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# 10 Degrees Traffic Impact Analysis

Jurisdiction: City of Marysville

August 2021



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## 1. DEVELOPMENT IDENTIFICATION

Gibson Traffic Consultants, Inc. (GTC) has been retained to provide a traffic impact analysis for the proposed 10 Degrees development. This report is intended to provide the City of Marysville, Snohomish County, and the Washington State Department of Transportation (WSDOT) with the necessary trip generation, trip distribution and level of service information to facilitate their reviews of the development. The 10 Degrees development is located south of 172<sup>nd</sup> Street NE and west of Twin Lake Avenue. A site vicinity map is included in Figure 1. The development is proposed to consist of 336 residential unit split between detached and attached units.

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

## 2. METHODOLOGY

The analysis contained in this report is based on the City of Marysville traffic impact analysis guidelines, which requires the analysis of intersections impacted with 25 or more PM peak-hour trips. The trip generation calculations are based on average trip generation rates published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10<sup>th</sup> Edition (2017)*. The trip distribution is based on the approved distributions provided by the City of Marysville for all development types in the area.

The level of service analysis at the study intersections has been performed in accordance with the *Highway Capacity Manual (HCM) 6<sup>th</sup> Edition*. Congestion is generally measured in terms of level of service (LOS). 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. A summary of the level of service criteria is included in Table 1.



**Table 1: Level of Service Criteria**

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 level of service at two-way stop-controlled intersections is based on the average delay for the stop approach with the highest delay. The level of service at all-way stop-controlled intersections, roundabouts, and signalized intersections is based on the average delay for all vehicles. The level of service analysis has been performed utilizing the *Synchro 11.1, Build 0* software for signalized and stop-controlled intersections. The level of service analysis for roundabout intersection has been performed using the *Sidra Version 8.0.7.7948* software. The City of Marysville identifies acceptable level of service as LOS E for stop-controlled and signalized intersections along the 172<sup>nd</sup> Street NE and Smokey Point Boulevard corridors. Intersections not located on these corridors have a level of service standard LOS D. WSDOT has a level of service threshold of LOS E for I-5 intersections, based on the *Development Services Manual, Appendix 29*.

### 3. TRIP GENERATION

The trip generation calculations for the 10 Degrees development are based on data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual, 10<sup>th</sup> Edition (2017)*. The average trip generation rates for following ITE Land Use Codes have been used in the trip generation calculations:

- ITE Land Use Code 210, Single-Family Detached Housing – 166 units
- ITE Land Use Code 220, Multifamily Housing (Low-Rise) – 170 units

<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.

The trip generation calculations have been performed for the weekday and Saturday. The weekday trip generation calculations for the 10 Degrees development are summarized in Table 2.

**Table 2: Trip Generation Summary - Weekday**

Land Use	Units	Average Daily Trips	AM Peak-Hour Trips			PM Peak-Hour Trips		
			Inbound	Outbound	Total	Inbound	Outbound	Total
Single-Family Detached Housing	166	1,567.04	30.71	92.13	122.84	104.58	61.42	166.00
Multifamily Housing (Low-Rise)	170	1,244.40	17.99	60.21	78.20	59.98	35.22	95.20
<b>TOTAL</b>		<b>2,811.44</b>	<b>47.80</b>	<b>152.34</b>	<b>201.04</b>	<b>164.56</b>	<b>96.64</b>	<b>261.20</b>

The 10 Degrees development is anticipated to generate approximately 12,811 average daily trips with 201 AM peak-hour trips and 261 PM peak-hour trips. It is important to note that the City of Marysville utilizes a rate of 1.00 trip per unit for the PM peak-hour trip generation, as opposed to the ITE trip generation rate of 0.99 trips per unit. The Saturday trip generation for the 10 Degrees development is summarized in Table 3.

**Table 3: Trip Generation Summary - Saturday**

Land Use	Units	Average Daily Trips	Peak-Hour Trips		
			Inbound	Outbound	Total
Single-Family Detached Housing	166	1,583.64	83.37	71.01	154.38
Multifamily Housing (Low-Rise)	170	1,383.80	74.97	44.03	119.00
<b>TOTAL</b>		<b>2,967.44</b>	<b>158.34</b>	<b>115.04</b>	<b>273.38</b>

The 10 Degrees development is anticipated to generate approximately 2,967 average Saturday daily trips with 273 trips generated during the peak-hour. The trip generation calculations are included in the attachments.

**4. TRIP DISTRIBUTION**

The trip distribution for the 10 Degrees development is based on distributions provided by the City of Marysville for new developments in the site vicinity. The trip distribution has been evaluated for the 2024 Opening Year conditions and the 2030 Horizon Year conditions.

#### **4.1 2024 Opening Year**

The opening year trip distribution is based on the existing roadway network. It is anticipated that 30% of the trips generated by the development will travel along 172<sup>nd</sup> Street NE, eleven percent to and from the west and nineteen percent to and from the east. Approximately 27% of the trips generated by the development will travel to and from the east along 156<sup>th</sup> Street NE. It is estimated that 33% of the trips generated by the development will travel along Interstate-5, fifteen percent to and from the north and eighteen percent to and from the south. The remaining 10% of the trips generated by the development will be to and from local retail areas in the site vicinity. Detailed trip distributions are shown in Figure 2 and Figure 3 for the weekday AM and PM peak-hours, respectively. A detailed trip distribution for the Saturday peak-hour is shown in Figure 4.

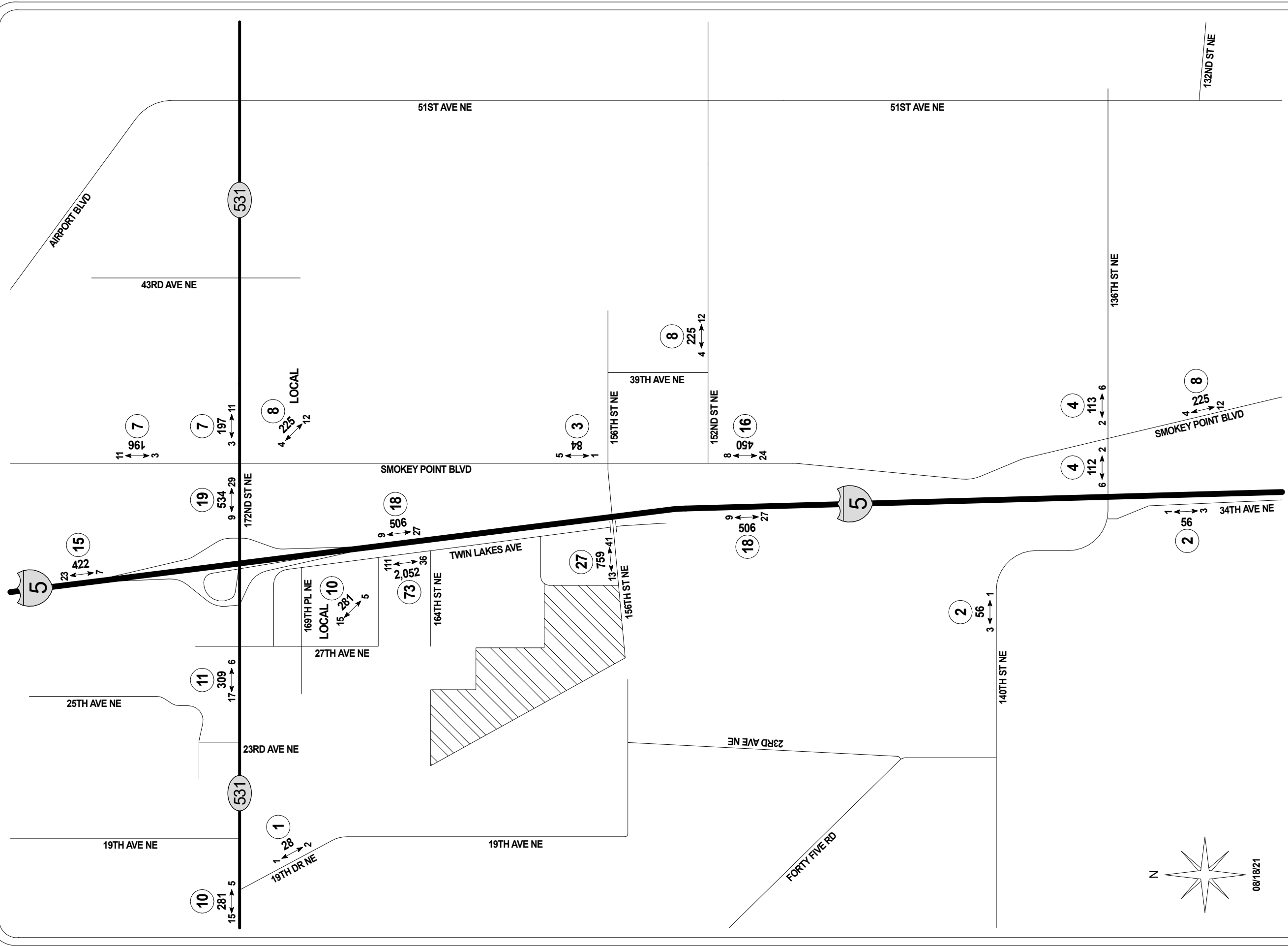
#### **4.2 2030 Horizon Year**

The horizon year distribution considers future roadway improvements, particularly new roadways south of 172<sup>nd</sup> Street NE and east of Twin Lakes Avenue and a full Interstate-5 interchange with 156<sup>th</sup> Street NE. These new roadways and the Interstate-5 interchange are anticipated to cause trips to divert from 172<sup>nd</sup> Street NE to 156<sup>th</sup> Street SE. It is anticipated that 45% of the trips generated by the development will travel along 156<sup>th</sup> Street NE, including the eighteen percent traveling to and from the south along Interstate-5 and the twenty-seven percent that will travel along City of Marysville roadways east of Interstate-5. It is estimated that 15% of the trips generated by the development will travel to and from the north along Interstate-5. These trips could use the new access to Interstate-5 at 156<sup>th</sup> Street NE, but have been assigned along 172<sup>nd</sup> Street NE to maximize the impact of the trips generated by the development to the intersections along the 172<sup>nd</sup> Street NE corridor. Approximately 30% of the trips generated by the development will travel along 172<sup>nd</sup> Street NE, eleven percent to and from the west and nineteen percent to and from the east. It is to and from the south along Twin Lake Avenue. The remaining 10% of the trips generated by the development will travel to and from local retail areas. The horizon year trip distributions for the weekday AM and PM peak-hours are shown in Figure 5 and Figure 6, respectively, and the horizon year distribution for the Saturday peak-hour is shown in Figure 7.

#### **4.3 Snohomish County Key Intersection Impacts**

The interlocal agreement between the City of Marysville and Snohomish County requires detailed development trip turning movement data at Snohomish County key intersections impacted with three or more directional trips on an approach or departure. The trips from the 10 Degrees development will impact 2 key intersections during the weekday AM and PM peak-hours. The turning movement volumes at the key intersections are shown in graphical and tabular form in the attachments.





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**FIGURE 2**  
2030 OPENING YEAR  
TRIP DISTRIBUTION  
WEEKDAY AM PEAK-HOUR

**LEGEND**  
AWDT  
WEEKDAY AM  
NEW DAILY TRAFFIC  
NEW PEAK-HOUR TRIPS  
TRIP DISTRIBUTION %

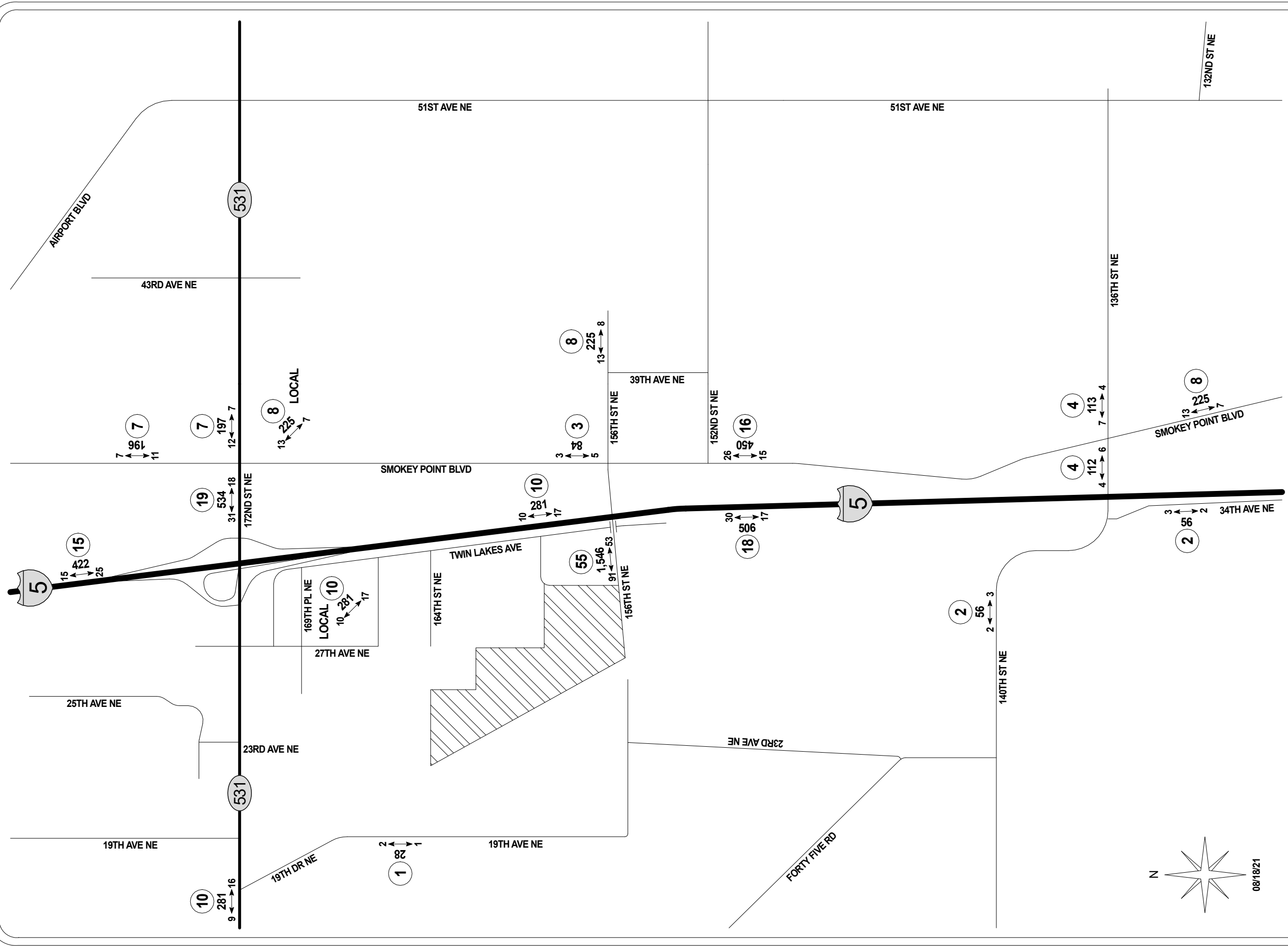
10 DEGREES

CITY OF MARYSVILLE









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**LEGEND**

AWDT  
WEEKDAY PM ↔ PEAK

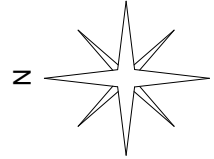
NEW DAILY TRAFFIC  
NEW PEAK-HOUR TRIPS

XX

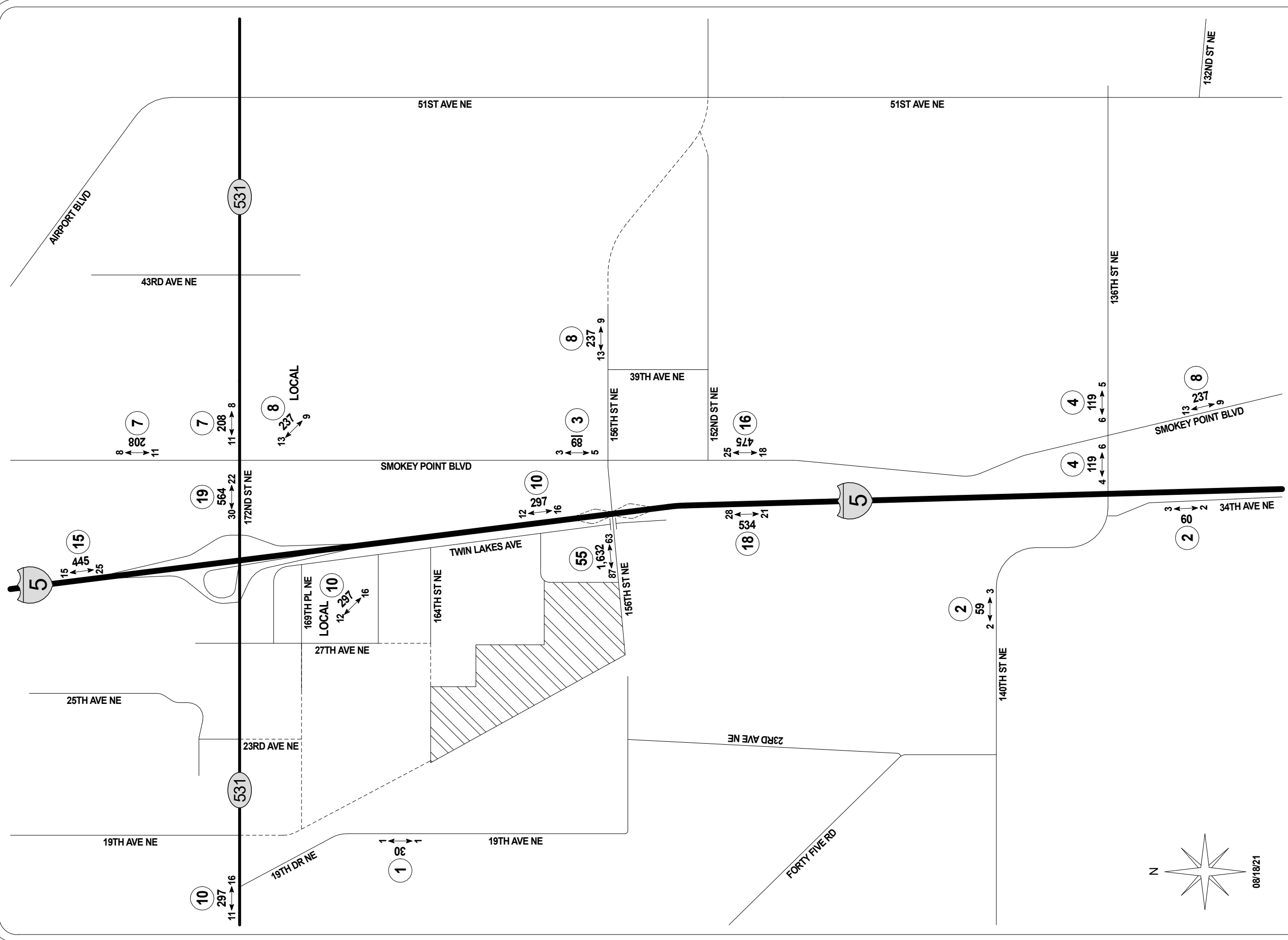
TRIP DISTRIBUTION %

**FIGURE 6**

**2036 HORIZON YEAR  
TRIP DISTRIBUTION  
WEEKDAY PM PEAK-HOUR**



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**FIGURE 7**  
**2036 HORIZON YEAR**  
**TRIP DISTRIBUTION**  
**SATURDAY PEAK-HOUR**

**LEGEND**

AWDT  
SATURDAY ← → PEAK

NEW DAILY TRAFFIC  
NEW PEAK-HOUR TRIPS

TRIP DISTRIBUTION %

XX

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## 5. INTERSECTION LEVEL OF SERVICE ANALYSIS

The City of Marysville typically requires analysis at intersections impacted with 25 peak-hour trips. Intersection analysis has been performed at the following intersections:

1. 172<sup>nd</sup> Street NE at 23<sup>rd</sup> Avenue NE – Roundabout
2. 172<sup>nd</sup> Street NE at 27<sup>th</sup> Avenue NE – Signalized
3. 169<sup>th</sup> Place NE at 27<sup>th</sup> Avenue NE – Signalized
4. 172<sup>nd</sup> Street NE at I-5 Southbound Ramps – Signalized
5. 172<sup>nd</sup> Street NE at I-5 Northbound Ramps – Signalized
6. 156<sup>th</sup> Street NE at Smokey Point Boulevard – Signalized
7. 152<sup>nd</sup> Street NE at Smokey Point Boulevard – Signalized
8. 136<sup>th</sup> Street NE at Smokey Point Boulevard – Signalized

The study intersections have been analyzed for the 2021 existing conditions, the 2024 Opening Year conditions, and the 2030 Horizon Year conditions during the weekday PM peak-hour and Saturday peak-hour. The 10 Degrees development is anticipated to be constructed in the year 2023, but the year 2024 has been chosen for the Opening Year to account for delays. The 2030 Horizon Year accounts for a 6-year period beyond the opening date. All of the study intersections have been analyzed for the Weekday PM peak-hour, but only intersections #1 through #3 have been analyzed for the Saturday peak-hour.

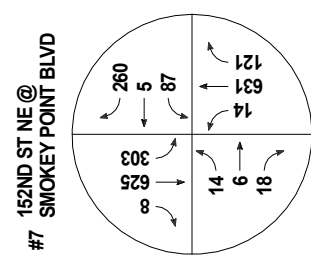
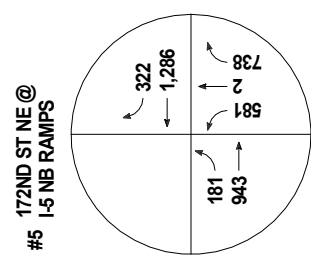
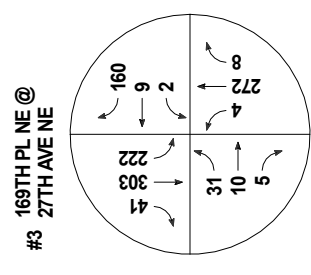
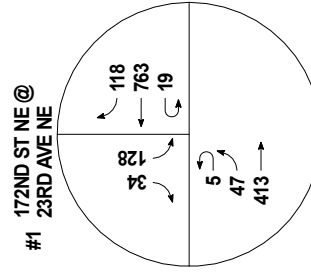
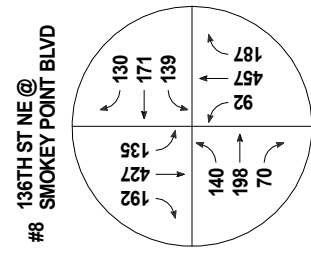
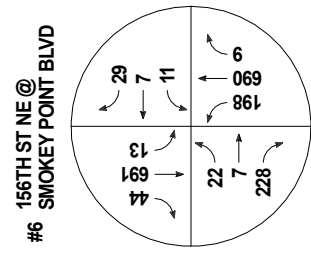
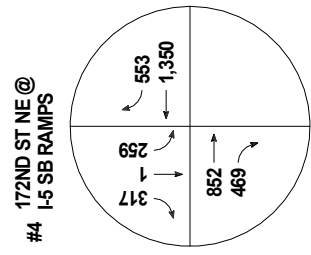
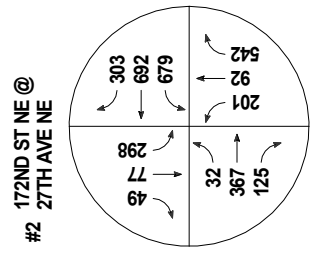
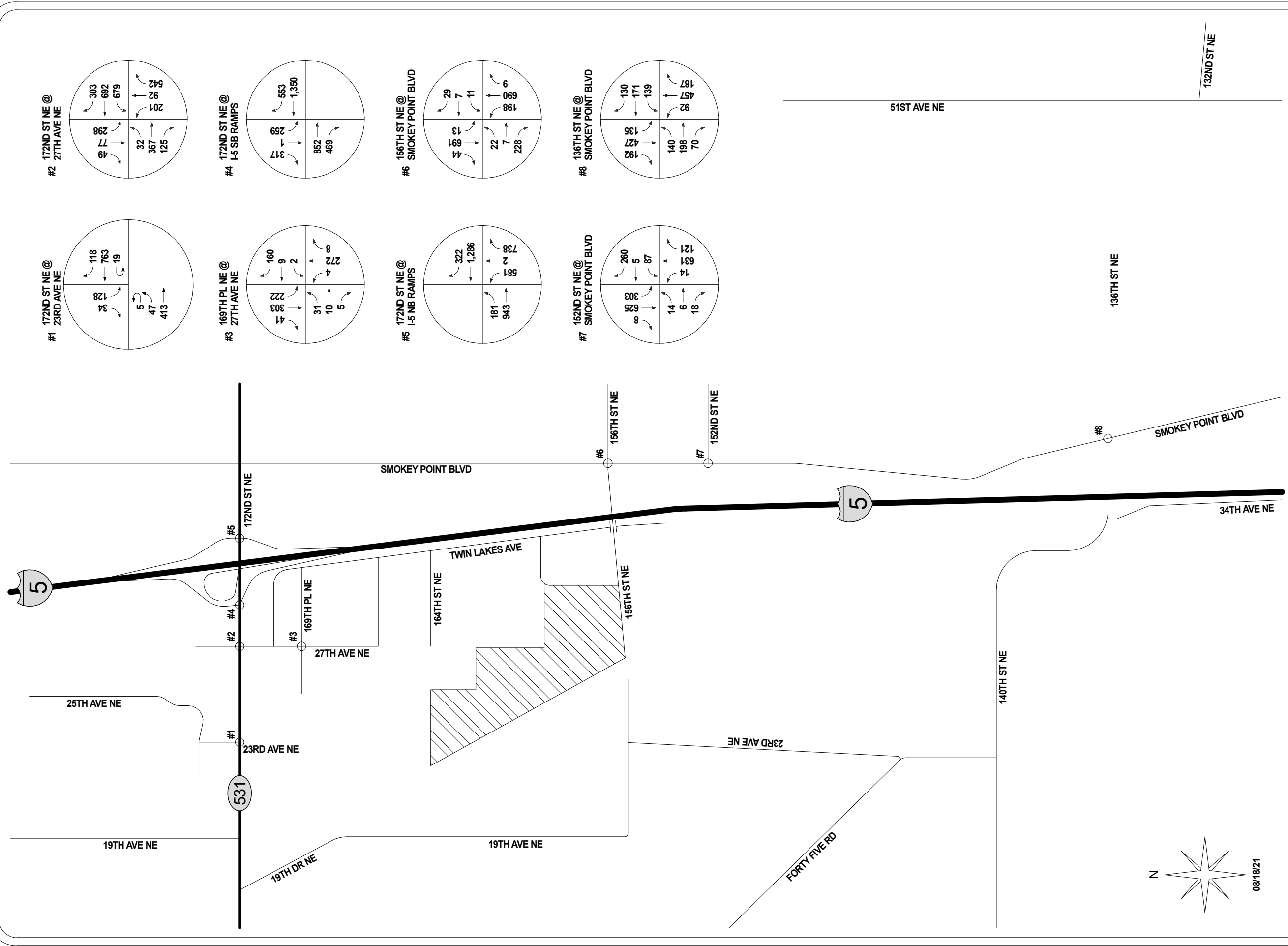
It is important to note that there is a proposed connection along the 19<sup>th</sup> Avenue NE corridor south of 172<sup>nd</sup> Street NE. This connection is likely dependent on development in the area that has not been submitted or reviewed as of the date of this report. The southern connection of the 23<sup>rd</sup> Avenue NE is also dependent on development in the area. However, there has been more development submitted to the City of Marysville along that corridor. The analysis in this report therefore assumes the 23<sup>rd</sup> Avenue NE connection, as opposed to a connection at 19<sup>th</sup> Avenue NE.

### 5.1 Turning Movement Calculations

The existing weekday PM peak-hour (occurring between 4:00 and 6:00 PM) and existing Saturday mid-day (occurring between 11:00 AM and 1:00 PM) turning movements at the study intersections were collected by the independent count firm Traffic Data Gathering (TDG) in July 2021. The 2024 and 2030 baseline turning movements at the study intersections have been calculated by applying a 3% annually compounding growth rate to the existing turning movements. The 2024 and 2030 future with development turning movements at the study intersections have been calculated by adding the trips generated by the development to the 2024 and 2030 baseline turning movements. It is important to note that the trips generated by the development have generally been assigned to the study intersections to maximize the impacts of the development to represent a conservatively high analysis of the impacts of the 10 Degrees development. One example of this is the assignment of trips traveling to and from the north along Interstate-5 to the 172<sup>nd</sup> Street NE corridor under the 2030 horizon year conditions. The turning movement calculations, including detailed distributions of the trips generated by the development, are shown in the attachments. The following figures identify the turning movements for each scenario:

- Figure 8: 2021 Existing Turning Movements – Weekday PM Peak-Hour
- Figure 9: 2021 Existing Turning Movements – Saturday Peak-Hour
- Figure 10: 2024 Baseline Turning Movements - Weekday PM Peak-Hour
- Figure 11: 2024 Baseline Turning Movements – Saturday Peak-Hour
- Figure 12: 2024 Opening Year Turning Movements – Weekday PM Peak-Hour
- Figure 13: 2024 Opening Year Turning Movements – Saturday Peak-Hour
- Figure 14: 2030 Baseline Turning Movements – Weekday PM Peak-Hour
- Figure 15: 2030 Baseline Turning Movements – Saturday Peak-hour
- Figure 16: 2030 Horizon Year Turning Movements – Weekday PM Peak-Hour
- Figure 17: 2030 Horizon year Turning Movements – Saturday Peak-Hour





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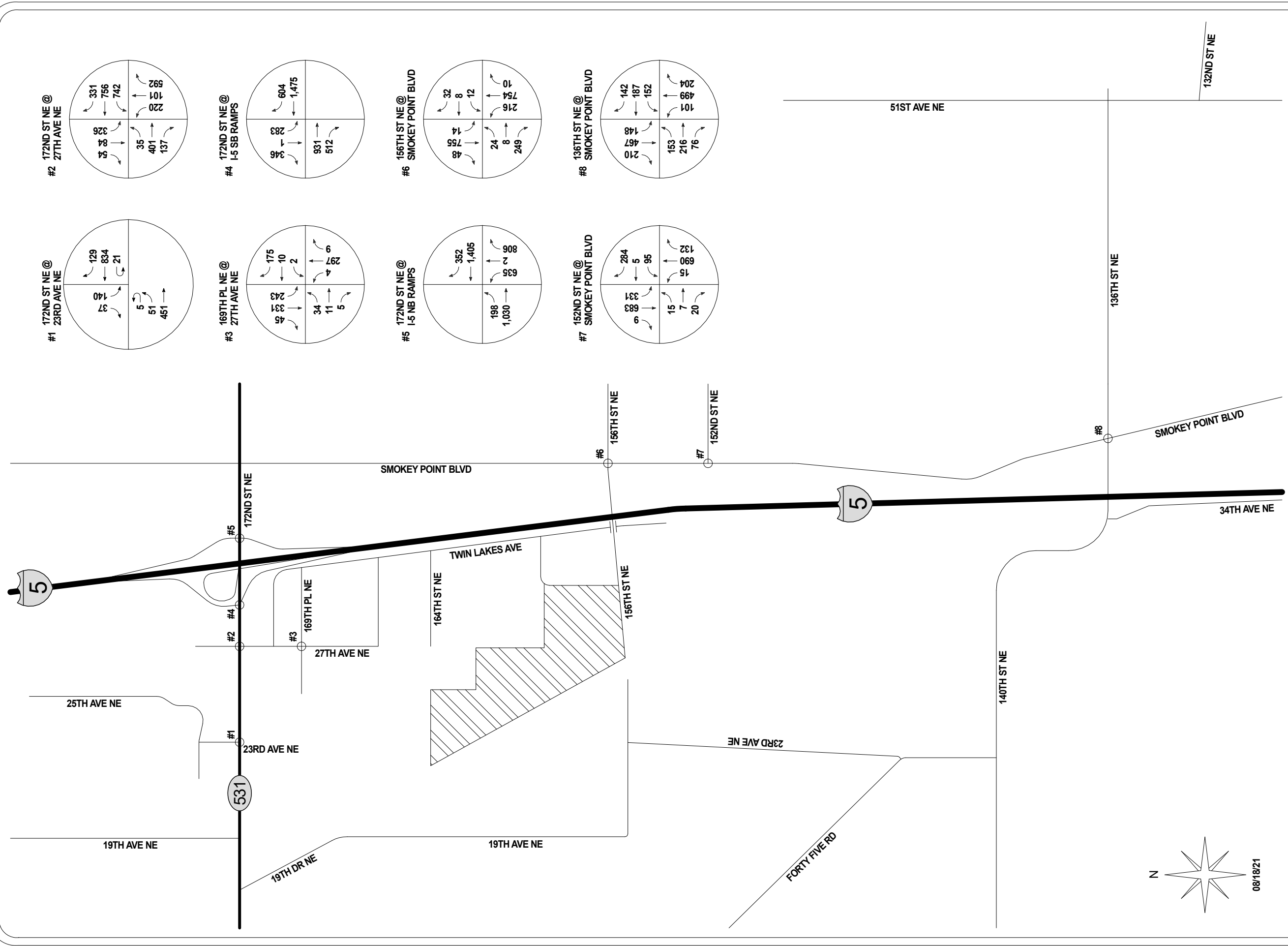
**FIGURE 8**  
2021 EXISTING  
TURNING MOVEMENTS  
WEEKDAY PM PEAK-HOUR

LEGEND  
WEEKDAY PM PEAK-HOUR  
TURNING MOVEMENT VOLUMES

10 DEGREES

CITY OF MARYSVILLE





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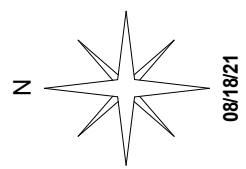
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**LEGEND**  
XXX →  
WEEKDAY PM PEAK-HOUR  
TURNING MOVEMENT VOLUMES

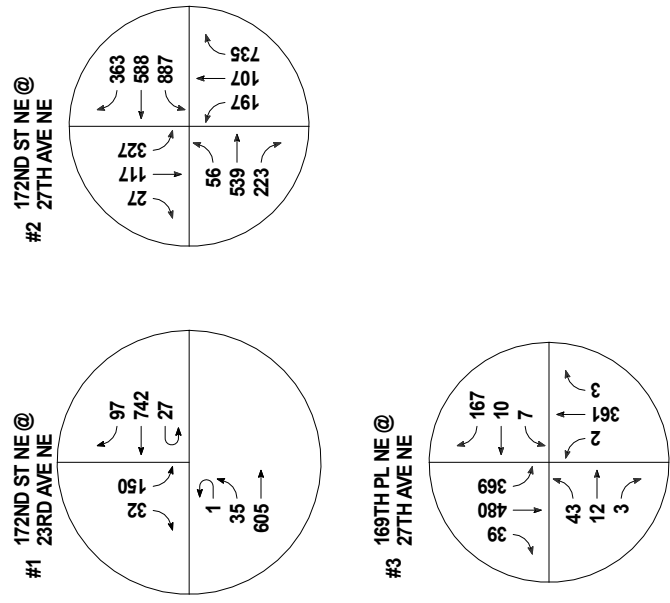
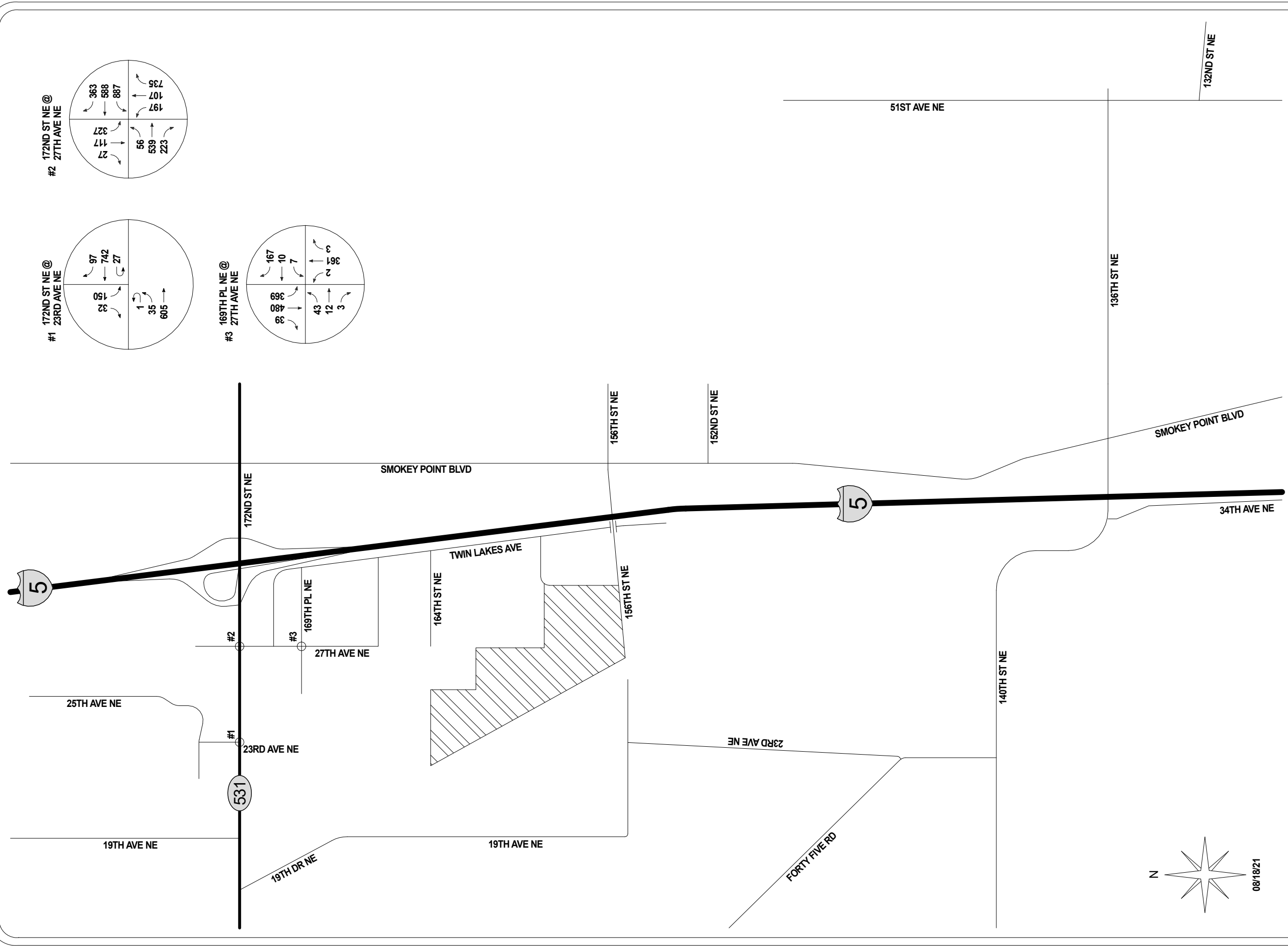
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**FIGURE 10**  
**2024 BASELINE**  
**TURNING MOVEMENTS**  
**WEEKDAY PM PEAK-HOUR**



08/18/21



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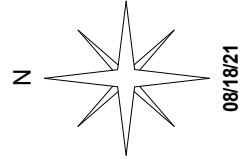
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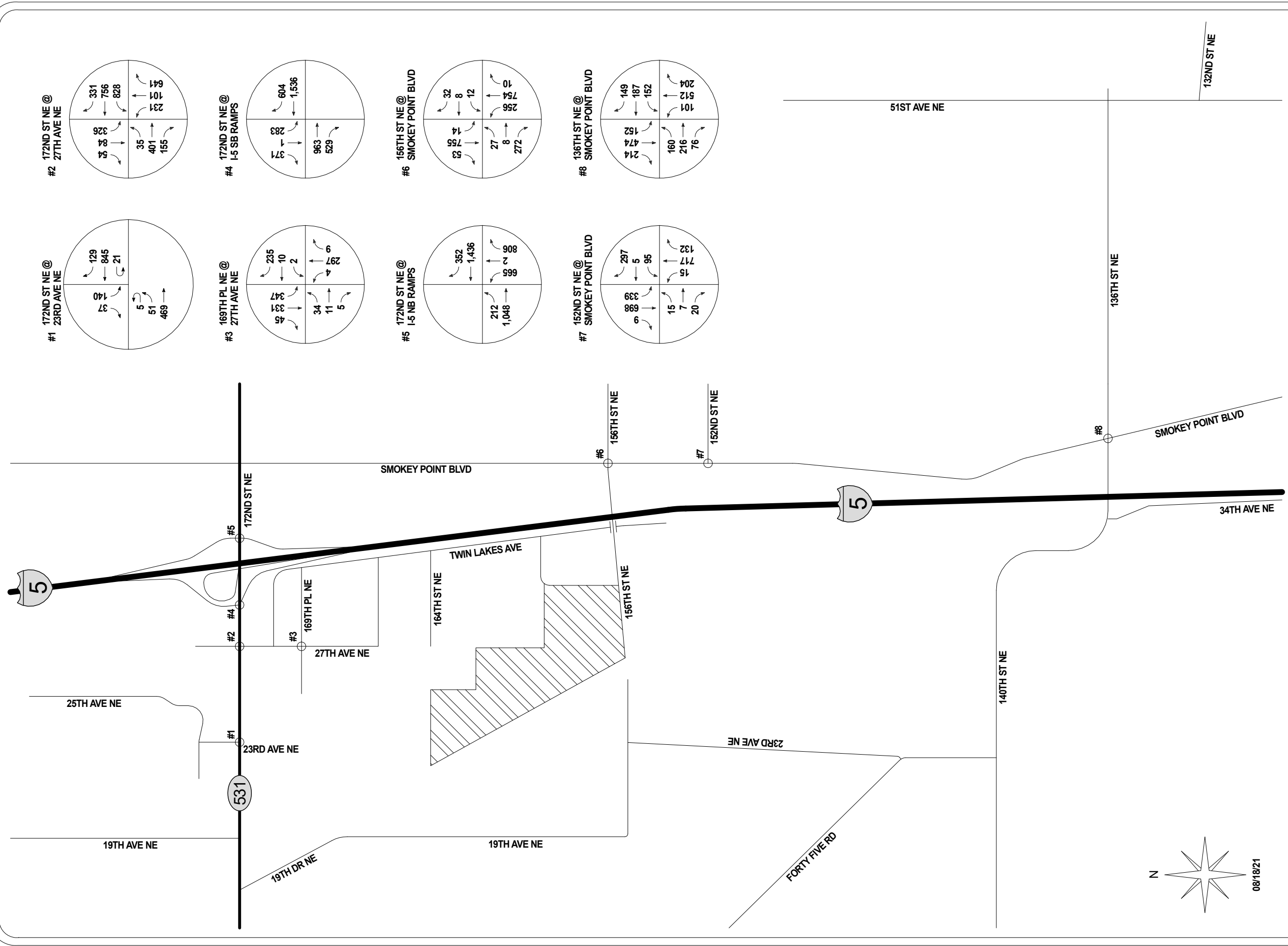
10 DEGREES

