.5	4.7	4.7
All-Red Time (s)	2.0	2.0	2.0	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	0.0	0.0	0.0
Total Lost Time (s)	5.1	5.1	5.1	5.4	5.1	5.1	5.5	6.7	6.7	5.5	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	74.8	60.0	60.0	59.3	50.2	50.2	53.9	36.9	36.9	40.4	28.9	28.9
Actuated g/C Ratio	0.54	0.43	0.43	0.43	0.36	0.36	0.39	0.26	0.26	0.29	0.21	0.21
v/c Ratio	0.66	0.30	0.30	0.18	0.37	0.28	0.75	0.88	0.16	0.42	0.71	0.45
Control Delay	27.9	29.8	17.1	19.9	37.1	13.9	44.5	68.9	5.6	33.6	61.6	26.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	29.8	17.1	19.9	37.1	13.9	44.5	68.9	5.6	33.6	61.6	26.8
LOS	C	C	B	B	D	B	D	E	A	C	E	C
Approach Delay		25.5			26.0			54.2			45.4	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	197	138	67	40	165	36	177	374	0	51	232	69
Queue Length 95th (ft)	338	249	158	85	279	107	252	521	29	89	330	142

2028 Future with Development Condition  
Kimley-Horn and Associates, Inc. [SF & AH 090221216]

PM Peak-Hour

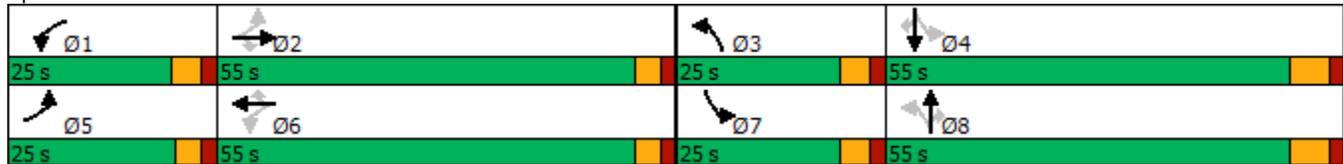
Lanes, Volumes, Timings  
 1: SR-9 & SR-530/E Division Street

Zahradnik Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)	2912			1232			3948			1253		
Turn Bay Length (ft)	350		50	75		100	175		175	150		50
Base Capacity (vph)	579	794	732	652	665	641	373	643	605	329	643	605
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.30	0.30	0.14	0.37	0.28	0.73	0.67	0.12	0.27	0.42	0.29

Intersection Summary	
Area Type:	Other
Cycle Length:	160
Actuated Cycle Length:	139.4
Natural Cycle:	105
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.88
Intersection Signal Delay:	38.0
Intersection LOS:	D
Intersection Capacity Utilization	79.3%
ICU Level of Service	D
Analysis Period (min)	15

Splits and Phases: 1: SR-9 & SR-530/E Division Street



Lanes, Volumes, Timings  
2: SR-9 & E Highland Drive

Zahradnik Development

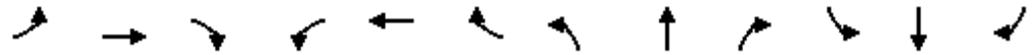
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	6	11	158	9	132	25	600	99	130	419	11
Future Volume (vph)	13	6	11	158	9	132	25	600	99	130	419	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	175		0
Storage Lanes	0		0	0		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
Frt		0.950			0.940			0.979				0.996
Flt Protected		0.979			0.974		0.950			0.950		
Satd. Flow (prot)	0	1716	0	0	1689	0	1752	1806	0	1752	1837	0
Flt Permitted		0.873			0.818		0.472			0.160		
Satd. Flow (perm)	0	1530	0	0	1418	0	871	1806	0	295	1837	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			78			16				3
Link Speed (mph)		30			30			45				45
Link Distance (ft)		577			2759			2515				4028
Travel Time (s)		13.1			62.7			38.1				61.0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	30	0	0	308	0	26	721	0	134	443	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	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		9.5	22.5		9.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		9.5	22.5		9.5	22.5	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		17.4%	41.3%		17.4%	41.3%	
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	
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effct Green (s)		12.8			12.8		23.3	19.5		25.9	25.0	
Actuated g/C Ratio		0.26			0.26		0.48	0.40		0.53	0.51	
v/c Ratio		0.07			0.72		0.05	0.98		0.44	0.47	
Control Delay		10.5			22.1		6.8	52.6		11.9	12.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		10.5			22.1		6.8	52.6		11.9	12.8	
LOS		B			C		A	D		B	B	
Approach Delay		10.5			22.1			51.0			12.6	
Approach LOS		B			C			D			B	
Queue Length 50th (ft)		4			58		3	~248		17	66	
Queue Length 95th (ft)		18			128		13	#475		#49	#245	