**FIGURE 11**  
2024 BASELINE  
TURNING MOVEMENTS  
SATURDAY PEAK-HOUR

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

CITY OF MARYSVILLE





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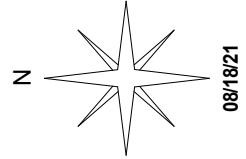
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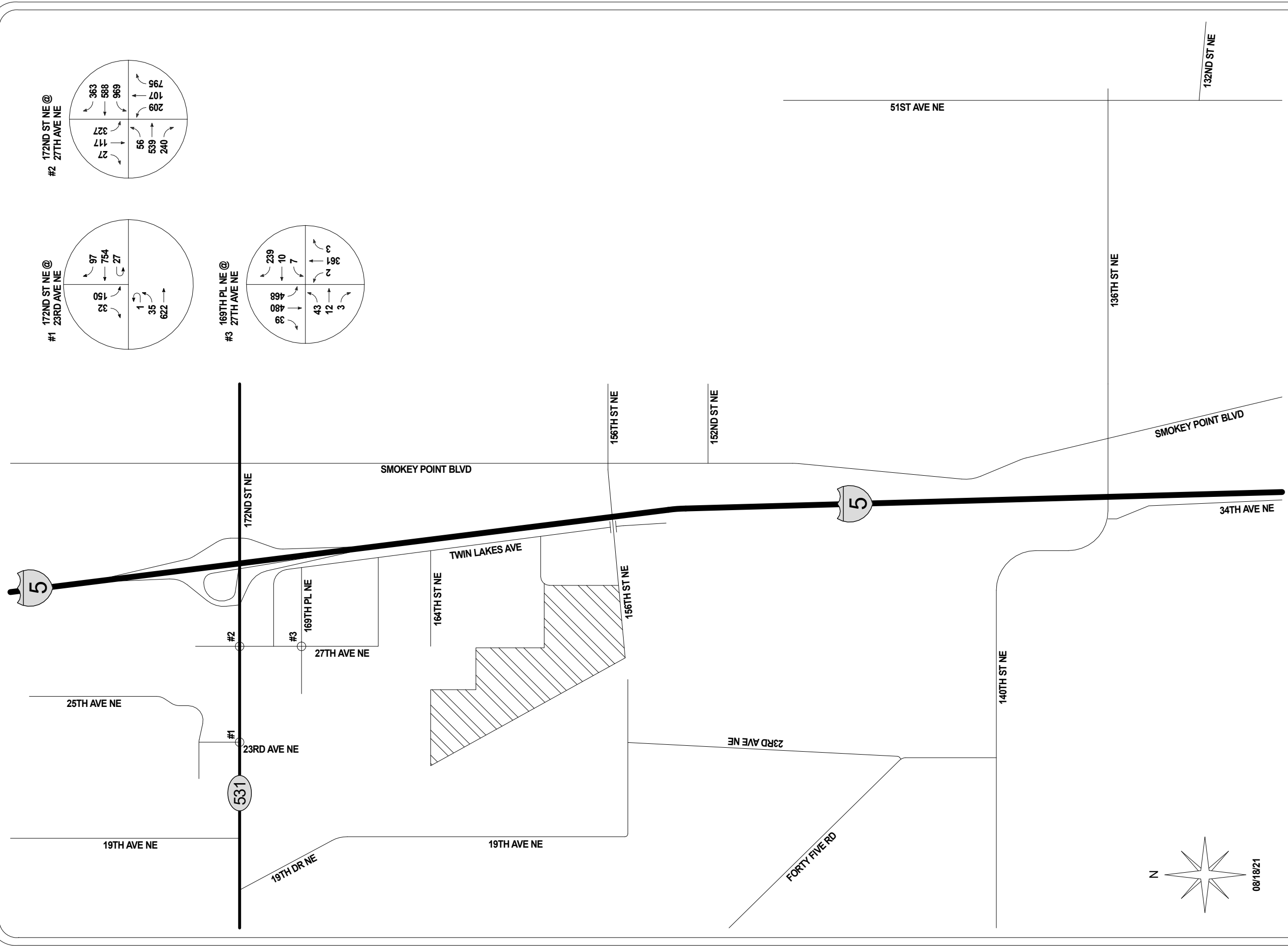
**10 DEGREES**

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

**FIGURE 12**  
**2024 OPENING YEAR**  
**TURNING MOVEMENTS**  
**WEEKDAY PM PEAK-HOUR**

**CITY OF MARYSVILLE**





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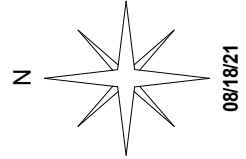
**10 DEGREES**

**CITY OF MARYSVILLE**

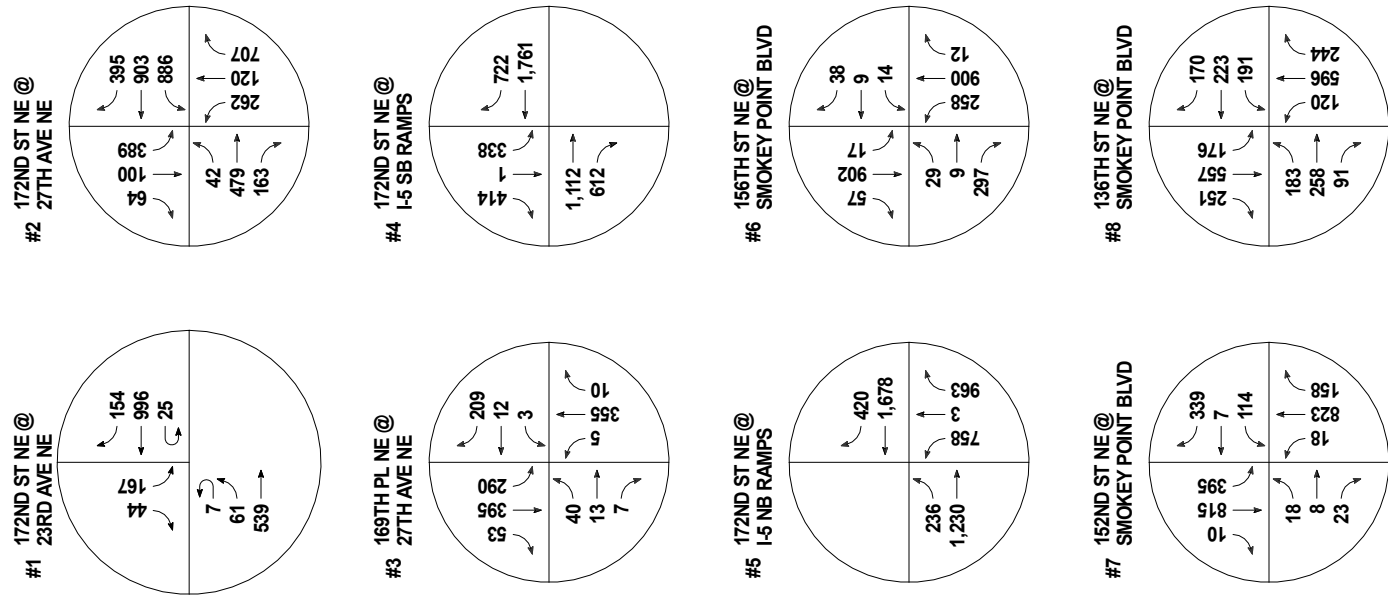
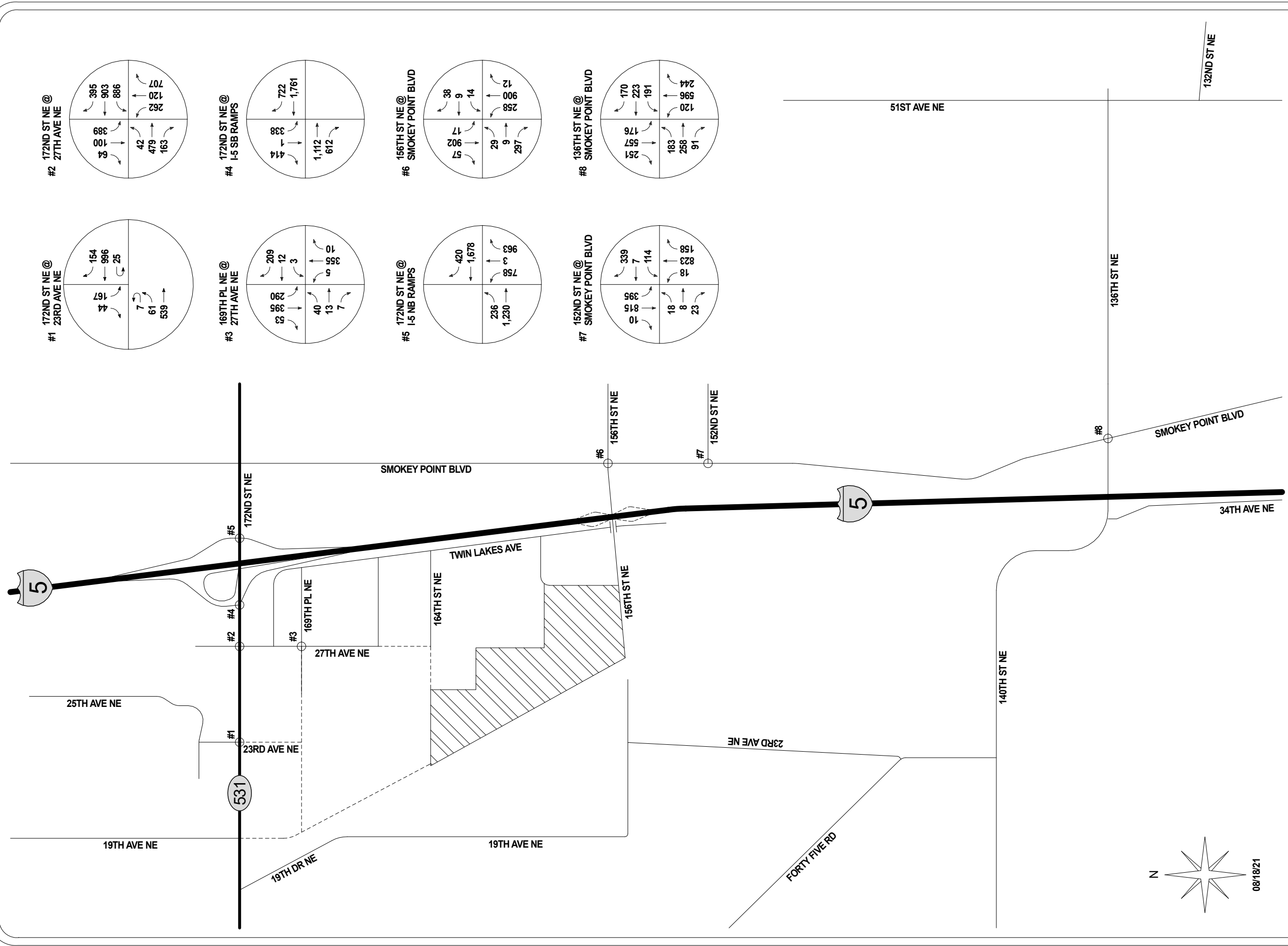
**LEGEND**

XXX → SATURDAY PEAK-HOUR TURNING MOVEMENT VOLUMES

**FIGURE 13**  
**2024 OPENING YEAR**  
**TURNING MOVEMENTS**  
**SATURDAY PEAK-HOUR**



08/18/21



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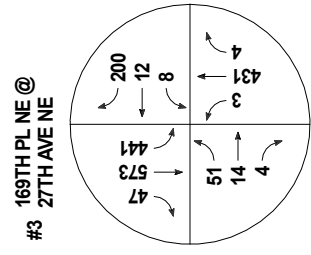
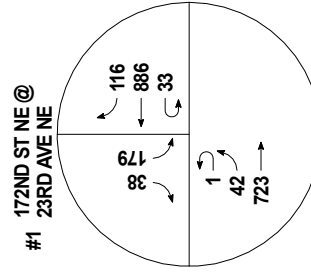
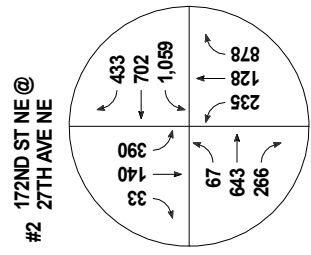
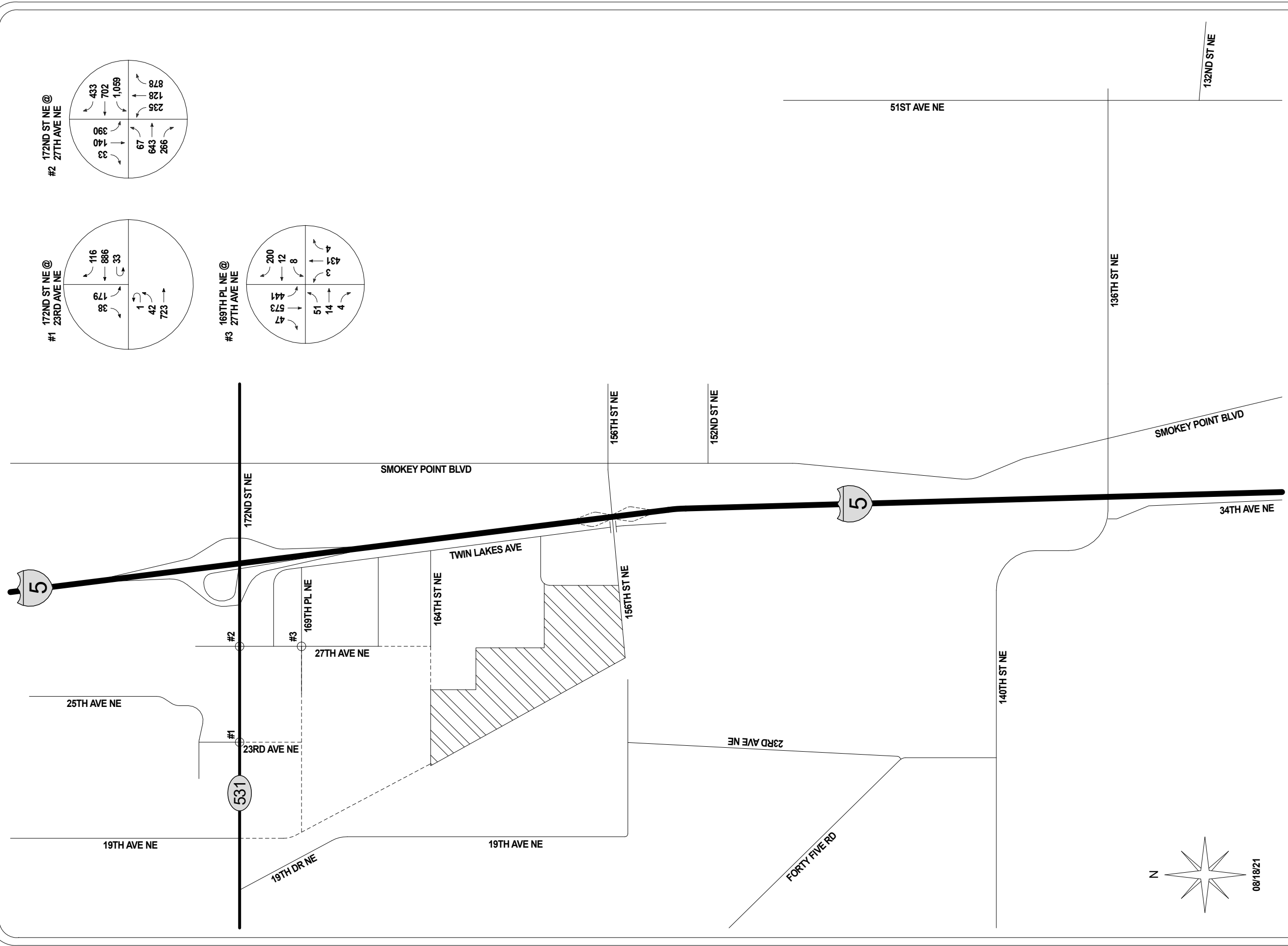
10 DEGREES

CITY OF MARYSVILLE

LEGEND

XXX → WEEKDAY PM PEAK-HOUR TURNING MOVEMENT VOLUMES

FIGURE 14  
2030 BASELINE  
TURNING MOVEMENTS  
WEEKDAY PM PEAK-HOUR



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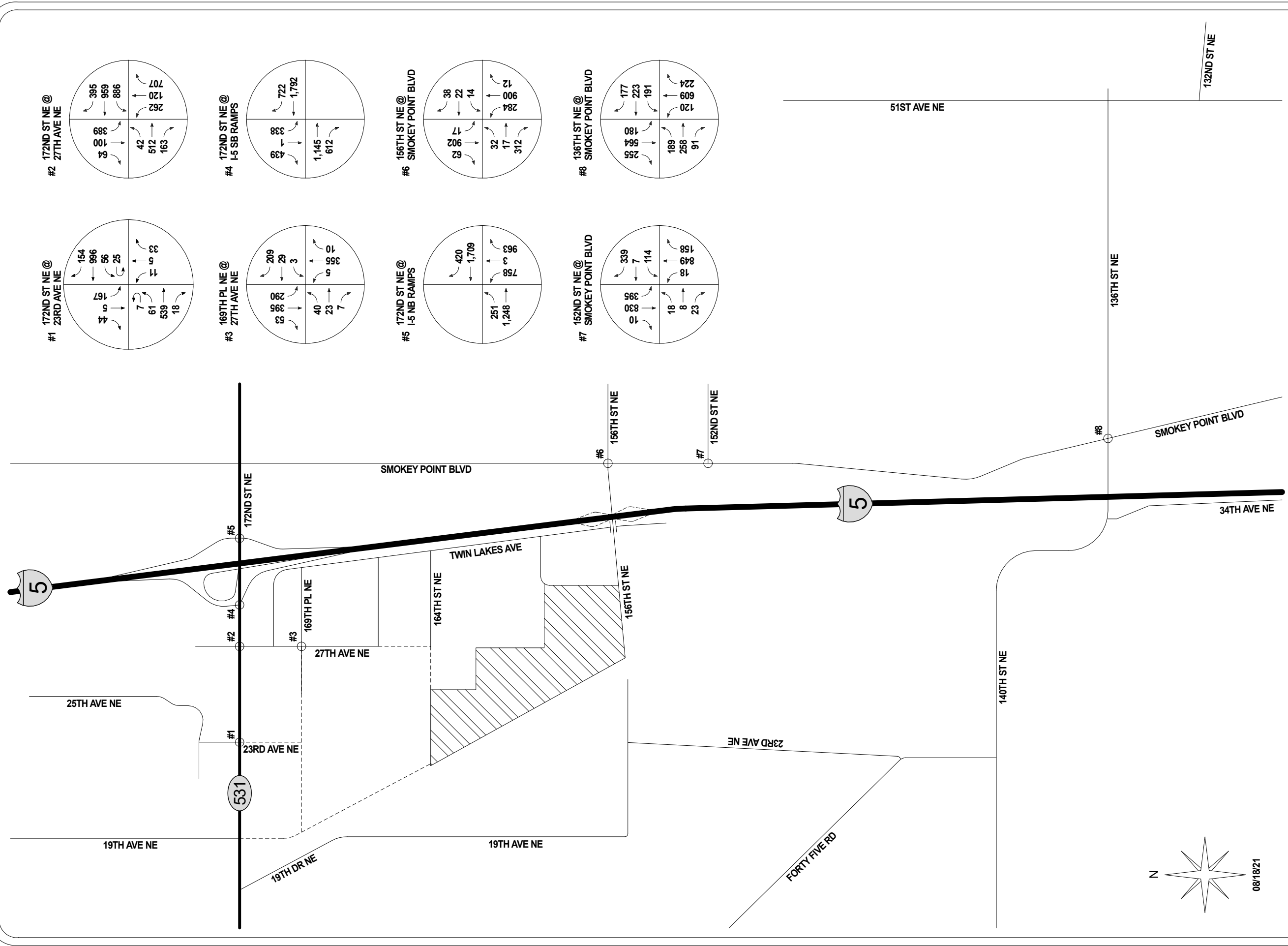
**FIGURE 15**  
2030 BASELINE  
TURNING MOVEMENTS  
SATURDAY PEAK-HOUR

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

10 DEGREES

CITY OF MARYSVILLE





**GIBSON TRAFFIC CONSULTANTS**

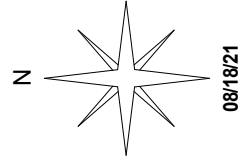
**TRAFFIC IMPACT STUDY**  
GTC #21-190

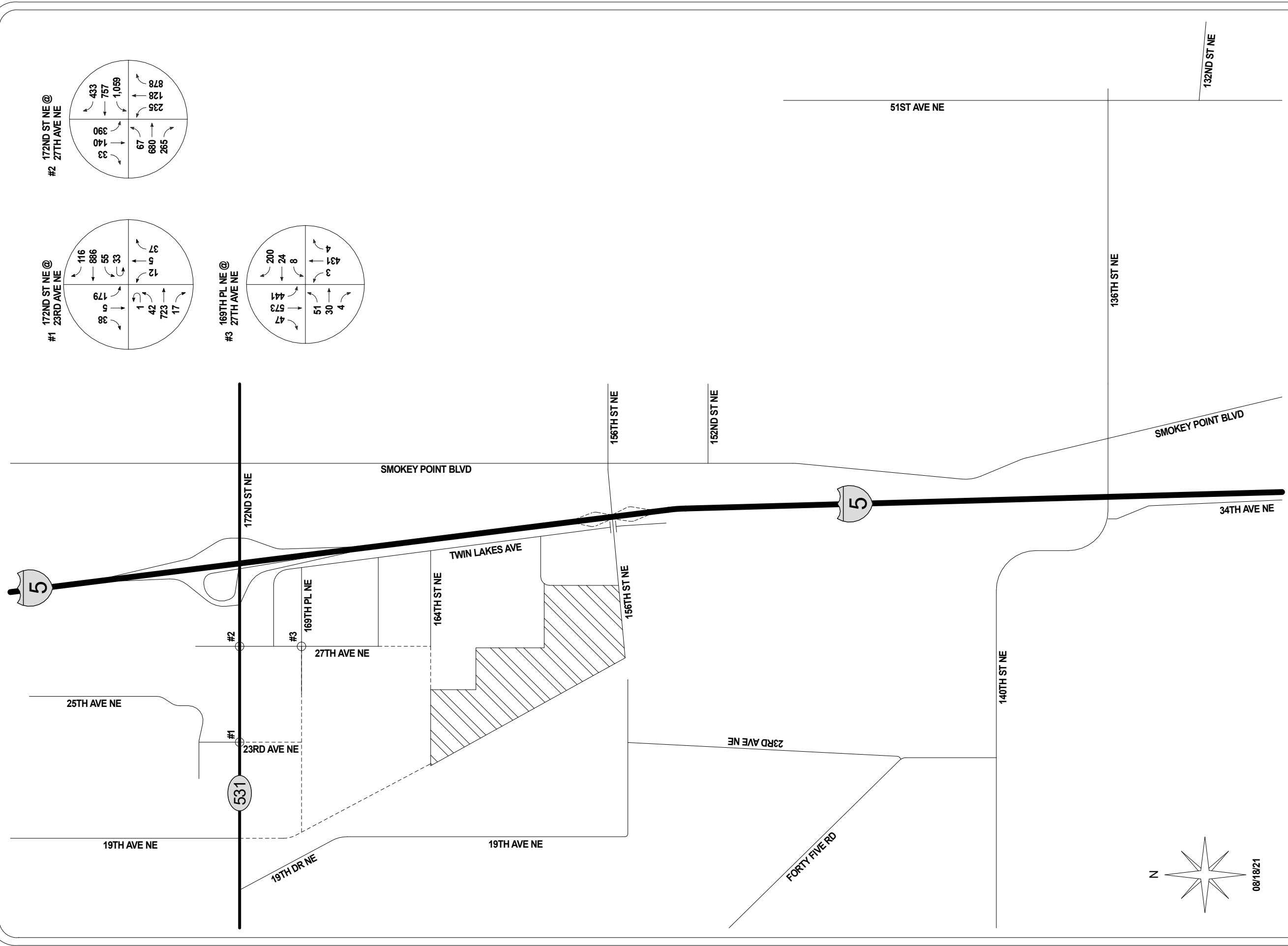
**LEGEND**  
XXX →  
WEEKDAY PM PEAK-HOUR  
TURNING MOVEMENT VOLUMES

**10 DEGREES**

**CITY OF MARYSVILLE**

**FIGURE 16**  
**2030 HORIZON YEAR**  
**TURNING MOVEMENTS**  
**WEEKDAY PM PEAK-HOUR**





TRAFFIC IMPACT STUDY  
GTC #21-190

GIBSON TRAFFIC CONSULTANTS

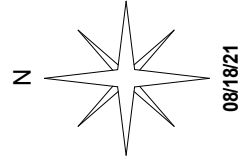
10 DEGREES

CITY OF MARYSVILLE

LEGEND

XXX → SATURDAY PEAK-HOUR TURNING MOVEMENT VOLUMES

FIGURE 17  
2030 HORIZON YEAR  
TURNING MOVEMENTS  
SATURDAY PEAK-HOUR



08/18/21

## 5.2 Level of Service Calculations

The level of service calculations have been performed utilizing the existing channelization, existing intersection control, heavy vehicle factors, and peak-hour factors from the turning movement counts. The parameters have been used for the 2021 existing, 2024 opening year, and 2030 horizon year conditions. It is important to note that the southern leg of the intersection of 172<sup>nd</sup> Street NE at 23<sup>rd</sup> Avenue NE is included under the 2030 horizon conditions, but is not anticipated to be constructed as part of the development. The southern leg is anticipated to be constructed as part of adjacent developments.

**Table 4: Level of Service Summary – Weekday PM Peak-Hour**

Intersection	Control	2021 Existing Conditions		2024 Baseline Conditions		2024 Opening Year Conditions		2030 Baseline Conditions		2030 Horizon Year Conditions	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1. 172 <sup>nd</sup> Street NE at 23 <sup>rd</sup> Avenue NE	Roundabout	A	5.6 sec	A	5.8 sec	A	5.8 sec	A	6.5 sec	A	7.5 sec
2. 172 <sup>nd</sup> Street NE at 27 <sup>th</sup> Avenue NE	Signal	D	45.4 sec	D	50.2 sec	D	54.5 sec	E	66.6 sec	E	68.2 sec
3. 169 <sup>th</sup> Place NE at 27 <sup>th</sup> Avenue NE	Signal	A	7.8 sec	A	8.0 sec	A	8.4 sec	A	8.7 sec	A	9.3 sec
4. 172 <sup>nd</sup> Street NE at I-5 Southbound Ramps	Signal	B	13.9 sec	B	16.0 sec	B	18.4 sec	C	25.6 sec	C	28.9 sec
5. 172 <sup>nd</sup> Street NE at I-5 Northbound Ramps	Signal	C	22.4 sec	C	23.7 sec	C	24.7 sec	C	27.8 sec	C	28.6 sec
6. 156 <sup>th</sup> Street NE at Smokey Point Boulevard	Signal	B	12.9 sec	B	13.1 sec	B	13.3 sec	B	13.9 sec	B	15.4 sec
7. 152 <sup>nd</sup> Street NE at Smokey Point Boulevard	Signal	B	14.1 sec	B	15.3 sec	B	15.7 sec	C	23.2 sec	C	24.4 sec
8. 136 <sup>th</sup> Street NE at Smokey Point Boulevard	Signal	C	26.2 sec	C	28.6 sec	C	29.1 sec	D	35.6 sec	D	36.5 sec

The level of service analysis of the Saturday peak-hour is summarized in Table 8.

**Table 5: Level of Service Summary – Saturday Peak-Hour**

Intersection	Control	2021 Existing Conditions		2024 Baseline Conditions		2024 Opening Year Conditions		2030 Baseline Conditions		2030 Horizon Year Conditions	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1. 172 <sup>nd</sup> Street NE at 23 <sup>rd</sup> Avenue NE	Roundabout	A	5.5 sec	A	5.7 sec	A	5.7 sec	A	6.4 sec	A	7.7 sec
2. 172 <sup>nd</sup> Street NE at 27 <sup>th</sup> Avenue NE	Signal	E	55.1 sec	E	66.6 sec	E	78.4 sec	F	109.6 sec	F	113.8 sec
3. 169 <sup>th</sup> Place NE at 27 <sup>th</sup> Avenue NE	Signal	A	8.7 sec	A	9.2 sec	B	10.0 sec	B	10.8 sec	B	11.5 sec

### 5.3 Future Roadway Improvements

The intersection of 172<sup>nd</sup> Street NE at 27<sup>th</sup> Avenue NE is anticipated to operate at LOS E under the 2030 baseline and horizon year conditions during the weekday PM peak-hour and LOS F under the 2030 baseline and horizon year conditions during the Saturday peak-hour. The 156<sup>th</sup> Street NE interchange is anticipated to reduce the volumes at the 172<sup>nd</sup> Street NE interchange and the surrounding intersections, including the intersection with 27<sup>th</sup> Avenue NE. However, a reduction to the turning movements, specifically the westbound left-turn and northbound right-turn movements, has not been made. These movements could potentially significantly decrease with the Interstate-5 at 156<sup>th</sup> Street NE interchange. The roadway improvements that are included as part of the 10 Degrees development are part of the overall roadway connectivity improvements south of 172<sup>nd</sup> Street NE that will help reduce the traffic volumes along 172<sup>nd</sup> Street NE. Additionally, the analysis along the 172<sup>nd</sup> Street NE corridor does not include the planned 5-lane section that will be constructed west of 27<sup>th</sup> Avenue NE as parcels develop. The roadways being constructed as part of the 10 Degrees development should mitigate the impacts of the 10 Degrees development and other improvements, such as the 156<sup>th</sup> Street NE interchange and additional channelization along 172<sup>nd</sup> Street NE, should improve the operations of the intersection of 172<sup>nd</sup> Street NE at 27<sup>th</sup> Avenue NE.

## 6. TRAFFIC MITIGATION FEES

The City of Marysville has an interlocal agreement with Snohomish County that provides for the payment of traffic mitigation fees to Snohomish County for City of Marysville developments. The City of Marysville also has an understanding with WSDOT for the payment of traffic mitigation fees.

### 6.1 City of Marysville

The City of Marysville traffic mitigation fees have been calculated using the residential rate of \$6,300 per residential PM peak-hour trip. The 10 Degrees development is proposed to generate 261.20 new PM peak-hour trips, resulting in a traffic mitigation fee of \$1,645,560.00. The fees for each of the unit types are:

- Single-Family Detached Housing – 166 Units
  - Total Fee - \$1,045,800.00
  - Fee per Unit - \$6,300.00
- Multifamily Housing (Low-Rise) – 170 Units
  - Total Fee - \$599,760.00
  - Fee per Unit - \$3,528.00

It is important to note that these traffic mitigation fees do not include any credits for roadways constructed as part of this development. It is possible that traffic mitigation fees will not be required to be paid if the on-site roadway costs that are creditable to City of Marysville traffic mitigation fees are more than the calculated traffic mitigation fees.

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## 6.2 Snohomish County

The City of Marysville and Snohomish County have an interlocal agreement that provides for the payment of traffic mitigation for impacts to Snohomish County roadways by City of Marysville developments. Traffic mitigation fees are based on predetermined area impacts or impacts to actual improvement projects. The only Snohomish County improvement project identified in the Snohomish County *Transportation Needs Report* is the intersection of 140<sup>th</sup> Street NE at 23<sup>rd</sup> Avenue NE. This intersection is anticipated to be impacted by 56 weekday daily trips (Figure 3 and Figure 6). The current Snohomish County fee for developments located in the City of Marysville is \$185 per daily trip. The impact of 56 average daily trips therefore results in a Snohomish County traffic mitigation fee of \$10,360.00. The fees for each of the unit types are:

- Single-Family Detached Housing – 31 average daily trips
  - Total Fee - \$5,735.00
  - Fee per Unit - \$34.55
- Multifamily Housing (Low-Rise) – 25 average daily trips
  - Total Fee - \$4,625.00
  - Fee per Unit - \$27.21

## 6.3 Washington State Department of Transportation

There are two major WSDOT improvements in the site vicinity that are impacted by trips generated by the 10 Degrees development. These improvements are the 172<sup>nd</sup> Street NE/SR-531 corridor improvements and the 156<sup>th</sup> Street NE interchange with Interstate-5. Both of these improvements are identified as funded as part of the Connecting Washington legislation. Payment of WSDOT traffic mitigation fees should therefore not be a condition of the 10 Degrees development.

## 7. CONCLUSIONS

The 10 Degrees development is proposed to consist of 166 single-family detached units and 170 multifamily housing (low-rise) units. The development is anticipated to generate approximately 2,811 average daily trips with 201 AM peak-hour trips and 261 PM peak-hour trips. The development is anticipated to generate approximately 2,967 average Saturday daily trips with 273 trips generated during the Saturday peak-hour. The study intersections are anticipated to operate at acceptable levels of service, particularly with the planned roadway improvements in the site vicinity and the roadway connectivity that will be included as part of the 10 Degrees development.

The development will have City of Marysville traffic mitigation fees of \$1,645,560.00 and Snohomish County traffic mitigation fees of \$10,360.00. There are on-site roadways that will be constructed as part of the 10 Degrees development that are creditable to the City of Marysville traffic mitigation fees. These roadway costs could be larger than the City of Marysville traffic mitigation fees, meaning a traffic mitigation fee does not need to be paid to the City of Marysville. WSDOT traffic mitigation fees should not be required for the 10 Degrees development since the major WSDOT improvements in the site vicinity are identified as funded under the Connecting Washington legislation.

# Site Plan



# **Trip Generation Calculations**



10 Degrees  
GTC #21-190

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

LAND USES	VARIABLE	ITE LU code	Trip Rate	Gross Trips			Internal Crossover		IN BOTH DIRECTIONS			NET EXTERNAL TRIPS BY TYPE					
				% IN	% OUT	In+Out (Total)	% of Gross Trips	Trips In+Out (Total)	TOTAL	PASS-BY		NEW		PASS-BY		NEW	
										In	Out	In+Out (Total)	% of Ext. Trips	In+Out (Total)	In	Out	In
Single-Family Detached Housing	166 units	210	9.44	50%	50%	1,567.04	0%	0.00	0.00	0.00	1,567.04	0.00	0.00	0.00	0.00	783.52	783.52
Multifamily Housing (Low-Rise)	170 units	220	7.32	50%	50%	1,244.40	0%	0.00	0.00	0.00	1,244.40	0.00	0.00	0.00	0.00	622.20	622.20
<b>Total</b>						2,811.44		0.00	0.00	0.00	2,811.44	0.00	0.00	0.00	0.00	1,405.72	1,405.72

10 Degrees  
 GTC #21-190

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

LAND USES	VARIABLE	ITE LU code	Gross Trips				Internal Crossover		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	PASS-BY	NEW	PASS-BY	NEW		
					In+Out (Total)	% of Ext. Trips	In+Out (Total)	% of Ext. Trips	In	Out	In	Out			
Single-Family Detached Housing	166 units	210	0.74	25%	75%	122.84	0%	0.00	0%	122.84	0%	0.00	0.00	30.71	92.13
Multifamily Housing (Low-Rise)	170 units	220	0.46	23%	77%	78.20	0%	0.00	0%	78.20	0%	0.00	0.00	17.99	60.21
<b>Total</b>						201.04		0.00		201.04		0.00	0.00	48.70	152.34

10 Degrees  
 GTC #21-190

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

LAND USES		NET EXTERNAL TRIPS BY TYPE														
		Gross Trips					Internal Crossover			IN BOTH DIRECTIONS			DIRECTIONAL ASSIGNMENTS			
		Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	% of Trips	In+Out (Total)	TOTAL	PASS-BY	NEW	In	Out	PASS-BY	In	Out
ITE LU code	VARIABLE															
Single-Family Detached Housing	166 units	1.00	63%	37%	166.00	0%	0.00	0.00	166.00	0%	0.00	166.00	0.00	0.00	104.58	61.42
Multifamily Housing (Low-Rise)	170 units	0.56	63%	37%	95.20	0%	0.00	0.00	95.20	0%	0.00	95.20	0.00	0.00	59.98	35.22
<b>Total</b>					261.20		0.00	0.00	261.20		0.00	261.20	0.00	0.00	164.56	96.64

10 Degrees  
GTC #21-190

**Trip Generation for: Development Saturday  
(a.k.a.): Average Saturday Daily Trips**

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	% of Ext. Trips	TOTAL	IN BOTH DIRECTIONS		DIRECTIONAL ASSIGNMENTS			
			Rate		% IN	% OUT	In+Out (Total)	In+Out (Total)	PASS-BY	NEW	In	Out	In	Out		
Single-Family Detached Housing	166 units	210	9.54	50%	50%	1,583.64	0%	0.00	0.00	1,583.64	0.00	1,583.64	0.00	0.00	791.82	791.82
Multifamily Housing (Low-Rise)	170 units	220	8.14	50%	50%	1,383.80	0%	0.00	0.00	1,383.80	0.00	1,383.80	0.00	0.00	691.90	691.90
<b>Total</b>						2,967.44		0.00	0.00	2,967.44	0.00	2,967.44	0.00	0.00	1,483.72	1,483.72

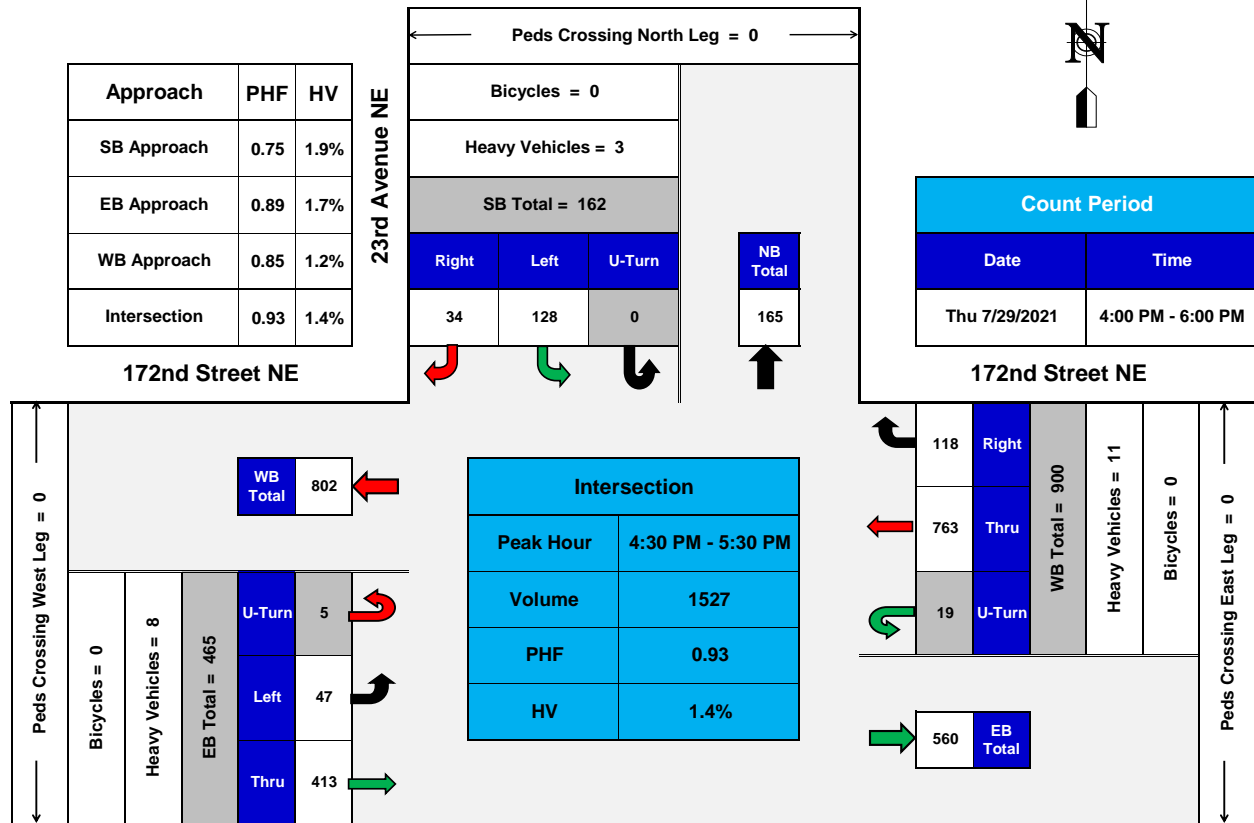
10 Degrees  
GTC #21-190

Trip Generation for: Development Peak Saturday, Peak Hour of Generator  
(a.k.a.): Saturday PM Peak Hour

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	PASS-BY	NEW	PASS-BY	NEW	
								In+Out (Total)	% of Ext. Trips	In+Out (Total)	In	Out	In	Out
Single-Family Detached Housing	166 units	210	0.93	54%	46%	154.38	0%	0.00	0%	154.38	0.00	0.00	83.37	71.01
Multifamily Housing (Low-Rise)	170 units	220	0.70	63%	37%	119.00	0%	0.00	0%	119.00	0.00	0.00	74.97	44.03
<b>Total</b>						273.38		0.00		273.38	0.00	0.00	158.34	115.04

# **Weekday PM Peak-Hour Turning Movement Calculations**

**172nd Street NE @ 23rd Avenue NE  
Marysville, Wa**



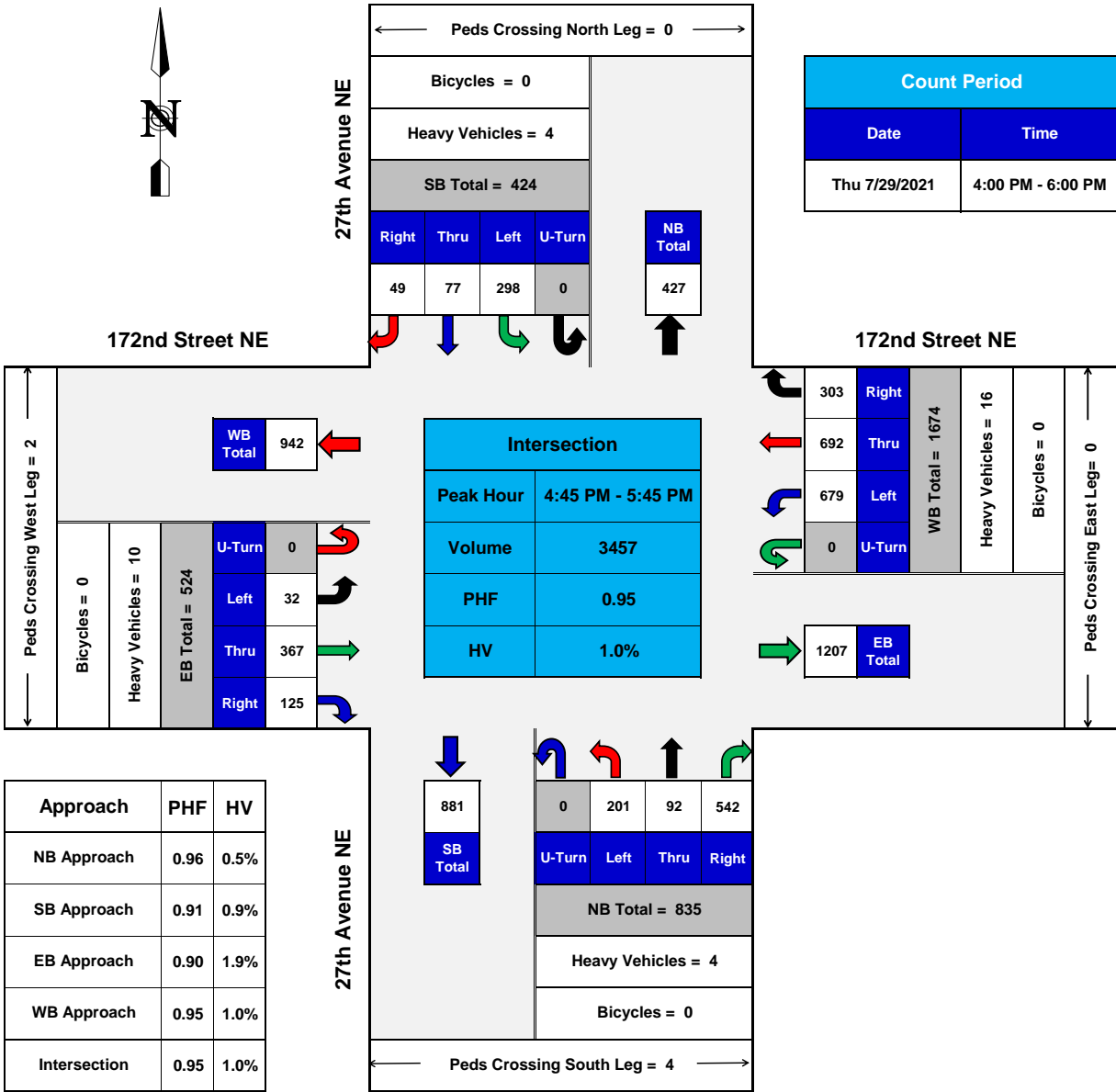
PHF = Peak Hour Factor  
HV = Heavy Vehicles

**TURNING MOVEMENTS DIAGRAM  
PEAK HOUR SUMMARY**



# 172nd Street NE @ 27th Avenue NE

Marysville, Wa



PHF = Peak Hour Factor  
 HV = Heavy Vehicles

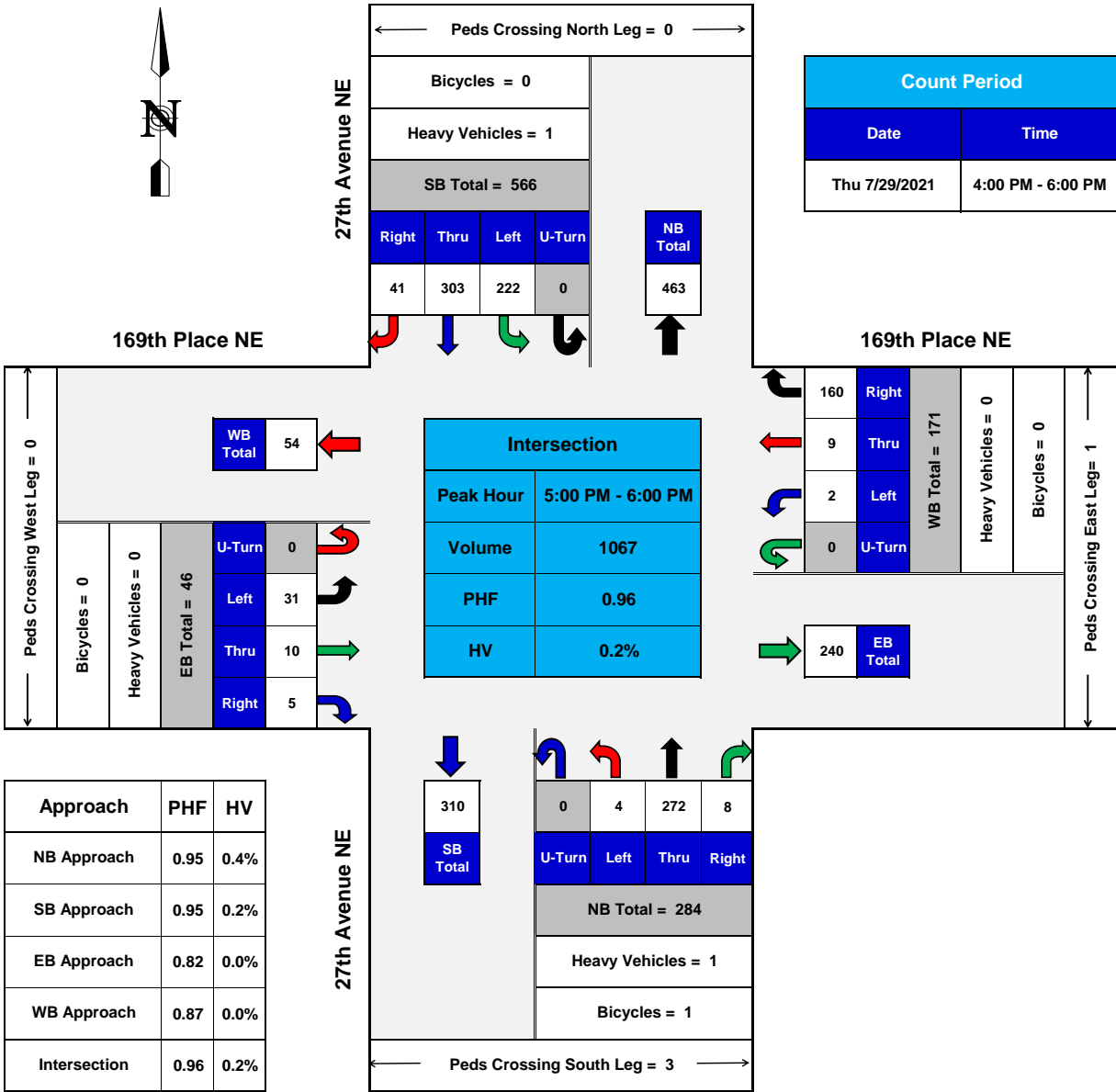
## TURNING MOVEMENTS DIAGRAM PEAK HOUR SUMMARY





# 169th Place NE @ 27th Avenue NE

Marysville, Wa



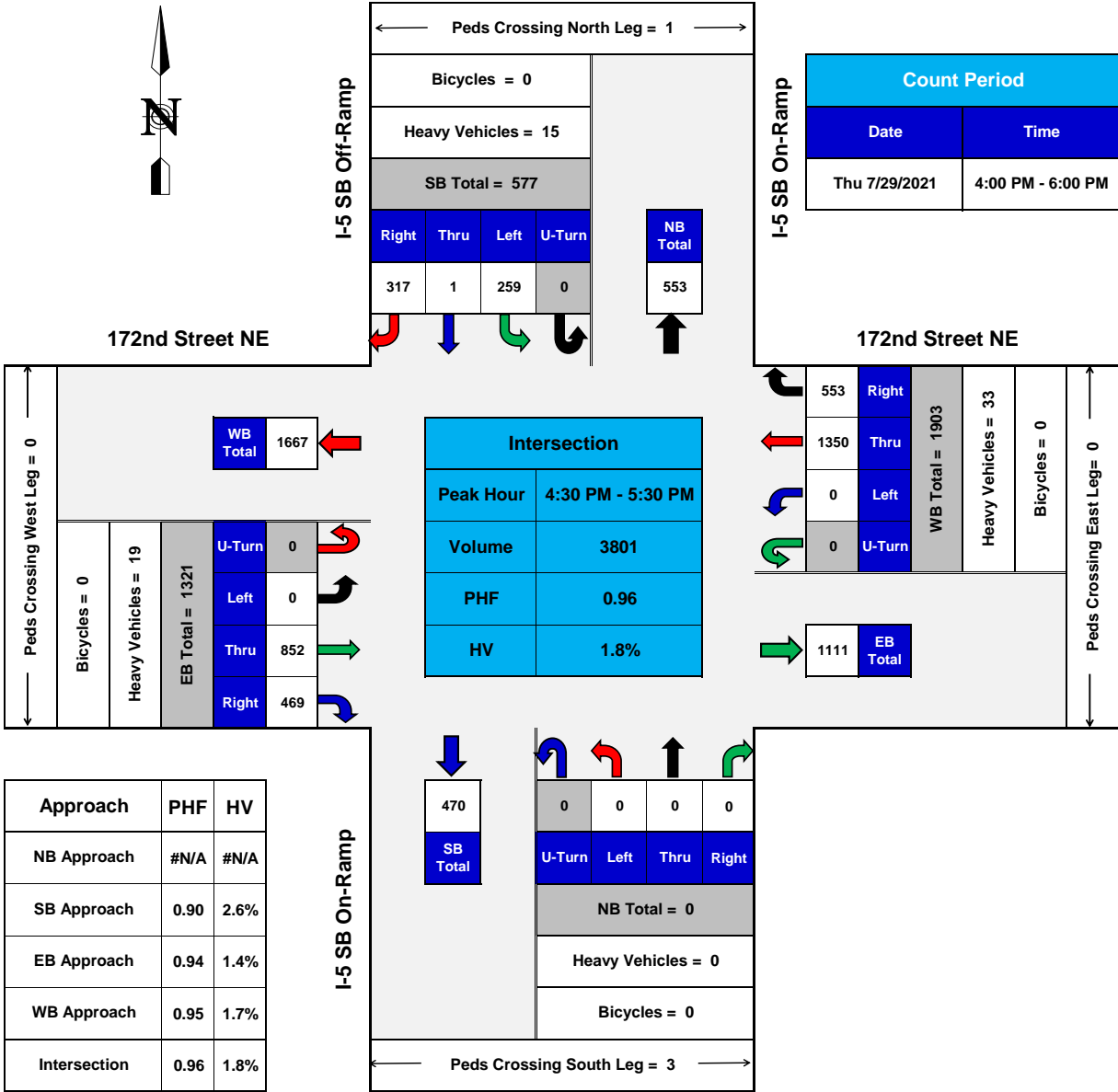
PHF = Peak Hour Factor  
HV = Heavy Vehicles

## TURNING MOVEMENTS DIAGRAM PEAK HOUR SUMMARY



# 172nd Street NE @ I-5 SB Ramps

Marysville, Wa

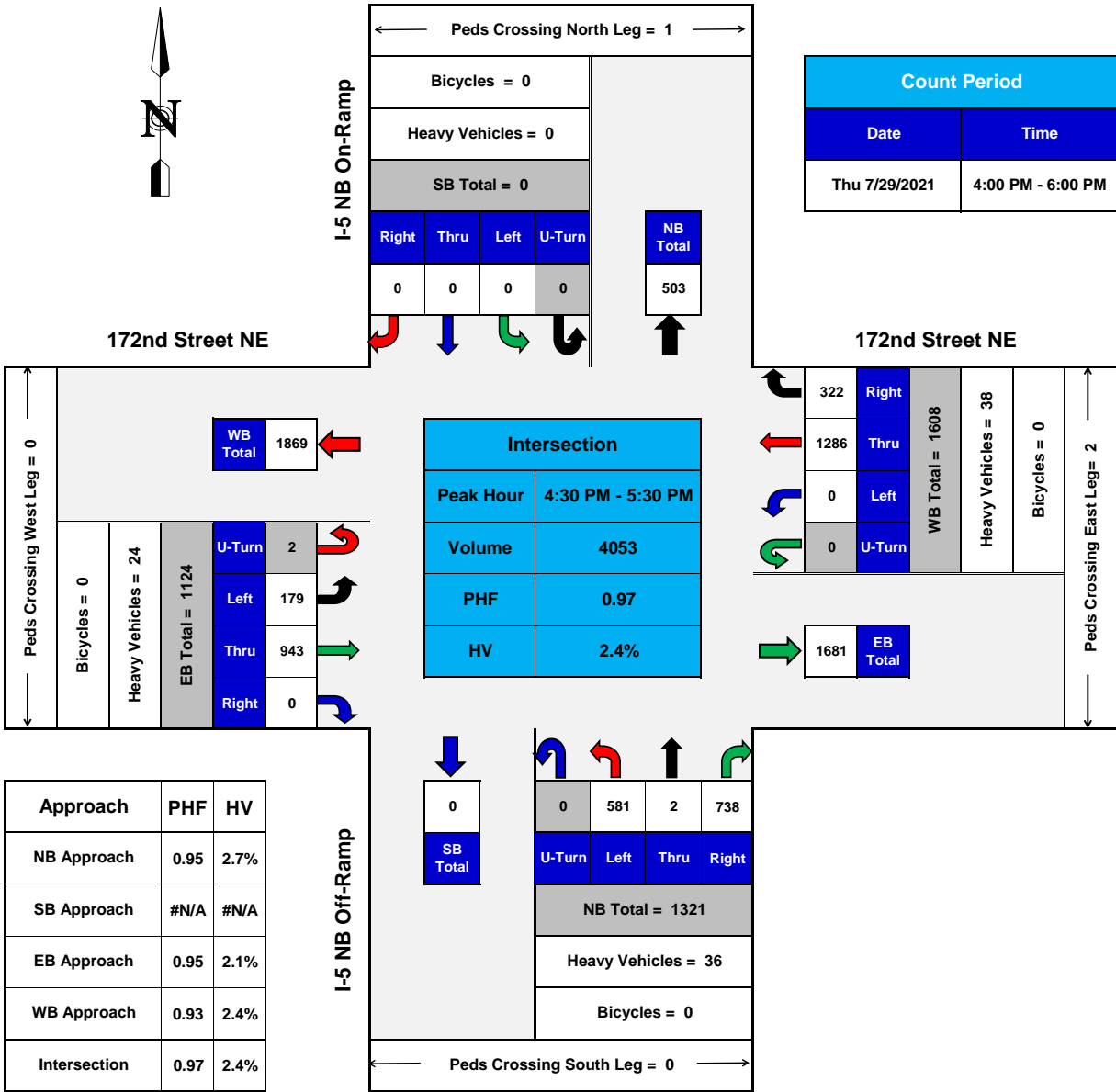


PHF = Peak Hour Factor  
HV = Heavy Vehicles

## TURNING MOVEMENTS DIAGRAM PEAK HOUR SUMMARY



**172nd Street NE @ I-5 NB Ramps**  
**Marysville, Wa**

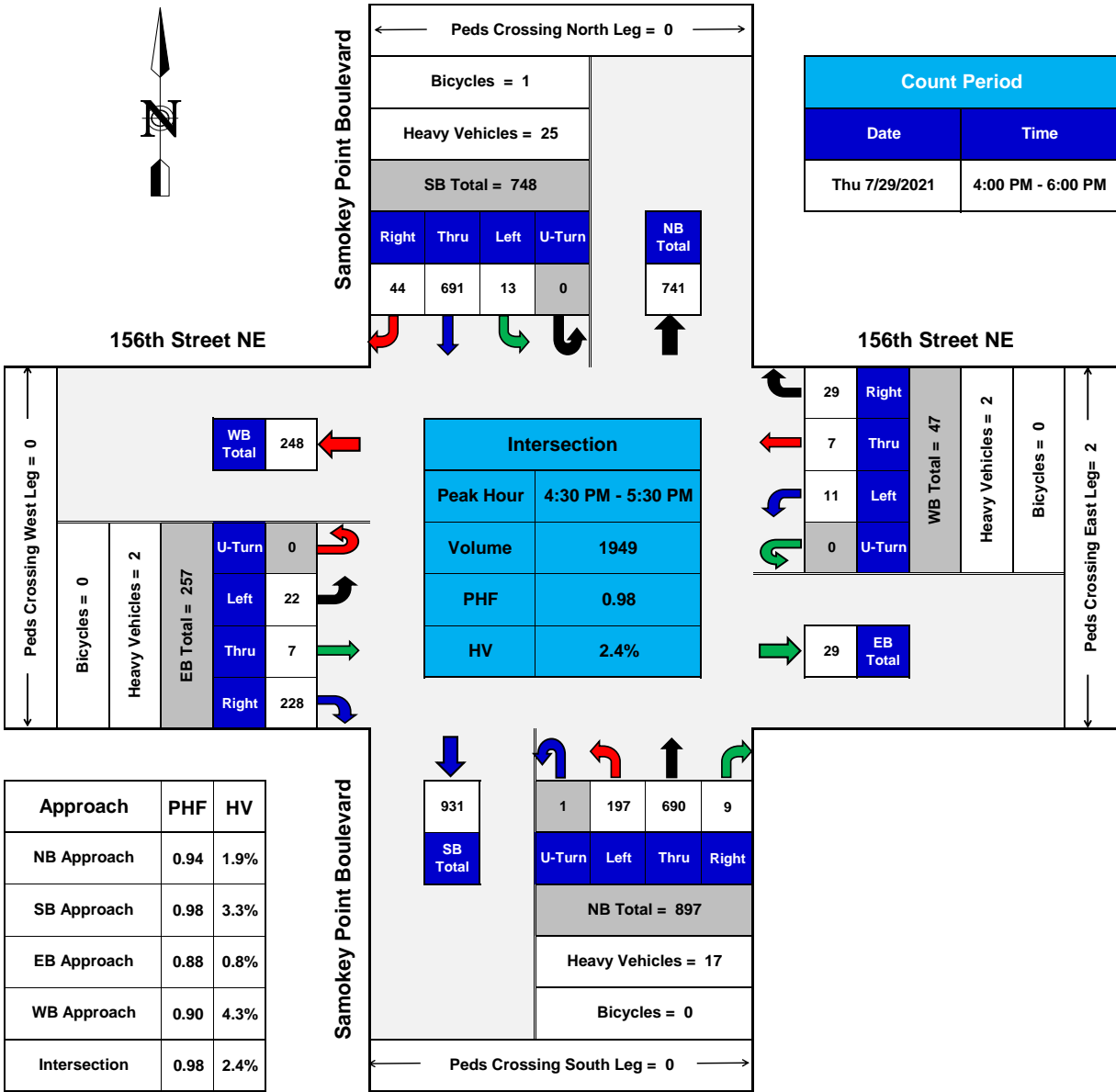


**TURNING MOVEMENTS DIAGRAM**  
**PEAK HOUR SUMMARY**



# 156th Street NE @ Smokey Point Boulevard

Marysville, Wa



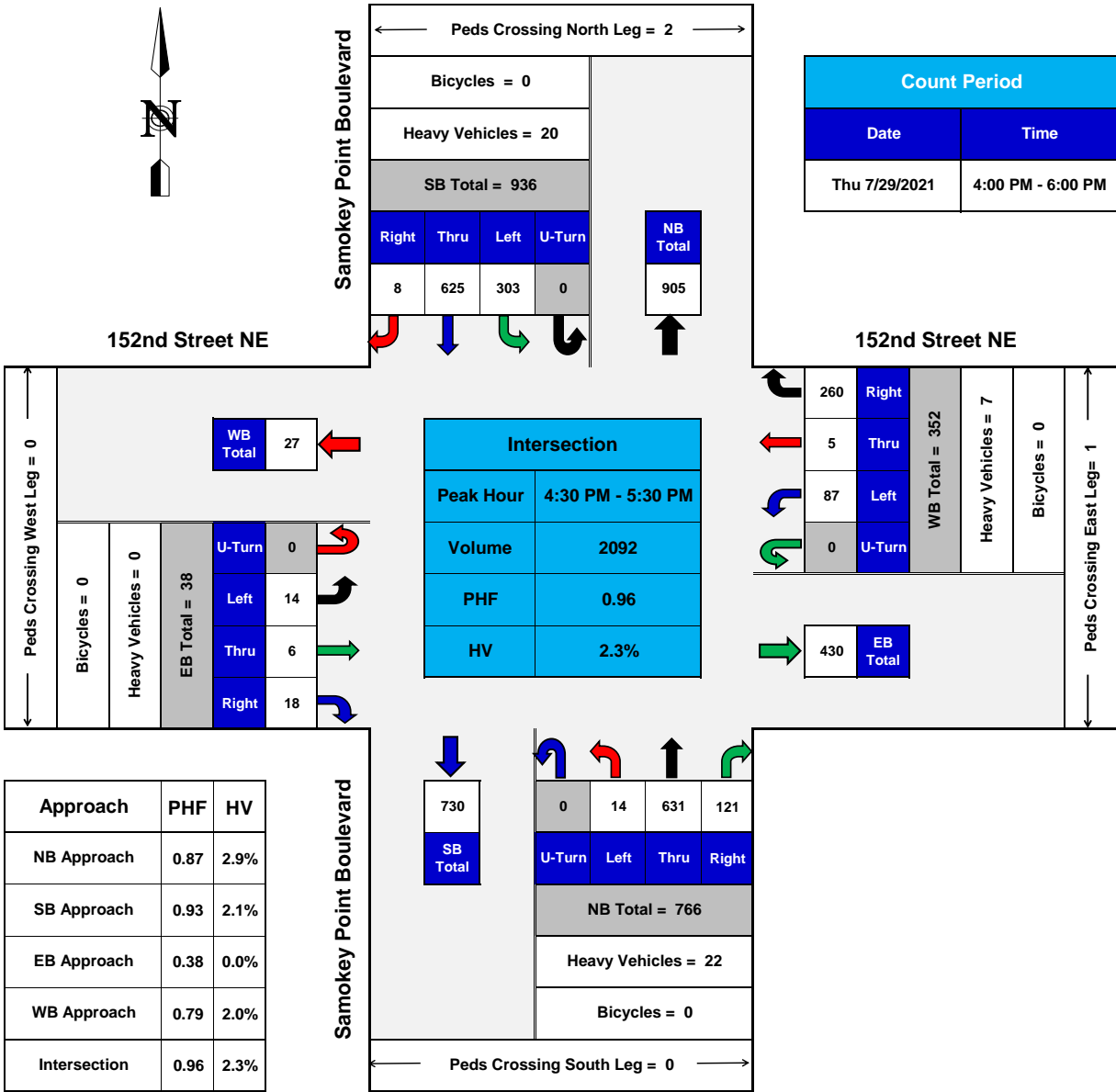
PHF = Peak Hour Factor  
 HV = Heavy Vehicles

## TURNING MOVEMENTS DIAGRAM PEAK HOUR SUMMARY



# 152nd Street NE @ Smokey Point Boulevard

Marysville, Wa

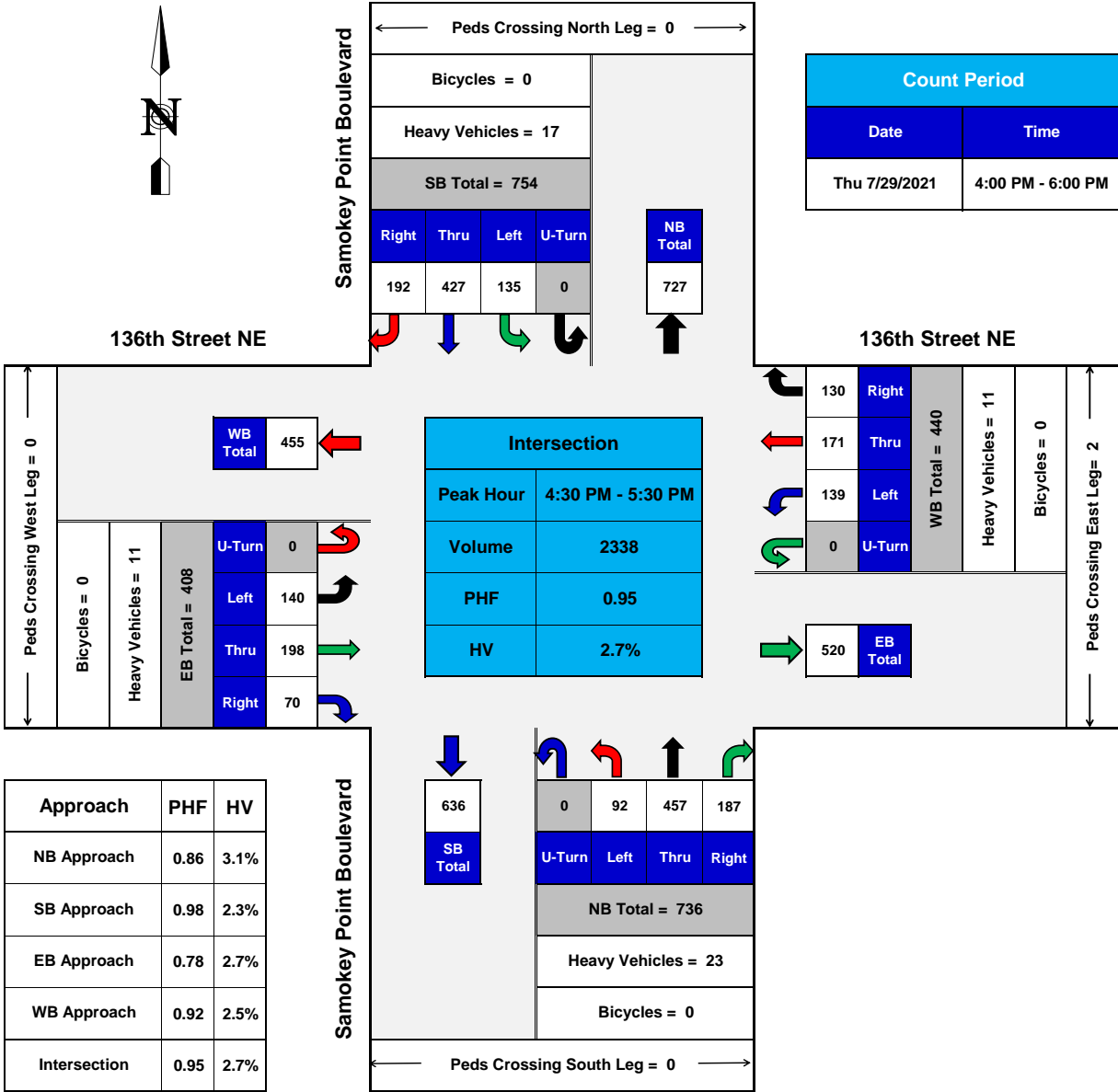


## TURNING MOVEMENTS DIAGRAM PEAK HOUR SUMMARY



# 136th Street NE @ Smokey Point Boulevard

Marysville, Wa



PHF = Peak Hour Factor  
HV = Heavy Vehicles

## TURNING MOVEMENTS DIAGRAM PEAK HOUR SUMMARY



**Opening Year**

**1 23rd Ave NE at 172nd St NE**

**Weekday PM Peak-Hour**

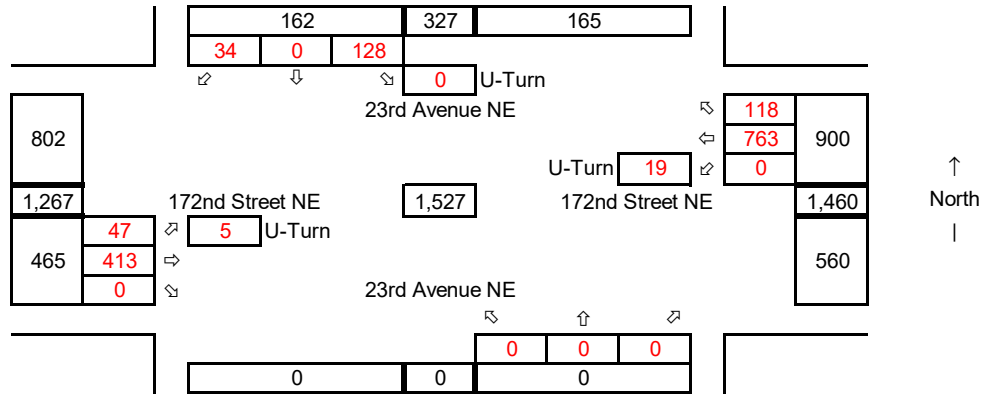
Synchro ID: 1

**Existing**

Average Weekday  
PM Peak-Hour

Year: **7/29/2021**

Data Source: **TDG**



**Future without Development**

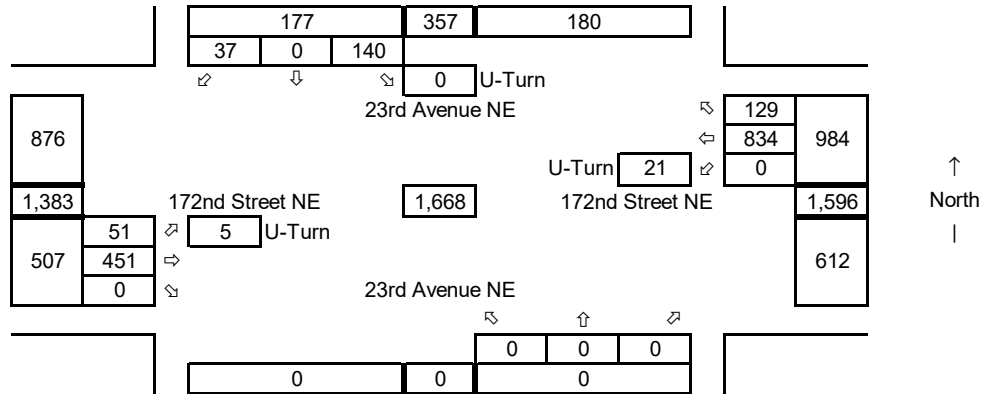
Average Weekday  
PM Peak Hour

Year: **2024**

Growth Rate = **3.0%**

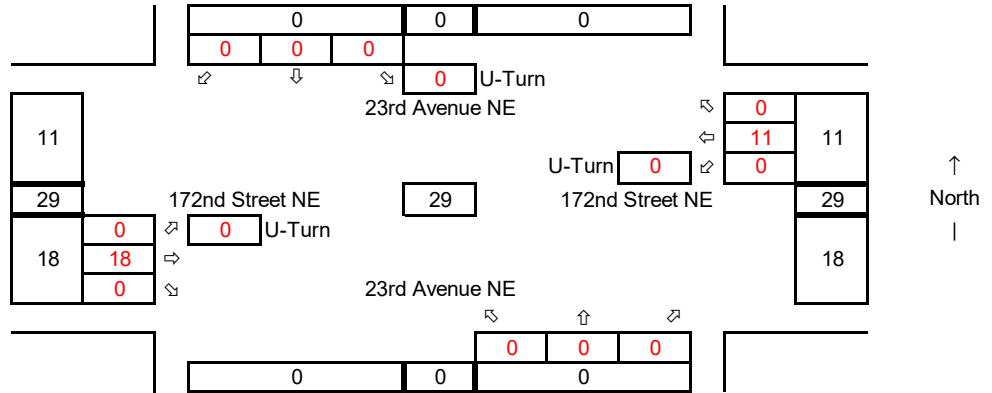
Years of Growth = 3

Total Growth = 1.0927



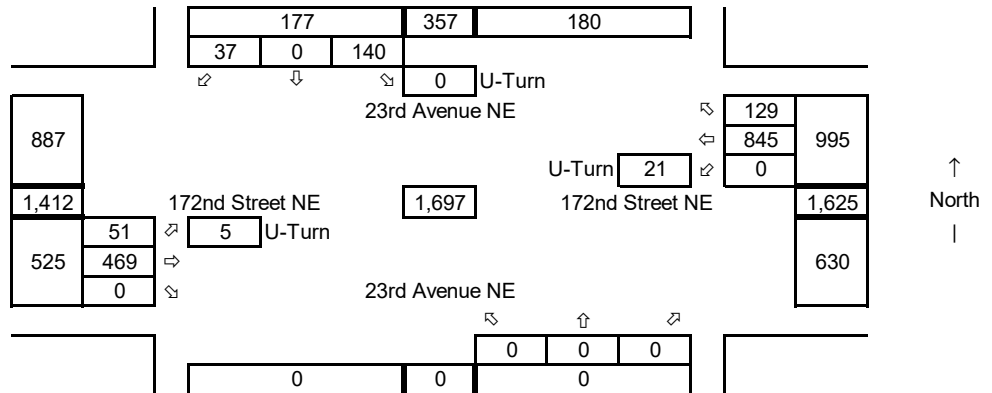
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Opening Year**

**2 27th Ave NE at 172nd St NE**

**Weekday PM Peak-Hour**

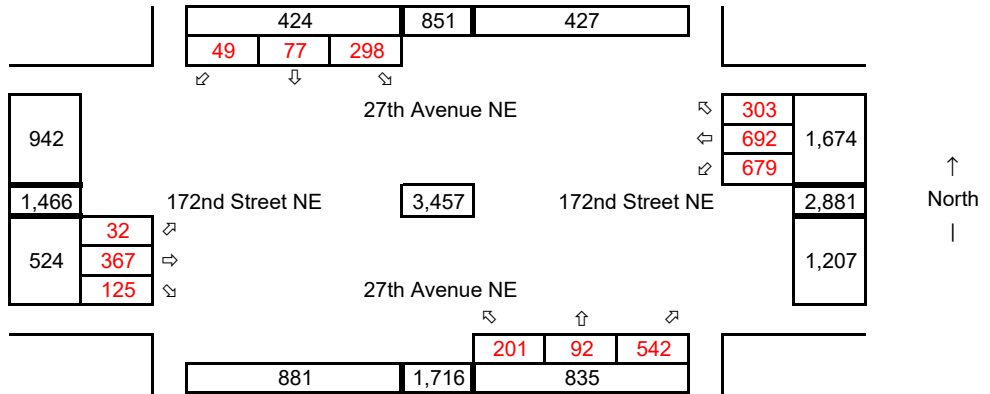
Synchro ID: 2

**Existing**

Average Weekday  
PM Peak-Hour

Year: **7/29/2021**

Data Source: **TDG**



**Future without Development**

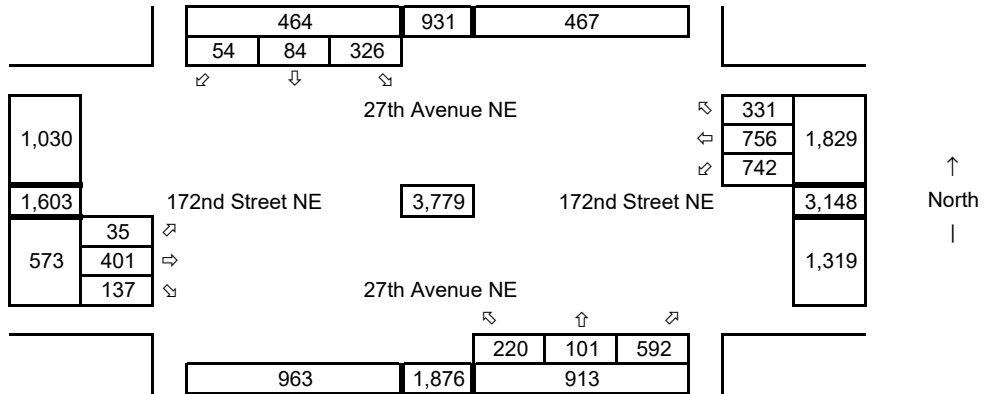
Average Weekday  
PM Peak Hour

Year: 2024

Growth Rate = 3.0%

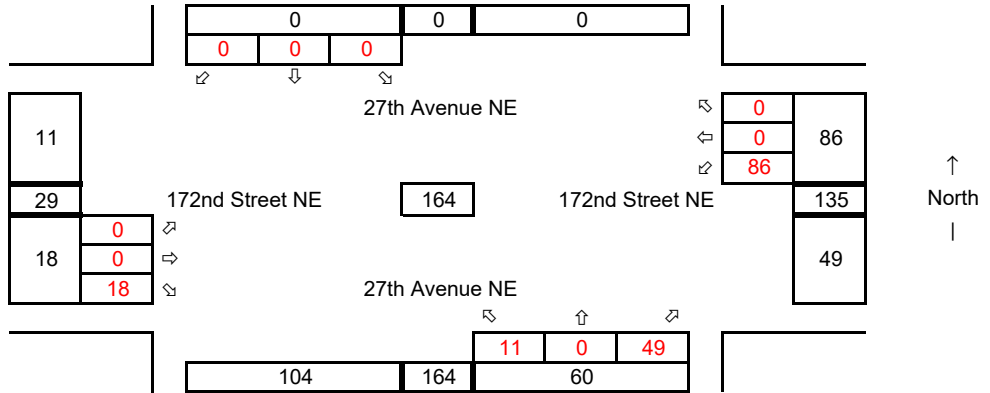
Years of Growth = 3

Total Growth = 1.0927



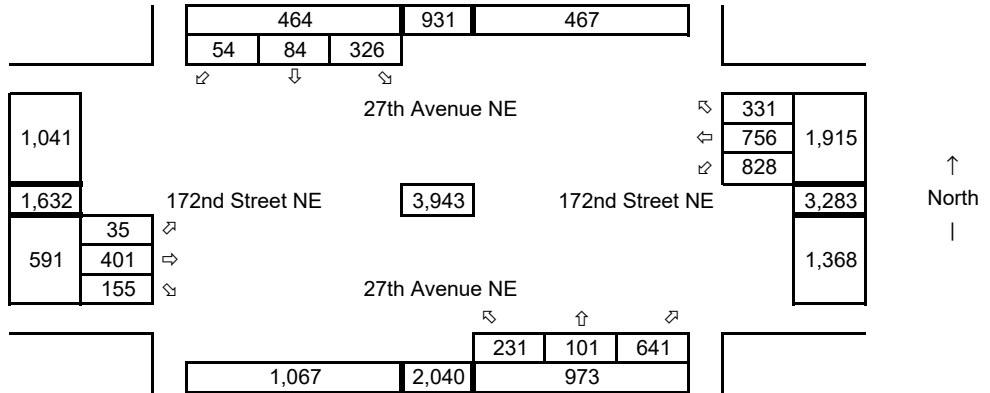
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour





**Opening Year**

**3 27th Ave NE at 169th PI NE**

**Weekday PM Peak-Hour**

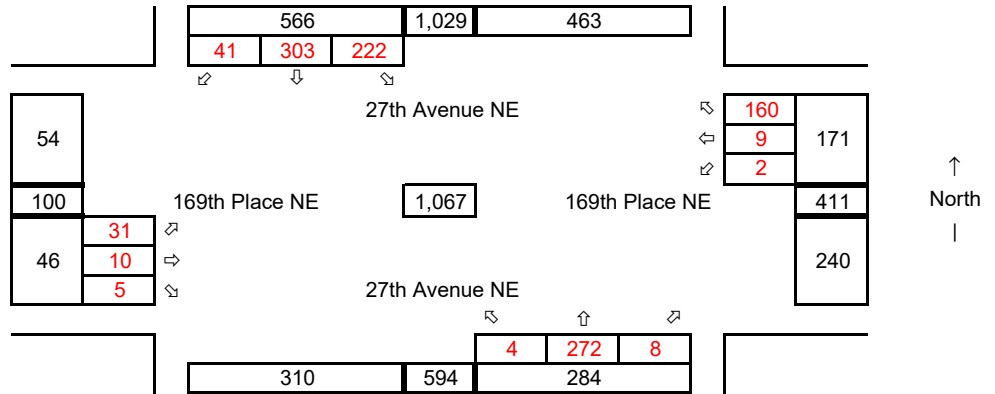
Synchro ID: 3

**Existing**

Average Weekday  
PM Peak-Hour

Year: **7/29/2021**

Data Source: **TDG**



**Future without Development**

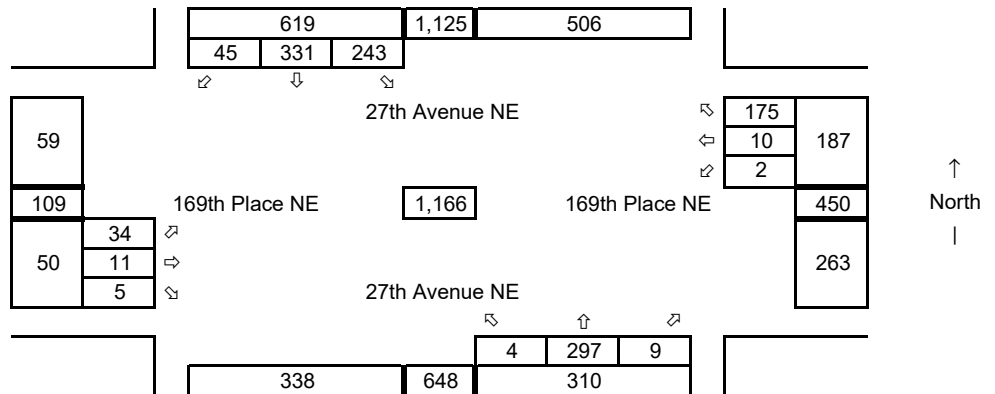
Average Weekday  
PM Peak Hour

Year: 2024

Growth Rate = 3.0%

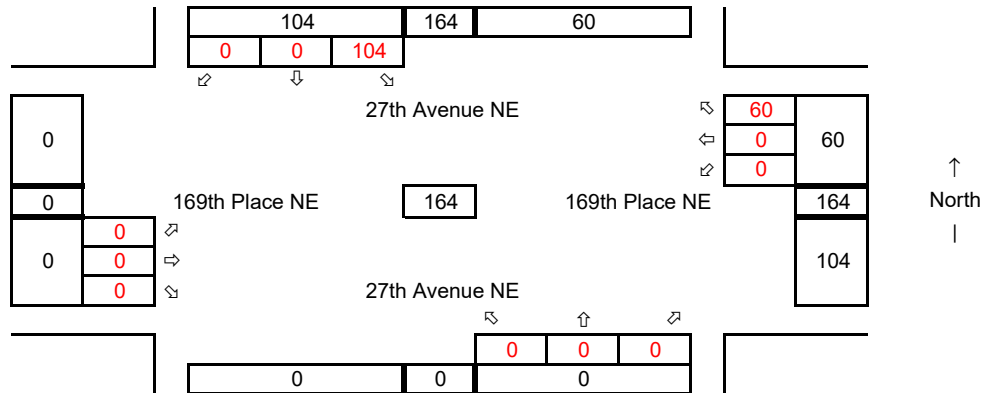
Years of Growth = 3

Total Growth = 1.0927



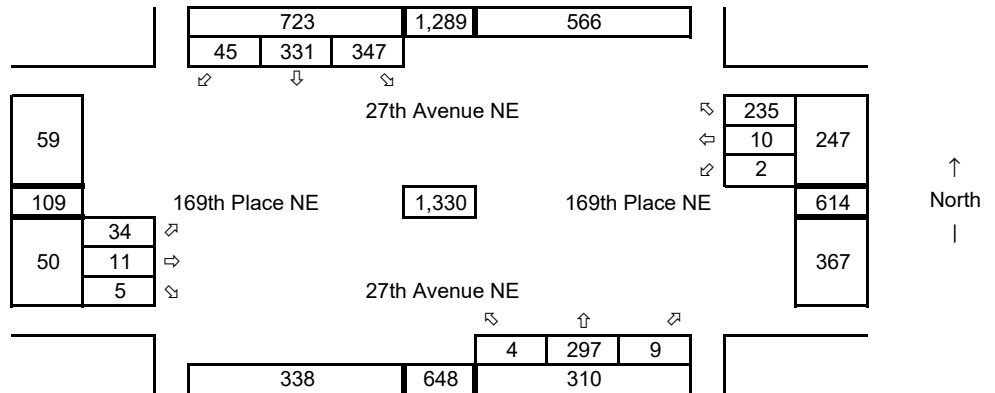
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Opening Year**

**4 I-5 SB Ramps at 172nd St NE**

**Weekday PM Peak-Hour**

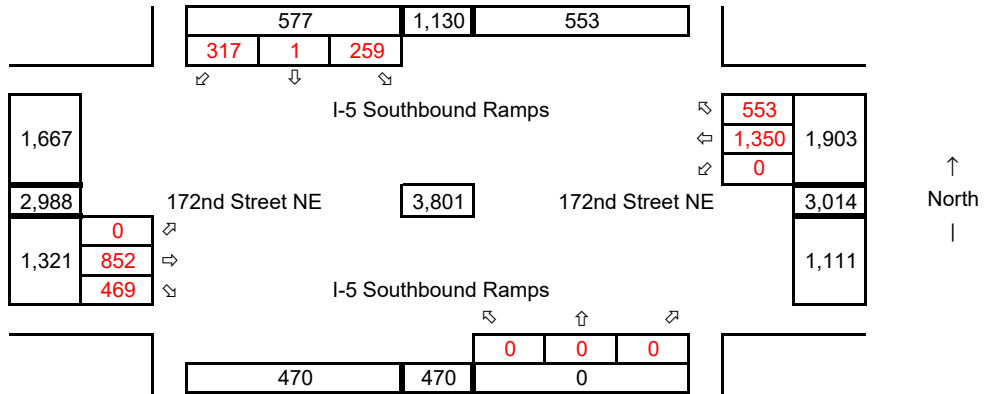
Synchro ID: 4

**Existing**

Average Weekday  
PM Peak-Hour

Year: **7/29/2021**

Data Source: **TDG**



**Future without Development**

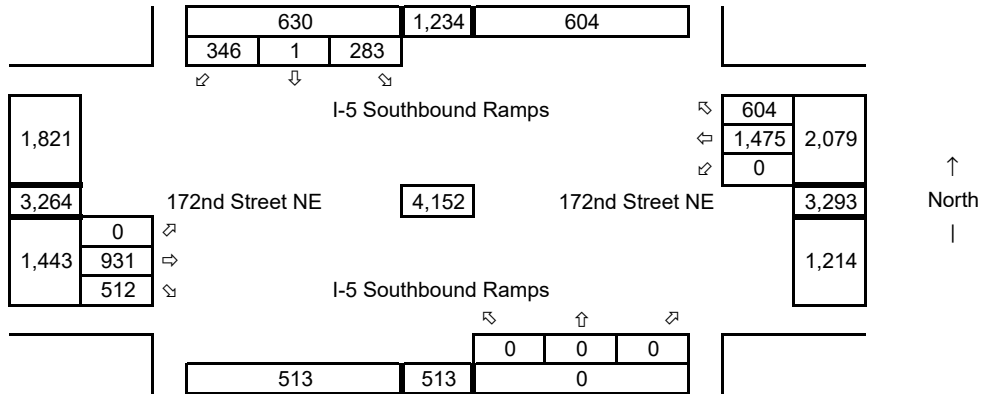
Average Weekday  
PM Peak Hour

Year: 2024

Growth Rate = 3.0%

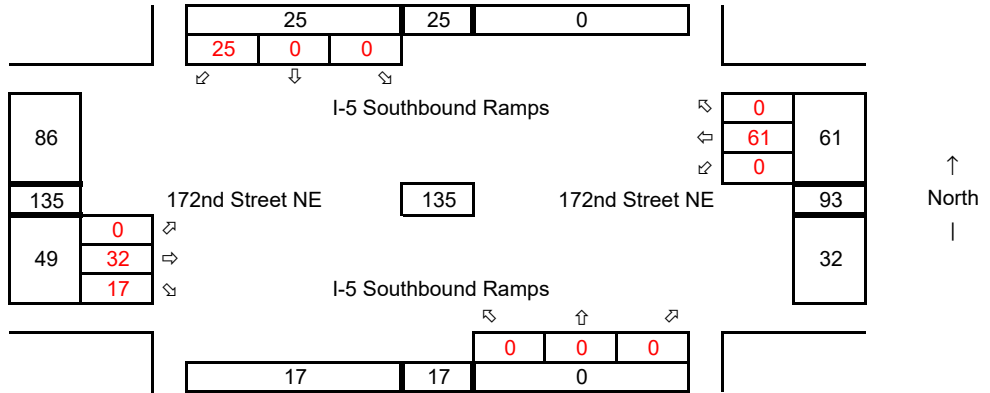
Years of Growth = 3

Total Growth = 1.0927



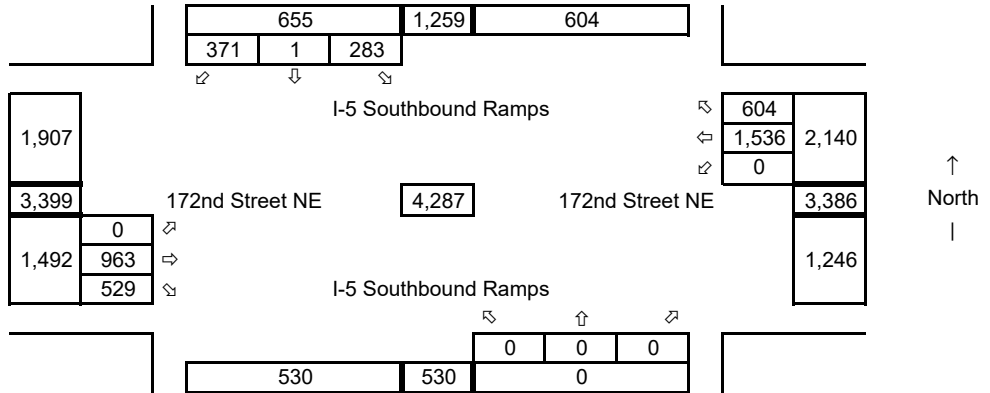
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Opening Year**