2028 Future with Development Condition  
Kimley-Horn and Associates, Inc. [SF & AH 090221216]

PM Peak-Hour

Lanes, Volumes, Timings  
2: SR-9 & E Highland Drive

Zahradnik Development

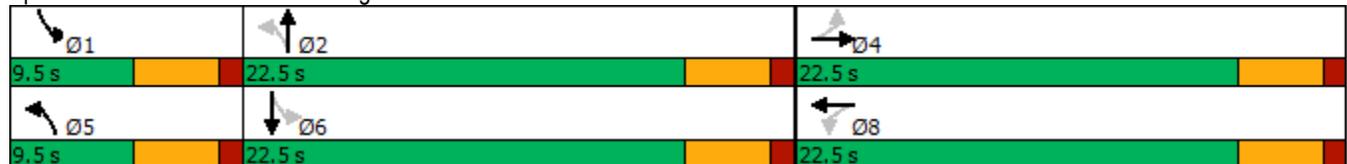


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		497			2679			2435			3948	
Turn Bay Length (ft)							250			175		
Base Capacity (vph)		581			581		508	732		308	946	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.05			0.53		0.05	0.98		0.44	0.47	

Intersection Summary

Area Type:	Other
Cycle Length:	54.5
Actuated Cycle Length:	48.7
Natural Cycle:	65
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.98
Intersection Signal Delay:	31.6
Intersection LOS:	C
Intersection Capacity Utilization	80.0%
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: 2: SR-9 & E Highland Drive



Lanes, Volumes, Timings  
3: SR-9 & 204th Street NE

Zahradnik Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	211	378	176	194	239	144	75	390	157	83	340	122
Future Volume (vph)	211	378	176	194	239	144	75	390	157	83	340	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		200	200		0	200		0	300		425
Storage Lanes	1		1	1		1	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
Ped Bike Factor							1.00					0.98
Fr <sub>t</sub>			0.850			0.850		0.957				0.850
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1783	0	1770	1863	1583
Fl <sub>t</sub> Permitted	0.464			0.329			0.359			0.085		
Satd. Flow (perm)	864	1863	1583	613	1863	1583	668	1783	0	158	1863	1548
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			153			152		14				149
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		2126			1282			6607			2515	
Travel Time (s)		48.3			29.1			100.1			38.1	
Confl. Peds. (#/hr)							1					1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	220	394	183	202	249	150	78	570	0	86	354	127
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0
Minimum Split (s)	10.5	41.9	41.9	9.5	10.5	10.5	9.5	42.3		9.5	40.3	40.3
Total Split (s)	45.0	45.0	45.0	25.0	30.0	30.0	25.0	42.3		25.0	40.3	40.3
Total Split (%)	31.6%	31.6%	31.6%	17.6%	21.1%	21.1%	17.6%	29.7%		17.6%	28.3%	28.3%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.5	3.5	3.5	4.3		3.5	4.3	4.3
All-Red Time (s)	2.0	2.0	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	0.0	0.0
Total Lost Time (s)	5.5	5.9	5.9	5.5	5.5	5.5	5.5	6.3		5.5	6.3	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max		None	Max	Max
Act Effct Green (s)	65.9	49.6	49.6	62.1	48.1	48.1	55.4	46.4		57.2	47.3	47.3
Actuated g/C Ratio	0.46	0.35	0.35	0.44	0.34	0.34	0.39	0.33		0.40	0.33	0.33
v/c Ratio	0.44	0.61	0.28	0.53	0.40	0.24	0.24	0.97		0.51	0.57	0.21
Control Delay	24.4	43.9	9.1	26.9	39.3	6.0	26.0	75.7		35.7	44.1	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	24.4	43.9	9.1	26.9	39.3	6.0	26.0	75.7		35.7	44.1	4.0
LOS	C	D	A	C	D	A	C	E		D	D	A
Approach Delay		30.5			26.8			69.7			33.8	
Approach LOS		C			C			E			C	
Queue Length 50th (ft)	117	300	18	106	176	0	42	509		47	270	0