**5 I-5 NB Ramps at 172nd St NE**

**Weekday PM Peak-Hour**

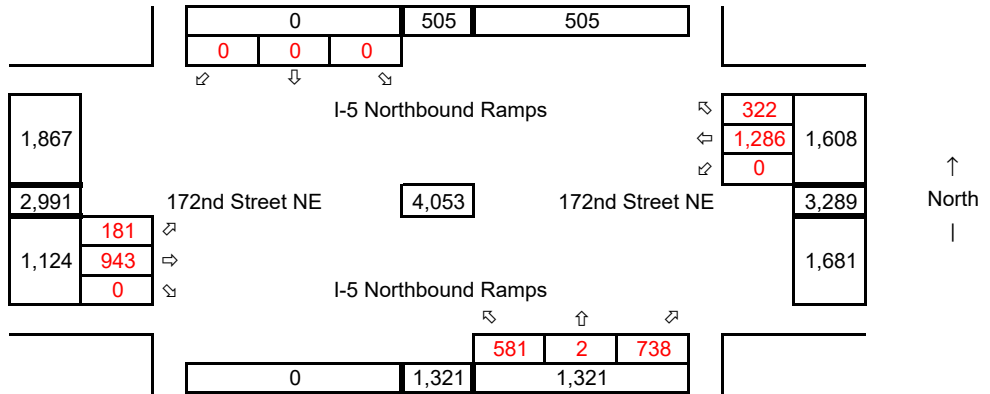
Synchro ID: 5

**Existing**

Average Weekday  
PM Peak-Hour

Year: **7/29/2021**

Data Source: **TDG**



**Future without Development**

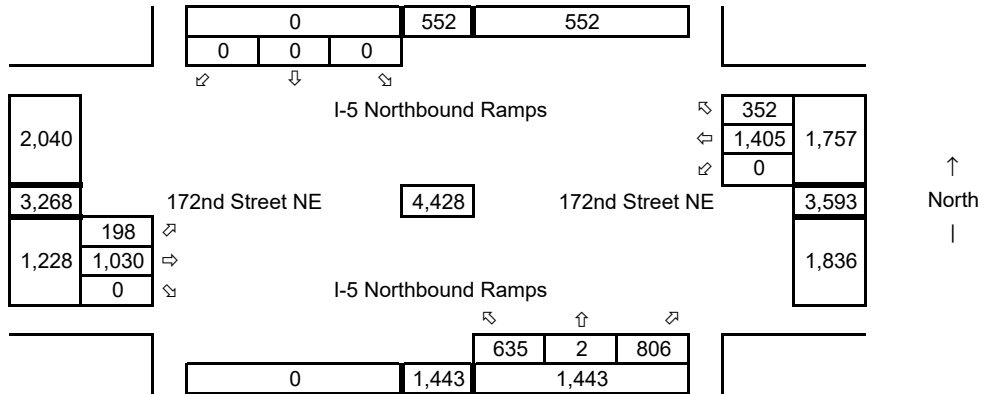
Average Weekday  
PM Peak Hour

Year: 2024

Growth Rate = 3.0%

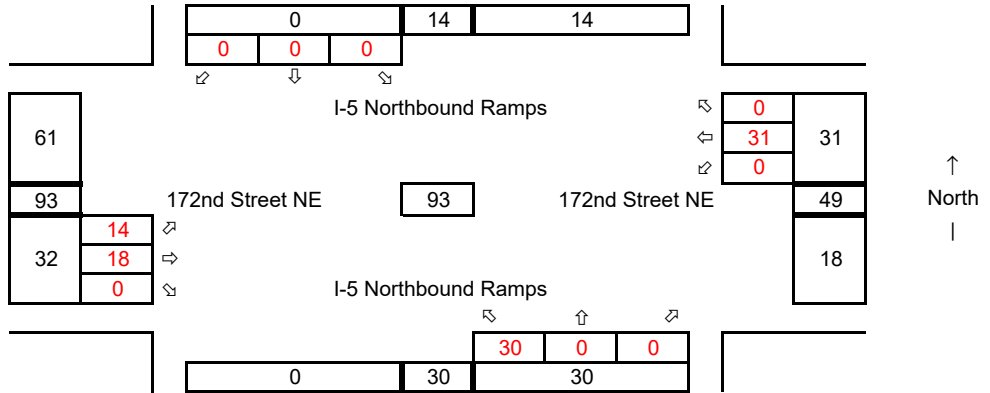
Years of Growth = 3

Total Growth = 1.0927



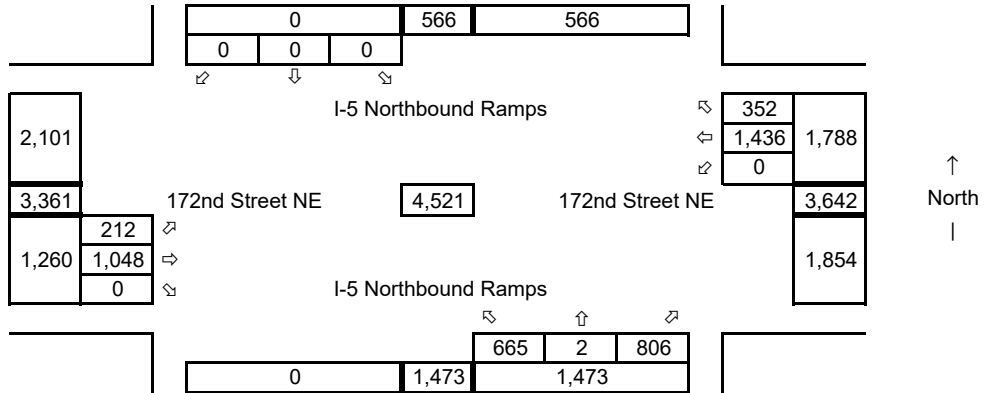
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Opening Year**

**6 156th St NE at Smokey Pt Blvd**

**Weekday PM Peak-Hour**

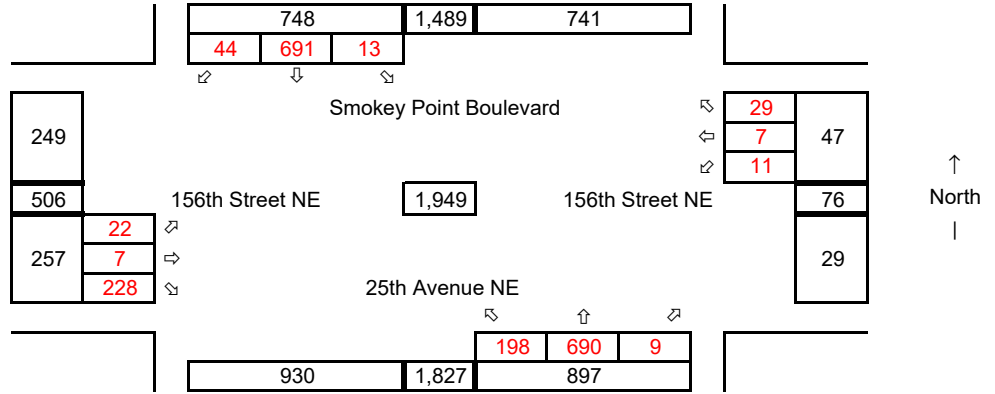
Synchro ID: 6

**Existing**

Average Weekday  
PM Peak-Hour

Year: **7/29/2021**

Data Source: **TDG**



↑ North

↑ North

↑ North

↑ North

**Future without Development**

Average Weekday  
PM Peak Hour

Year: 2024

Growth Rate = 3.0%

Years of Growth = 3

Total Growth = 1.0927

**Total Development Trips**

Average Weekday  
PM Peak Hour

**Future with Development**

Average Weekday  
PM Peak Hour

**Opening Year**

**7 152nd St NE at Smokey Pt Blvd**

**Weekday PM Peak-Hour**

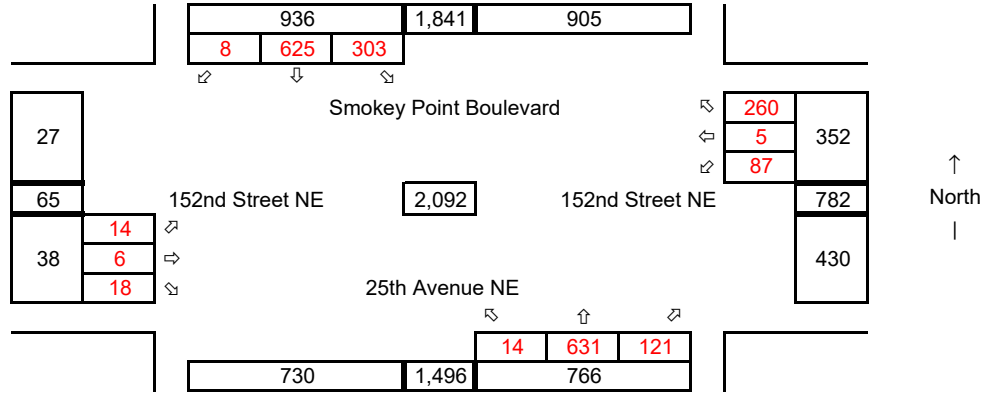
Synchro ID: 7

**Existing**

Average Weekday  
PM Peak-Hour

Year: **7/29/2021**

Data Source: **TDG**



**Future without Development**

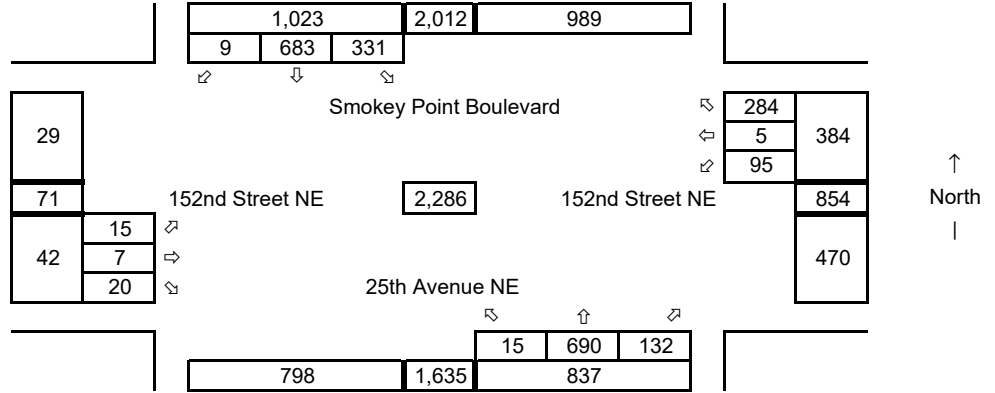
Average Weekday  
PM Peak Hour

Year: 2024

Growth Rate = 3.0%

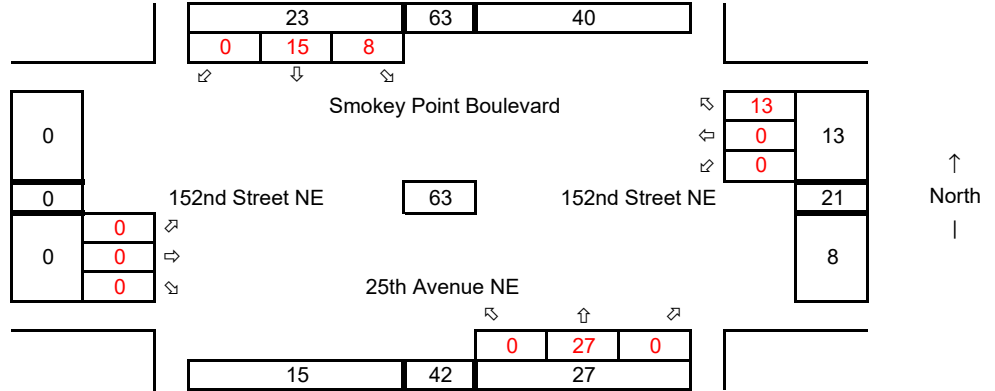
Years of Growth = 3

Total Growth = 1.0927



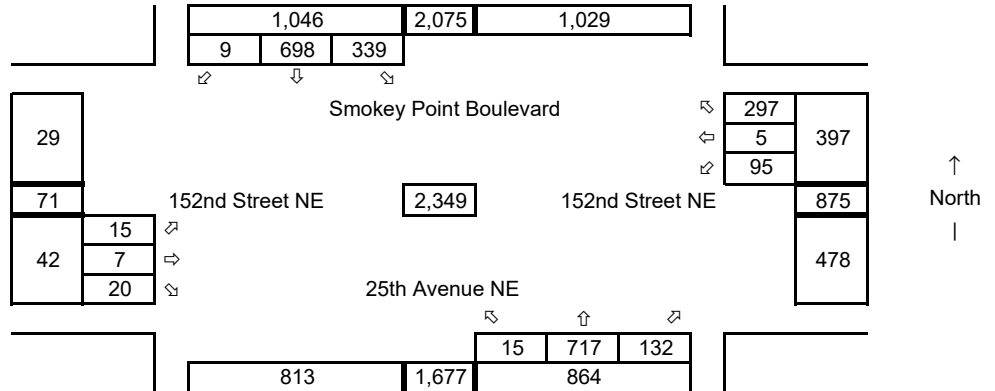
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Opening Year**

**8 136th St NE at Smokey Pt Blvd**

**Weekday PM Peak-Hour**

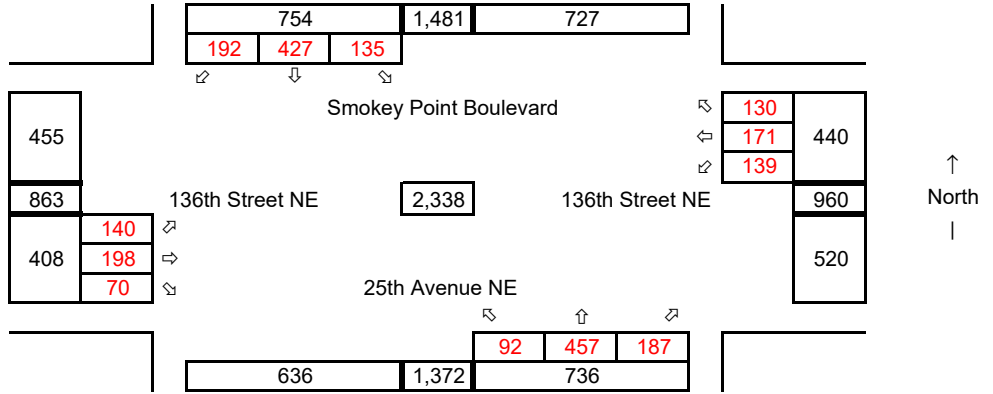
Synchro ID: 8

**Existing**

Average Weekday  
PM Peak-Hour

Year: 7/29/2021

Data Source: TDG



**Future without Development**

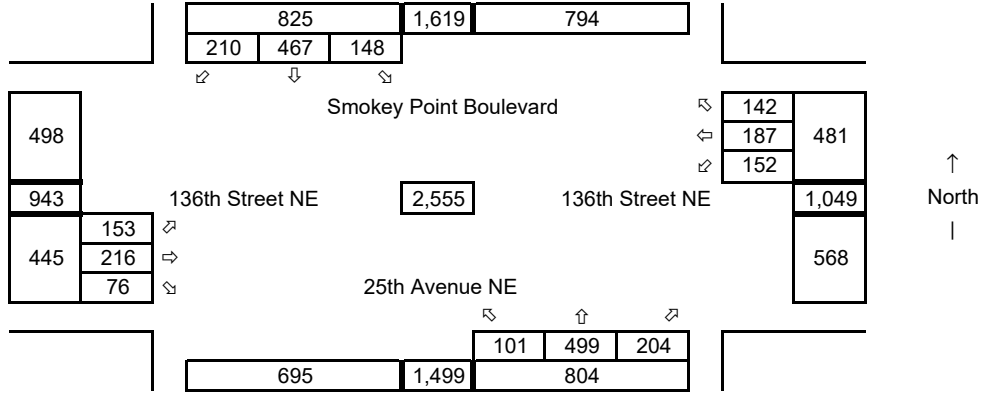
Average Weekday  
PM Peak Hour

Year: 2024

Growth Rate = 3.0%

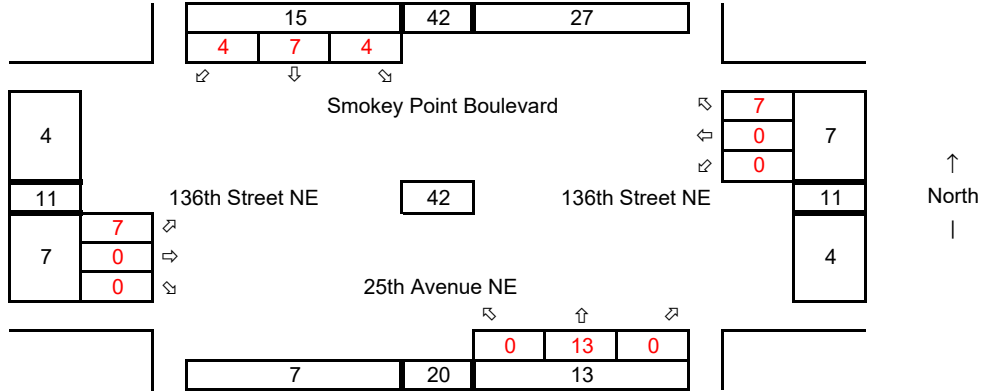
Years of Growth = 3

Total Growth = 1.0927



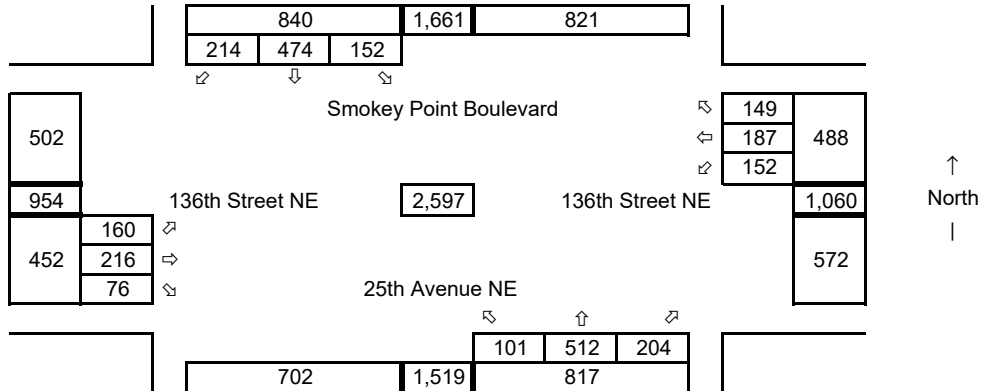
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Horizon Year**

**1 23rd Ave NE at 172nd St NE**

**Weekday PM Peak-Hour**

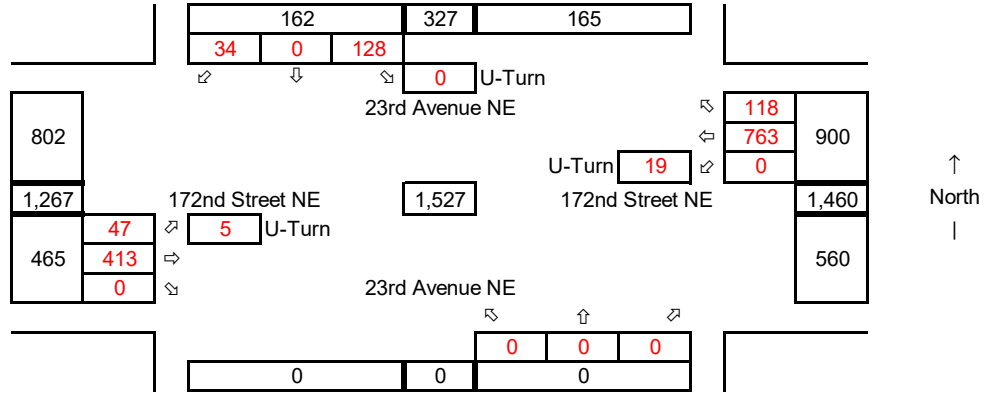
Synchro ID: 1

**Existing**

Average Weekday  
PM Peak-Hour

Year: 7/29/2021

Data Source: TDG



**Future without Development**

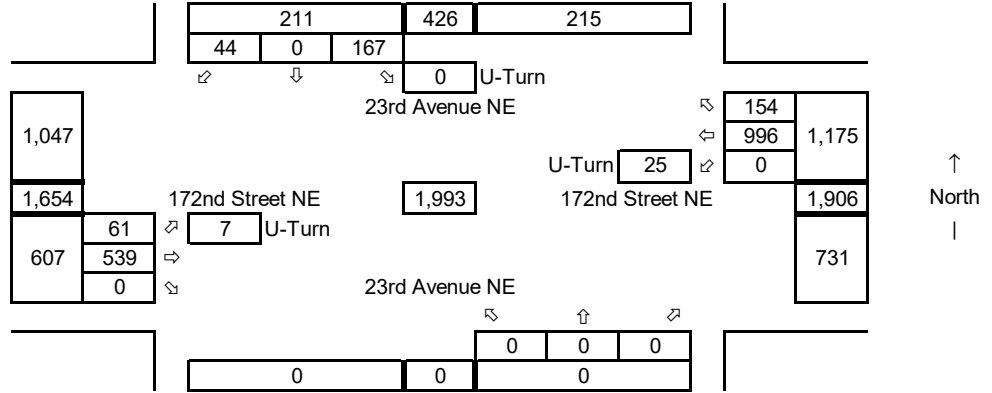
Average Weekday  
PM Peak Hour

Year: 2030

Growth Rate = 3.0%

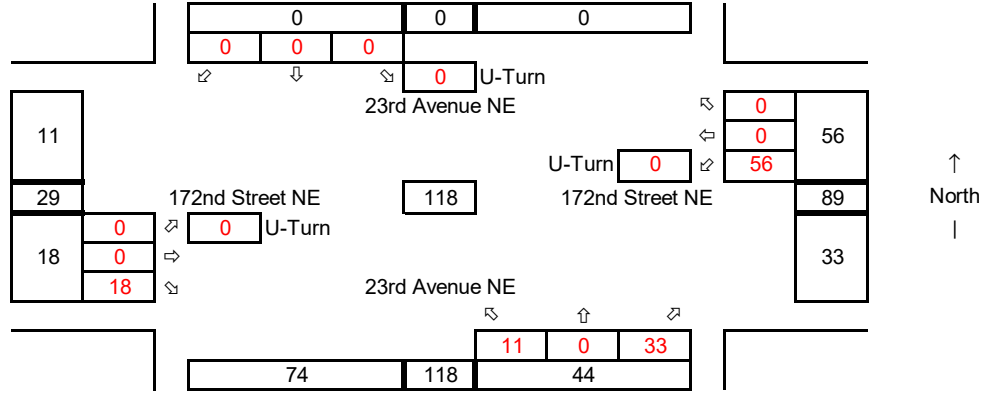
Years of Growth = 9

Total Growth = 1.3048



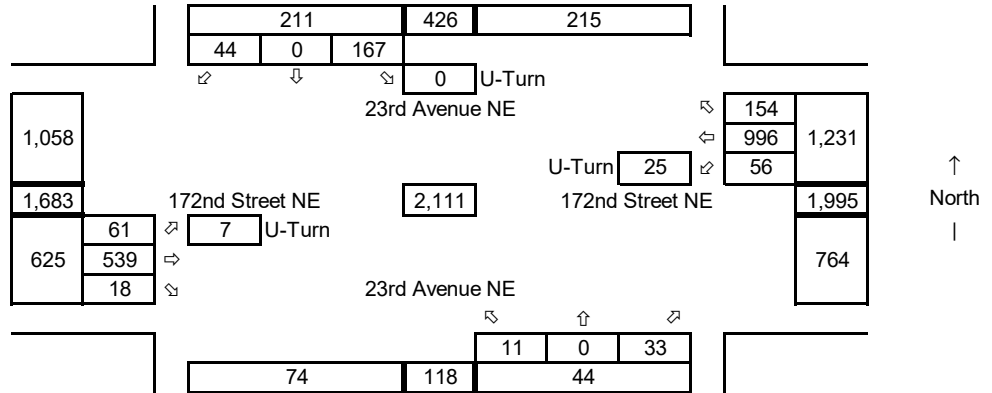
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Horizon Year**

**2 27th Ave NE at 172nd St NE**

**Weekday PM Peak-Hour**

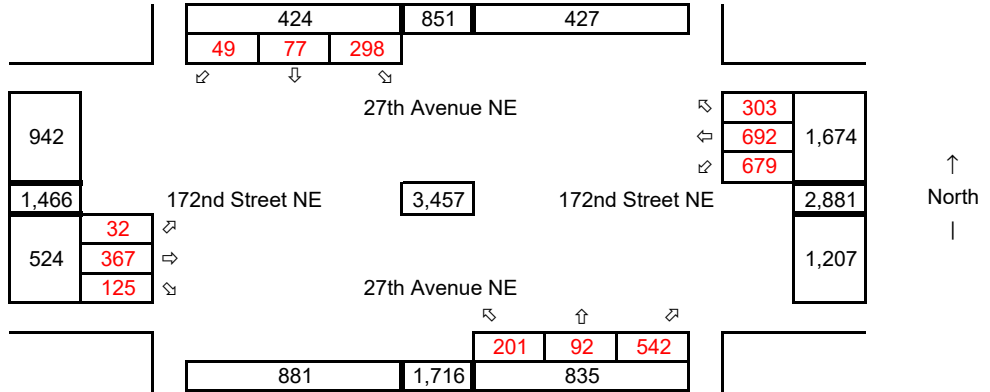
Synchro ID: 2

**Existing**

Average Weekday  
PM Peak-Hour

Year: 7/29/2021

Data Source: TDG



**Future without Development**

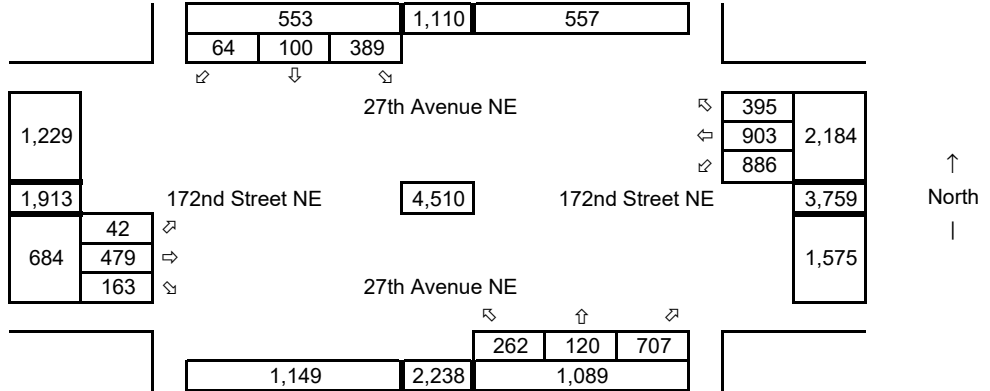
Average Weekday  
PM Peak Hour

Year: 2030

Growth Rate = 3.0%

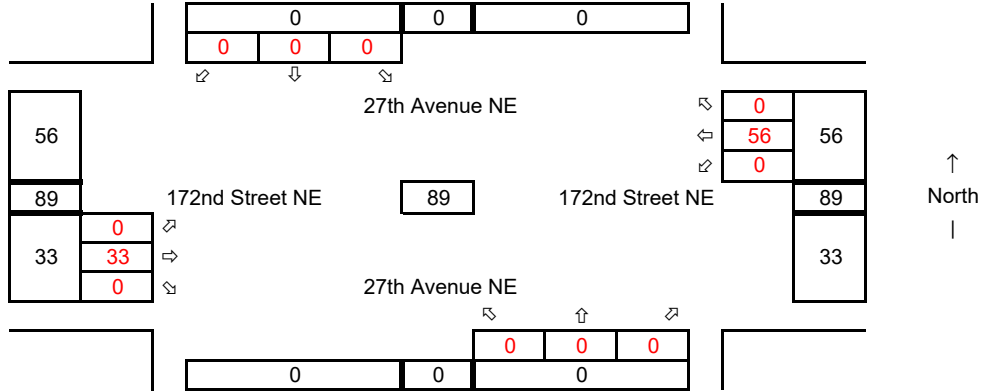
Years of Growth = 9

Total Growth = 1.3048



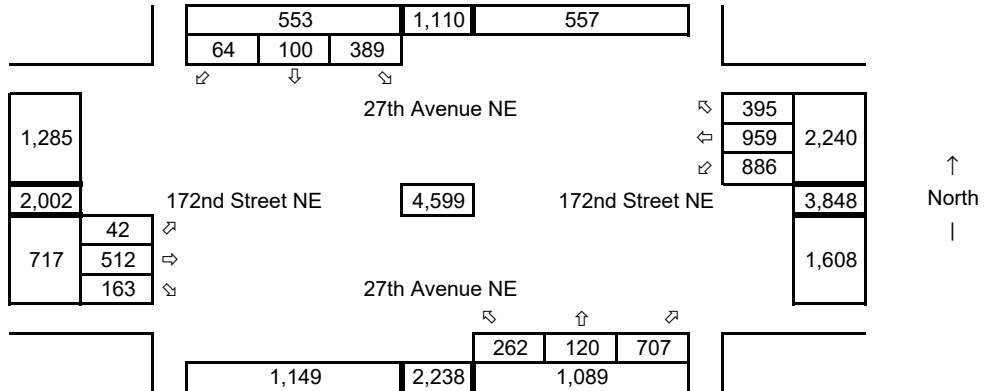
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour





**Horizon Year**

**3 27th Ave NE at 169th PI NE**

**Weekday PM Peak-Hour**

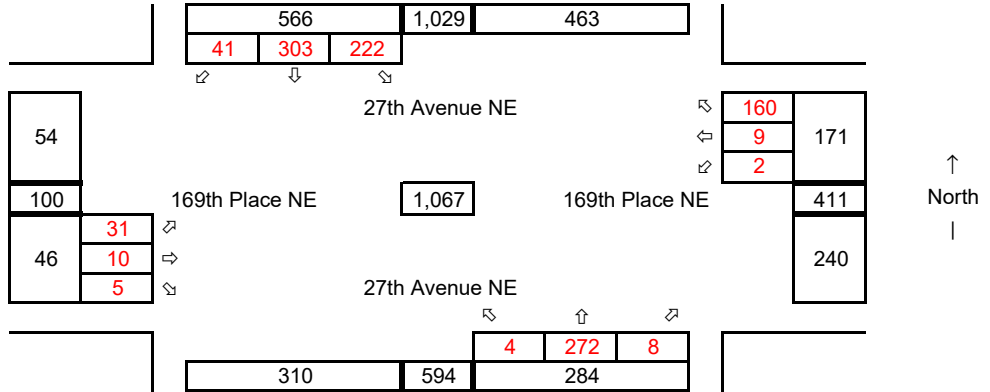
Synchro ID: 3

**Existing**

Average Weekday  
PM Peak-Hour

Year: 7/29/2021

Data Source: TDG



**Future without Development**

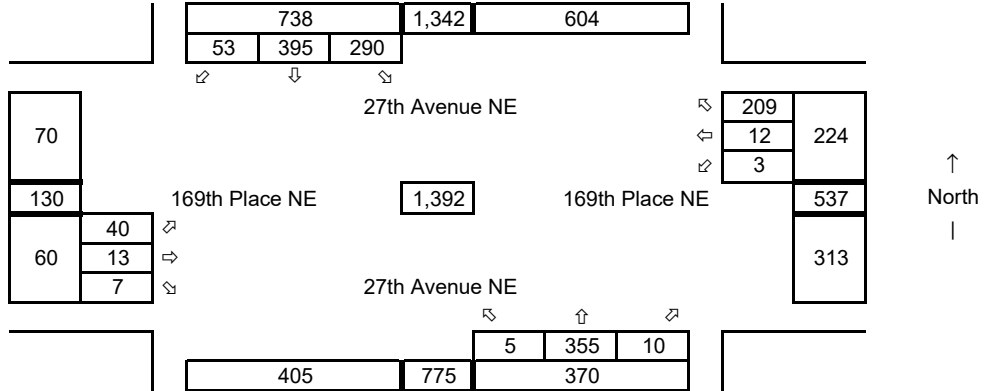
Average Weekday  
PM Peak Hour

Year: 2030

Growth Rate = 3.0%

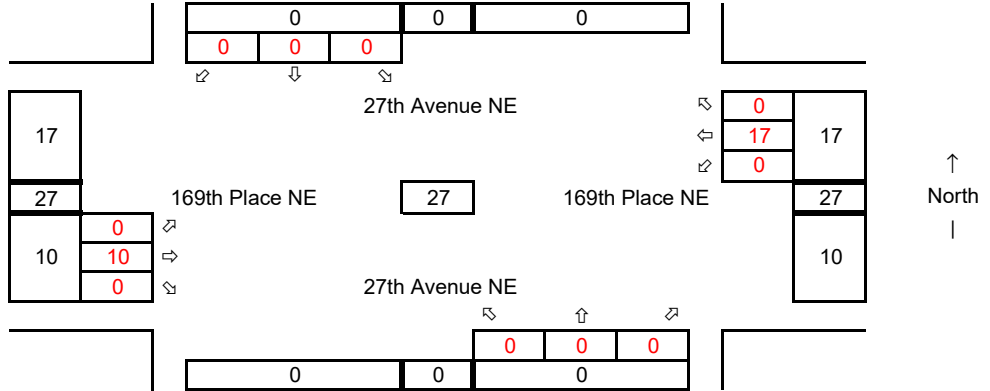
Years of Growth = 9

Total Growth = 1.3048



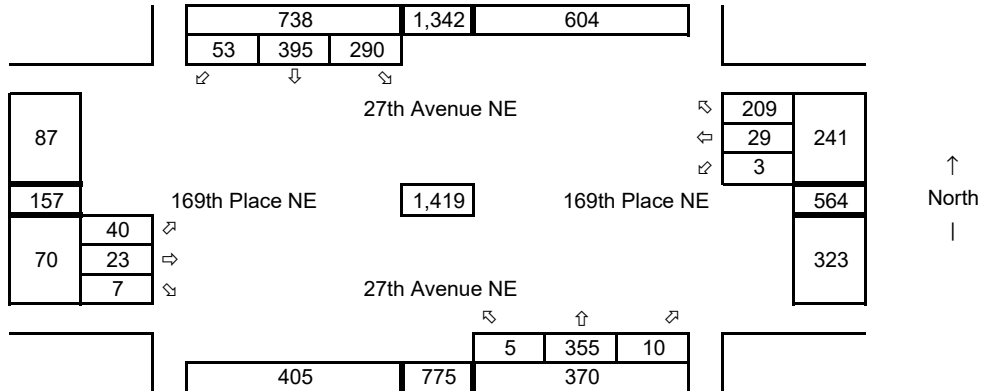
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Horizon Year**

**4 I-5 SB Ramps at 172nd St NE**

**Weekday PM Peak-Hour**

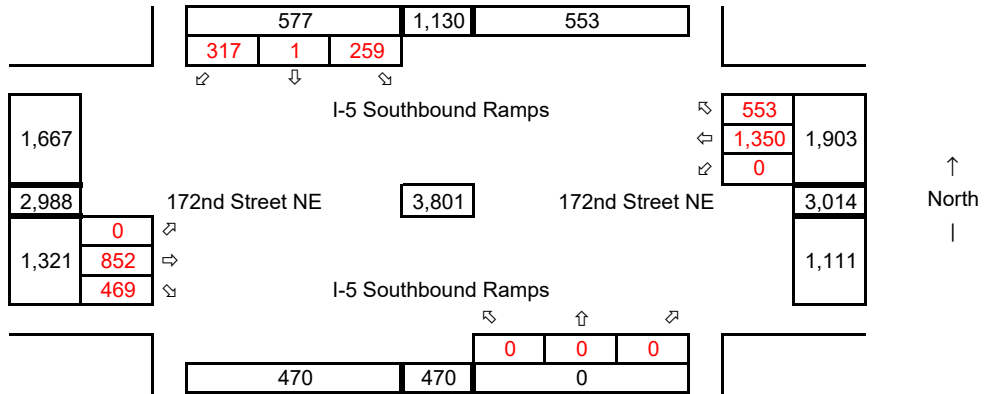
Synchro ID: 4

**Existing**

Average Weekday  
PM Peak-Hour

Year: 7/29/2021

Data Source: TDG



**Future without Development**

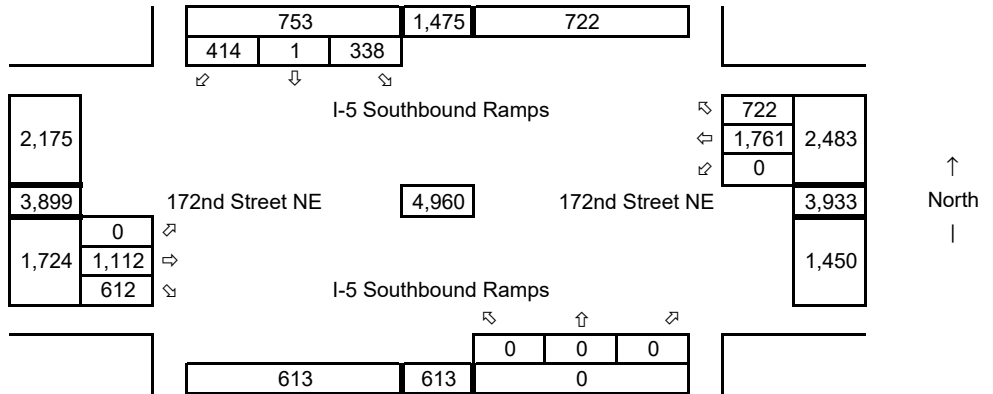
Average Weekday  
PM Peak Hour

Year: 2030

Growth Rate = 3.0%

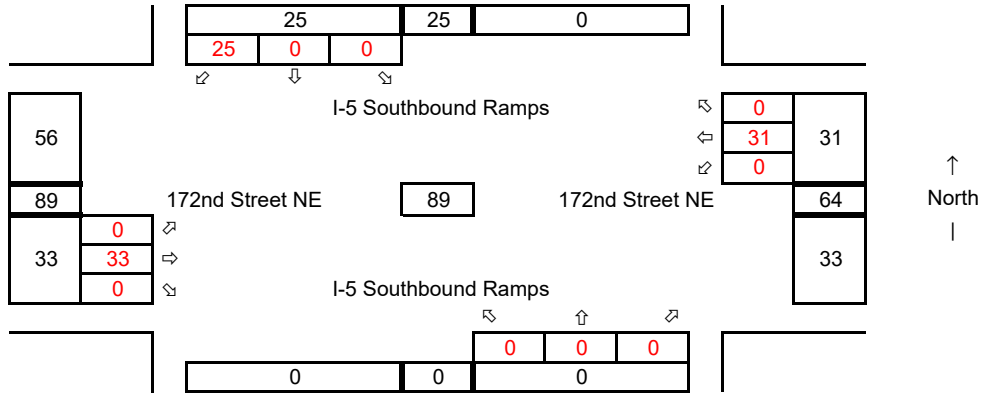
Years of Growth = 9

Total Growth = 1.3048



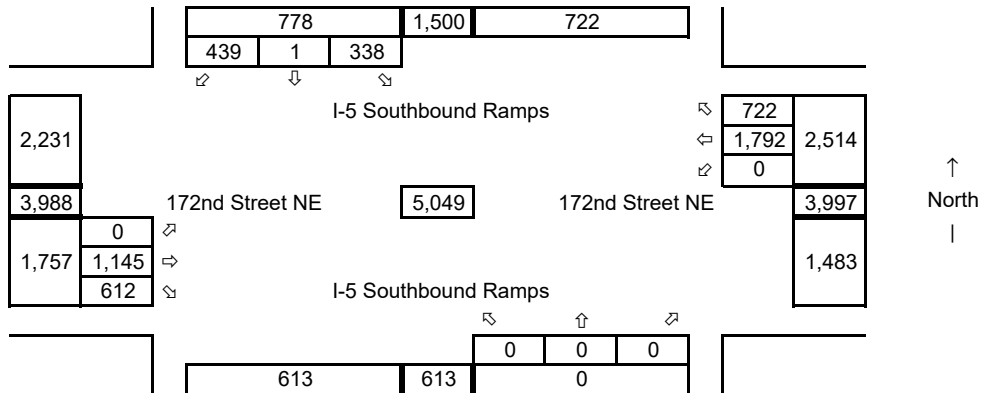
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Horizon Year**

**5 I-5 NB Ramps at 172nd St NE**

**Weekday PM Peak-Hour**

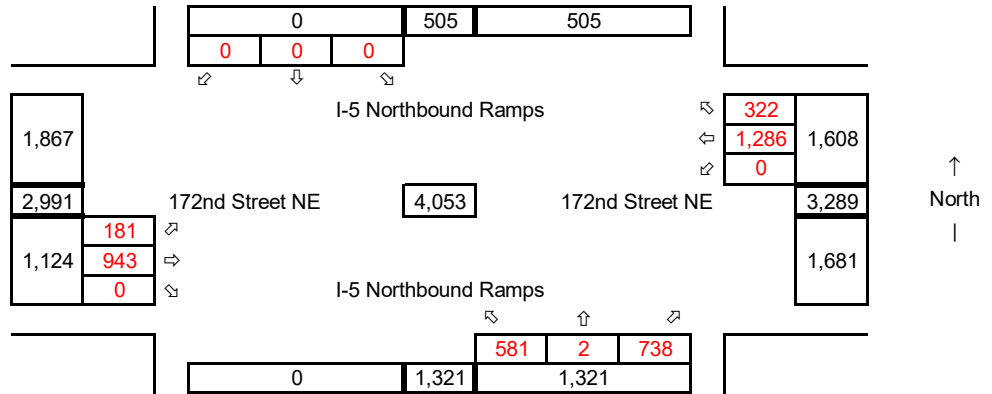
Synchro ID: 5

**Existing**

Average Weekday  
PM Peak-Hour

Year: **7/29/2021**

Data Source: **TDG**



**Future without Development**

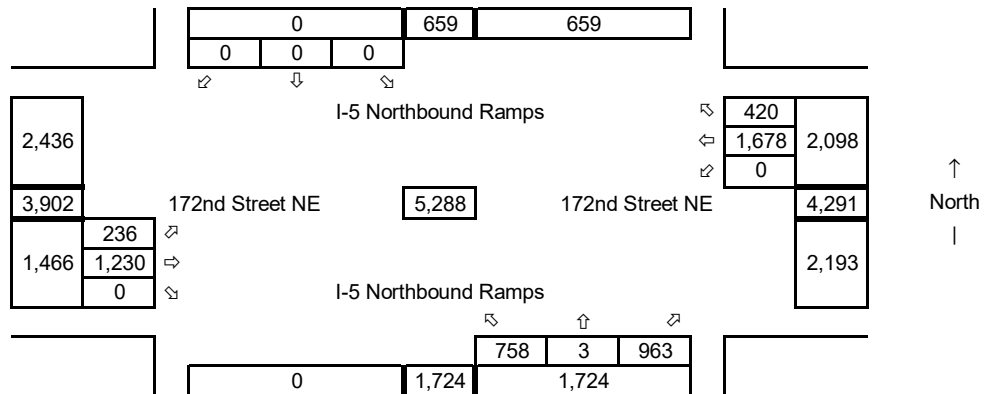
Average Weekday  
PM Peak Hour

Year: 2030

Growth Rate = 3.0%

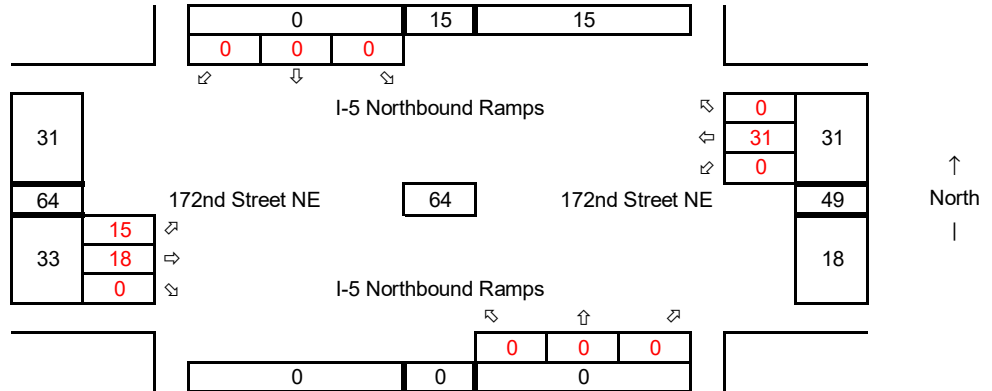
Years of Growth = 9

Total Growth = 1.3048



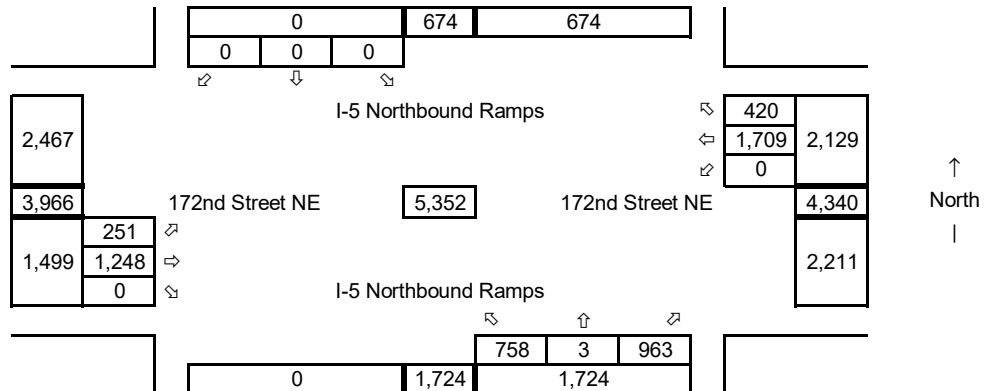
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Horizon Year**