2028 Future with Development Condition  
Kimley-Horn and Associates, Inc. [SF & AH 090221216]

PM Peak-Hour

Lanes, Volumes, Timings  
3: SR-9 & 204th Street NE

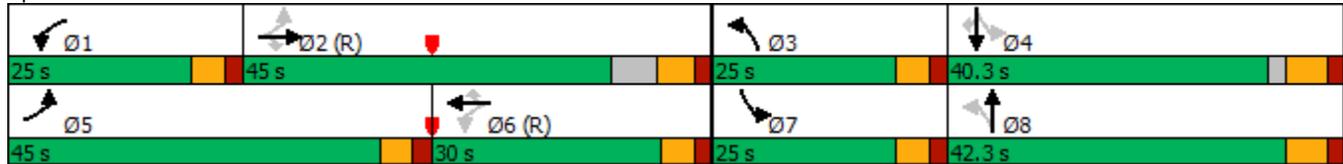
Zahradnik Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	174	438	79	160	272	51	76	#791		84	389	32
Internal Link Dist (ft)		2046			1202			6527			2435	
Turn Bay Length (ft)	150		200	200			200			300		425
Base Capacity (vph)	673	649	651	446	629	635	441	590		289	619	614
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.33	0.61	0.28	0.45	0.40	0.24	0.18	0.97		0.30	0.57	0.21

Intersection Summary

Area Type: Other  
 Cycle Length: 142.3  
 Actuated Cycle Length: 142.3  
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 105  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.97  
 Intersection Signal Delay: 40.1  
 Intersection LOS: D  
 Intersection Capacity Utilization 84.7%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: SR-9 & 204th Street NE



Lanes, Volumes, Timings  
4: SR-9 & Eaglefield Drive

Zahradnik Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	32	34	90	26	127	36	451	184	179	475	68
Future Volume (vph)	64	32	34	90	26	127	36	451	184	179	475	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	450		0	250		450	200		450
Storage Lanes	1		0	1		0	1		1	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
Ped Bike Factor		0.98		0.98								
Frt		0.922			0.876				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1681	0	1770	1632	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.471			0.693			0.950			0.950		
Satd. Flow (perm)	877	1681	0	1266	1632	0	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			144				209			104
Link Speed (mph)		30			30			45				45
Link Distance (ft)		540			446			4765				6607
Travel Time (s)		12.3			10.1			72.2				100.1
Confl. Peds. (#/hr)			7	7								
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	75	0	102	174	0	41	513	209	203	540	77
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phase	7	4		3	8		5	2	2	1	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	5.0
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	12.0	25.0		12.0	25.0		13.0	53.0	53.0	20.0	60.0	60.0
Total Split (%)	10.9%	22.7%		10.9%	22.7%		11.8%	48.2%	48.2%	18.2%	54.5%	54.5%
Yellow Time (s)	3.5	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	1.0
Lost Time Adjust (s)	0.0	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	4.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)	14.4	8.9		14.7	9.0		7.5	26.6	26.6	14.1	39.1	39.1
Actuated g/C Ratio	0.20	0.12		0.20	0.12		0.10	0.36	0.36	0.19	0.53	0.53
v/c Ratio	0.28	0.32		0.33	0.53		0.23	0.76	0.30	0.60	0.54	0.09
Control Delay	26.9	23.2		27.6	16.6		40.8	29.6	4.0	40.7	16.8	1.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.9	23.2		27.6	16.6		40.8	29.6	4.0	40.7	16.8	1.8
LOS	C	C		C	B		D	C	A	D	B	A
Approach Delay		25.1			20.7			23.2			21.3	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	26	16		37	13		18	206	0	83	179	0

2028 Future with Development Condition  
Kimley-Horn and Associates, Inc. [SF & AH 090221216]

PM Peak-Hour

Lanes, Volumes, Timings  
4: SR-9 & Eaglefield Drive

Zahradnik Development

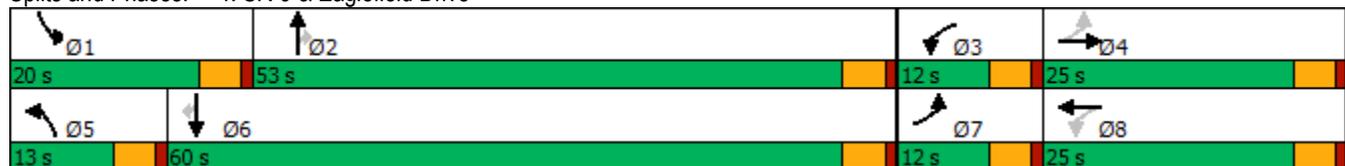


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	69	59		91	72		59	365	39	#230	338	13
Internal Link Dist (ft)		460			366			4685			6527	
Turn Bay Length (ft)	150			450			250		450	200		450
Base Capacity (vph)	281	541		320	599		224	1287	1158	409	1419	1230
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.14		0.32	0.29		0.18	0.40	0.18	0.50	0.38	0.06

Intersection Summary

Area Type: Other  
 Cycle Length: 110  
 Actuated Cycle Length: 73.2  
 Natural Cycle: 80  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.76  
 Intersection Signal Delay: 22.2      Intersection LOS: C  
 Intersection Capacity Utilization 62.0%      ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 4: SR-9 & Eaglefield Drive