**6 156th St NE at Smokey Pt Blvd**

**Weekday PM Peak-Hour**

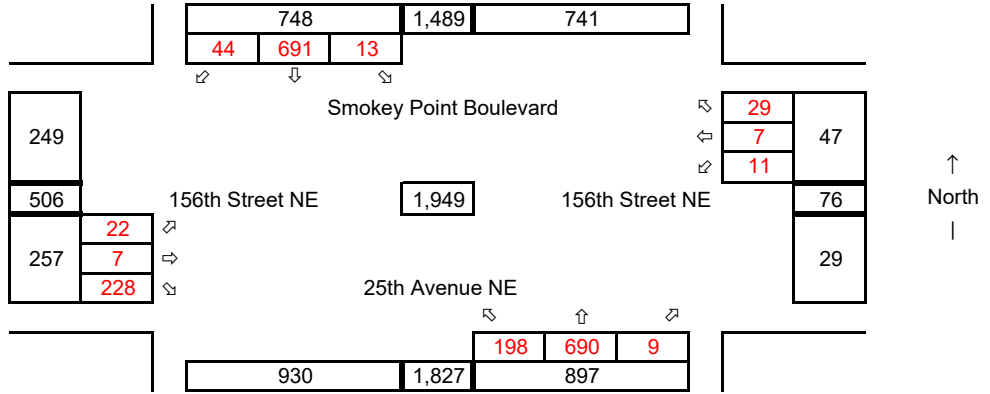
Synchro ID: 6

**Existing**

Average Weekday  
PM Peak-Hour

Year: **7/29/2021**

Data Source: **TDG**



**Future without Development**

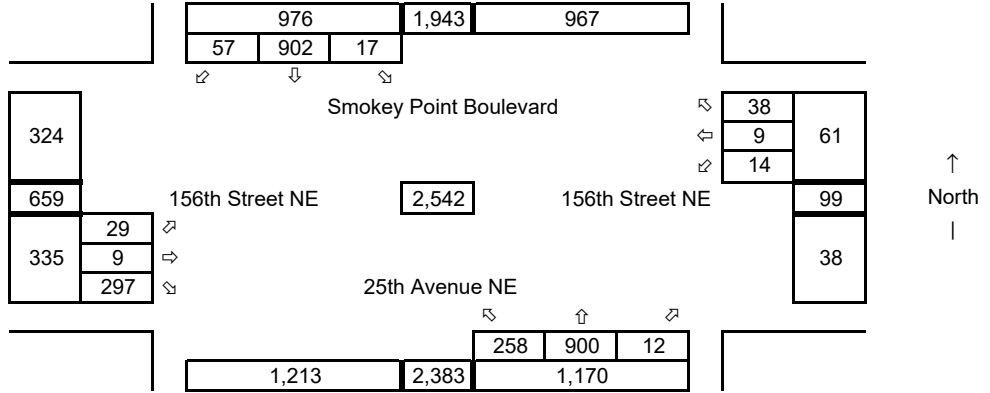
Average Weekday  
PM Peak Hour

Year: 2030

Growth Rate = 3.0%

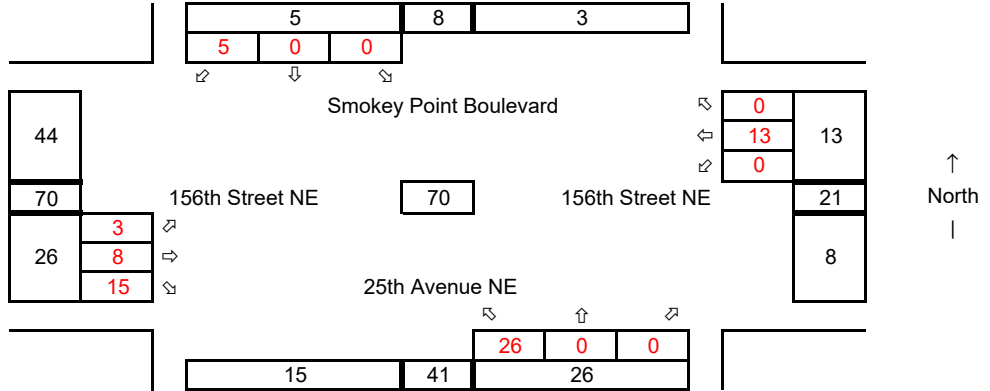
Years of Growth = 9

Total Growth = 1.3048



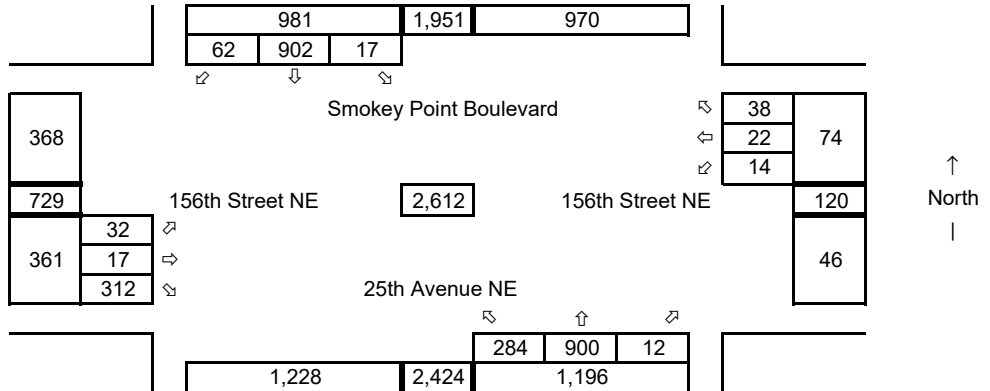
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Horizon Year**

**7 152nd St NE at Smokey Pt Blvd**

**Weekday PM Peak-Hour**

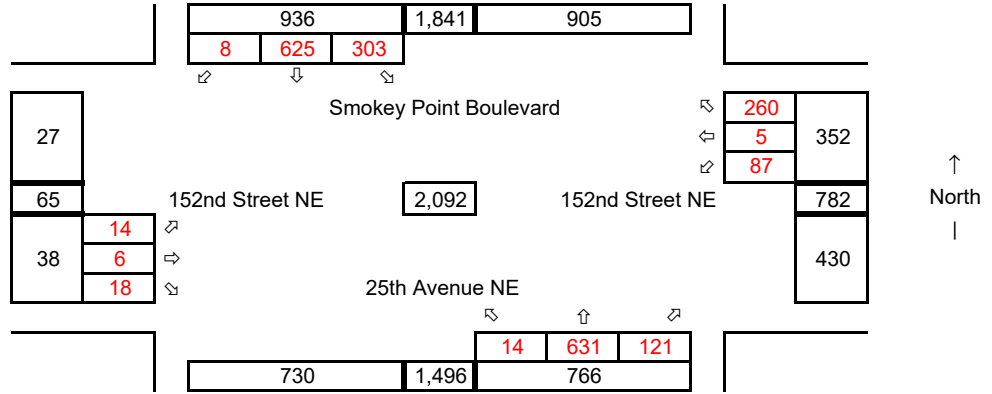
Synchro ID: 7

**Existing**

Average Weekday  
PM Peak-Hour

Year: 7/29/2021

Data Source: TDG



**Future without Development**

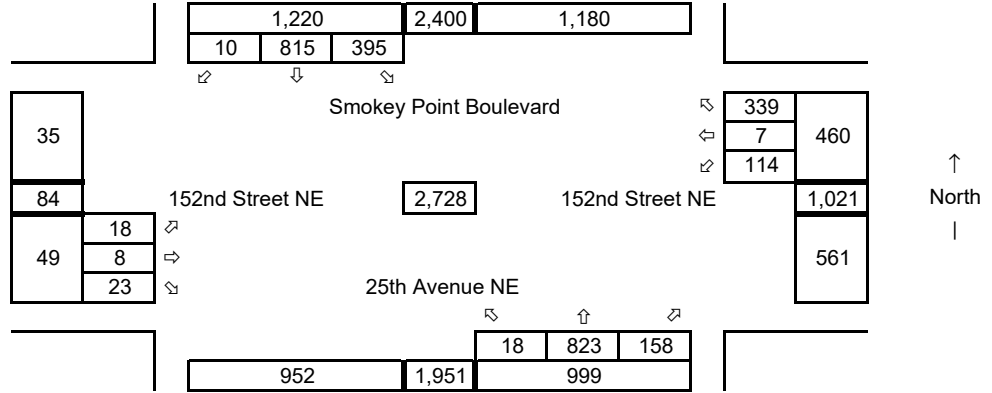
Average Weekday  
PM Peak Hour

Year: 2030

Growth Rate = 3.0%

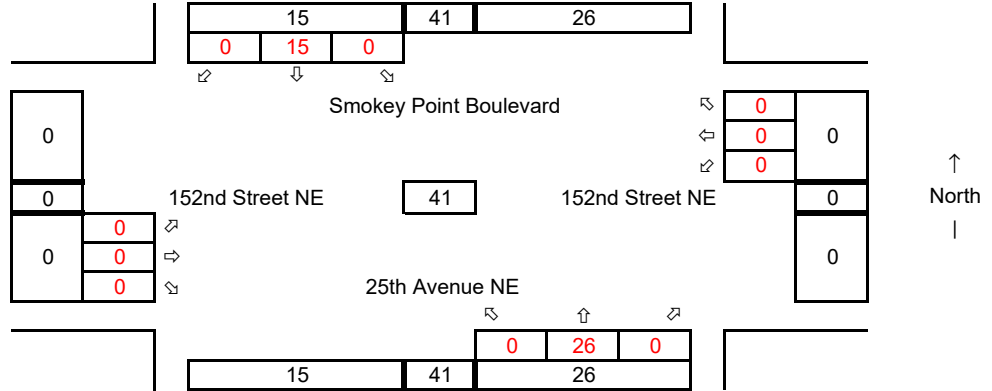
Years of Growth = 9

Total Growth = 1.3048



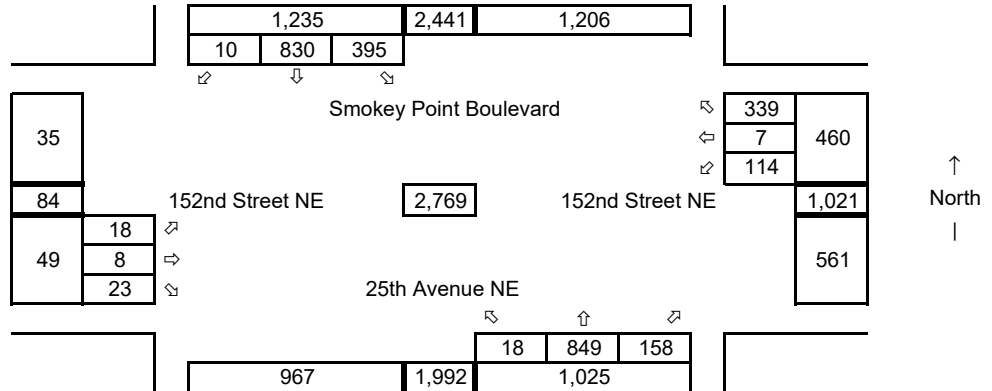
**Total Development Trips**

Average Weekday  
PM Peak Hour



**Future with Development**

Average Weekday  
PM Peak Hour



**Horizon Year**

**8 136th St NE at Smokey Pt Blvd**

**Weekday PM Peak-Hour**

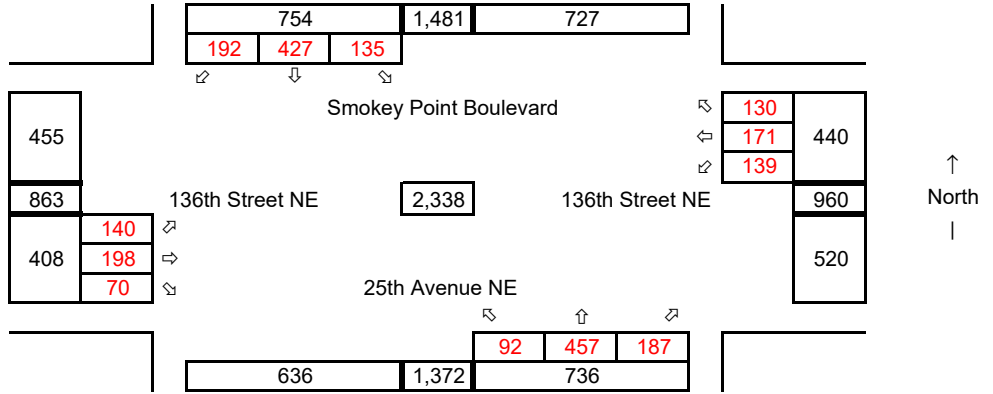
Synchro ID: 8

**Existing**

Average Weekday  
PM Peak-Hour

Year: 7/29/2021

Data Source: TDG



**Future without Development**

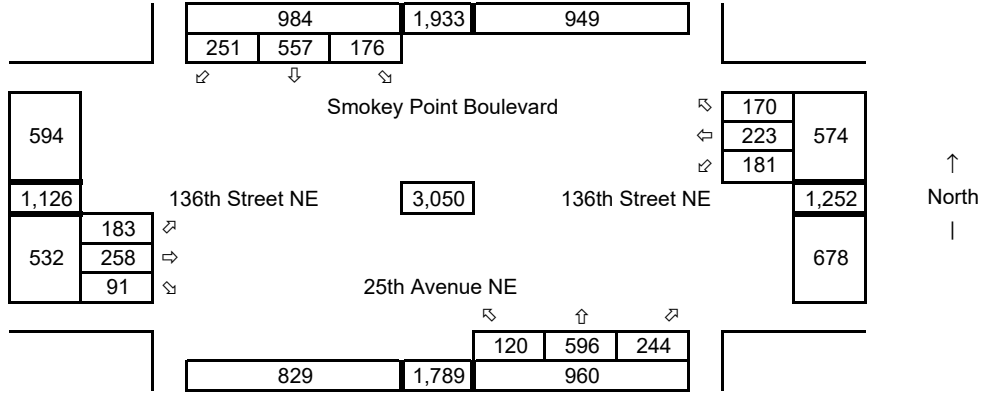
Average Weekday  
PM Peak Hour

Year: 2030

Growth Rate = 3.0%

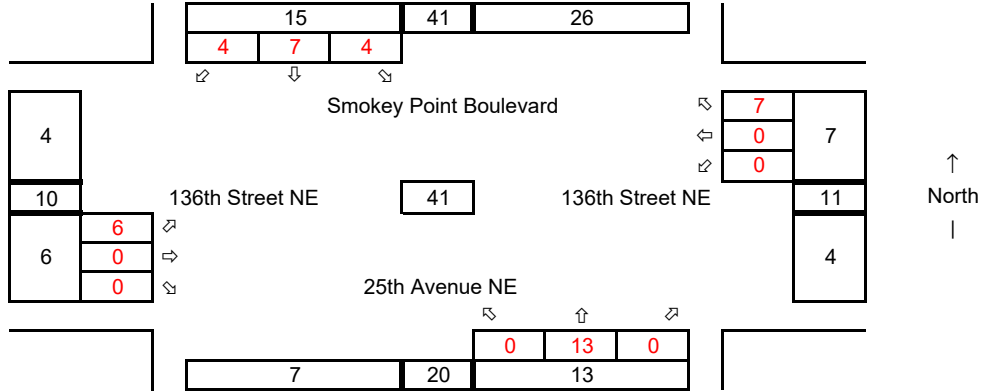
Years of Growth = 9

Total Growth = 1.3048



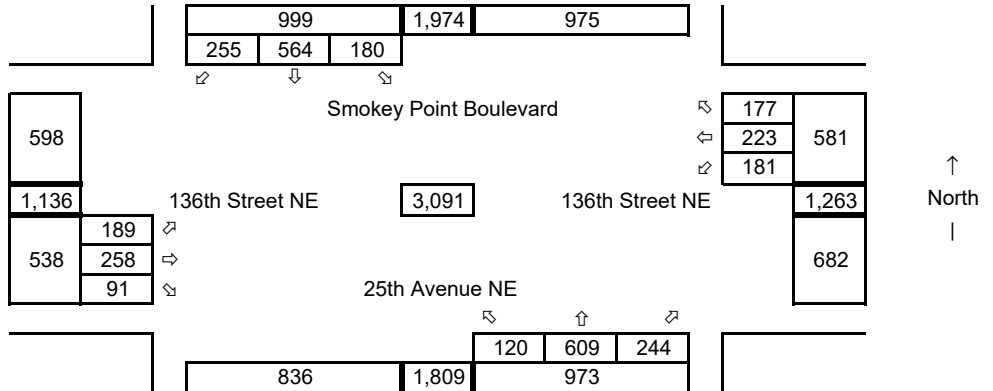
**Total Development Trips**

Average Weekday  
PM Peak Hour



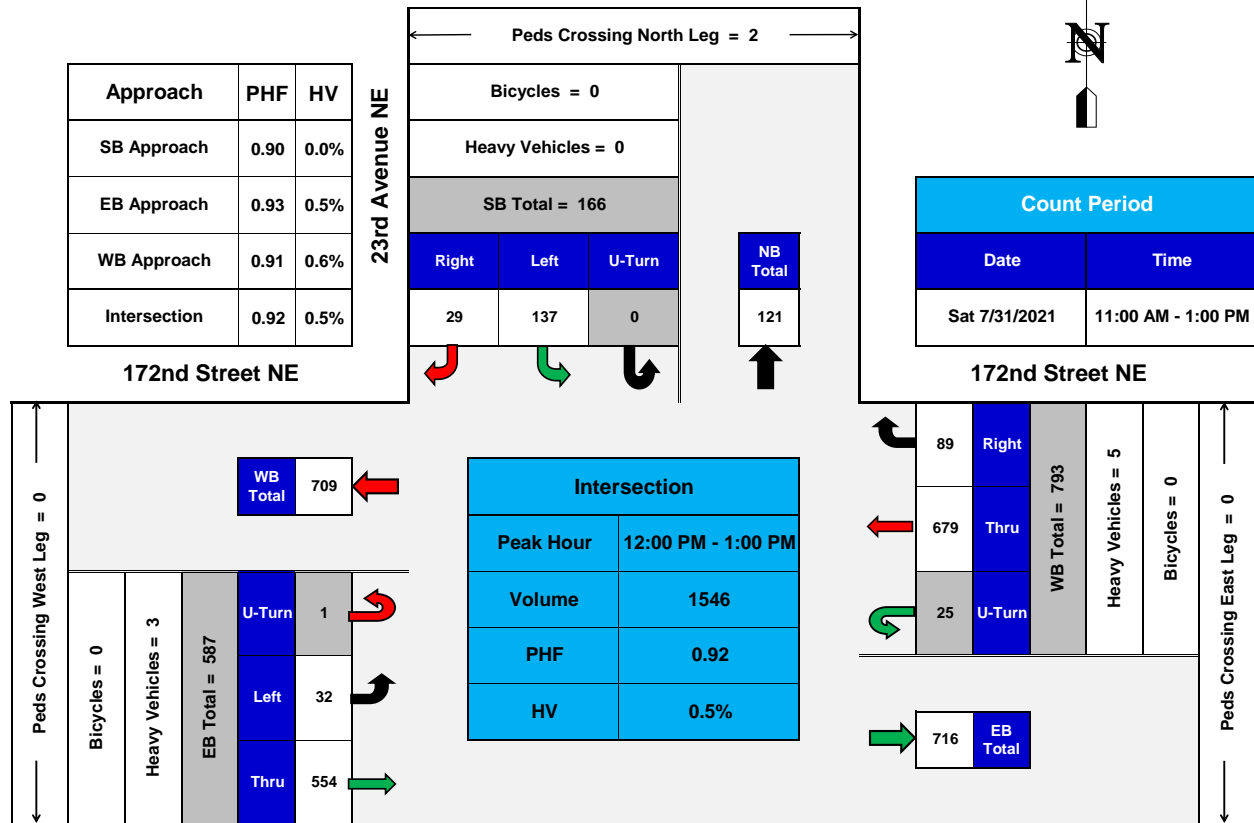
**Future with Development**

Average Weekday  
PM Peak Hour



# **Saturday Peak-Hour Turning Movement Calculations**

**172nd Street NE @ 23rd Avenue NE  
Marysville, Wa**



PHF = Peak Hour Factor  
HV = Heavy Vehicles

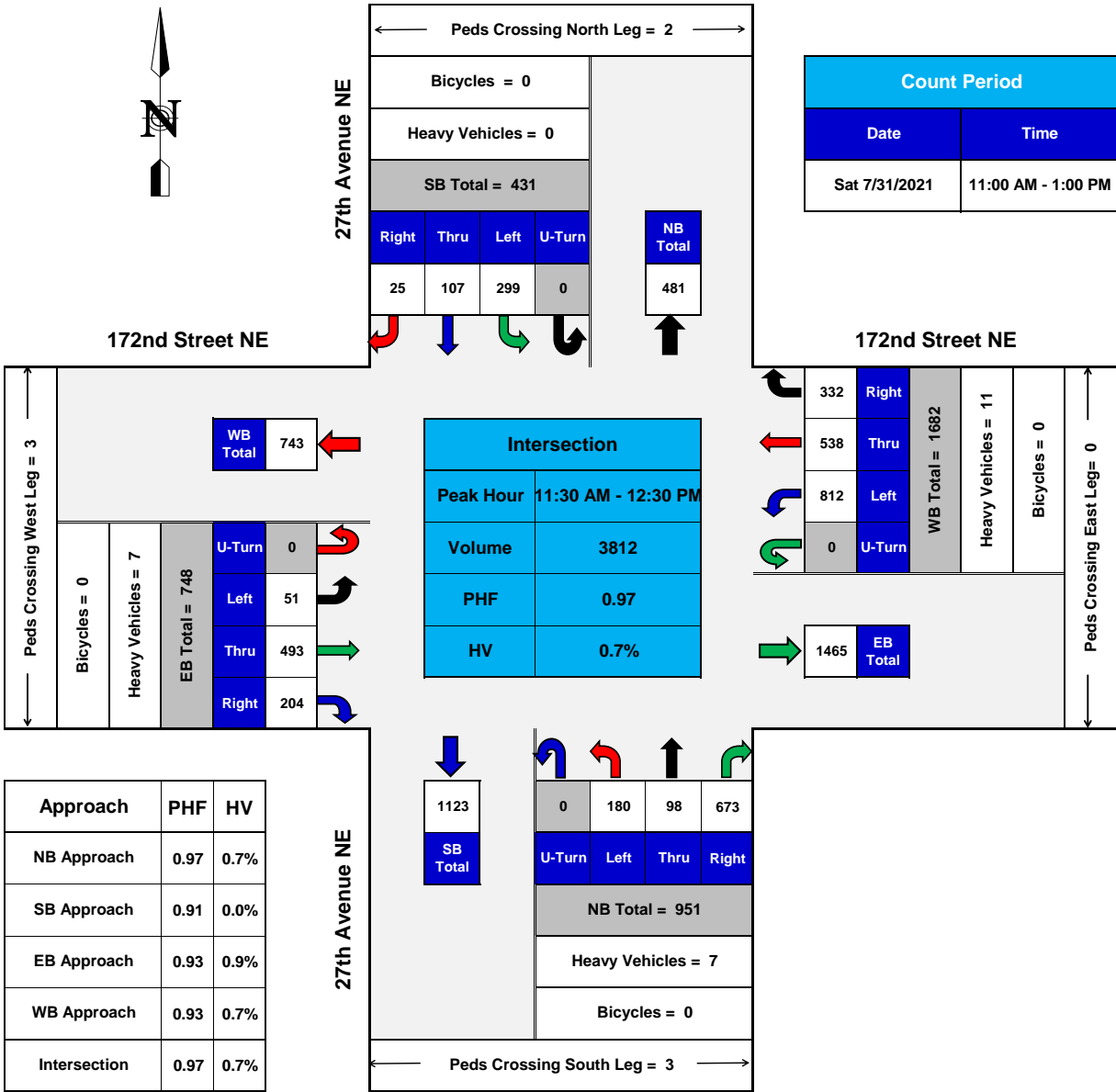
**TURNING MOVEMENTS DIAGRAM  
PEAK HOUR SUMMARY**





# 172nd Street NE @ 27th Avenue NE

Marysville, Wa



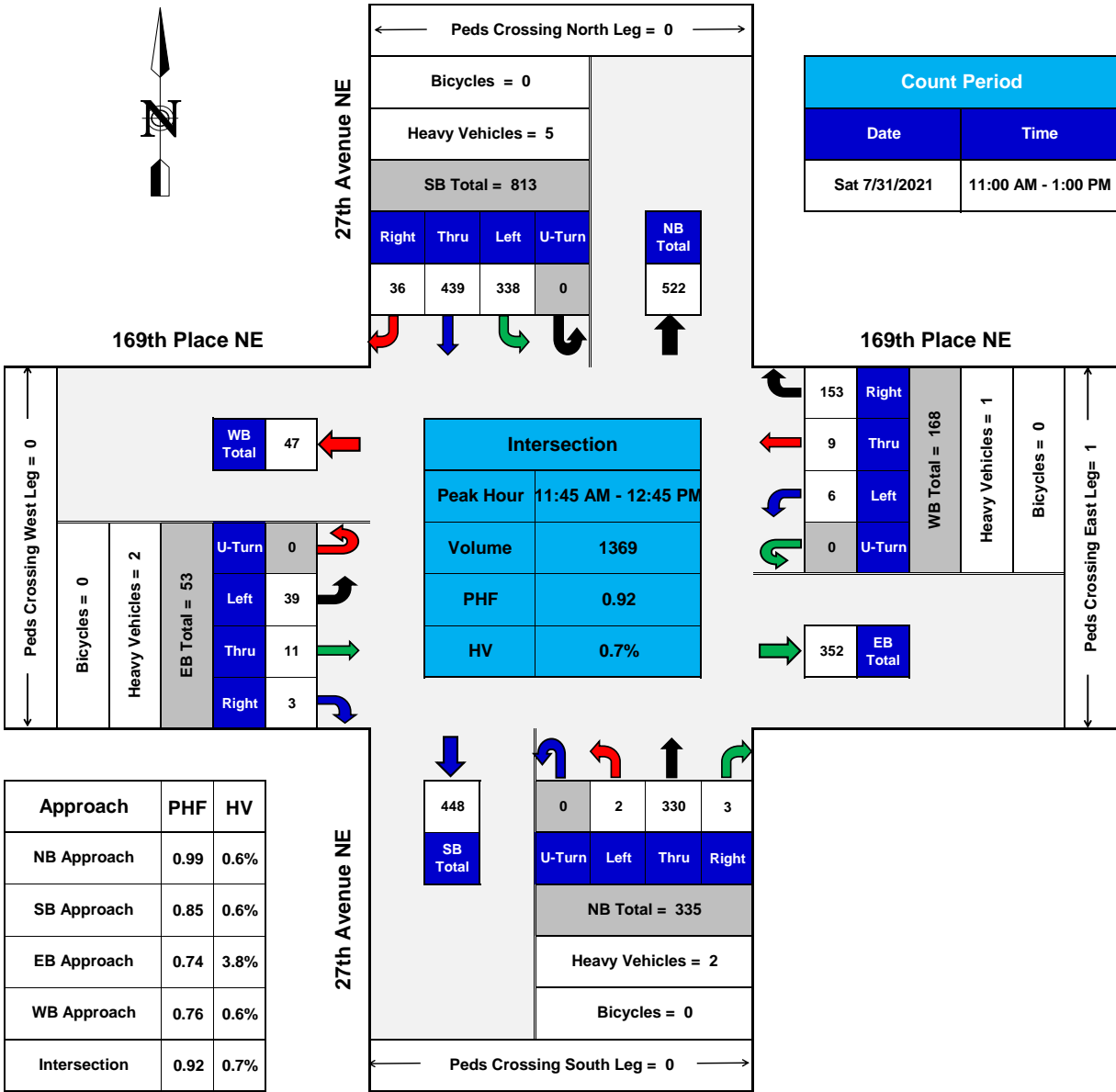
PHF = Peak Hour Factor  
HV = Heavy Vehicles