# SITE LAYOUT

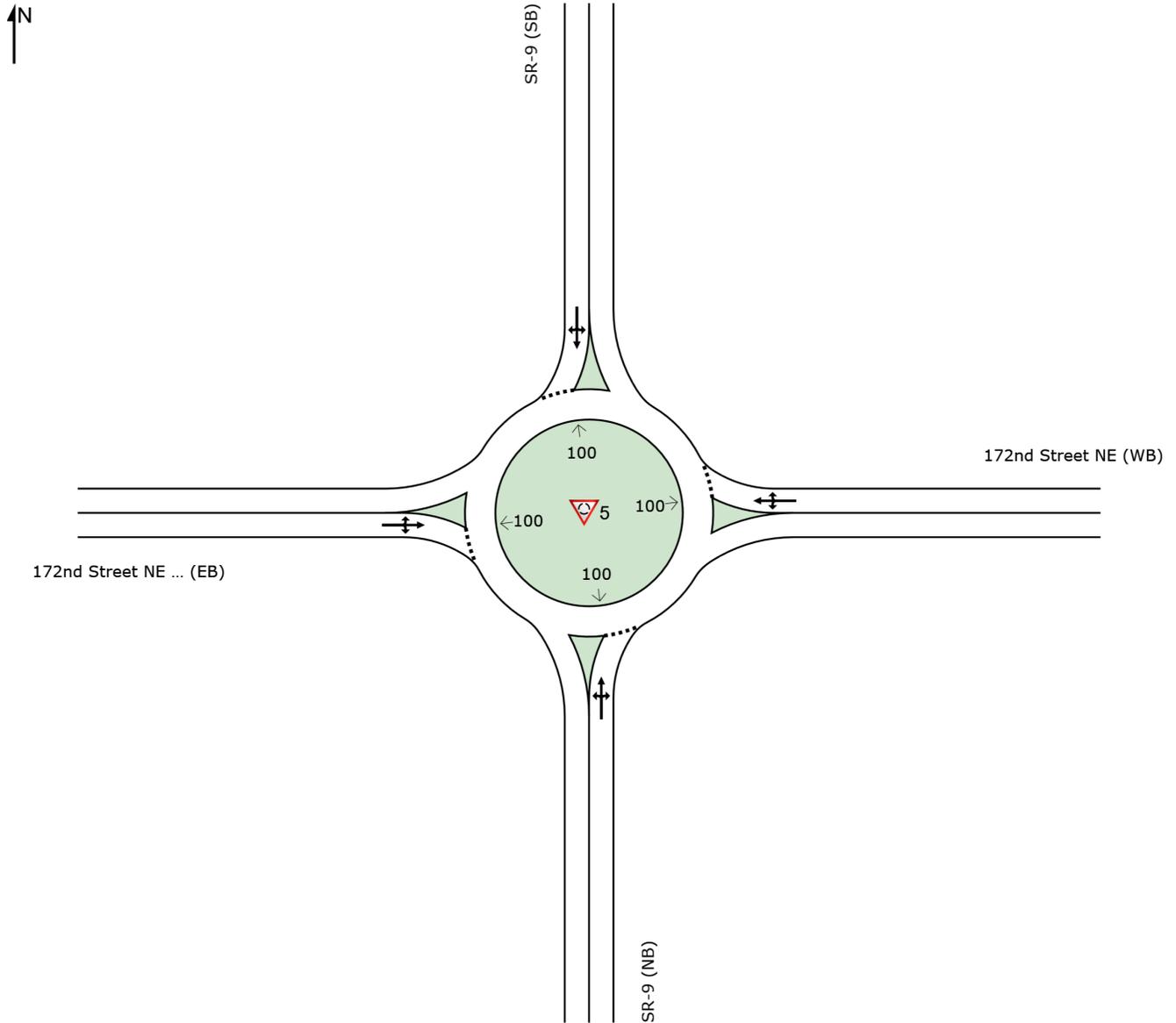
## Site: 5 [2028 Future Conditions (Site Folder: General)]

SR-9 at 172nd Street NE (SR-531)

Site Category: (None)

Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: K:\SNO\_TPTO\2021\21-216 Zahradnik\Full Analysis\Intersection Analysis\Sidra\#5 - SR-9 at 172nd Street NE-SR-531.sip9

# MOVEMENT FLOWS FOR SITE (INPUT)

Approach movement input flow rates (veh/h)

## All Movement Classes

**Site: 5 [2028 Future Conditions (Site Folder: General)]**

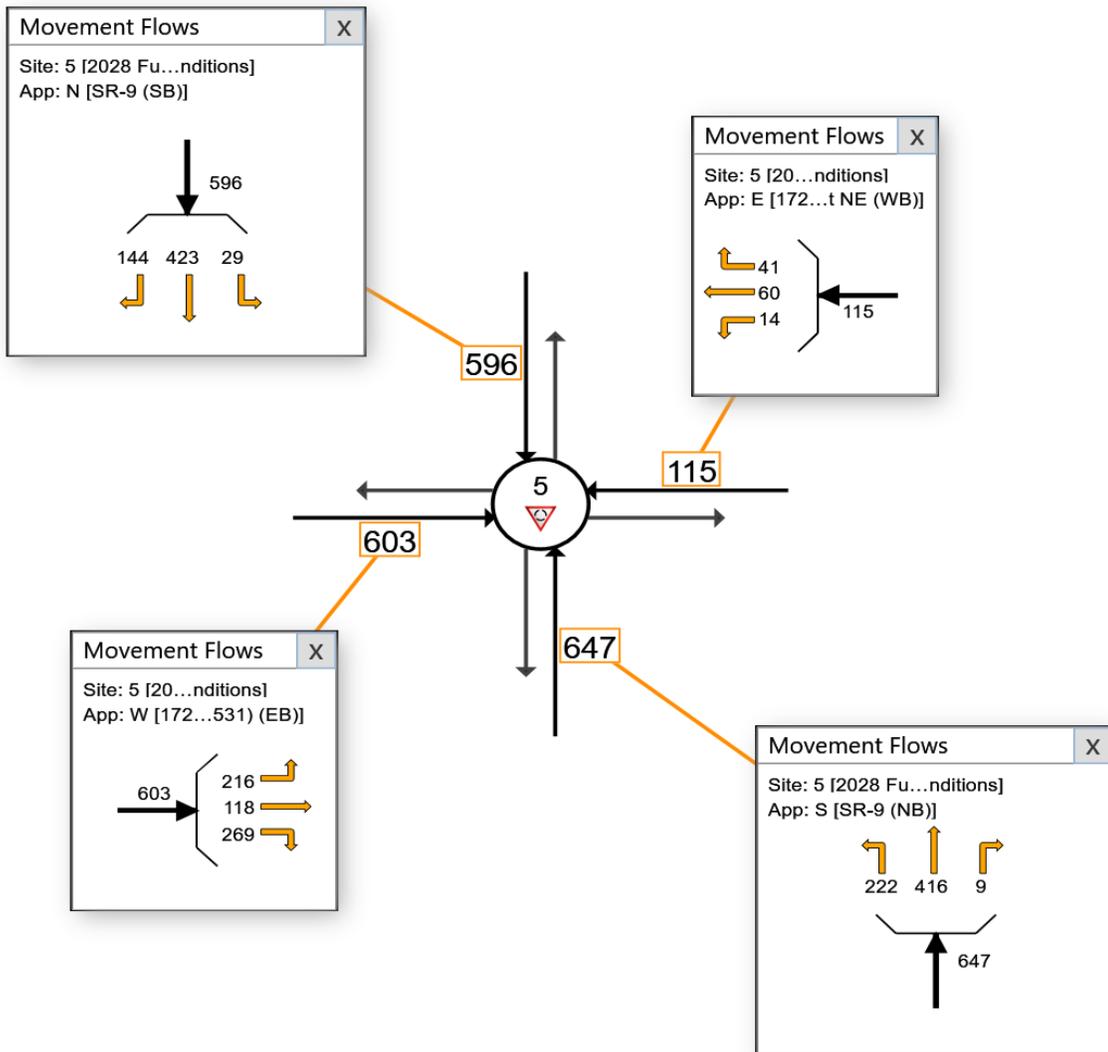
SR-9 at 172nd Street NE (SR-531)

Site Category: (None)

Roundabout

Use the button below to open or close all popup boxes. Click value labels to open selected ones. Click and drag popup boxes to move to preferred positions.

Close All Popups



# MOVEMENT SUMMARY

## Site: 5 [2028 Future Conditions (Site Folder: General)]

SR-9 at 172nd Street NE (SR-531)

Site Category: (None)

Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: SR-9 (NB)														
3	L2	222	3.0	234	3.0	0.712	15.7	LOS B	9.0	229.9	0.92	0.92	1.11	33.8
8	T1	416	3.0	438	3.0	0.712	9.8	LOS A	9.0	229.9	0.92	0.92	1.11	33.7
18	R2	9	3.0	9	3.0	0.712	9.8	LOS A	9.0	229.9	0.92	0.92	1.11	32.8
Approach		647	3.0	681	3.0	0.712	11.8	LOS B	9.0	229.9	0.92	0.92	1.11	33.7
East: 172nd Street NE (WB)														
1	L2	14	3.0	15	3.0	0.223	16.5	LOS B	1.6	41.1	0.90	0.87	0.90	34.0
6	T1	60	3.0	63	3.0	0.223	10.6	LOS B	1.6	41.1	0.90	0.87	0.90	33.9
16	R2	41	3.0	43	3.0	0.223	10.6	LOS B	1.6	41.1	0.90	0.87	0.90	32.9
Approach		115	3.0	121	3.0	0.223	11.3	LOS B	1.6	41.1	0.90	0.87	0.90	33.6
North: SR-9 (SB)														
7	L2	29	3.0	31	3.0	0.603	12.9	LOS B	5.8	147.9	0.76	0.73	0.81	35.5
4	T1	423	3.0	445	3.0	0.603	7.0	LOS A	5.8	147.9	0.76	0.73	0.81	35.4
14	R2	144	3.0	152	3.0	0.603	7.0	LOS A	5.8	147.9	0.76	0.73	0.81	34.4
Approach		596	3.0	627	3.0	0.603	7.3	LOS A	5.8	147.9	0.76	0.73	0.81	35.2
West: 172nd Street NE (SR-531) (EB)														
5	L2	216	3.0	227	3.0	0.726	17.9	LOS B	9.3	238.6	0.96	1.03	1.27	32.6
2	T1	118	3.0	124	3.0	0.726	12.0	LOS B	9.3	238.6	0.96	1.03	1.27	32.6
12	R2	269	3.0	283	3.0	0.726	12.0	LOS B	9.3	238.6	0.96	1.03	1.27	31.7
Approach		603	3.0	635	3.0	0.726	14.1	LOS B	9.3	238.6	0.96	1.03	1.27	32.2
All Vehicles		1961	3.0	2064	3.0	0.726	11.1	LOS B	9.3	238.6	0.88	0.89	1.06	33.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula.