## TURNING MOVEMENTS DIAGRAM PEAK HOUR SUMMARY



# 169th Place NE @ 27th Avenue NE

Marysville, Wa



**TURNING MOVEMENTS DIAGRAM**  
PEAK HOUR SUMMARY



**Opening Year**

**1 23rd Ave NE at 172nd St NE**

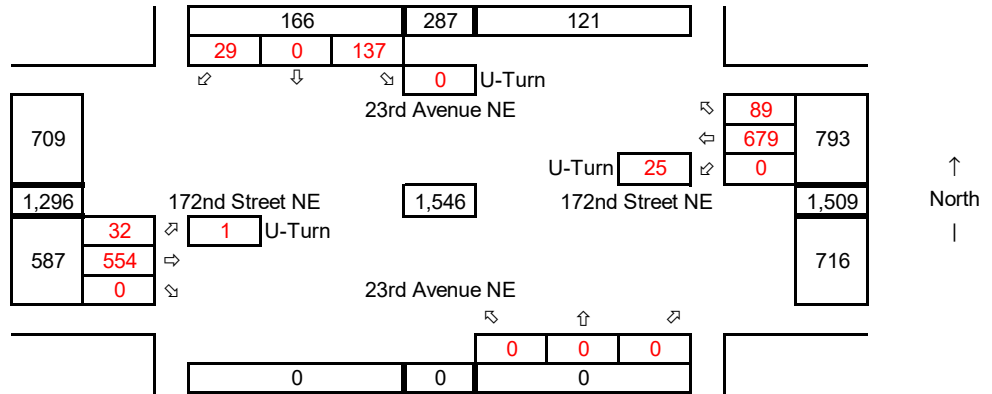
**Saturday Peak-Hour**

Synchro ID: 1

**Existing**  
Saturday  
Peak-Hour

Year: **7/31/2021**

Data Source: **TDG**



**Future without Development**

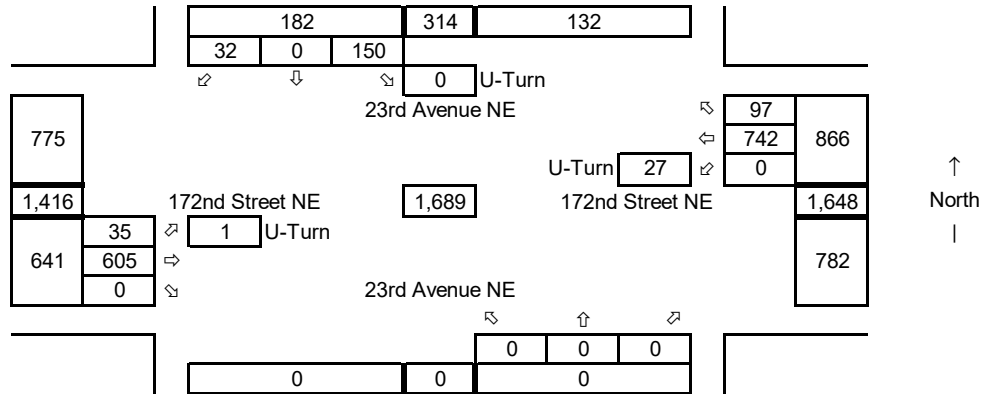
Saturday  
PM Peak Hour

Year: **2024**

Growth Rate = **3.0%**

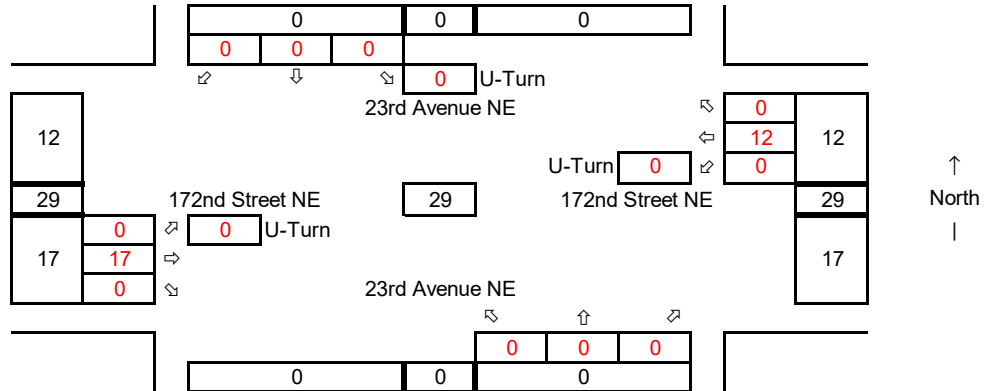
Years of Growth = 3

Total Growth = 1.0927



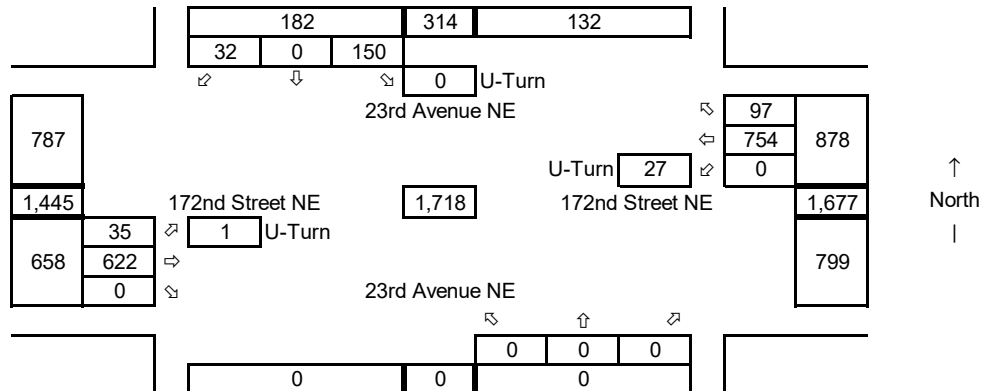
**Total Development Trips**

Saturday  
PM Peak Hour



**Future with Development**

Saturday  
PM Peak Hour



**Opening Year**

**2 27th Ave NE at 172nd St NE**

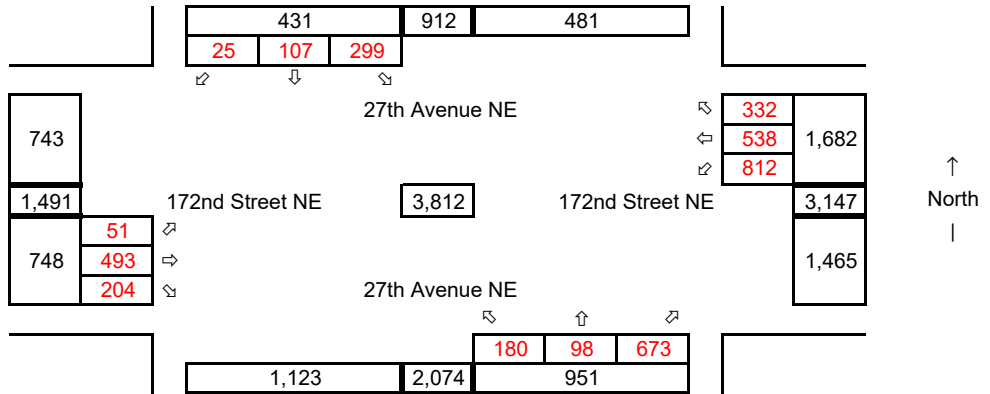
**Saturday Peak-Hour**

Synchro ID: 2

**Existing**  
Saturday  
Peak-Hour

Year: **7/31/2021**

Data Source: **TDG**



**Future without Development**

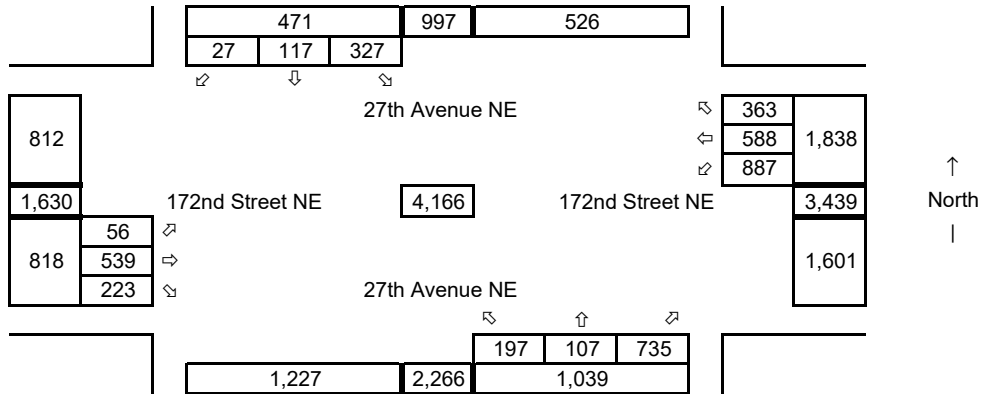
Saturday  
PM Peak Hour

Year: 2024

Growth Rate = 3.0%

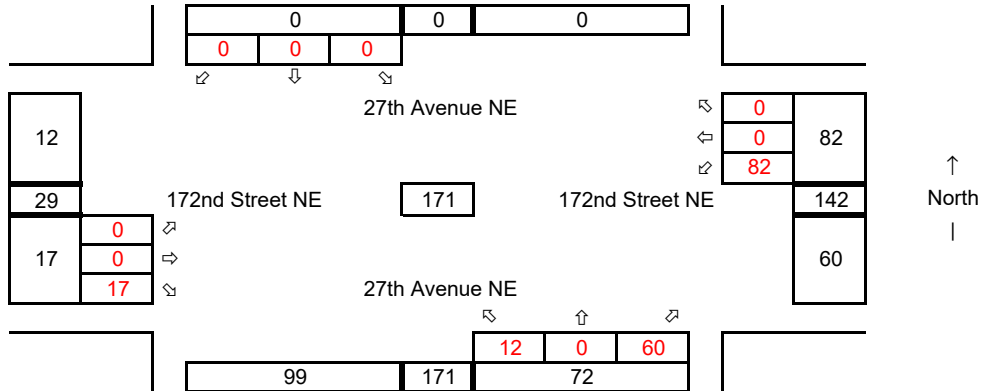
Years of Growth = 3

Total Growth = 1.0927



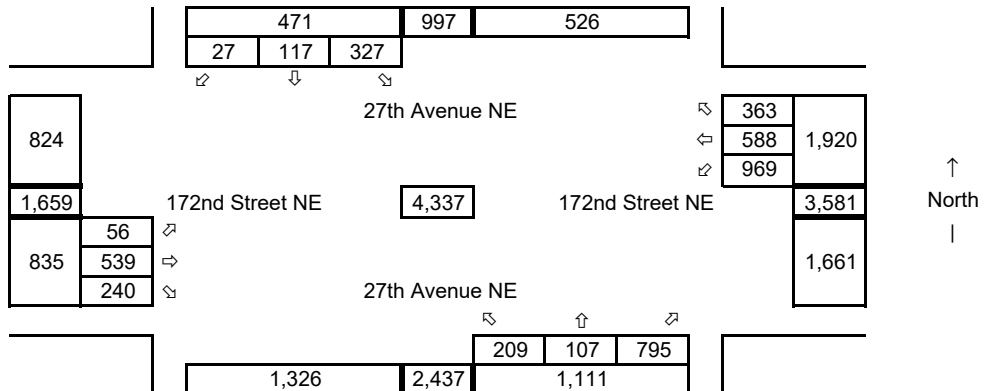
**Total Development Trips**

Saturday  
PM Peak Hour



**Future with Development**

Saturday  
PM Peak Hour



**Opening Year**

**3 27th Ave NE at 169th PI NE**

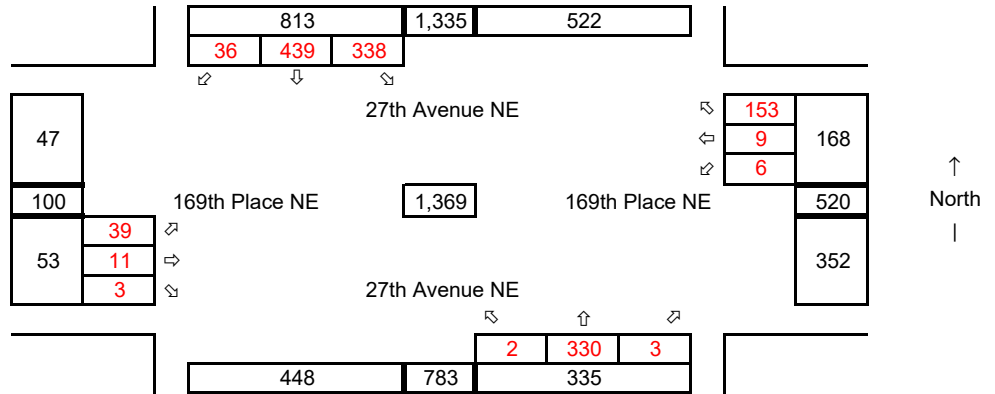
**Saturday Peak-Hour**

Synchro ID: 3

**Existing**  
Saturday  
Peak-Hour

Year: **7/31/2021**

Data Source: **TDG**



**Future without Development**

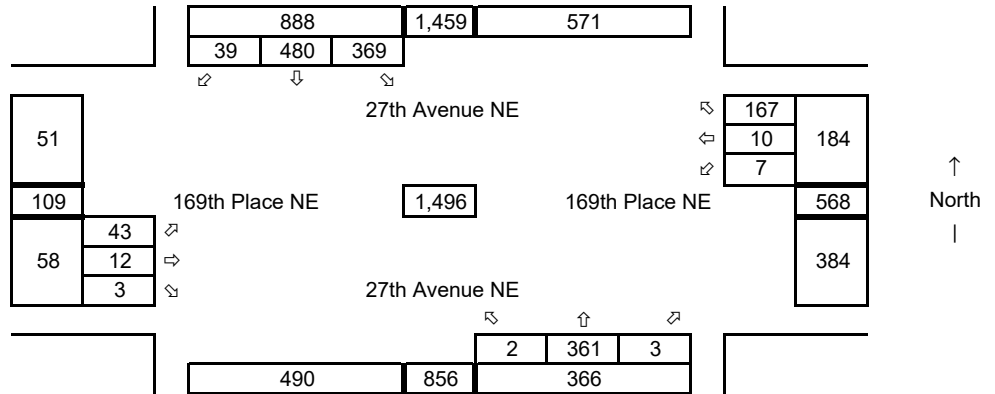
Saturday  
PM Peak Hour

Year: 2024

Growth Rate = 3.0%

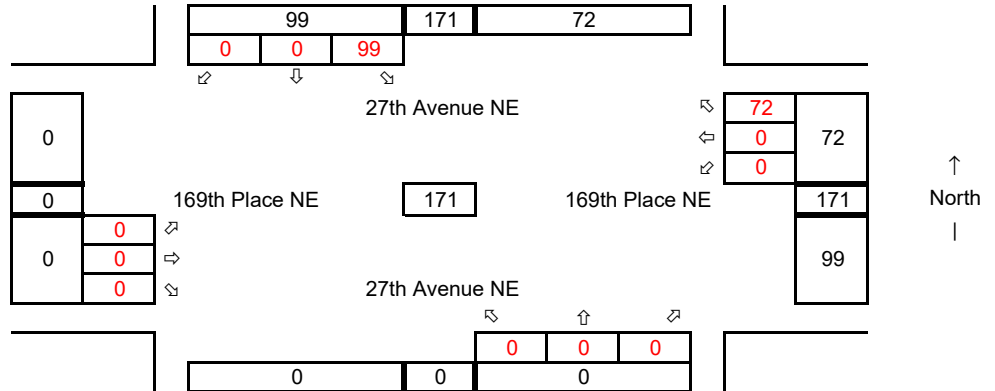
Years of Growth = 3

Total Growth = 1.0927



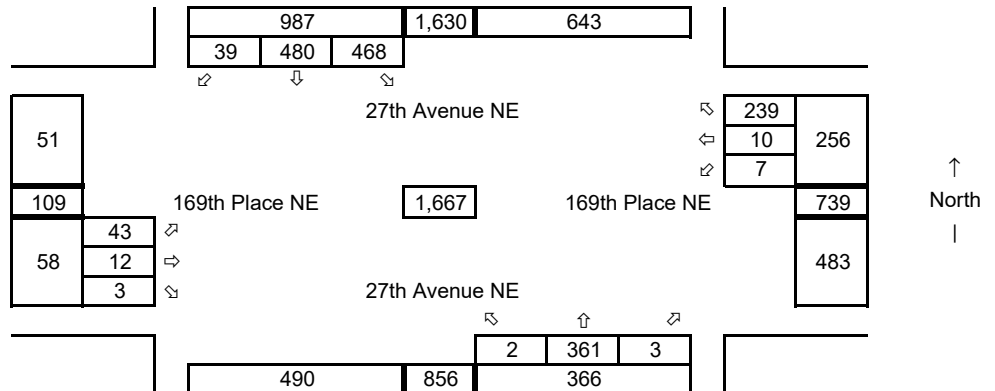
**Total Development Trips**

Saturday  
PM Peak Hour



**Future with Development**

Saturday  
PM Peak Hour



**Horizon Year**

**1 23rd Ave NE at 172nd St NE**

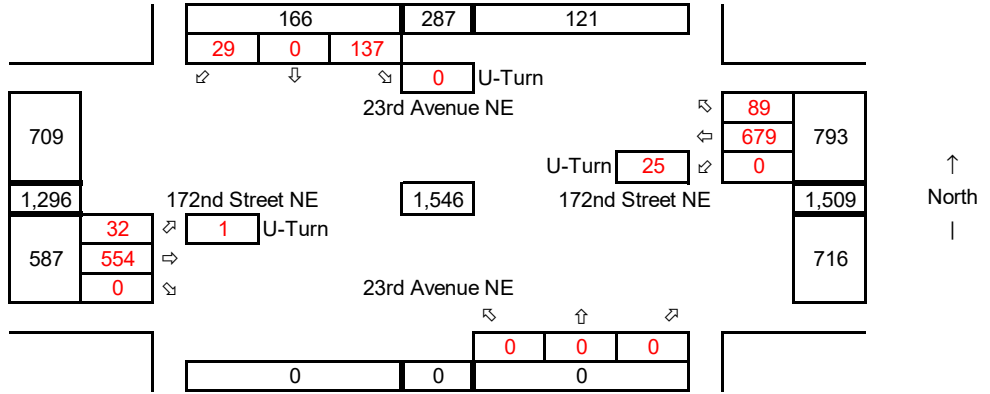
**Saturday Peak-Hour**

Synchro ID: 1

**Existing**  
Saturday  
Peak-Hour

Year: **7/31/2021**

Data Source: **TDG**



**Future without Development**

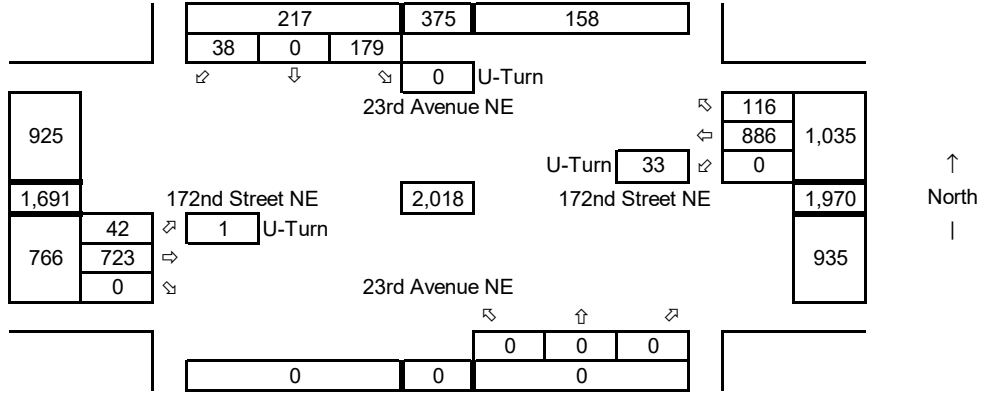
Saturday  
PM Peak Hour

Year: **2030**

Growth Rate = **3.0%**

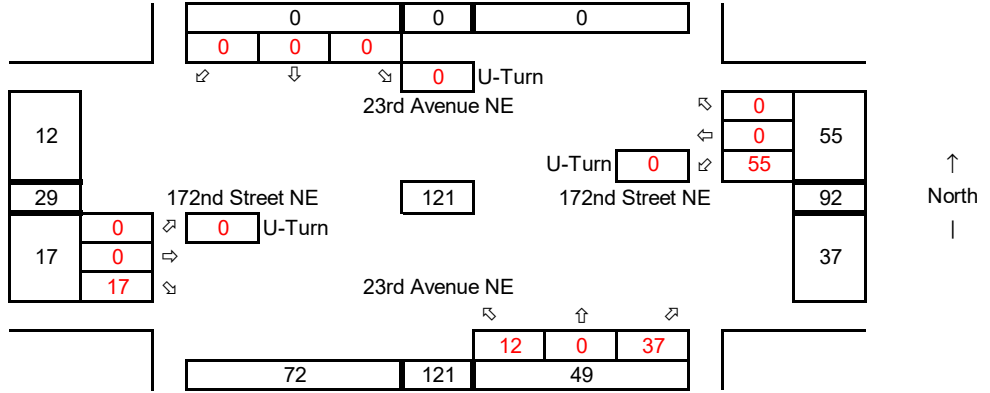
Years of Growth = 9

Total Growth = 1.3048



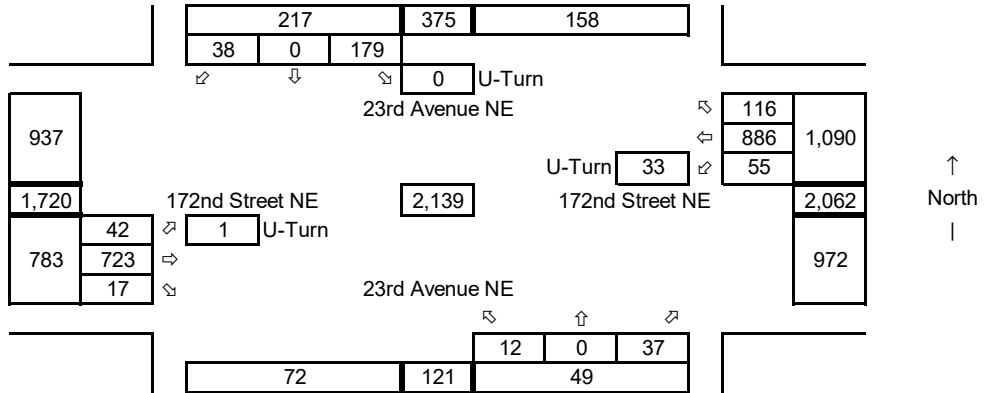
**Total Development Trips**

Saturday  
PM Peak Hour



**Future with Development**

Saturday  
PM Peak Hour



**Horizon Year**

**2 27th Ave NE at 172nd St NE**

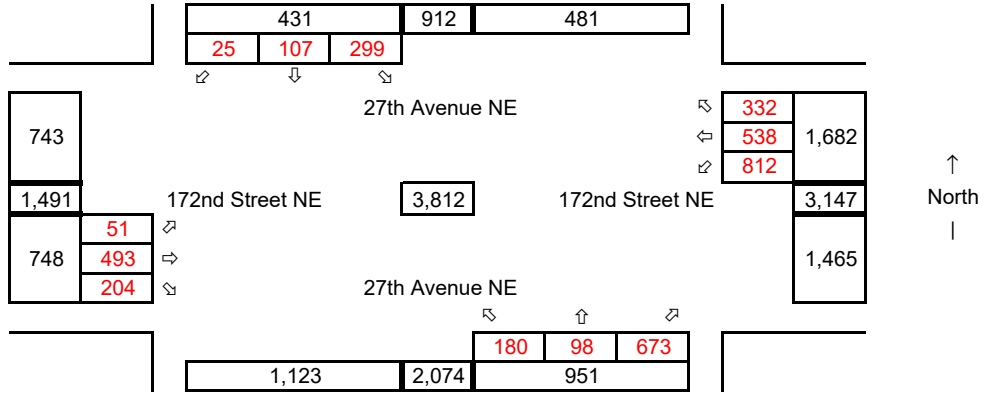
**Saturday Peak-Hour**

Synchro ID: 2

**Existing**  
Saturday  
Peak-Hour

Year: **7/31/2021**

Data Source: **TDG**



**Future without Development**

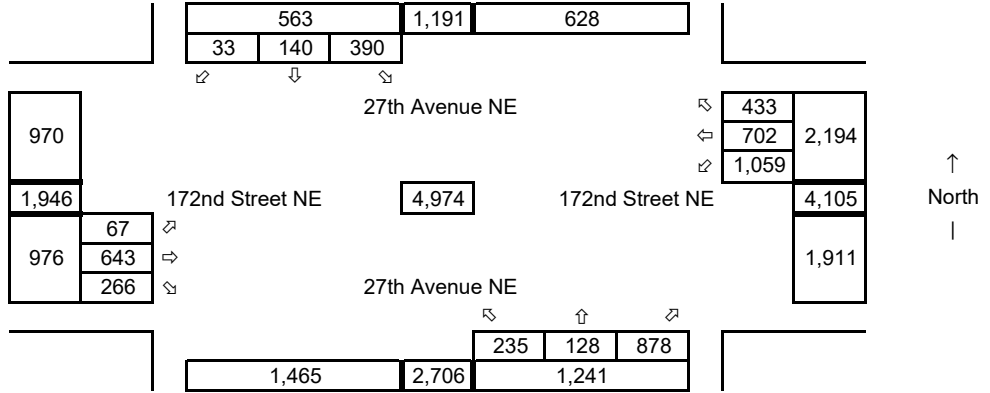
Saturday  
PM Peak Hour

Year: 2030

Growth Rate = 3.0%

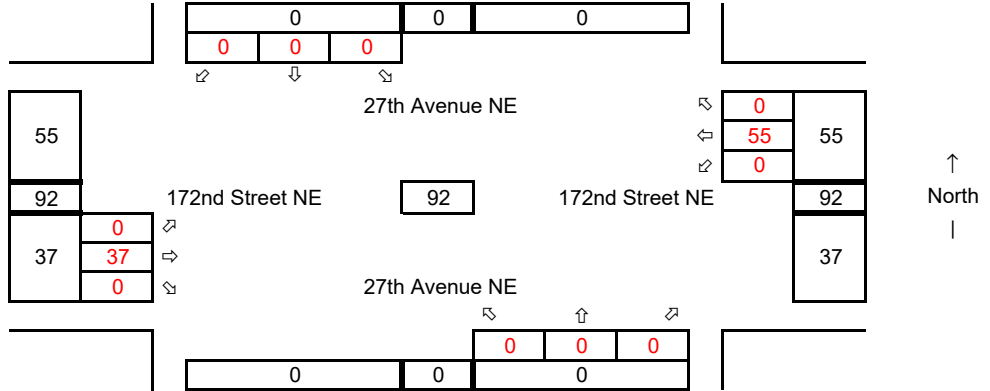
Years of Growth = 9

Total Growth = 1.3048



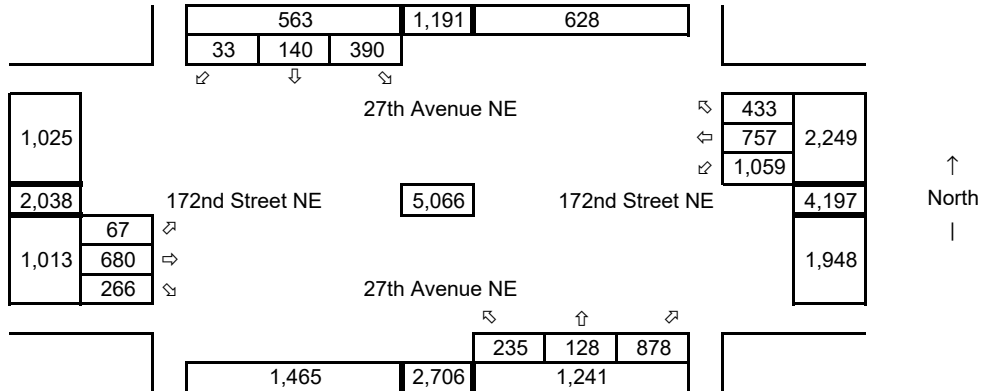
**Total Development Trips**

Saturday  
PM Peak Hour



**Future with Development**

Saturday  
PM Peak Hour



Horizon Year

3 27th Ave NE at 169th PI NE

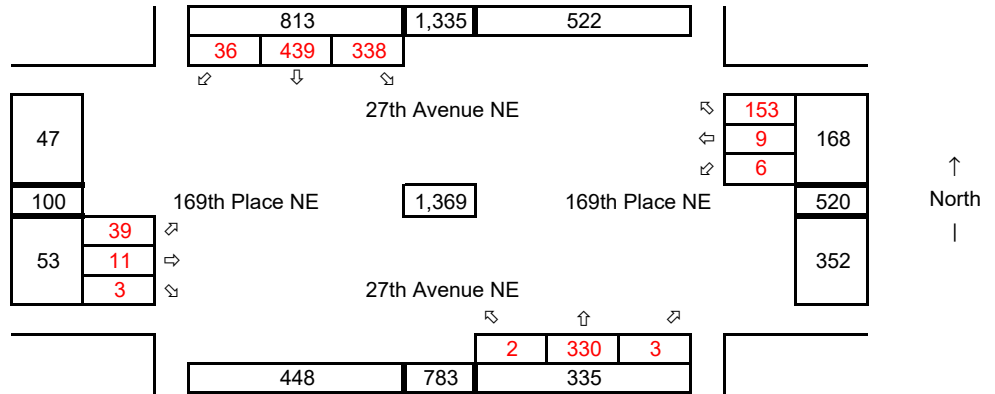
Saturday Peak-Hour

Synchro ID: 3

Existing  
Saturday  
Peak-Hour

Year: 7/31/2021

Data Source: TDG



Future without Development

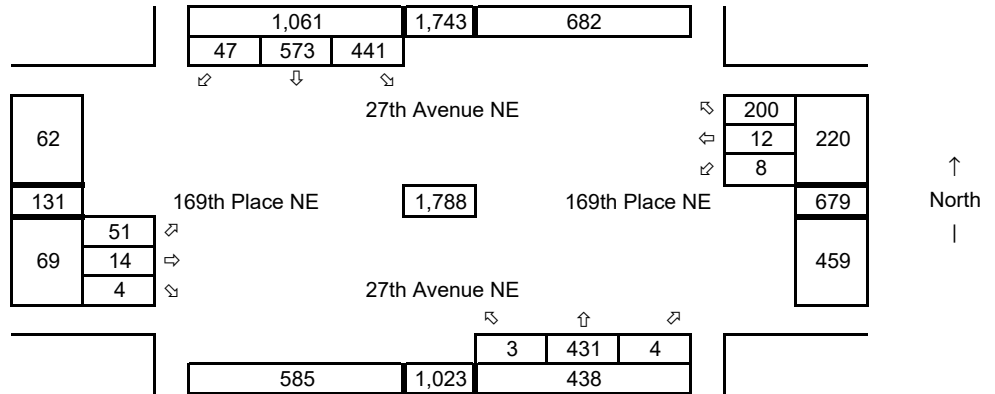
Saturday  
PM Peak Hour

Year: 2030

Growth Rate = 3.0%

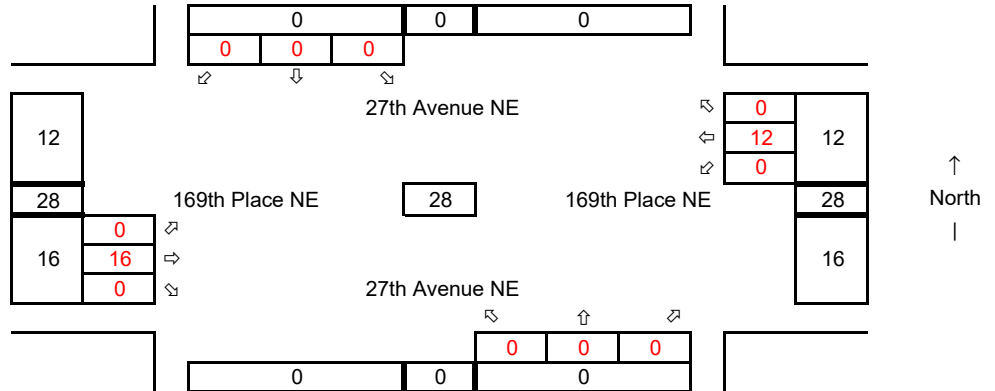
Years of Growth = 9

Total Growth = 1.3048



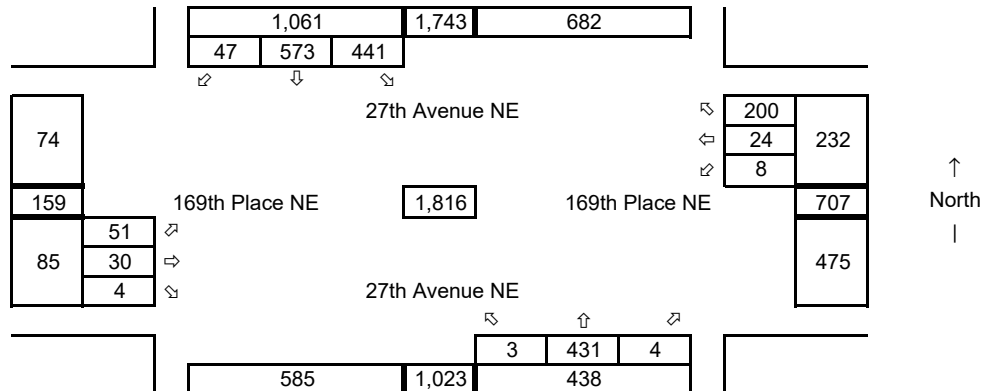
Total Development Trips

Saturday  
PM Peak Hour



Future with Development

Saturday  
PM Peak Hour



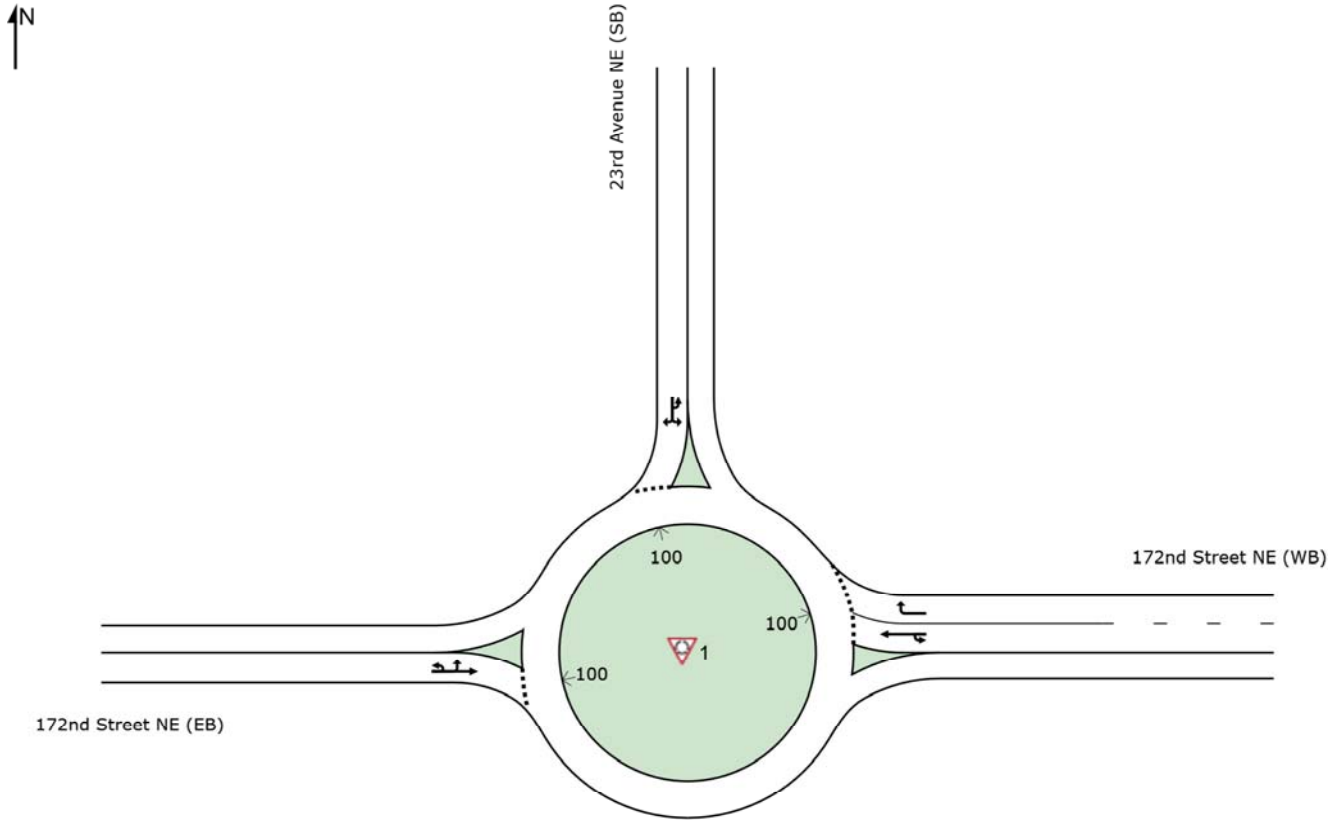


# **Weekday PM Peak-Hour Level of Service Calculations**

# SITE LAYOUT

## Site: 1 [2021 Existing Conditions - Weekday PM]

172nd Street NE at 23rd Avenue NE  
Site Category: PM Peak-Hour  
Roundabout



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Organisation: GIBSON TRAFFIC CONSULTANTS | Created: Wednesday, August 18, 2021 7:25:41 AM  
Project: H:\2021\21-190\Sidra#1 - 172nd St NE at 23rd Ave NE.sip8

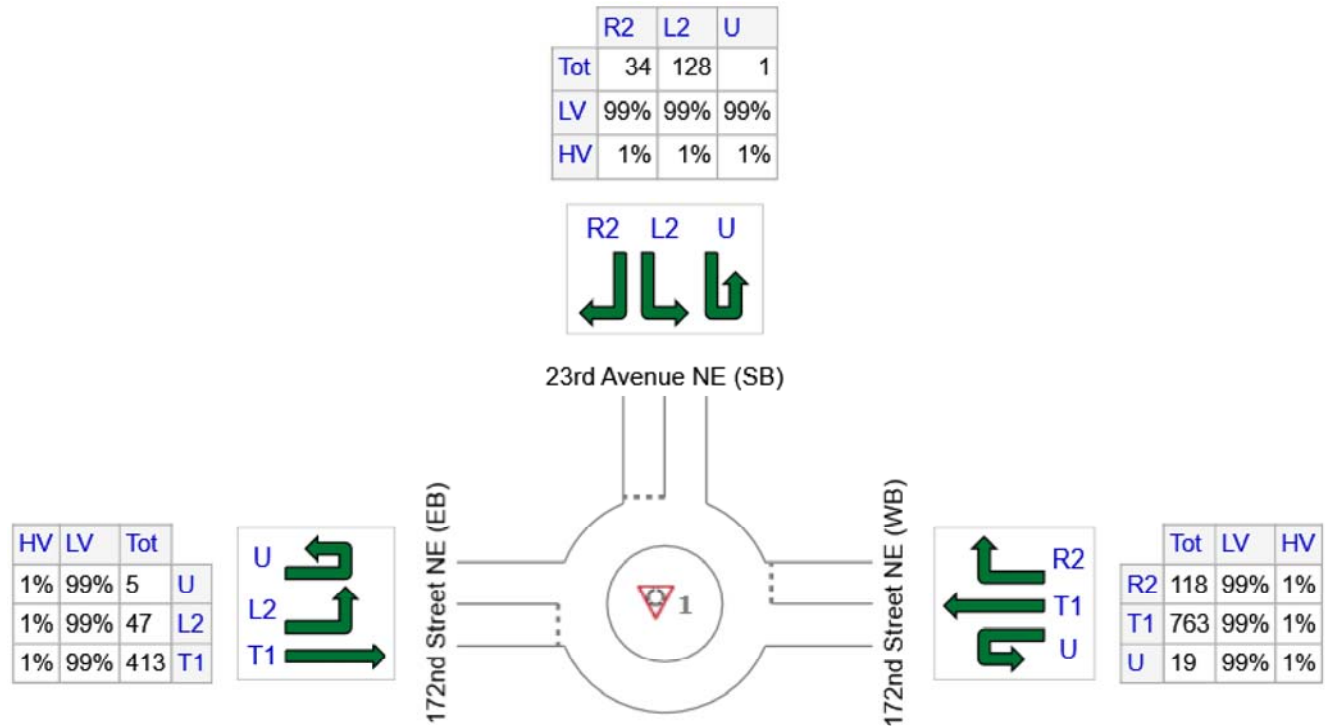
# INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

 Site: 1 [2021 Existing Conditions - Weekday PM]

172nd Street NE at 23rd Avenue NE  
 Site Category: PM Peak-Hour  
 Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
E: 172nd Street NE (WB)	900	891	9
N: 23rd Avenue NE (SB)	163	161	2
W: 172nd Street NE (EB)	465	460	5
Total	1528	1513	15

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 Organisation: GIBSON TRAFFIC CONSULTANTS | Created: Wednesday, August 18, 2021 7:25:48 AM  
 Project: H:\2021\21-190\Sidra#1 - 172nd St NE at 23rd Ave NE.sip8

# MOVEMENT SUMMARY

## Site: 1 [2021 Existing Conditions - Weekday PM]

172nd Street NE at 23rd Avenue NE  
 Site Category: PM Peak-Hour  
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: 172nd Street NE (WB)												
1u	U	20	1.0	0.512	12.5	LOS B	4.4	109.7	0.27	0.39	0.27	38.2
6	T1	820	1.0	0.512	4.1	LOS A	4.4	109.7	0.27	0.39	0.27	37.1
16	R2	127	1.0	0.110	4.4	LOS A	0.6	14.1	0.20	0.46	0.20	36.2
Approach		968	1.0	0.512	4.3	LOS A	4.4	109.7	0.26	0.40	0.26	37.0
North: 23rd Avenue NE (SB)												
7u	U	1	1.0	0.224	17.1	LOS B	1.4	35.8	0.76	0.83	0.76	33.8
7	L2	138	1.0	0.224	14.7	LOS B	1.4	35.8	0.76	0.83	0.76	33.1
14	R2	37	1.0	0.224	8.8	LOS A	1.4	35.8	0.76	0.83	0.76	32.1
Approach		175	1.0	0.224	13.5	LOS B	1.4	35.8	0.76	0.83	0.76	32.9
West: 172nd Street NE (EB)												
5u	U	5	1.0	0.392	13.0	LOS B	2.7	67.7	0.42	0.49	0.42	37.4
5	L2	51	1.0	0.392	10.6	LOS B	2.7	67.7	0.42	0.49	0.42	36.4
2	T1	444	1.0	0.392	4.6	LOS A	2.7	67.7	0.42	0.49	0.42	36.3
Approach		500	1.0	0.392	5.3	LOS A	2.7	67.7	0.42	0.49	0.42	36.4
All Vehicles		1643	1.0	0.512	5.6	LOS A	4.4	109.7	0.37	0.47	0.37	36.3

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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Organisation: GIBSON TRAFFIC CONSULTANTS | Processed: Tuesday, August 17, 2021 2:51:57 PM

Project: H:\2021\21-190\Sidra#1 - 172nd St NE at 23rd Ave NE.sip8

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	32	367	125	679	692	303	201	92	542	298	77	49
Future Volume (vph)	32	367	125	679	692	303	201	92	542	298	77	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	195	375	400	200	200	150	150	0	175	175	175	175
Storage Lanes	1	2	1	1	1	1	1	1	1	1	1	1
Taper Length (ft)	25	25	25	25	25	25	25	25	25	25	25	25
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	1.00	1.00	1.00	0.97	1.00	1.00	1.00
Ped Bike Factor		0.962				0.850		0.850	0.950	0.941		
Flt Protected	0.950			0.950		0.950		0.950	0.950	0.950		
Satd. Flow (prot)	1787	3438	0	3467	3574	1599	1787	1881	1599	3467	1760	0
Flt Permitted	0.950			0.950		0.950		0.950	0.950	0.950		
Satd. Flow (perm)	1787	3438	0	3467	3574	1599	1782	1881	1599	3467	1760	0
Right Turn on Red			Yes			Yes		Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)		28				280		489			20	
Link Speed (mph)		30		30		30		30		30		30
Link Distance (ft)		1312		609		730		589		589		589
Travel Time (s)		29.8		13.8		16.6		13.4		13.4		13.4
Confl. Peds. (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	34	386	132	715	728	319	212	97	571	314	81	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	518	0	715	728	319	212	97	571	314	133	0
Turn Type	Prot	NA	Prot	NA	Perm	NA	Prot	NA	Perm	Prot	NA	NA
Protected Phases	5	2		6		6		8		7		4
Permitted Phases												
Detector Phase	5	2		6		6		8		7		4
Switch Phase												
Minimum Initial (s)	3.0	7.0	3.0	7.0	3.0	7.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Split (s)	9.5	38.3	38.3	38.3	9.5	23.1	23.1	23.1	9.5	45.1	45.1	45.1
Total Split (s)	20.0	38.3	46.0	60.0	60.0	25.0	25.0	25.0	25.0	25.0	45.1	45.1
Total Split (%)	13.0%	24.8%	29.8%	38.9%	38.9%	16.2%	16.2%	16.2%	16.2%	16.2%	29.2%	29.2%
Maximum Green (s)	15.0	32.0	41.0	53.7	53.7	20.0	19.9	19.9	20.0	40.0	40.0	40.0
Yellow Time (s)	3.0	4.3	3.0	4.3	3.0	3.1	3.1	3.0	3.1	3.0	3.1	3.1
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)	5.0	6.3	5.0	6.3	6.3	5.0	5.1	5.1	5.0	5.0	5.1	5.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	3.0	2.5	3.0	2.5	3.0	2.5	3.0	2.5	3.0	2.5	3.0
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	7.7	25.4	33.1	55.6	55.6	19.3	42.7	42.7	16.9	40.3	40.3	40.3
Actuated G/C Ratio	0.06	0.18	0.24	0.40	0.40	0.14	0.31	0.31	0.12	0.29	0.29	0.29
v/c Ratio	0.35	0.80	0.87	0.51	0.40	0.86	0.17	0.69	0.75	0.25	0.25	0.25

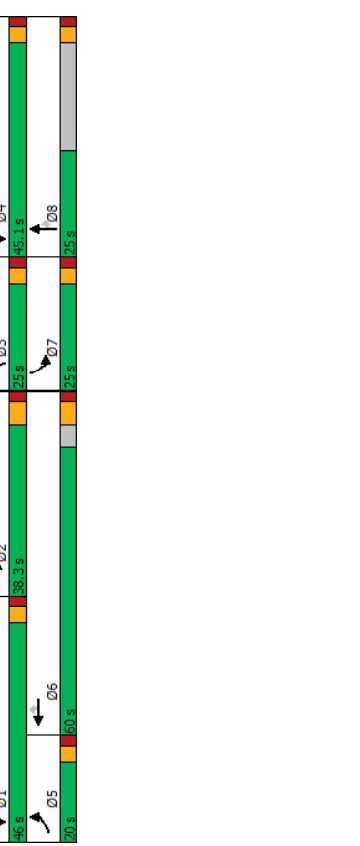
2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	76.7	62.2	63.9	34.0	6.7	90.4	40.5	40.5	12.6	72.4	36.4	36.4
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	76.7	62.2	63.9	34.0	6.7	90.4	40.5	40.5	12.6	72.4	36.4	36.4
LOS	E	E	E	C	A	F	D	D	B	E	D	D
Approach Delay	63.1	41.2	34.4									
Approach LOS	E	D	C									
Queue Length 50th (ft)	31	230	328	277	23	193	66	56	145	80	155	155
Queue Length 95th (ft)	72	312	422	351	94	#375	130	223	213	213	509	509
Internal Link Dist (ft)	195		400		200	150						
Turn Bay Length (ft)	193	815	1025	1520	841	257	575	828	500	522		
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
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	0.18	0.64	0.70	0.48	0.38	0.82	0.17	0.69	0.63	0.25	0.25	0.25

Intersection Summary  
Area Type: Other  
Cycle Length: 154.4  
Actuated Cycle Length: 139.7  
Natural Cycle: 135  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.87  
Intersection Signal Delay: 45.4  
Intersection LOS: D  
ICU Level of Service F  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.



2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

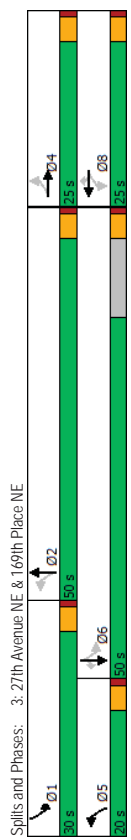
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	31	10	5	2	2	9	4	272	8	222	303	41
Traffic Volume (vph)	31	10	5	2	2	9	4	272	8	222	303	41
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	0	0	0	75	0	200	0	0	0	0	0	135
Storage Length (ft)	0	0	0	1	1	1	1	1	0	0	1	1
Taper Length (ft)	25	0	0	25	0	25	0	25	0	25	0	0
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	1.00	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.96
Frt	0.986	0.986	0.986	0.985	0.985	0.985	0.985	0.985	0.985	0.985	0.985	0.850
Flt Protected	0	0	0	0	0	0	0	0	0	0	0	0
Satd. Flow (prot)	0	1788	0	0	1864	1599	1787	1872	0	1787	1881	1599
Flt Permitted	0	0.809	0	0	0.961	0.569	0.569	0.569	0	0.519	0.519	0.537
Satd. Flow (perm)	0	1496	0	0	1805	1599	1057	1872	0	970	1881	1537
Right Turn on Red	0	0	0	0	0	0	0	0	0	0	0	0
Satd. Flow (RTOR)	5	0	0	0	0	167	0	0	0	0	0	52
Link Speed (mph)	30	30	30	30	30	30	30	30	30	30	30	30
Link Distance (ft)	967	967	967	413	413	413	413	413	413	413	413	730
Travel Time (s)	22.0	22.0	22.0	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	16.6
Confl. Peds. (#/hr)	0	0	0	3	3	3	3	3	3	3	3	8
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 (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	32	10	5	2	2	9	4	283	8	231	316	43
Shared Lane Traffic (%)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	47	0	0	11	167	4	291	0	231	316	43
Turn Type	Perm	NA	Perm	NA	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	Perm
Protected Phases	4	4	4	8	8	8	2	2	2	1	6	6
Permitted Phases	4	4	4	8	8	8	5	5	5	1	6	6
Detector Phase	4	4	4	8	8	8	5	5	5	1	6	6
Switch Phase	7.0	7.0	7.0	7.0	7.0	7.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Initial (s)	22.5	22.5	22.5	26.0	26.0	26.0	9.5	22.5	9.5	26.0	26.0	26.0
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	20.0	50.0	30.0	50.0	50.0	50.0
Total Split (s)	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	19.0%	47.6%	28.6%	47.6%	47.6%	47.6%
Total Split (%)	21.0	21.0	21.0	21.0	21.0	21.0	16.0	46.0	26.0	46.0	46.0	46.0
Maximum Green (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Yellow Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
All-Red Time (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
Lost Time Adjust (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	3.0	3.0	3.0	3.0	3.0
Lead/Lag	None	None	None	None	None	None	None	None	None	None	None	None
Lead-Lag Optimize?	2.5	2.5	2.5	2.5	2.5	2.5	2.0	3.0	3.0	3.0	3.0	3.0
Vehicle Extension (s)	None	None	None	None	None	None	None	None	None	None	None	None
Recall Mode	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Walk Time (s)	3	3	3	3	3	3	3	3	3	3	3	3
Flash Don't Walk (s)	9.8	9.8	9.8	9.8	9.8	9.8	51.5	46.4	58.9	57.4	57.4	57.4
Pedestrian Calls (#/hr)	0.13	0.13	0.13	0.13	0.13	0.13	0.67	0.60	0.77	0.75	0.75	0.75
Act Effct Green (s)	0.24	0.24	0.24	0.24	0.24	0.24	0.01	0.26	0.28	0.22	0.22	0.24
Actuated G/C Ratio	0.13	0.13	0.13	0.13	0.13	0.13	0.05	0.26	0.28	0.22	0.22	0.24
v/c Ratio	0.24	0.24	0.24	0.24	0.24	0.24	0.01	0.26	0.28	0.22	0.22	0.24

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	30.4	10.1	5.0	2.0	2.0	9.0	4.0	9.2	4.0	4.9	4.9	1.8
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	30.4	10.1	5.0	2.0	2.0	9.0	4.0	9.2	4.0	4.9	4.9	1.8
LOS	C	B	B	C	C	B	A	A	A	A	A	A
Approach Delay	30.4	11.2	5.0	2.0	2.0	9.0	4.0	9.1	4.0	4.3	4.3	1.8
Approach LOS	C	B	B	C	C	B	A	A	A	A	A	A
Queue Length 50th (ft)	18	5	0	0	0	0	0	49	17	24	24	0
Queue Length 95th (ft)	48	19	4	4	4	4	4	151	72	135	135	11
Internal Link Dist (ft)	887	333	333	333	333	333	333	645	645	650	650	135
Turn Bay Length (ft)	420	502	565	963	1134	1134	1134	1024	1416	1170	1170	1170
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
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	0.11	0.02	0.30	0.00	0.26	0.26	0.26	0.23	0.22	0.22	0.22	0.04

Intersection Summary  
Area Type: Other  
Cycle Length: 105  
Actuated Cycle Length: 76.7  
Natural Cycle: 65  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.48  
Intersection Signal Delay: 7.8  
Intersection Capacity Utilization: 46.7%  
Analysis Period (min): 15  
Intersection LOS: A  
ICU Level of Service: A



Splits and Phases: 3: 27th Avenue NE & 169th Place NE  
2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
4: I-5 Southbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	852	469	0	1350	553	0	0	0	259	1	317
Future Volume (vph)	0	852	469	0	1350	553	0	0	0	259	1	317
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200	0	0	0	0	0	0	0	350	0	435
Storage Lanes	0	1	0	0	1	0	0	0	0	1	0	1
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		0.98	0.850		0.950	0.850				0.950	0.850	0.99
Frt		0.850	0.850		0.850	0.850				0.850	0.850	0.850
Flt Protected												
Satd. Flow (prot)	0	3539	1583	0	3539	1583	0	0	0	0.950	0.953	1583
Satd. Flow (perm)	0	3539	1552	0	3539	1523	0	0	0	0.950	0.953	1583
Right Turn on Red		Yes	Yes		Yes	Yes			Yes			Yes
Satd. Flow (RTOR)		489	489		576	576			576			79
Link Speed (mph)		30			30			30				30
Link Distance (ft)		609			940			979				1126
Travel Time (s)		13.8			21.4			22.3				25.6
Confl. Peds. (#/hr)	8		4	4		8	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
Adj. Flow (vph)	0	888	489	0	1406	576	0	0	0	270	1	330
Shared Lane Traffic (%)										50%		
Lane Group Flow (vph)	0	888	489	0	1406	576	0	0	0	135	136	330
Turn Type		NA	Perm		NA	Perm		NA	Perm	Perm	NA	Perm
Protected Phases		2			6			6		4		4
Permitted Phases		2	2		6	6		6		4	4	4
Detector Phase												
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0
Vehicle Extension (s)	None	None	None	None	None	None	None	None	None	4.5	4.5	4.5
Recall Mode	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Walk Time (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	21.0	21.0	21.0
Flash Don't Walk (s)	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	77.2	77.2	77.2	76.9	76.9	76.9	76.9	76.9	76.9	28.7	28.7	28.7
Actuated g/C Ratio	0.66	0.66	0.66	0.65	0.65	0.65	0.65	0.65	0.65	0.24	0.24	0.24
v/c Ratio	0.38	0.41	0.38	0.61	0.48	0.48	0.33	0.33	0.33	0.33	0.33	0.75
Control Delay	9.3	1.6	9.3	12.5	1.9	1.9	43.9	44.0	45.8	0.0	0.0	0.0

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
4: I-5 Southbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.3	1.9	12.5	1.9	12.5	1.9	43.9	44.0	45.8	0.0	0.0	0.0
LOS	A	A	A	B	B	A	D	D	D	D	D	D
Approach Delay	6.7	9.4	9.4	9.4	9.4	9.4	45.0	45.0	45.0	0.0	0.0	0.0
Approach LOS	A	A	A	A	A	A	D	D	D	D	D	D
Queue Length 50th (ft)	145	0	289	0	289	0	96	97	195	0	0	0
Queue Length 95th (ft)	178	31	343	33	343	33	175	176	380	0	0	0
Internal Link Dist (ft)	529	200	860	860	860	860	1046	1046	1046	0	0	0
Turn Bay Length (ft)	2864	1349	2887	1340	2887	1340	440	440	440	0	0	0
Base Capacity (vph)	0	309	0	0	0	0	0	0	0	0	0	0
Stallion 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	0.31	0.47	0.49	0.43	0.49	0.43	0.33	0.33	0.33	0.33	0.33	0.75

Intersection Summary  
Area Type: Other  
Cycle Length: 130  
Actuated Cycle Length: 117.7  
Natural Cycle: 70  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.75  
Intersection Signal Delay: 13.9  
Intersection Capacity Utilization 70.6%  
Analysis Period (min) 15  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.