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

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

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HCM 6th TWSC  
6: 172nd Street NE & 85th Avenue NE

Zahradnik Development

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↗	↗	↘	↘	↘
Traffic Vol, veh/h	88	563	372	71	45	50
Future Vol, veh/h	88	563	372	71	45	50
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	350	125	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	90	574	380	72	46	51

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	454	0	-	0	1136 382
Stage 1	-	-	-	-	382 -
Stage 2	-	-	-	-	754 -
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	1107	-	-	-	223 665
Stage 1	-	-	-	-	690 -
Stage 2	-	-	-	-	465 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1105	-	-	-	204 664
Mov Cap-2 Maneuver	-	-	-	-	204 -
Stage 1	-	-	-	-	633 -
Stage 2	-	-	-	-	464 -

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	18.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1105	-	-	-	204	664
HCM Lane V/C Ratio	0.081	-	-	-	0.225	0.077
HCM Control Delay (s)	8.5	-	-	-	27.7	10.9
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.8	0.2

HCM 6th TWSC  
7: 172nd Street NE & 80th Drive NE

Zahradnik Development

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	63	635	409	16	16	36
Future Vol, veh/h	63	635	409	16	16	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	65	655	422	16	16	37

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	438	0	-	0	1215 430
Stage 1	-	-	-	-	430 -
Stage 2	-	-	-	-	785 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1117	-	-	-	199 623
Stage 1	-	-	-	-	654 -
Stage 2	-	-	-	-	448 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1117	-	-	-	187 623
Mov Cap-2 Maneuver	-	-	-	-	187 -
Stage 1	-	-	-	-	616 -
Stage 2	-	-	-	-	448 -

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	16.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1117	-	-	-	363
HCM Lane V/C Ratio	0.058	-	-	-	0.148
HCM Control Delay (s)	8.4	-	-	-	16.6
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	0.5

HCM 6th TWSC  
8: 172nd Street NE & Gleneagel Boulevard

Zahradnik Development

Intersection						
Int Delay, s/veh	1.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	117	692	417	36	17	51
Future Vol, veh/h	117	692	417	36	17	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	325	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	122	721	434	38	18	53

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	472	0	-	0	1418 453
Stage 1	-	-	-	-	453 -
Stage 2	-	-	-	-	965 -
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	1090	-	-	-	151 607
Stage 1	-	-	-	-	640 -
Stage 2	-	-	-	-	370 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1090	-	-	-	134 607
Mov Cap-2 Maneuver	-	-	-	-	134 -
Stage 1	-	-	-	-	568 -
Stage 2	-	-	-	-	370 -

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	19.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1090	-	-	-	322
HCM Lane V/C Ratio	0.112	-	-	-	0.22
HCM Control Delay (s)	8.7	-	-	-	19.3
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.4	-	-	-	0.8