Splits and Phases: 4: I-5 Southbound Ramps & 172nd Street NE

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
5: I-5 Northbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	181	943	0	0	1286	322	581	2	738	0	0	0
Future Volume (vph)	181	943	0	0	1286	322	581	2	738	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	600	0	0	0	300	400	0	0	0	0	0	0
Storage Lanes	1	0	0	0	1	1	1	1	1	0	0	0
Taper Length (ft)	25	0	25	0	0	25	0	25	0	25	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				0.98	0.98	0.99	0.99	0.850			
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	1770	3539	0	0	5085	1583	1681	1686	1583	0	0	0
Flt Permitted	0.950						0.950	0.953				
Satd. Flow (perm)	1768	3539	0	0	5085	1553	1681	1686	1562	0	0	0
Right Turn on Red			Yes		Yes	Yes	Yes	Yes	Yes			Yes
Satd. Flow (RTOR)			332		332		387					
Link Speed (mph)	30				30		30		30			30
Link Distance (ft)	940				1086		1094		999			999
Travel Time (s)	21.4				24.7		24.9		22.7			22.7
Confl. Peds. (#/hr)	3		9	9	3		5	5	5			5
Confl. Bikes (#/hr)			1									
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
Adj. Flow (vph)	187	972	0	0	1326	332	599	2	761	0	0	0
Shared Lane Traffic (%)					50%		50%					
Lane Group Flow (vph)	187	972	0	0	1326	332	299	302	761	0	0	0
Turn Type	Prot	NA	NA	NA	Perm	Perm	Perm	NA	Free	NA	Free	Free
Permitted Phases	5	2			6		8	8				
Detector Phase	5	2			6		8	8				
Switch Phase												
Minimum Initial (s)	5.0	7.0			7.0		7.0	7.0				
Minimum Split (s)	10.6	24.1			23.8		40.8	40.8				
Total Split (s)	30.0	90.0			60.0		30.0	30.0				
Total Split (%)	25.0%	75.0%			50.0%		25.0%	25.0%				
Maximum Green (s)	24.4	83.9			54.2		24.2	24.2				
Yellow Time (s)	3.6	4.1			3.8		3.8	3.8				
All-Red Time (s)	2.0	2.0			2.0		2.0	2.0				
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0				
Total Lost Time (s)	5.6	6.1			5.8		5.8	5.8				
Lead/Lag					Lag		Lag	Lag				
Lead-Lag Optimize?	Yes				Yes		Yes	Yes				
Vehicle Extension (s)	3.0	4.0			4.0		4.5	4.5				
Recall Mode	None	None			None		Max	Max				
Walk Time (s)					7.0		7.0	7.0				
Flash Don't Walk (s)					8.0		8.0	28.0				
Pedestrian Calls (#/hr)					0		0	0				
Act Effct Green (s)	17.6	72.3			49.3		35.3	35.3				119.6
Actuated G/C Ratio	0.15	0.60			0.41		0.30	0.30				1.00
v/c Ratio	0.72	0.45			0.63		0.60	0.61				0.49

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
5: I-5 Northbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	65.5	13.4			29.7	4.0	44.5	44.6	1.1			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	65.5	13.4			29.7	4.0	44.5	44.6	1.1			
LOS	E	B			C	A	D	D	A			
Approach Delay		21.8			24.5		20.3					
Approach LOS		C			C		C					
Queue Length 50th (ft)	146	200			294	0	223	225	0			
Queue Length 95th (ft)	227	244			373	57	348	352	0			919
Internal Link Dist (ft)	600	860			1006		400	1014				
Turn Bay Length (ft)	364	2506			2326	890	496	498	1562			
Base Capacity (vph)	0	0			0	0	0	0	0			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.51	0.39			0.57	0.37	0.60	0.61	0.49			
Intersection Summary	Other											
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	119.6											
Natural Cycle:	90											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.72											
Intersection Signal Delay:	22.4											
Intersection Capacity Utilization:	78.4%											
Analysis Period (min):	15											

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]



2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]



Lanes, Volumes, Timings  
6: Smokey Point Boulevard & 156th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	22	7	228	11	7	29	198	690	9	13	691	44
Traffic Volume (vph)	22	7	228	11	7	29	198	690	9	13	691	44
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	150	150	200	200	200	250	250	250	0	200	0	0
Storage Length (ft)	1	1	1	1	1	0	0	0	0	0	0	0
Storage Lanes	25	1	1	25	1	25	1	25	0	25	0	0
Taper Length (ft)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Lane Util. Factor												
Ped Bike Factor												
Frt	0.950	0.850	0.850	0.950	0.878	0.950	0.998	0.991	0.950	0.950	0.991	0.950
Flt Protected	1770	1863	1583	1770	1635	0	1770	3531	0	1770	3502	0
Satd. Flow (prot)	0.651	0.753	0.753	0.651	0.651	0.224	0.381	0.381	0.381	0.381	0.381	0.381
Flt Permitted	1213	1863	1583	1403	1635	0	417	3531	0	709	3502	0
Satd. Flow (perm)												
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			233			30		1			7	
Link Speed (mph)			30			30		30			30	
Link Distance (ft)			1704			1283		4794			4794	
Travel Time (s)			38.7			29.2		30.8			109.0	
Confl. Peds. (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	22	7	233	11	7	30	202	704	9	13	705	45
Lane Group Flow (vph)	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	NA	pm+pt	NA	NA	NA
Turn Type	7	4	4	8	8	5	2	6	1	6	6	6
Protected Phases	4	4	4	3	8	2	2	2	2	2	2	2
Permitted Phases	7	4	4	8	8	5	2	6	1	6	6	6
Detector Phase	7	4	4	8	8	5	2	6	1	6	6	6
Switch Phase	7	4	4	8	8	5	2	6	1	6	6	6
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0	7.0	7.0	10.0	10.0
Minimum Split (s)	12.0	25.0	25.0	12.0	25.0	12.0	25.0	25.0	12.0	25.0	25.0	25.0
Vehicle Split (s)	25.0	20.0	20.0	25.0	10.0	20.0	50.0	50.0	20.0	50.0	50.0	50.0
Total Split (%)	21.7%	17.4%	17.4%	21.7%	8.7%	17.4%	43.5%	43.5%	17.4%	43.5%	43.5%	43.5%
Maximum Green (s)	20.0	15.0	15.0	20.0	5.0	15.0	45.0	45.0	15.0	45.0	45.0	45.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.5	2.0	2.0	3.5	2.0	3.5
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	10.8	9.8	9.8	10.0	7.8	37.0	35.3	28.0	28.0	35.3	20.5	20.5
Actuated g/C Ratio	0.18	0.17	0.17	0.17	0.13	0.62	0.60	0.47	0.47	0.35	0.35	0.35
v/c Ratio	0.08	0.02	0.51	0.04	0.15	0.39	0.34	0.03	0.03	0.62	0.62	0.62
Control Delay	22.3	27.0	9.2	22.0	16.8	7.9	8.3	6.8	6.8	19.2	19.2	19.2

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
6: Smokey Point Boulevard & 156th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	22.3	27.0	9.2	22.0	16.8	7.9	8.3	6.8	6.8	19.2	19.2	19.2
LOS	C	C	A	C	B	A	A	A	A	A	A	B
Approach Delay	10.8	10.8	18.0	18.0	18.0	8.2	8.2	8.2	8.2	19.0	19.0	19.0
Approach LOS	B	B	A	B	B	A	A	A	A	A	A	B
Queue Length 50th (ft)	6	2	0	3	2	17	35	1	1	92	92	92
Queue Length 95th (ft)	26	15	63	16	31	74	174	9	9	221	221	221
Internal Link Dist (ft)	150	1624	150	200	1203	250	1276	200	200	4714	4714	4714
Turn Bay Length (ft)	652	517	608	654	466	628	2831	713	2809	713	2809	2809
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
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	0.03	0.01	0.38	0.02	0.08	0.32	0.25	0.02	0.02	0.27	0.27	0.27

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]



2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
7: Smokey Point Boulevard & 152nd Street NE

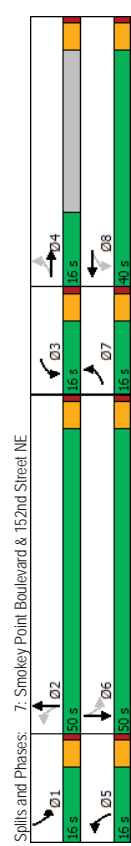
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	14	6	18	87	5	260	14	631	121	303	625	8
Traffic Volume (vph)	14	6	18	87	5	260	14	631	121	303	625	8
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	50	0	0	125	0	0	150	0	200	0	200	0
Storage Length (ft)	25	0	0	1	0	0	1	0	1	0	1	0
Taper Length (ft)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Lane Util. Factor	1.00	0.886	0.999	0.853	0.976	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Ped Bike Factor	0.950	1770	1650	0	1770	1568	0	1770	3440	0	1770	3531
Flt Protected	0.930	1731	1650	0	810	1568	0	746	3440	0	381	3531
Flt Permitted	1731	1650	0	810	1568	0	746	3440	0	381	3531	0
Said. Flow (perm)	19	30	271	21	30	21	30	21	30	21	30	21
Right Turn on Red	30	209	5141	1452	33.0	1452	33.0	1452	33.0	1452	33.0	1452
Said. Flow (RTOR)	4.8	116.8	116.8	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
Link Speed (mph)	1	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Link Distance (ft)	15	6	19	91	5	271	15	657	126	316	651	8
Travel Time (s)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Confl. Peds. (#/hr)	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Peak Hour Factor	7	4	8	8	8	8	8	8	8	8	8	8
Adj. Flow (vph)	15	25	0	91	276	0	15	783	0	316	659	0
Shared Lane Traffic (%)	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Lane Group Flow (vph)	7	4	8	8	8	8	8	8	8	8	8	8
Turn Type	4	4	4	4	4	4	4	4	4	4	4	4
Protected Phases	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Permitted Phases	9.5	27.0	11.5	26.0	9.5	24.0	9.5	24.0	9.5	26.0	9.5	26.0
Detector Phase	16.0	16.0	16.0	40.0	16.0	50.0	16.0	50.0	16.0	50.0	16.0	50.0
Switch Phase	13.1%	13.1%	13.1%	32.8%	13.1%	41.0%	13.1%	41.0%	13.1%	41.0%	13.1%	41.0%
Minimum Initial (s)	11.0	11.0	11.0	35.0	11.0	45.0	11.0	45.0	11.0	45.0	11.0	45.0
Minimum Split (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Split (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Lost Time (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
Lost Time Adjust (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Total Lost Time (s)	Lead/Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	None	None	None	None	None	None	None	None	None	None	None	None
Recall Mode	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Walk Time (s)	15.0	15.0	15.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Flash Don't Walk (s)	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Calls (#/hr)	7.5	5.6	10.8	9.2	19.9	36.7	35.0	36.7	35.0	36.7	35.0	36.7
Act Effct Green (s)	0.13	0.10	0.19	0.16	0.44	0.63	0.60	0.63	0.60	0.63	0.60	0.63
Actuated g/C Ratio	0.07	0.14	0.34	0.58	0.04	0.66	0.61	0.66	0.61	0.66	0.61	0.66
v/c Ratio	20.5	19.1	23.8	9.7	19.4	14.0	8.3	14.0	8.3	14.0	8.3	14.0
Control Delay												

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
7: Smokey Point Boulevard & 152nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	20.5	19.1	23.8	9.7	7.1	19.4	7.1	19.4	14.0	14.0	8.3	8.3
LOS	C	B	C	A	A	B	A	B	B	B	A	A
Approach Delay	19.6	13.2	13.2	13.2	13.2	13.2	13.2	13.2	19.1	19.1	10.2	10.2
Approach LOS	B	B	B	B	B	B	B	B	B	B	B	B
Queue Length 50th (ft)	4	2	27	1	1	96	1	96	29	29	32	32
Queue Length 95th (ft)	18	25	66	66	66	66	66	66	#177	#177	157	157
Internal Link Dist (ft)	50	129	5061	125	150	1372	125	1372	200	200	2846	2846
Turn Bay Length (ft)	419	1052	396	1093	608	2777	419	2777	517	517	2846	2846
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
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	0.04	0.02	0.23	0.25	0.02	0.28	0.02	0.28	0.61	0.61	0.23	0.23
Intersection Summary	Other											
Area Type:	Other											
Cycle Length:	122											
Actuated Cycle Length:	58											
Natural Cycle:	80											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.66											
Intersection Signal Delay:	14.1											
Intersection Capacity Utilization:	67.1%											
Analysis Period (min):	15											
# 95th percentile volume exceeds capacity, queue may be longer.	Queue shown is maximum after two cycles.											
Intersection LOS:	B											
ICU Level of Service:	C											



Splits and Phases: 7: Smokey Point Boulevard & 152nd Street NE

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
8: State Avenue/Smockey Point Boulevard & 136th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	140	198	70	139	171	130	92	457	187	135	427	192
Traffic Volume (vph)	140	198	70	139	171	130	92	457	187	135	427	192
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	150	150	200	0	300	0	300	0	300	0	300	0
Storage Length (ft)	1	1	1	0	1	0	1	0	1	0	1	0
Storage Lanes	25	25	25	0	25	0	25	0	25	0	25	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Ped Bike Factor	0.850	0.850	0.850	0.935	0.935	0.935	0.956	0.956	0.956	0.956	0.956	0.956
FIT Protected	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1752	1845	1568	1752	1725	0	1752	3351	0	1752	3315	0
FIT Permitted	0.281	0.483	0.483	0.337	0.337	0.337	0.337	0.238	0.238	0.238	0.238	0.238
Satd. Flow (perm)	518	1845	1547	890	1725	0	622	3351	0	476	3315	0
Right Turn on Red			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)			143	32	30	44	44	49	49	49	49	49
Link Speed (mph)	30	30	30	30	30	30	30	30	30	30	30	30
Link Distance (ft)	981	981	981	4740	4740	2821	2821	4424	4424	4424	4424	4424
Travel Time (s)	22.3	22.3	22.3	107.7	107.7	64.1	64.1	100.5	100.5	100.5	100.5	100.5
Confl. Peds. (#/hr)	1	1	1	1	1	1	1	1	1	1	1	1
Confl. Bikes (#/hr)	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Peak Hour Factor	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Heavy Vehicles (%)	147	208	74	146	180	137	97	481	197	142	449	202
Adj. Flow (vph)	147	208	74	146	180	137	97	481	197	142	449	202
Shared Lane Traffic (%)												
Lane Group Flow (vph)	147	208	74	146	317	0	97	678	0	142	651	0
Turn Type	pm+pt	MA	Perm	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	MA	NA
Protected Phases	7	4	4	3	8	5	2	2	1	6	1	6
Permitted Phases	4	4	4	8	8	2	2	6	6	6	6	6
Detector Phase	7	4	4	3	8	5	2	2	1	6	1	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	7.0	5.0	5.0	7.0	5.0	5.0	7.0	5.0
Minimum Split (s)	10.0	34.0	34.0	10.0	23.0	10.0	35.0	10.0	35.0	10.0	23.0	10.0
Total Split (s)	15.0	35.0	35.0	30.0	40.0	35.0	35.0	26.9%	26.9%	30.0	23.1%	23.1%
Total Split (%)	11.5%	26.9%	26.9%	23.1%	30.8%	26.9%	26.9%	23.1%	23.1%	23.1%	23.1%	23.1%
Maximum Green (s)	10.0	30.0	30.0	25.0	35.0	30.0	30.0	25.0	25.0	25.0	25.0	25.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (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
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Don't Walk (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effr Green (s)	28.0	18.9	18.9	28.6	19.2	37.9	30.4	41.7	34.1	41.7	34.1	34.1
Actuated g/C Ratio	0.32	0.22	0.22	0.33	0.22	0.43	0.35	0.47	0.39	0.47	0.39	0.39

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
8: State Avenue/Smockey Point Boulevard & 136th Street NE

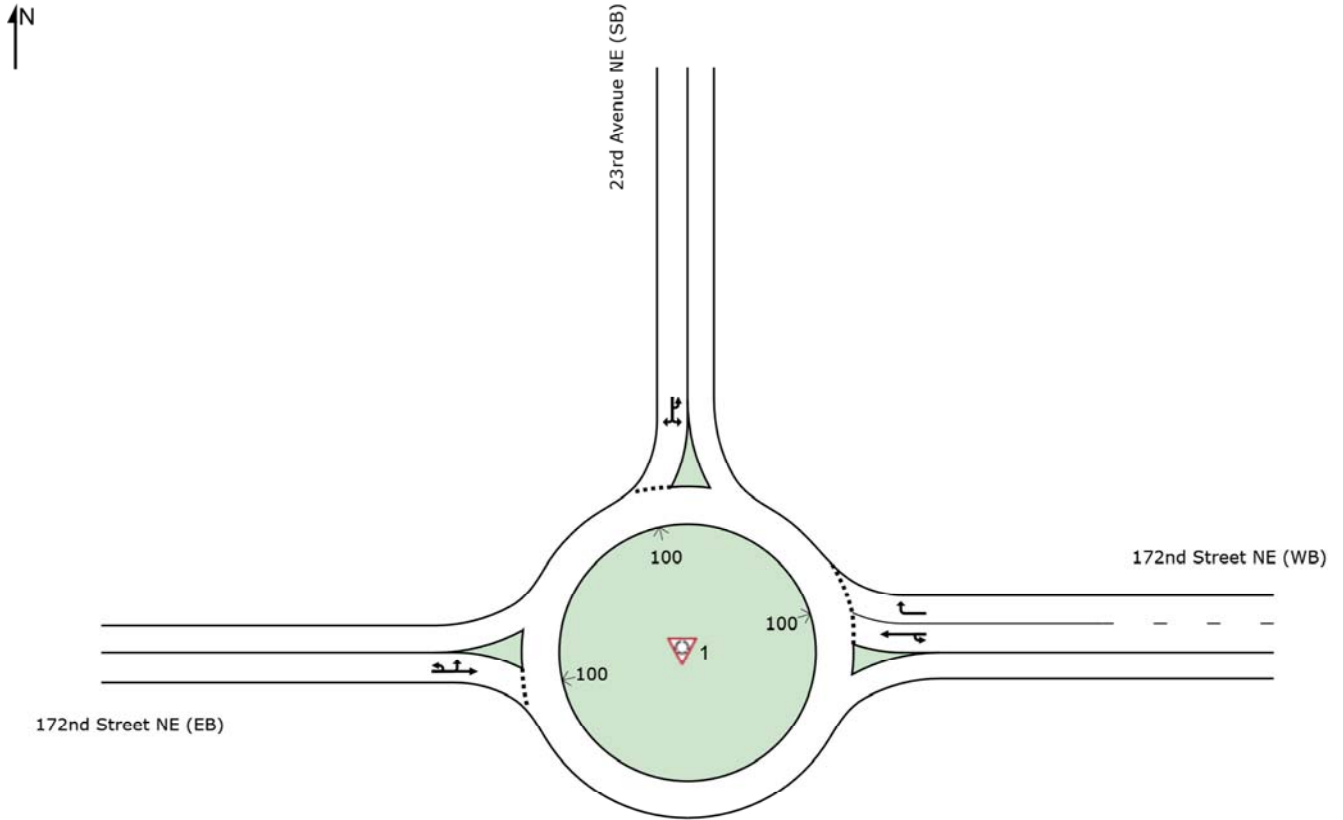
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
v/c Ratio	0.50	0.53	0.17	0.38	0.79	0.38	0.27	0.57	0.40	0.40	0.49	0.49	
Control Delay	24.9	36.2	0.8	21.4	43.8	21.4	15.4	25.7	16.9	16.9	22.7	22.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.9	36.2	0.8	21.4	43.8	21.4	15.4	25.7	16.9	16.9	22.7	22.7	
LOS	C	D	A	C	D	B	C	C	B	C	C	C	
Approach Delay	26.2	26.2	26.2	36.8	36.8	24.4	24.4	24.4	24.4	24.4	21.7	21.7	
Approach LOS	C	C	C	D	D	C	C	C	C	C	C	C	
Queue Length 50th (ft)	53	101	0	53	151	27	149	149	41	41	136	136	
Queue Length 95th (ft)	100	185	0	100	255	64	255	255	89	89	233	233	
Internal Link Dist (ft)	901	901	901	4660	4660	2741	2741	2741	4344	4344	4344	4344	
Turn Bay Length (ft)	150	150	150	200	200	300	300	300	300	300	300	300	
Base Capacity (vph)	313	637	628	590	910	704	1187	1187	608	608	1318	1318	
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	0.47	0.33	0.12	0.25	0.35	0.14	0.57	0.57	0.23	0.23	0.49	0.49	
Intersection Summary													
Area Type:	Other												
Cycle Length:	130												
Actuated Cycle Length:	87.8												
Natural Cycle:	90												
Control Type:	Actuated-Uncoordinated												
Maximum v/c Ratio:	0.79												
Intersection Signal Delay:	26.2												
Intersection Capacity Utilization:	67.5%												
Analysis Period (min):	15												
Spills and Phases:	8: State Avenue/Smockey Point Boulevard & 136th Street NE												
Ø1	30 s	Ø2	35 s	Ø3	30 s	Ø4	35 s	Ø5	35 s	Ø6	30 s	Ø7	40 s
Ø8	15 s	Ø9	15 s	Ø10	15 s	Ø11	15 s	Ø12	15 s	Ø13	15 s	Ø14	15 s

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

# SITE LAYOUT

## Site: 1 [2024 Baseline Conditions - Weekday PM]

172nd Street NE at 23rd Avenue NE  
Site Category: PM Peak-Hour  
Roundabout



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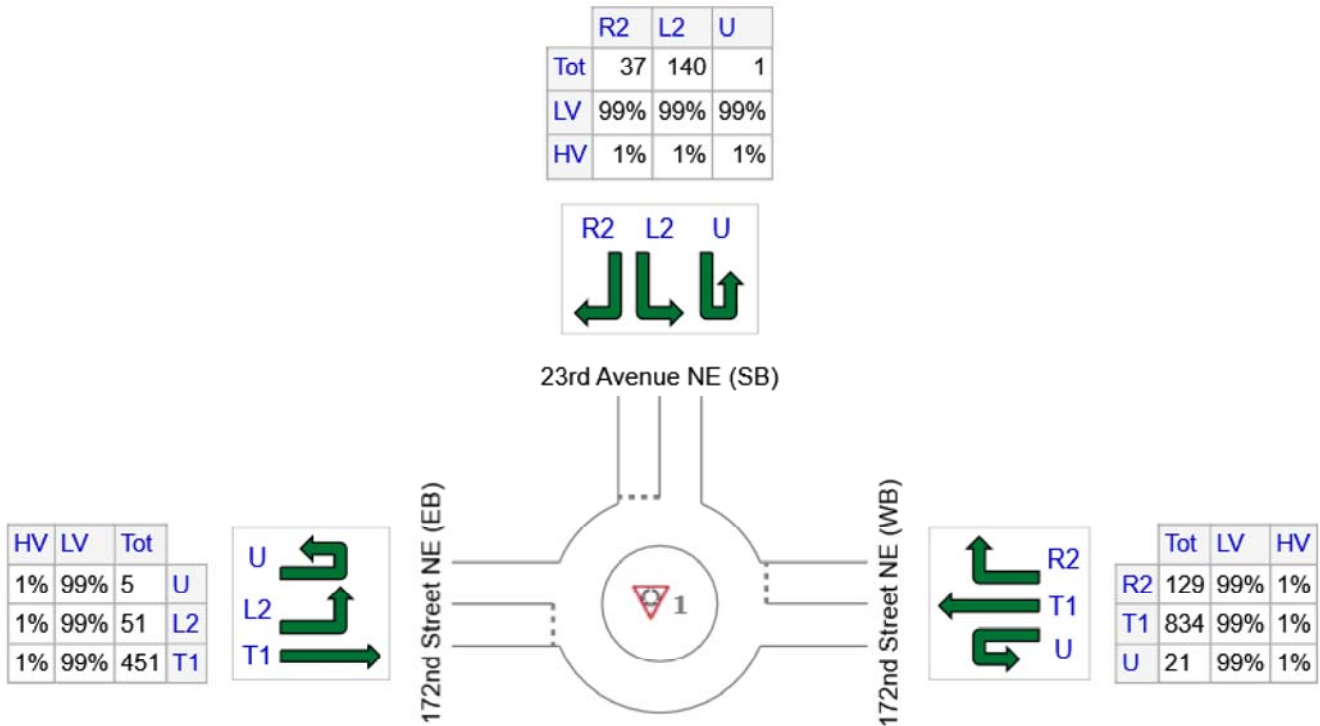
# INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

 Site: 1 [2024 Baseline Conditions - Weekday PM]

172nd Street NE at 23rd Avenue NE  
 Site Category: PM Peak-Hour  
 Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
E: 172nd Street NE (WB)	984	974	10
N: 23rd Avenue NE (SB)	178	176	2
W: 172nd Street NE (EB)	507	502	5
Total	1669	1652	17

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# MOVEMENT SUMMARY

 **Site: 1 [2024 Baseline Conditions - Weekday PM]**

172nd Street NE at 23rd Avenue NE  
 Site Category: PM Peak-Hour  
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: 172nd Street NE (WB)												
1u	U	23	1.0	0.562	12.5	LOS B	5.2	131.6	0.31	0.40	0.31	38.0
6	T1	897	1.0	0.562	4.2	LOS A	5.2	131.6	0.31	0.40	0.31	37.0
16	R2	139	1.0	0.121	4.4	LOS A	0.6	15.8	0.22	0.46	0.22	36.2
Approach		1058	1.0	0.562	4.4	LOS A	5.2	131.6	0.30	0.41	0.30	36.9
North: 23rd Avenue NE (SB)												
7u	U	1	1.0	0.268	18.2	LOS B	1.8	45.3	0.82	0.87	0.82	33.3
7	L2	151	1.0	0.268	15.8	LOS B	1.8	45.3	0.82	0.87	0.82	32.6
14	R2	40	1.0	0.268	9.9	LOS A	1.8	45.3	0.82	0.87	0.82	31.6
Approach		191	1.0	0.268	14.6	LOS B	1.8	45.3	0.82	0.87	0.82	32.4
West: 172nd Street NE (EB)												
5u	U	5	1.0	0.434	13.1	LOS B	3.1	79.0	0.47	0.50	0.47	37.2
5	L2	55	1.0	0.434	10.7	LOS B	3.1	79.0	0.47	0.50	0.47	36.3
2	T1	485	1.0	0.434	4.7	LOS A	3.1	79.0	0.47	0.50	0.47	36.2
Approach		545	1.0	0.434	5.4	LOS A	3.1	79.0	0.47	0.50	0.47	36.2
All Vehicles		1795	1.0	0.562	5.8	LOS A	5.2	131.6	0.40	0.48	0.40	36.1

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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Organisation: GIBSON TRAFFIC CONSULTANTS | Processed: Tuesday, August 17, 2021 2:51:58 PM

Project: H:\2021\21-190\Sidra#1 - 172nd St NE at 23rd Ave NE.sip8

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	35	401	137	742	756	331	220	101	592	326	84	54
Traffic Volume (vph)	35	401	137	742	756	331	220	101	592	326	84	54
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	195	375	400	200	150	200	150	200	175	175	175	175
Storage Length (ft)	1	2	1	1	1	1	1	1	1	1	1	1
Storage Lanes	25	25	25	25	25	25	25	25	25	25	25	25
Taper Length (ft)	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Lane Util. Factor		0.962				0.850		0.850		0.950		0.99
Ped Bike Factor										0.941		0.941
Flt Protected	0.950			0.950		0.850		0.950		0.950		0.950
Satd. Flow (prot)	1787	3438	0	3467	3574	1599	1787	1881	1599	3467	1759	0
Flt Permitted	0.950			0.950		0.950		0.950		0.950		0
Satd. Flow (perm)	1787	3438	0	3467	3574	1599	1782	1881	1599	3467	1759	0
Right Turn on Red			Yes			Yes		Yes		Yes		Yes
Satd. Flow (RTOR)		28			279			479				20
Link Speed (mph)		30		30		30		30		30		30
Link Distance (ft)		1312		609		730		589		589		589
Travel Time (s)		29.8		13.8		16.6		13.4		13.4		13.4
Confl. Peds. (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	37	422	144	781	796	348	232	106	623	343	88	57
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	566	0	781	796	348	232	106	623	343	145	0
Turn Type	Prot	NA	Prot	NA	Perm	6	3	8	8	7	4	4
Protected Phases	5	2		1	6		3	8	8	7	4	4
Permitted Phases	5	2		1	6		3	8	8	7	4	4
Detector Phase	5	2		1	6		3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	3.0	7.0	3.0	7.0	7.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Split (s)	9.5	38.3	38.3	38.3	38.3	9.5	23.1	23.1	23.1	9.5	45.1	45.1
Total Split (s)	20.0	38.3	46.0	60.0	60.0	25.0	25.0	25.0	25.0	25.0	45.1	45.1
Total Split (%)	13.0%	24.8%	29.8%	38.9%	38.9%	16.2%	16.2%	16.2%	16.2%	16.2%	29.2%	29.2%
Maximum Green (s)	15.0	32.0	41.0	53.7	53.7	20.0	19.9	19.9	19.9	20.0	40.0	40.0
Yellow Time (s)	3.0	4.3	3.0	4.3	4.3	3.0	3.1	3.1	3.1	3.0	3.1	3.1
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)	5.0	6.3	5.0	6.3	6.3	5.0	5.1	5.1	5.1	5.0	5.1	5.1
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	3.0	2.5	3.0	3.0	2.5	3.0	3.0	3.0	2.5	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	8.0	27.7	36.3	58.3	58.3	20.1	42.3	42.3	42.3	18.0	40.2	40.2
Actuated G/C Ratio	0.05	0.19	0.25	0.40	0.40	0.14	0.29	0.29	0.29	0.12	0.28	0.28
v/c Ratio	0.38	0.84	0.91	0.56	0.43	0.94	0.19	0.77	0.77	0.80	0.80	0.80

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	79.7	66.1	68.3	36.0	8.5	106.7	43.2	19.2	71.9	39.3	39.3	39.3
Queue Delay	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.7	66.1	68.3	36.6	8.5	106.7	43.2	19.2	71.9	39.3	39.3	39.3
LOS	E	E	E	D	A	F	D	B	E	D	D	D
Approach Delay		67.0		44.4		43.0			66.4			
Approach LOS		E		D		D			E			
Queue Length 50th (ft)	36	267	378	312	42	229	80	136	168	97	168	97
Queue Length 95th (ft)	77	345	469	391	124	#423	140	327	231	168	168	168
Internal Link Dist (ft)		1232		529		650			509			
Turn Bay Length (ft)	195		400		200	150			175			
Base Capacity (vph)	184	779	979	1481	826	246	546	804	478	499	499	499
Starvation Cap Reductn	0	0	0	328	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	0.20	0.73	0.80	0.69	0.42	0.94	0.19	0.77	0.72	0.72	0.72	0.29

Intersection Summary

Area Type:	Other
Cycle Length:	154.4
Actuated Cycle Length:	145.8
Natural Cycle:	145
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.94
Intersection Signal Delay:	50.2
Intersection Capacity Utilization:	100.0%
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer:	0
Queue shown is maximum after two cycles:	0



2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

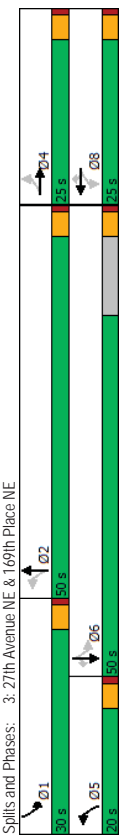
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	34	11	11	2	10	175	4	297	9	243	331	45
Traffic Volume (vph)	34	11	11	2	10	175	4	297	9	243	331	45
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	0	0	0	75	0	0	200	0	0	0	0	135
Storage Length (ft)	0	0	0	1	1	1	1	1	0	0	0	1
Taper Length (ft)	25	0	0	25	0	0	25	0	0	0	0	1
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	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99	1.00	1.00	0.96
Frt	0.987			0.850			0.996		0.850			0.850
Flt Protected	0	1790	0	0.992	0.950	0.950	1.787	1872	0	1787	1881	1599
Satd. Flow (prot)	0	1790	0	0	1866	1599	0.554	0.499	0	0.499	0.499	0.499
Flt Permitted	0	0.803	0	0.963	0.554	0.499	1030	1872	0	933	1881	1537
Satd. Flow (perm)	0	1487	0	0	1809	1599	Yes	Yes	Yes	Yes	Yes	Yes
Right Turn on Red	0	0	0	0	0	0	0	0	0	0	0	0
Satd. Flow (RTOR)	5			182			2					52
Link Speed (mph)	30			30			30					30
Link Distance (ft)	967			413			725					730
Travel Time (s)	22.0			9.4			16.5					16.6
Confl. Peds. (#/hr)	0			3			8					5
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 (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	35	11	11	2	10	175	4	297	9	243	331	47
Shared Lane Traffic (%)	0			0			0					0
Lane Group Flow (vph)	0	51	0	0	12	182	4	318	0	253	345	47
Turn Type	Perm	NA	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	Perm
Protected Phases	4			8			5		2		1	6
Permitted Phases	4			8			8		2		6	6
Detector Phase	4			8			8		2		1	6
Switch Phase	4			8			8		2		1	6
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	22.5	22.5	26.0	26.0	26.0	26.0	9.5	22.5	9.5	26.0	26.0	26.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	20.0	50.0	30.0	50.0	50.0	50.0
Total Split (%)	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	19.0%	47.6%	28.6%	47.6%	47.6%	47.6%
Maximum Green (s)	21.0	21.0	21.0	21.0	21.0	21.0	16.0	46.0	26.0	46.0	46.0	46.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lead			Lag		Lag		Lag	Lag
Lead-Lag Optimize?				Yes			Yes		Yes		Yes	Yes
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	8.0	8.0	8.0	15.0	15.0	15.0	10.0	10.0	15.0	15.0	15.0	15.0
Pedestrian Calls (#/hr)	3	3	3	3	3	3	3	3	3	3	3	13
Act Effct Green (s)	9.8	9.8	9.8	9.8	9.8	9.8	51.5	46.4	59.2	57.7	57.7	57.7
Actuated G/C Ratio	0.13	0.13	0.13	0.13	0.13	0.13	0.67	0.60	0.77	0.75	0.75	0.75
v/c Ratio	0.26	0.26	0.26	0.05	0.50	0.01	0.28		0.31	0.25	0.24	0.04

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	31.2			29.3			10.1	4.2	9.6	4.2	5.0	2.0
Queue Delay	0.0			0.0			0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.2			29.3			10.1	4.2	9.6	4.2	5.0	2.0
LOS	C			C			B	A	A	A	A	A
Approach Delay	31.2			11.3			11.3		9.5		4.5	
Approach LOS	C			B			A		A		A	
Queue Length 50th (ft)	20			5			0	0	56	19	27	0
Queue Length 95th (ft)	52			20			52	4	169	79	149	13
Internal Link Dist (ft)	887			333			200		645		650	
Turn Bay Length (ft)							200		1127		1414	1169
Base Capacity (vph)	415			501			574	946	1127	1007	1414	1169
Starvation Cap Reductn	0			0			0	0	0	0	0	0
Spillback Cap Reductn	0			0			0	0	0	0	0	0
Storage Cap Reductn	0			0			0	0	0	0	0	0
Reduced v/c Ratio	0.12			0.02			0.32	0.00	0.28	0.25	0.24	0.04

Intersection Summary  
Area Type: Other  
Cycle Length: 105  
Actuated Cycle Length: 77.1  
Natural Cycle: 65  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.50  
Intersection Signal Delay: 8.0  
Intersection Capacity Utilization: 49.4%  
Analysis Period (min): 15  
Intersection LOS: A  
ICU Level of Service A



2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]



Lanes, Volumes, Timings  
4: I-5 Southbound Ramps & 172nd Street NE

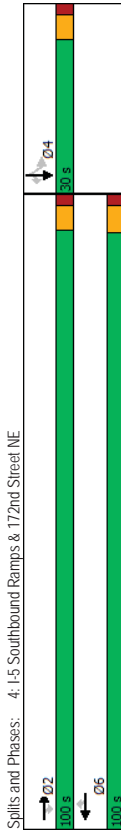
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	931	512	0	1475	604	0	0	0	283	1	346
Future Volume (vph)	0	931	512	0	1475	604	0	0	0	283	1	346
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200	0	0	0	0	0	0	0	350	0	435
Storage Lanes	0	1	0	0	1	0	0	0	0	1	0	1
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		0.98	0.98		0.96	0.96				0.99	0.99	0.99
Frt		0.850	0.850		0.850	0.850				0.850	0.850	0.850
Flt Protected												
Satd. Flow (prot)	0	3539	1583	0	3539	1583	0	0	0	0.950	0.953	1583
Flt Permitted												
Satd. Flow (perm)	0	3539	1552	0	3539	1523	0	0	0	1.681	1.686	1562
Right Turn on Red			Yes		Yes	Yes			Yes			Yes
Satd. Flow (RTOR)			533		629	629						62
Link Speed (mph)		30			30			30				30
Link Distance (ft)		609			940			979				1126
Travel Time (s)		13.8			21.4			22.3				25.6
Confl. Peds. (#/hr)	8	0	4	4	8	1	1	8	0	0	0	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
Adj. Flow (vph)	0	970	533	0	1536	629	0	0	0	295	1	360
Shared Lane Traffic (%)										50%		
Lane Group Flow (vph)	0	970	533	0	1536	629	0	0	0	147	149	360
Turn Type		NA	Perm		NA	Perm		NA	Perm	Perm	NA	Perm
Protected Phases		2			6			6		4		4
Permitted Phases		2	2		6	6		6		4	4	4
Detector Phase												
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0
Vehicle Extension (s)	None	None	None	None	None	None	None	None	None	4.5	4.5	4.5
Recall Mode	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Walk Time (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	21.0	21.0	21.0
Flash Don't Walk (s)	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Calls (#/hr)	85.4	85.4	85.4	85.1	85.1	85.1	85.1	85.1	85.1	28.3	28.3	28.3
Act Effct Green (s)	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.23	0.23	0.23
Actuated g/C Ratio	0.40	0.43	0.43	0.64	0.64	0.51	0.64	0.51	0.64	0.39	0.39	0.90
v/c Ratio	9.1	1.7	1.7	12.6	12.6	2.0	12.6	2.0	12.6	47.7	47.7	66.8
Control Delay												

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
4: I-5 Southbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.3	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	2.1	2.1	12.6	2.0	2.0	47.6	47.7	47.7	66.8	66.8	66.8
LOS	A	A	A	B	A	A	D	D	D	D	D	E
Approach Delay	6.8			9.5			58.1					
Approach LOS	A			A			E					
Queue Length 50th (ft)	164	0	0	335	0	0	117	118	118	265	265	265
Queue Length 95th (ft)	199	32	32	397	33	33	189	192	192	446	446	446
Internal Link Dist (ft)	529			860			899			1046		1046
Turn Bay Length (ft)	2687	1306	1306	2679	1305	1305	350	350	350	380	400	400
Base Capacity (vph)	962	328	328	0	0	0	0	0	0	0	0	0
Stallion 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	0.56	0.54	0.54	0.57	0.48	0.48	0.39	0.39	0.39	0.39	0.39	0.90
Intersection Summary	Other											
Area Type:	Other											
Cycle Length:	130											
Actuated Cycle Length:	125.5											
Natural Cycle:	75											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.90											
Intersection Signal Delay:	16.0											
Intersection LOS:	B											
Intersection Capacity Utilization:	74.0%											
Analysis Period (min):	15											
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												



2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
5: I-5 Northbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	198	1030	0	0	1405	352	635	4	806	0	0	0
Future Volume (vph)	198	1030	0	0	1405	352	635	2	806	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	600	0	0	0	300	400	0	0	0	0	0	0
Storage Lanes	1	0	0	0	1	1	1	1	1	0	0	0
Taper Length (ft)	25	0	25	0	0	25	0	0	25	0	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				0.98	0.98			0.99	0.850		
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	1770	3539	0	0	5085	1583	1681	1686	1583	0	0	0
Flt Permitted	0.950						0.950	0.953				
Satd. Flow (perm)	1768	3539	0	0	5085	1553	1681	1686	1562	0	0	0
Right Turn on Red			Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)			363		363				366			
Link Speed (mph)		30		30				30				30
Link Distance (ft)		940		1086				1094				999
Travel Time (s)		21.4		24.7				24.9				22.7
Confl. Peds. (#/hr)	3		9	9		3			5	5		
Confl. Bikes (#/hr)			1									
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
Adj. Flow (vph)	204	1062	0	0	1448	363	655	2	831	0	0	0
Shared Lane Traffic (%)							50%					
Lane Group Flow (vph)	204	1062	0	0	1448	363	327	330	831	0	0	0
Turn Type	Prot	NA	NA	NA	Perm	Perm	Perm	NA	Free	Free	Free	Free
Permitted Phases	5	2		6		6	8	8				
Detector Phase	5	2		6	6	6	8	8				
Switch Phase												
Minimum Initial (s)	5.0	7.0		7.0	7.0	7.0	7.0	7.0				
Minimum Split (s)	10.6	24.1		23.8	23.8	40.8	40.8	40.8				
Total Split (s)	30.0	90.0		60.0	60.0	30.0	30.0	30.0				
Total Split (%)	25.0%	75.0%		50.0%	50.0%	25.0%	25.0%	25.0%				
Maximum Green (s)	24.4	83.9		54.2	54.2	24.2	24.2	24.2				
Yellow Time (s)	3.6	4.1		3.8	3.8	3.8	3.8	3.8				
All-Red Time (s)	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				
Total Lost Time (s)	5.6	6.1		5.8	5.8	5.8	5.8	5.8				
Lead/Lag				Lag	Lag	Lag	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	4.0		4.0	4.0	4.5	4.5	4.5				
Recall Mode	None	None		None	None	Max	Max	Max				
Walk Time (s)				7.0	7.0	7.0	7.0	7.0				
Flash Don't Walk (s)				8.0	8.0	28.0	28.0	28.0				
Pedestrian Calls (#/hr)				0	0	0	0	0				
Act Effct Green (s)	18.8	76.1		52.0	52.0	35.2	35.2	35.2	123.3			
Actuated G/C Ratio	0.15	0.62		0.42	0.42	0.29	0.29	1.00				
v/c Ratio	0.76	0.49		0.67	0.67	0.42	0.42	0.68	0.69	0.53		

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

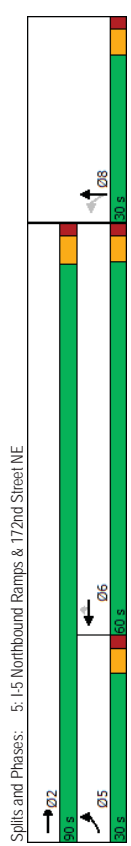
PM Peak-Hour

Lanes, Volumes, Timings  
5: I-5 Northbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	68.6	13.6		31.0	31.0	4.0	49.1	49.2	1.3			
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay	68.6	13.6		31.0	31.0	4.0	49.1	49.2	1.3			
LOS	E	B		C	C	A	D	D	A			
Approach Delay		22.4		25.6				22.4				
Approach LOS		C		C				C				
Queue Length 50th (ft)	161	227		338		0	252	254	0			
Queue Length 95th (ft)	246	274		419		59	385	388	0			
Internal Link Dist (ft)	600	860		1006		300	400	1014				919
Turn Bay Length (ft)	352	2421		2247		888	479	481	1562			
Base Capacity (vph)	0	0		0		0	0	0	0			
Starvation Cap Reductn	0	0		0		0	0	0	0			
Spillback Cap Reductn	0	0		0		0	0	0	0			
Storage Cap Reductn	0	0		0		0	0	0	0			
Reduced v/c Ratio	0.58	0.44		0.64		0.41	0.68	0.69	0.53			
Intersection Summary	Other											
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	123.3											
Natural Cycle:	90											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.76											
Intersection Signal Delay:	23.7											
Intersection Capacity Utilization:	81.6%											
Analysis Period (min):	15											

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour



Lanes, Volumes, Timings  
6: Smokey Point Boulevard & 156th Street NE

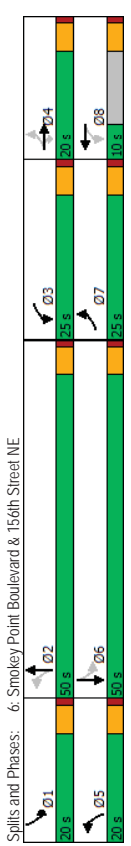
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	←	←	←	←	←	←	←	←	←	←	←	←
Traffic Volume (vph)	24	8	249	12	8	32	216	754	10	14	755	48
Future Volume (vph)	24	8	249	12	8	32	216	754	10	14	755	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	150	200	200	0	250	0	200	0	200	0	0
Storage Lanes	1	1	1	1	0	1	0	1	0	1	0	0
Taper Length (ft)	25	25	25	25	0	25	0	25	0	25	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	0.95
Ped Bike Factor							0.998			1.00	1.00	
Frt	0.950		0.850	0.950	0.879		0.950		0.950		0.991	
Flt Protected												
Satd. Flow (prot)	1770	1863	1583	1770	1637	0	1770	3531	0	1770	3502	0
Flt Permitted	0.643		0.752		0.201		0.201		0.357		0.357	
Satd. Flow (perm)	1198	1863	1583	1401	1637	0	374	3531	0	665	3502	0
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	Yes
Satd. Flow (RTOR)			254		33		1			7		
Link Speed (mph)			30		30		30		30		30	
Link Distance (ft)			1704		1283		1356		4794		4794	
Travel Time (s)			38.7		29.2		30.8		109.0		109.0	
Confl. Peds. (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	24	8	254	12	8	33	220	769	10	14	770	49
Lane Group Flow (vph)	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	NA	pm+pt	NA	pm+pt	NA
Turn Type	7	4	4	3	8	5	2	2	1	6	6	6
Protected Phases	7	4	4	3	8	5	2	2	1	6	6	6
Permitted Phases	7	4	4	3	8	5	2	2	1	6	6	6
Detector Phase												
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	12.0	25.0	25.0	12.0	25.0	12.0	25.0	12.0	25.0	12.0	25.0	12.0
Vehicle Split (s)	25.0	20.0	20.0	25.0	10.0	20.0	50.0	20.0	50.0	20.0	50.0	20.0
Total Split (%)	21.7%	17.4%	17.4%	21.7%	8.7%	17.4%	43.5%	17.4%	43.5%	17.4%	43.5%	17.4%
Maximum Green (s)	20.0	15.0	15.0	20.0	5.0	15.0	45.0	15.0	45.0	15.0	45.0	15.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.5	2.0	3.5	2.0	3.5	2.0
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	10.9	10.0	10.0	10.1	7.9	40.0	38.3	30.4	38.3	30.4	22.9	30.4
Actuated g/C Ratio	0.17	0.16	0.16	0.16	0.13	0.64	0.61	0.49	0.61	0.49	0.37	0.61
v/c Ratio	0.09	0.03	0.95	0.04	0.17	0.44	0.36	0.03	0.36	0.03	0.63	0.36
Control Delay	23.8	28.5	9.6	23.5	17.2	8.3	8.2	6.6	8.2	19.2	19.4	6.6