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↘		↙	↗
Traffic Vol, veh/h	37	789	469	11	8	24
Future Vol, veh/h	37	789	469	11	8	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	822	489	11	8	25

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	500	0	-	0	1395 495
Stage 1	-	-	-	-	495 -
Stage 2	-	-	-	-	900 -
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	1064	-	-	-	156 575
Stage 1	-	-	-	-	613 -
Stage 2	-	-	-	-	397 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1064	-	-	-	150 575
Mov Cap-2 Maneuver	-	-	-	-	150 -
Stage 1	-	-	-	-	590 -
Stage 2	-	-	-	-	397 -

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	16.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1064	-	-	-	150	575
HCM Lane V/C Ratio	0.036	-	-	-	0.056	0.043
HCM Control Delay (s)	8.5	-	-	-	30.4	11.5
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	0.1

HCM 6th TWSC  
 10: 85th Avenue NE & 84th Avenue NE/Site Access

Zahradnik Development

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	7	31	0	0	17	85	52	0	61	0
Future Vol, veh/h	0	0	7	31	0	0	17	85	52	0	61	0
Conflicting Peds, #/hr	0	0	1	0	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	92	86	92	92	92	86	86	92	92	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	8	34	0	0	20	99	57	0	71	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	240	268	73	244	240	128	72	0	0	156	0	0
Stage 1	72	72	-	168	168	-	-	-	-	-	-	-
Stage 2	168	196	-	76	72	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	714	638	989	710	661	922	1528	-	-	1424	-	-
Stage 1	938	835	-	834	759	-	-	-	-	-	-	-
Stage 2	834	739	-	933	835	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	705	628	987	696	651	922	1527	-	-	1424	-	-
Mov Cap-2 Maneuver	705	628	-	696	651	-	-	-	-	-	-	-
Stage 1	924	834	-	822	748	-	-	-	-	-	-	-
Stage 2	822	729	-	924	834	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	8.7		10.4		0.8		0	
HCM LOS	A		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1527	-	-	987	696	1424	-	-
HCM Lane V/C Ratio	0.013	-	-	0.008	0.048	-	-	-
HCM Control Delay (s)	7.4	0	-	8.7	10.4	0	-	-
HCM Lane LOS	A	A	-	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.2	0	-	-

HCM 6th TWSC  
 11: 85th Avenue NE & 175th Street NE/Site Access

Zahradnik Development

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	0	9	15	0	0	11	55	26	0	32	0
Future Vol, veh/h	1	0	9	15	0	0	11	55	26	0	32	0
Conflicting Peds, #/hr	0	0	1	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	92	83	92	92	92	83	83	92	92	83	100
Heavy Vehicles, %	1	2	1	2	2	2	1	1	2	2	1	1
Mvmt Flow	1	0	11	16	0	0	13	66	28	0	39	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	145	159	40	152	145	80	39	0	0	94	0	0
Stage 1	39	39	-	106	106	-	-	-	-	-	-	-
Stage 2	106	120	-	46	39	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.52	6.21	7.12	6.52	6.22	4.11	-	-	4.12	-	-
Critical Hdwy Stg 1	6.11	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.018	3.309	3.518	4.018	3.318	2.209	-	-	2.218	-	-
Pot Cap-1 Maneuver	826	733	1034	815	746	980	1577	-	-	1500	-	-
Stage 1	979	862	-	900	807	-	-	-	-	-	-	-
Stage 2	902	796	-	968	862	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	820	726	1033	800	739	980	1577	-	-	1500	-	-
Mov Cap-2 Maneuver	820	726	-	800	739	-	-	-	-	-	-	-
Stage 1	970	862	-	892	800	-	-	-	-	-	-	-
Stage 2	894	789	-	957	862	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	8.6		9.6		0.9		0	
HCM LOS	A		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1577	-	-	1007	800	1500	-
HCM Lane V/C Ratio	0.008	-	-	0.012	0.02	-	-
HCM Control Delay (s)	7.3	0	-	8.6	9.6	0	-
HCM Lane LOS	A	A	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0	-