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
6: Smokey Point Boulevard & 156th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	23.8	28.5	9.6	23.5	17.2	8.3	8.2	6.6	8.2	19.2	19.4	6.6
LOS	C	C	A	C	B	A	A	A	A	A	A	B
Approach Delay		11.3		18.6								
Approach LOS		B		B								
Queue Length 50th (ft)	7	2	0	3	2	19	40	1	40	1	106	40
Queue Length 95th (ft)	30	17	67	18	33	83	195	10	247	10	474	247
Internal Link Dist (ft)	150	1624	150	200	1203	250	599	2724	691	2695	691	2695
Turn Bay Length (ft)	620	490	604	622	446	0	0	0	0	0	0	0
Stallion 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	0.04	0.02	0.42	0.02	0.09	0.37	0.29	0.02	0.30	0.02	0.30	0.02
Intersection Summary	Other											
Area Type:	Other											
Cycle Length:	115											
Actuated Cycle Length:	62.3											
Natural Cycle:	75											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.63											
Intersection Signal Delay:	13.1											
Intersection LOS:	B											
Intersection Capacity Utilization:	56.2%											
Analysis Period (min):	15											

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]



Lanes, Volumes, Timings  
7: Smokey Point Boulevard & 152nd Street NE

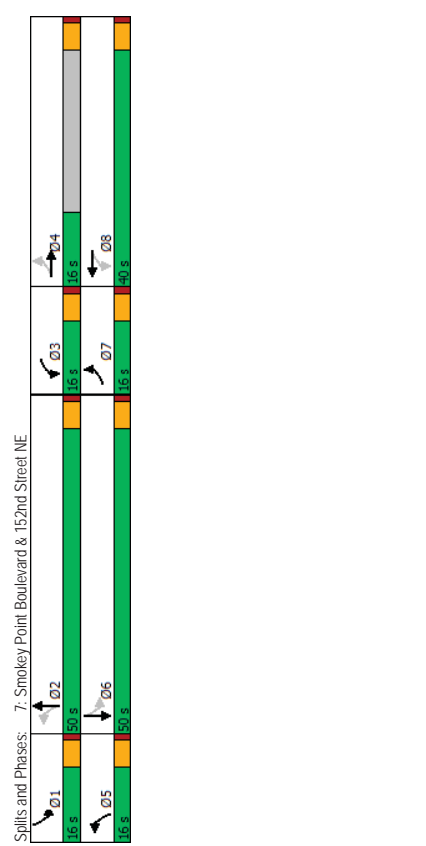
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	15	7	20	95	15	284	15	690	132	331	683	9
Traffic Volume (vph)	15	7	20	95	5	284	15	690	132	331	683	9
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	50	0	125	0	150	0	200	0	200	0	200	0
Storage Length (ft)	25	0	1	0	1	0	1	0	25	0	1	0
Taper Length (ft)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Lane Util. Factor	1.00	0.887	0.99	0.852	0.99	0.976	0.950	0.998	0.950	0.950	0.998	0.950
Ped Bike Factor	0.950	1770	1652	0	1770	1566	0	1770	3440	0	1770	3531
Flt Protected	0.909	1692	1652	0	794	1566	0	703	3440	0	341	3531
Satd. Flow (prot)	1	21	29	0	29	0	21	0	21	0	21	0
Flt Permitted	30	30	30	30	30	30	30	30	30	30	30	30
Satd. Flow (perm)	209	5141	116.8	116.8	116.8	116.8	116.8	116.8	116.8	116.8	116.8	116.8
Right Turn on Red	1	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Satd. Flow (RTOR)	16	7	21	99	5	296	16	719	138	345	711	9
Link Speed (mph)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Link Distance (ft)	16	28	0	99	301	0	16	857	0	345	720	0
Travel Time (s)	7	4	8	8	8	8	8	8	8	8	8	8
Confl. Peds. (#/hr)	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Peak Hour Factor	7	4	8	8	8	8	8	8	8	8	8	8
Adj. Flow (vph)	4	4	4	4	4	4	4	4	4	4	4	4
Shared Lane Traffic (%)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Group Flow (vph)	9.5	27.0	11.5	26.0	9.5	24.0	9.5	24.0	9.5	26.0	9.5	26.0
Protected Phases	16.0	16.0	16.0	40.0	16.0	50.0	16.0	50.0	16.0	50.0	16.0	50.0
Permitted Phases	13.1%	13.1%	13.1%	32.8%	13.1%	41.0%	13.1%	41.0%	13.1%	41.0%	13.1%	41.0%
Detector Phase	11.0	11.0	11.0	35.0	11.0	45.0	11.0	45.0	11.0	45.0	11.0	45.0
Switch Phase	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Initial (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Split (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
All-Red Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lost Time Adjust (s)	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Total Lost Time (s)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead/Lag Optimize?	None	None	None	None	None	None	None	None	None	None	None	None
Vehicle Extension (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Recall Mode	15.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Walk Time (s)	0	0	0	0	0	0	0	0	0	0	0	0
Flash Don't Walk (s)	7.6	5.7	9.6	6.6	27.5	21.9	38.8	37.2	38.8	37.2	38.8	37.2
Pedestrian Calls (#/hr)	0.13	0.09	0.19	0.16	0.45	0.36	0.64	0.61	0.64	0.61	0.64	0.61
Act Effct Green (s)	0.07	0.16	0.37	0.61	0.04	0.68	0.70	0.33	0.70	0.33	0.70	0.33
Actuated g/C Ratio	2.19	2.00	25.5	10.0	7.2	19.8	8.5	8.5	19.7	8.5	8.5	8.5
v/c Ratio	2.19	2.00	25.5	10.0	7.2	19.8	8.5	8.5	19.7	8.5	8.5	8.5
Control Delay												

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
7: Smokey Point Boulevard & 152nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	21.9	20.0	25.5	10.0	7.2	19.8	19.7	8.5	19.7	8.5	19.7	8.5
LOS	C	C	C	A	A	A	B	A	B	B	A	A
Approach Delay	20.7	13.8	13.8	13.8	13.8	13.8	19.5	12.1	19.5	12.1	19.5	12.1
Approach LOS	C	C	C	B	B	B	B	B	B	B	B	B
Queue Length 50th (ft)	5	2	31	2	1	110	35	37	110	35	110	37
Queue Length 95th (ft)	20	28	75	71	11	244	#243	178	244	#243	178	178
Internal Link Dist (ft)	50	129	5061	5061	5061	5061	1372	1276	5061	1372	1276	1276
Turn Bay Length (ft)	403	1017	383	1071	593	2691	492	2758	383	1071	492	2758
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
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	0.04	0.03	0.26	0.28	0.03	0.32	0.70	0.26	0.70	0.26	0.70	0.26
Intersection Summary	Other											
Area Type:	Other											
Cycle Length:	122											
Actuated Cycle Length:	60.6											
Natural Cycle:	90											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.70											
Intersection Signal Delay:	15.3											
Intersection Capacity Utilization:	72.1%											
Analysis Period (min):	15											
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												



2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
8: State Avenue/Smokey Point Boulevard & 136th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	153	216	76	152	187	142	101	499	204	148	467	210
Traffic Volume (vph)	153	216	76	152	187	142	101	499	204	148	467	210
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	150	190	190	150	200	0	300	0	300	0	300	0
Storage Length (ft)	1	1	1	1	1	0	1	0	1	0	1	0
Storage Lanes	25	1	1	25	1	0	25	1	25	0	25	1
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99	1.00		1.00			0.99	0.99		0.99	
Frt	0.950	0.850		0.950	0.935		0.950	0.956		0.950	0.954	
FRT Protected	1752	1845	1568	1752	1725	0	1752	3351	0	1752	3319	0
Satd. Flow (prot)	0.265	0.450	0.450	0.450	0.270	0	0.270	0.217	0	0.217	0.217	0
Satd. Flow (perm)	489	1845	1547	829	1725	0	498	3351	0	400	3319	0
Right Turn on Red			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)			143	32	30	44	30	49	30	49	30	49
Link Speed (mph)		30		30		30	30	30	30	30	30	30
Link Distance (ft)		981		4740		2821	4424	4424	4424	4424	4424	4424
Travel Time (s)		22.3		107.7		64.1	100.5	100.5	100.5	100.5	100.5	100.5
Confl. Peds. (#/hr)		1	1									
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	161	227	80	160	197	149	106	525	215	156	492	221
Shared Lane Traffic (%)												
Lane Group Flow (vph)	161	227	80	160	346	0	106	740	0	156	713	0
Turn Type	pm+pt	MA	Perm	pm+pt	NA	pm+pt	5	2	6	pm+pt	MA	NA
Protected Phases	7	4	4	3	8	2	2	6	1	6	6	6
Permitted Phases	4	4	4	4	8	2	2	6	6	6	6	6
Detector Phase	7	4	4	3	8	2	2	6	1	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	7.0	5.0	7.0	5.0	5.0	5.0	7.0	7.0
Minimum Split (s)	10.0	34.0	34.0	10.0	23.0	10.0	35.0	10.0	35.0	10.0	23.0	30.0
Total Split (s)	15.0	35.0	35.0	30.0	40.0	35.0	35.0	26.9%	26.9%	23.1%	23.1%	30.0
Total Split (%)	11.5%	26.9%	26.9%	23.1%	30.8%	26.9%	26.9%	23.1%	23.1%	23.1%	23.1%	23.1%
Maximum Green (s)	10.0	30.0	30.0	25.0	35.0	30.0	30.0	30.0	25.0	25.0	25.0	25.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (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
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Don't Walk (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effr Green (s)	30.0	20.7	20.7	31.3	21.3	38.4	30.4	41.6	32.0	41.6	32.0	32.0
Actuated g/C Ratio	0.33	0.23	0.23	0.34	0.23	0.42	0.33	0.46	0.35	0.46	0.35	0.35

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2024 Baseline Conditions  
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Lanes, Volumes, Timings  
8: State Avenue/Smokey Point Boulevard & 136th Street NE

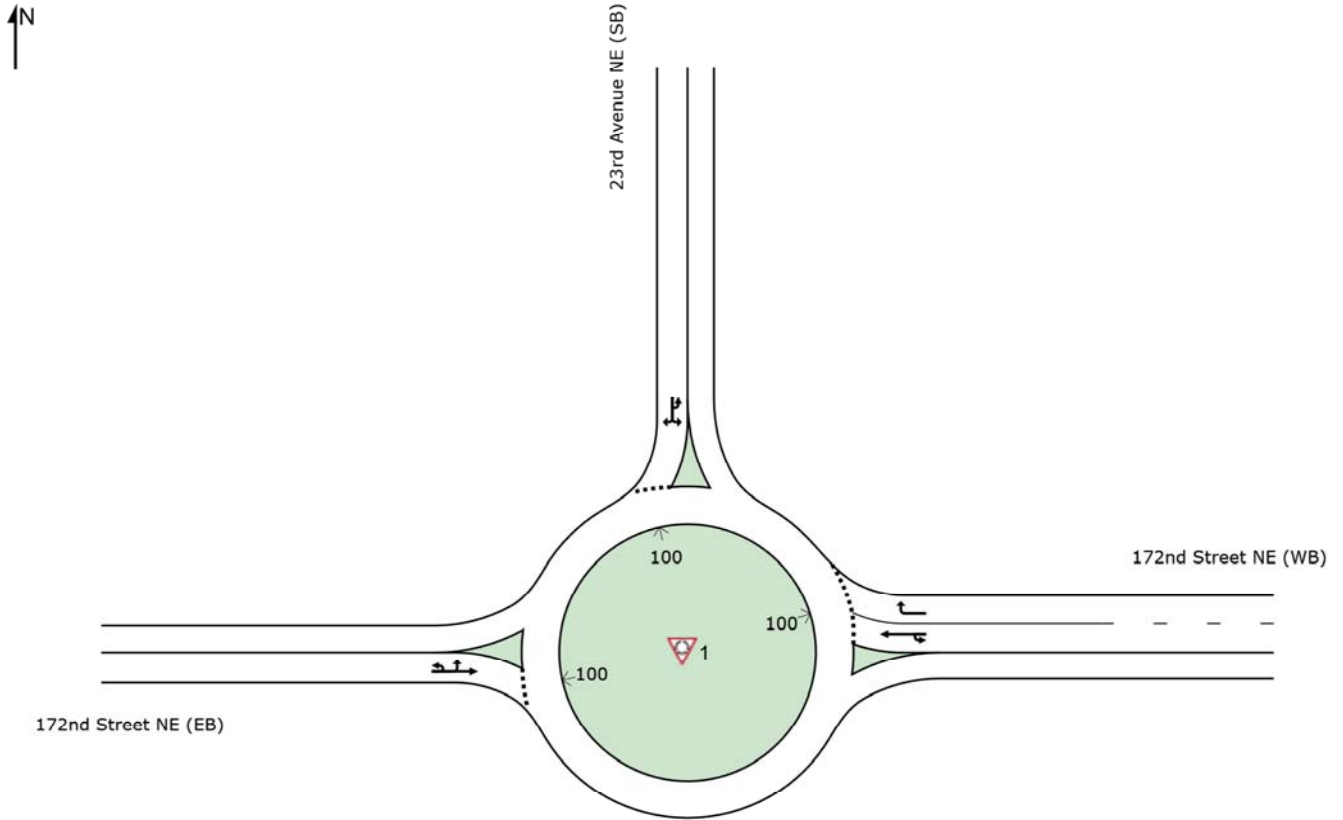
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.55	0.54	0.17	0.41	0.81	0.33	0.64	0.64	0.64	0.48	0.59	0.59
Control Delay	26.3	36.7	1.1	21.8	45.0	17.4	28.9	28.9	28.9	19.5	26.4	26.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.3	36.7	1.1	21.8	45.0	17.4	28.9	28.9	28.9	19.5	26.4	26.4
LOS	C	D	A	C	D	B	C	C	C	B	C	C
Approach Delay		27.0		37.6							25.1	
Approach LOS		C		D							C	
Queue Length 50th (ft)	60	114	0	59	172	32	177	177	177	48	163	163
Queue Length 95th (ft)	110	204	3	109	284	73	298	298	298	103	274	274
Internal Link Dist (ft)	901			4660						2741		
Turn Bay Length (ft)	150	150	150	200	881	300	1150	1150	1150	300	1200	1200
Base Capacity (vph)	306	616	612	583	881	666	1150	1150	1150	575	1200	1200
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	0.37	0.13	0.27	0.39	0.16	0.64	0.64	0.64	0.27	0.59	0.59
Intersection Summary	Other											
Area Type:	Other											
Cycle Length:	130											
Actual Cycle Length:	90.9											
Natural Cycle:	90											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.81											
Intersection Signal Delay:	28.6											
Intersection Capacity Utilization:	72.2%											
Analysis Period (min):	15											
Spills and Phases:	8: State Avenue/Smokey Point Boulevard & 136th Street NE											
	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	Ø10	Ø11	Ø12
	30 s	35 s	30 s	35 s	35 s	30 s	15 s	40 s	35 s	35 s	35 s	35 s

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

# SITE LAYOUT

## Site: 1 [2024 Opening Conditions - Weekday PM]

172nd Street NE at 23rd Avenue NE  
Site Category: PM Peak-Hour  
Roundabout



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Organisation: GIBSON TRAFFIC CONSULTANTS | Created: Wednesday, August 18, 2021 7:26:15 AM  
Project: H:\2021\21-190\Sidra#1 - 172nd St NE at 23rd Ave NE.sip8

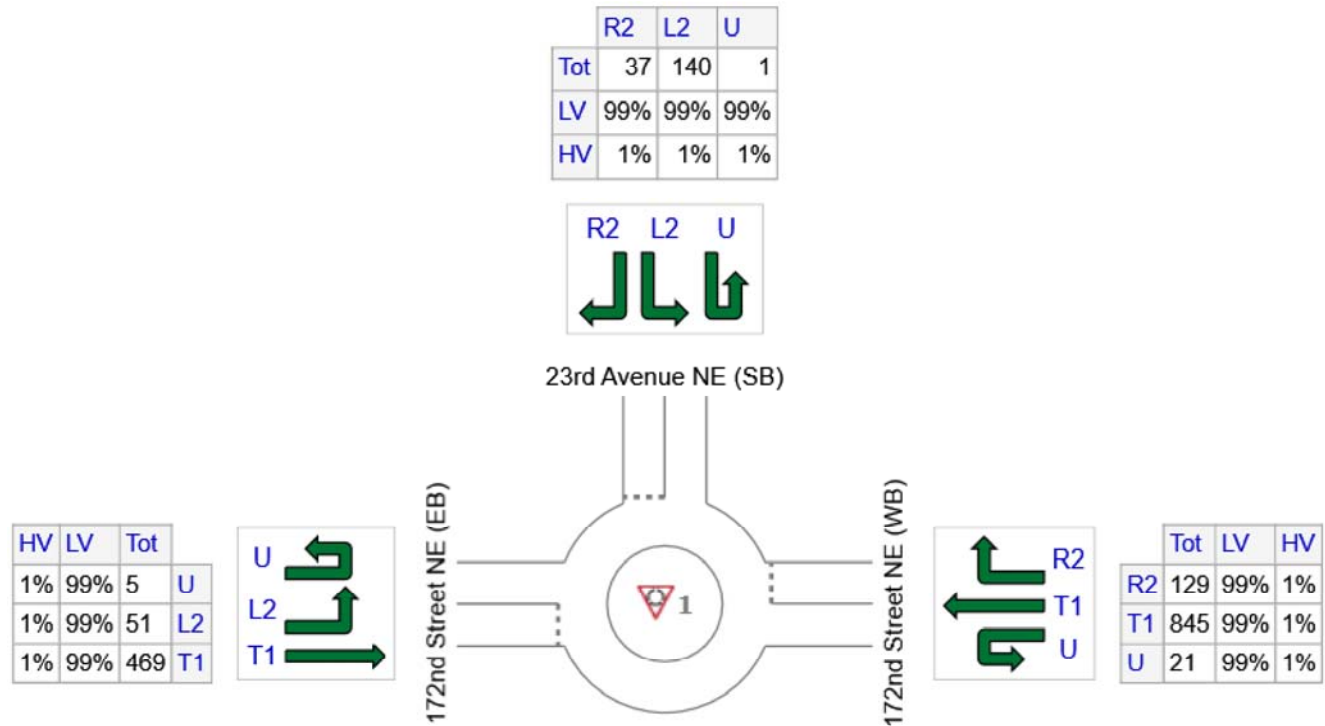
# INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

 Site: 1 [2024 Opening Conditions - Weekday PM]

172nd Street NE at 23rd Avenue NE  
 Site Category: PM Peak-Hour  
 Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
E: 172nd Street NE (WB)	995	985	10
N: 23rd Avenue NE (SB)	178	176	2
W: 172nd Street NE (EB)	525	520	5
Total	1698	1681	17

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# MOVEMENT SUMMARY

## Site: 1 [2024 Opening Conditions - Weekday PM]

172nd Street NE at 23rd Avenue NE  
 Site Category: PM Peak-Hour  
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: 172nd Street NE (WB)												
1u	U	23	1.0	0.569	12.5	LOS B	5.4	135.3	0.31	0.40	0.31	38.0
6	T1	909	1.0	0.569	4.2	LOS A	5.4	135.3	0.31	0.40	0.31	36.9
16	R2	139	1.0	0.121	4.4	LOS A	0.6	15.9	0.22	0.46	0.22	36.2
Approach		1070	1.0	0.569	4.4	LOS A	5.4	135.3	0.30	0.41	0.30	36.9
North: 23rd Avenue NE (SB)												
7u	U	1	1.0	0.272	18.4	LOS B	1.8	46.3	0.83	0.88	0.83	33.2
7	L2	151	1.0	0.272	15.9	LOS B	1.8	46.3	0.83	0.88	0.83	32.5
14	R2	40	1.0	0.272	10.1	LOS B	1.8	46.3	0.83	0.88	0.83	31.6
Approach		191	1.0	0.272	14.7	LOS B	1.8	46.3	0.83	0.88	0.83	32.3
West: 172nd Street NE (EB)												
5u	U	5	1.0	0.449	13.1	LOS B	3.3	83.4	0.48	0.50	0.48	37.2
5	L2	55	1.0	0.449	10.7	LOS B	3.3	83.4	0.48	0.50	0.48	36.3
2	T1	504	1.0	0.449	4.8	LOS A	3.3	83.4	0.48	0.50	0.48	36.2
Approach		565	1.0	0.449	5.4	LOS A	3.3	83.4	0.48	0.50	0.48	36.2
All Vehicles		1826	1.0	0.569	5.8	LOS A	5.4	135.3	0.41	0.48	0.41	36.1

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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Organisation: GIBSON TRAFFIC CONSULTANTS | Processed: Tuesday, August 17, 2021 2:51:58 PM

Project: H:\2021\21-190\Sidra#1 - 172nd St NE at 23rd Ave NE.sip8



Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

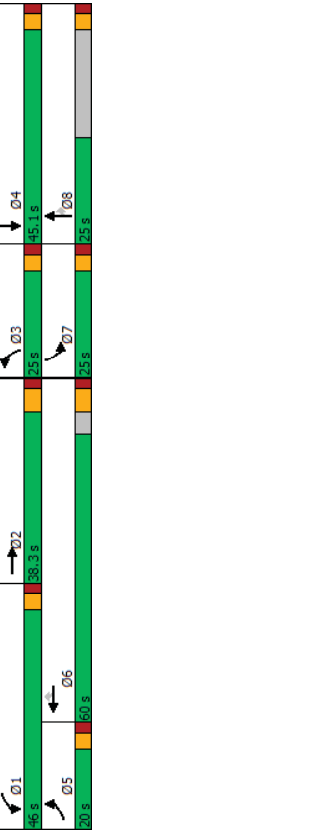
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR
Control Delay	81.1	68.8	74.2	35.0	8.4	126.1	44.6	26.6	80.3	40.5	10 Degrees
Queue Delay	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	10 Degrees
Total Delay	81.1	68.8	74.2	35.8	8.4	126.1	44.6	26.6	80.3	40.5	10 Degrees
LOS	F	E	E	D	A	F	D	C	F	D	10 Degrees
Approach Delay	69.5	47.7	52.0								10 Degrees
Approach LOS	E	D	D								10 Degrees
Queue Length 50th (ft)	36	282	442	312	42	-262	83	218	173	100	10 Degrees
Queue Length 95th (ft)	77	355	#576	391	124	#448	140	#474	231	168	10 Degrees
Internal Link Dist (ft)	195	1232	400	529			650			509	10 Degrees
Turn Bay Length (ft)	179	758	950	1489	828	238	525	791	463	484	10 Degrees
Base Capacity (vph)	0	0	0	367	0	0	0	0	0	0	10 Degrees
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	10 Degrees
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	10 Degrees
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	10 Degrees
Reduced v/c Ratio	0.21	0.77	0.92	0.71	0.42	1.02	0.20	0.85	0.74	0.30	10 Degrees

Intersection Summary

Area Type:	Other
Cycle Length:	154.4
Actuated Cycle Length:	149.9
Natural Cycle:	145
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.02
Intersection Signal Delay:	54.5
Intersection Capacity Utilization:	103.6%
Analysis Period (min):	15
ICU Level of Service:	G

- 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: 27th Avenue NE/Spring Lane & 172nd Street NE



2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR
Lane Configurations	35	401	155	828	756	331	231	101	641	326	84
Traffic Volume (vph)	35	401	155	828	756	331	231	101	641	326	84
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	195	375	400	200	150	175	1	1	1	1	1
Storage Length (ft)	1	1	2	1	1	1	1	1	1	1	1
Storage Lanes	25	25	25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Taper Length (ft)	1.00	0.95	0.97	0.95	1.00	1.00	1.00	1.00	1.00	0.99	0.99
Lane Util. Factor	0.958	0.950	0.950	0.950	0.850	0.950	0.850	0.950	0.950	0.941	0.941
Ped Bike Factor	1787	3424	0	3467	3574	1599	1787	1881	1599	3467	1759
Flt Protected	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1787	3424	0	3467	3574	1599	1787	1881	1599	3467	1759
Flt Permitted	1787	3424	0	3467	3574	1599	1787	1881	1599	3467	1759
Satd. Flow (perm)	33	30	30	279							
Right Turn on Red	30	1312	29.8	609	13.8						
Satd. Flow (RTOR)	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Link Speed (mph)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Link Distance (ft)	37	422	163	872	796	348	243	106	675	343	88
Travel Time (s)	37	585	0	872	796	348	243	106	675	343	145
Confl. Peds. (#/hr)	Prot	NA	Prot	NA	Perm	6	6	8	8	7	4
Peak Hour Factor	5	2	1	6	6	6	3	8	8	7	4
Heavy Vehicles (%)	5	2	1	6	6	6	3	8	8	7	4
Adj. Flow (vph)	3.0	7.0	3.0	38.3	38.3	9.5	23.1	23.1	23.1	9.5	45.1
Shared Lane Traffic (%)	20.0	38.3	46.0	60.0	60.0	25.0	25.0	25.0	25.0	25.0	45.1
Lane Group Flow (vph)	13.0%	24.8%	29.8%	38.9%	38.9%	16.2%	16.2%	16.2%	16.2%	16.2%	29.2%
Turn Type	15.0	32.0	41.0	53.7	53.7	20.0	19.9	19.9	20.0	40.0	40.0
Protected Phases	3.0	4.3	3.0	4.3	4.3	3.0	3.1	3.1	3.0	3.1	3.1
Permitted Phases	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Detector Phases	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Switch Phase	5.0	6.3	5.0	6.3	6.3	5.0	5.1	5.1	5.0	5.1	5.1
Minimum Initial (s)	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Minimum Split (s)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Total Split (s)	2.5	3.0	2.5	3.0	3.0	2.5	3.0	3.0	2.5	3.0	3.0
Total Split (%)	None	None	None	None	None	None	None	None	None	None	None
Yellow Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
All-Red Time (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Lost Time Adjust (s)	0	0	0	0	0	0	0	0	0	0	0
Total Lost Time (s)	8.1	28.7	0.05	0.19	0.26	0.42	0.13	0.28	0.28	0.12	0.27
Lead/Lag	0.39	0.86	0.95	0.53	0.42	1.02	0.20	0.85	0.81	0.30	0.30
Lead-Lag Optimize?											
Vehicle Extension (s)											
Recall Mode											
Walk Time (s)											
Flash Dont Walk (s)											
Pedestrian Calls (#/hr)											
Act Effct Green (s)											
Actuated G/C Ratio											
v/c Ratio											

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	34	11	11	2	10	235	4	297	9	347	331	45
Traffic Volume (vph)	34	11	11	2	10	235	4	297	9	347	331	45
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	0	0	0	75	0	0	200	0	0	0	0	135
Storage Length (ft)	0	0	0	1	1	1	1	1	0	0	0	1
Taper Length (ft)	25	0	0	25	0	0	25	0	0	0	0	1
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	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99	1.00	1.00	0.96
Frt	0.987			0.850			0.996		0.850			0.850
Flt Protected	0	1790	0	0.992	0.950	0.950	1.787	1872	0	1787	1881	1599
Satd. Flow (prot)	0.802	0.802	0.963	0.554	0.495	0.495	0.554	0.963	0.554	0.495	0.495	0.554
Satd. Flow (perm)	0	1485	0	0	1809	1599	1030	1872	0	925	1881	1537
Right Turn on Red			Yes		Yes	Yes		Yes	Yes		Yes	Yes
Satd. Flow (RTOR)	5			245			2					52
Link Speed (mph)	30			30			30					30
Link Distance (ft)	967			413			725					730
Travel Time (s)	22.0			9.4			16.5					16.6
Confl. Peds. (#/hr)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Peak Hour Factor	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Heavy Vehicles (%)	35	11	5	2	10	245	4	309	9	361	345	47
Adj. Flow (vph)	0	51	0	0	12	245	4	318	0	361	345	47
Shared Lane Traffic (%)	Perm	NA	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	Perm
Lane Group Flow (vph)	4	4	4	8	8	8	5	2	6	6	6	6
Protected Phases	4	4	4	8	8	8	5	2	6	6	6	6
Permitted Phases	4	4	4	8	8	8	5	2	6	6	6	6
Detector Phase	4	4	4	8	8	8	5	2	6	6	6	6
Switch Phase	7.0	7.0	7.0	7.0	7.0	7.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Initial (s)	22.5	22.5	26.0	26.0	26.0	26.0	9.5	22.5	9.5	26.0	26.0	26.0
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	20.0	50.0	30.0	50.0	50.0	50.0
Total Split (s)	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	19.0%	47.6%	28.6%	47.6%	47.6%	47.6%
Total Split (%)	21.0	21.0	21.0	21.0	21.0	21.0	16.0	46.0	26.0	46.0	46.0	46.0
Maximum Green (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Yellow Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
All-Red Time (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
Lost Time Adjust (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)												
Lead/Lag	2.5	2.5	2.5	2.5	2.5	2.5	2.0	3.0	3.0	3.0	3.0	3.0
Lead-Lag Optimize?	None	None	None	None	None	None	None	None	None	None	None	None
Vehicle Extension (s)	8.0	8.0	15.0	15.0	15.0	15.0	10.0	10.0	15.0	15.0	15.0	15.0
Recall Mode	3	3	3	3	3	3	3	3	3	3	3	3
Flash Don't Walk (s)	9.9	9.9	9.9	9.9	9.9	9.9	51.6	46.6	61.0	59.6	59.6	59.6
Pedestrian Calls (#/hr)	0.13	0.13	0.13	0.13	0.13	0.13	0.65	0.59	0.77	0.75	0.75	0.75
Act Effct Green (s)	0.27	0.27	0.27	0.27	0.27	0.27	0.01	0.29	0.44	0.24	0.24	0.24
Actuated G/C Ratio	0.13	0.13	0.13	0.13	0.13	0.13	0.05	0.59	0.01	0.29	0.24	0.24
v/c Ratio												

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

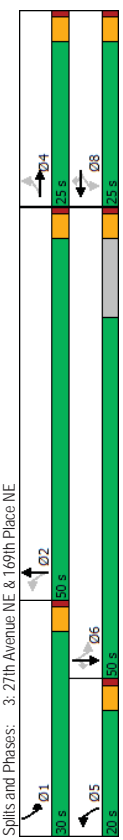
Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	32.5			30.8	10.9	4.5	10.5			4.9	4.8	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5			30.8	10.9	4.5	10.5			4.9	4.8	1.8
LOS	C	C	C	B	A	B	A	B	A	A	A	A
Approach Delay	32.5			11.8			10.5			4.7		
Approach LOS	C			B			B			A		
Queue Length 50th (ft)	20	5	0	5	0	0	60	29	27	0		
Queue Length 95th (ft)	54	21	61	4	183	147	12					
Internal Link Dist (ft)	887			333			645			650		
Turn Bay Length (ft)						200				1002	1418	1171
Base Capacity (vph)	406			490	612	939	1104			0	0	0
Starvation Cap Reductn	0			0	0	0	0			0	0	0
Spillback Cap Reductn	0			0	0	0	0			0	0	0
Storage Cap Reductn	0			0	0	0	0			0	0	0
Reduced v/c Ratio	0.13			0.02	0.40	0.00	0.29			0.36	0.24	0.04

Intersection Summary

Area Type: Other  
 Cycle Length: 105  
 Actuated Cycle Length: 79  
 Natural Cycle: 65  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.59  
 Intersection Signal Delay: 8.4  
 Intersection Capacity Utilization: 55.2%  
 Analysis Period (min): 15

Intersection LOS: A  
 ICU Level of Service B



2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
4: I-5 Southbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	963	529	0	1536	604	0	0	0	283	1	371
Future Volume (vph)	0	963	529	0	1536	604	0	0	0	283	1	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	200	0	0	0	0	0	0	350	0	435
Storage Lanes	0	0	1	0	1	1	0	0	0	1	0	1
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		0.98	0.850		0.96	0.850				0.99	0.850	0.99
FRT		0.850	0.850		0.850	0.850				0.850	0.850	0.850
Flt Protected												
Satd. Flow (prot)	0	3539	1583	0	3539	1583	0	0	0	0.950	0.953	1583
Flt Permitted												
Satd. Flow (perm)	0	3539	1552	0	3539	1523	0	0	0	0.950	0.953	1562
Right Turn on Red			Yes		Yes	Yes			Yes			Yes
Satd. Flow (RTOR)			551		629	629			Yes			54
Link Speed (mph)		30			30			30				30
Link Distance (ft)		609			940			979				1126
Travel Time (s)		13.8			21.4			22.3				25.6
Confl. Peds. (#/hr)	8	0	4	4	8	8	1	8	0	0	0	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
Adj. Flow (vph)	0	1003	551	0	1600	629	0	0	0	295	1	386
Shared Lane Traffic (%)										50%		
Lane Group Flow (vph)	0	1003	551	0	1600	629	0	0	0	147	149	386
Turn Type		NA	Perm		NA	Perm		NA	Perm	NA	Perm	NA
Protected Phases		2			6			6		4		4
Permitted Phases		2	2		6	6		6		4	4	4
Detector Phase												
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5
Recall Mode	None	None	None	None	None	None	None	None	None	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	21.0	21.0	21.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	88.4	88.4	88.4	88.1	88.1	88.1	88.1	88.1	88.1	28.2	28.2	28.2
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.22	0.22	0.22
v/c Ratio	0.41	0.44	0.44	0.66	0.66	0.51	0.66	0.66	0.51	0.40	0.40	1.00
Control Delay	9.1	1.7	1.7	12.9	12.9	2.0	12.9	2.0	2.0	48.6	48.7	90.4

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
4: I-5 Southbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.4	0.4	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	2.1	2.1	13.1	2.0	2.0	48.6	48.7	90.4	0.0	0.0	0.0
LOS	A	A	A	B	B	A	D	D	D	D	D	F
Approach Delay	6.8			10.0							72.3	
Approach LOS	A			A							E	
Queue Length 50th (ft)	172	0	0	362	0	0	117	118	-324			
Queue Length 95th (ft)	208	32	32	427	33		189	192	#531			
Internal Link Dist (ft)	529			860			899				1046	
Turn Bay Length (ft)			200				350				435	
Base Capacity (vph)	2619	1291	1291	2611	1288		369	370	385			
Stallion Cap Reductn	949	322	322	341	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.60	0.57	0.57	0.70	0.49		0.40	0.40	0.40			1.00
Intersection Summary												
Area Type:	Other											
Cycle Length:	130											
Actuated Cycle Length:	128.3											
Natural Cycle:	80											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	1.00											
Intersection Signal Delay:	18.4											
Intersection Capacity Utilization:	75.7%											
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.												
Spills and Phases:	4: I-5 Southbound Ramps & 172nd Street NE											

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
5: I-5 Northbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	212	1048	0	0	1436	352	665	4	806	0	0	0
Future Volume (vph)	212	1048	0	0	1436	352	665	2	806	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	600	0	0	0	300	400	0	0	0	0	0	0
Storage Lanes	1	0	0	0	1	1	1	1	1	0	0	0
Taper Length (ft)	25	0	25	0	0	25	0	25	0	25	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				0.98	0.98	0.850	0.850				
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	1770	3539	0	0	5085	1583	1681	1686	1583	0	0	0
Flt Permitted	0.950						0.950	0.953				
Satd. Flow (perm)	1768	3539	0	0	5085	1553	1681	1686	1562	0	0	0
Right Turn on Red			Yes		Yes	Yes	Yes	Yes	Yes	0	0	Yes
Satd. Flow (RTOR)			363		363		363		363			
Link Speed (mph)	30			30			30		30			30
Link Distance (ft)	940			1086			1094		999			999
Travel Time (s)	21.4			24.7			24.9		22.7			22.7
Confl. Peds. (#/hr)	3		9	9		3		5	5			5
Confl. Bikes (#/hr)			1									
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
Adj. Flow (vph)	219	1080	0	0	1480	363	686	2	831	0	0	0
Shared Lane Traffic (%)					50%							
Lane Group Flow (vph)	219	1080	0	0	1480	363	343	345	831	0	0	0
Turn Type	Prot	NA	0	0	NA	Perm	Perm	NA	Free	0	0	0
Protected Phases	5	2			6		8		8			
Permitted Phases												
Detector Phase	5	2			6		8		8			
Switch Phase												
Minimum Initial (s)	5.0	7.0			7.0		7.0		7.0			
Minimum Split (s)	10.6	24.1			23.8		40.8		40.8			
Total Split (s)	30.0	90.0			60.0		30.0		30.0			
Total Split (%)	25.0%	75.0%			50.0%		25.0%		25.0%			
Maximum Green (s)	24.4	83.9			54.2		24.2		24.2			
Yellow Time (s)	3.6	4.1			3.8		3.8		3.8			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	5.6	6.1			5.8		5.8		5.8			
Lead/Lag	Lead	Lag			Lag		Lag		Lag			
Lead-Lag Optimize?	Yes	Yes			Yes		Yes		Yes			
Vehicle Extension (s)	3.0	4.0			4.0		4.5		4.5			
Recall Mode	None	None			None		Max		Max			
Walk Time (s)	7.0	7.0			7.0		7.0		7.0			
Flash Don't Walk (s)	10.0	10.0			8.0		28.0		28.0			
Pedestrian Calls (#/hr)	0	0			0		0		0			
Act Effct Green (s)	19.7	77.4			52.4		35.1		35.1			124.5
Actuated G/C Ratio	0.16	0.62			0.42		0.28		0.28			1.00
v/c Ratio	0.78	0.49			0.69		0.42		0.73			0.53

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
5: I-5 Northbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	70.3	13.5			31.9	4.0	51.8	51.8	1.3			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	70.3	13.5			31.9	4.0	51.8	51.8	1.3			
LOS	E	B			C	A	D	D	A			
Approach Delay		23.1			26.4		24.2					
Approach LOS		C			C		C					
Queue Length 50th (ft)	174	232			356	0	271	273	0			
Queue Length 95th (ft)	264	281			431	59	#411	#413	0			
Internal Link Dist (ft)	600	860			1006		1014					919
Turn Bay Length (ft)	348	2394			2222	883	474	475	1562			
Base Capacity (vph)	0	0			0	0	0	0	0			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.63	0.45			0.67	0.41	0.72	0.73	0.53			
Intersection Summary	Other											
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	124.5											
Natural Cycle:	90											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.78											
Intersection Signal Delay:	24.7											
Intersection Capacity Utilization:	83.0%											
ICU Level of Service:	E											
# 95th percentile volume exceeds capacity, queue may be longer.												
Analysis Period (min):	15											
Queue shown is maximum after two cycles.												
Splits and Phases:	5: I-5 Northbound Ramps & 172nd Street NE											

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
6: Smokey Point Boulevard & 156th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	27	8	212	12	8	32	256	754	10	14	755	53
Traffic Volume (vph)	27	8	212	12	8	32	256	754	10	14	755	53
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	150	150	150	200	200	0	250	0	200	0	200	0
Storage Length (ft)	1	1	1	1	1	0	1	0	0	1	0	0
Taper Length (ft)	25	1	25	1	1	0	25	0	25	0	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor			0.850		0.879		0.998		0.990		0.990	
FRT	0.950			0.950		0.950		0.950		0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1637	0	1770	3531	0	1770	3498	0
FRT Permitted	0.644		0.752		0.200		0.200		0.357		0.357	
Satd. Flow (perm)	1200	1863	1583	1401	1637	0	372	3531	0	665	3498	0
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)			278		33		1				7	
Link Speed (mph)		30			30		30		30		30	
Link Distance (ft)		1704			1283		1356		4794		4794	
Travel Time (s)		38.7			29.2		30.8		109.0		109.0	
Confl. Peds. (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	28	8	278	12	8	33	261	769	10	14	770	54
Lane Group Flow (vph)	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	NA	pm+pt	NA	NA	NA
Turn Type	7	4	4	8	8	5	2	2	1	6	6	6
Protected Phases	4											
Permitted Phases	7	4	4	8	8	5	2	2	1	6	6	6
Detector Phase	7	4	4	8	8	5	2	2	1	6	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0	7.0	7.0	10.0	10.0
Minimum Split (s)	12.0	25.0	25.0	12.0	25.0	12.0	25.0	25.0	12.0	25.0	25.0	25.0
Total Split (s)	25.0	20.0	20.0	25.0	10.0	20.0	50.0	50.0	20.0	50.0	50.0	50.0
Total Split (%)	21.7%	17.4%	17.4%	21.7%	8.7%	17.4%	43.5%	43.5%	17.4%	43.5%	43.5%	43.5%
Maximum Green (s)	20.0	15.0	15.0	20.0	5.0	15.0	45.0	45.0	15.0	45.0	45.0	45.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.5	3.5	2.0	3.5	3.5	3.5
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	11.1	10.1	10.1	10.2	8.0	42.6	40.9	40.9	31.7	24.2	24.2	24.2
Actuated g/C Ratio	0.17	0.16	0.16	0.16	0.12	0.66	0.63	0.63	0.49	0.37	0.37	0.37
v/c Ratio	0.10	0.03	0.98	0.05	0.18	0.50	0.35	0.35	0.03	0.63	0.63	0.63
Control Delay	25.0	29.4	9.9	24.5	17.4	9.4	8.1	8.1	6.7	19.8	19.8	19.8

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

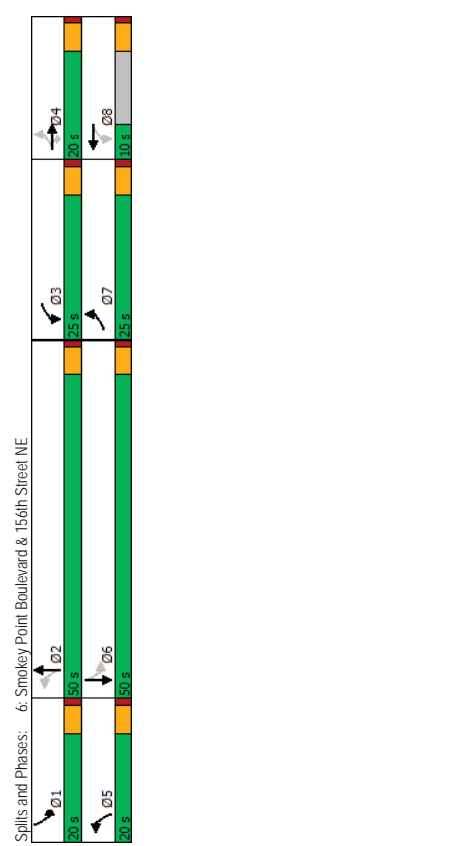
PM Peak-Hour

Lanes, Volumes, Timings  
6: Smokey Point Boulevard & 156th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	25.0	29.4	9.9	24.5	17.4	9.4	8.1	8.1	6.7	19.8	19.8	19.8
LOS	C	C	A	C	B	A	A	A	A	A	A	B
Approach Delay	11.8			19.0		8.4						19.6
Approach LOS	B			B		A						B
Queue Length 50th (ft)	10	3	0	4	3	23	40	40	1	120	120	120
Queue Length 95th (ft)	33	17	71	19	33	105	198	198	10	252	252	252
Internal Link Dist (ft)	1624			1203		1276						4714
Turn Bay Length (ft)	150		150	200		250						200
Base Capacity (vph)	594	468	606	596	427	587	2635	2635	677	2582	2582	2582
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	0.05	0.02	0.46	0.02	0.10	0.44	0.30	0.30	0.02	0.32	0.32	0.32

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour



Lanes, Volumes, Timings  
7: Smokey Point Boulevard & 152nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	15	7	20	95	15	297	15	717	132	339	698	9
Traffic Volume (vph)	15	7	20	95	5	297	15	717	132	339	698	9
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	50	0	0	125	0	0	150	0	200	0	200	0
Storage Length (ft)	25	1	0	1	0	0	1	0	1	0	1	0
Taper Length (ft)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Lane Util. Factor	1.00	0.887	0.99	0.852	0.977	0.950	0.977	0.950	0.950	0.950	0.950	0.950
Ped Bike Factor	0.950	1770	1652	0	1770	1566	0	1770	3444	0	1770	3531
Flt Protected	0.909	1692	1652	0	794	1566	0	692	3444	0	326	3531
Satd. Flow (prot)	1	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Flt Permitted	16	7	21	99	5	309	16	747	138	353	727	9
Satd. Flow (perm)	1	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Right Turn on Red	16	7	21	99	5	309	16	747	138	353	727	9
Satd. Flow (RTOR)	16	7	21	99	5	309	16	747	138	353	727	9
Link Speed (mph)	30	30	30	30	30	30	30	30	30	30	30	30
Link Distance (ft)	209	5141	116.8	116.8	116.8	116.8	116.8	116.8	116.8	116.8	116.8	116.8
Travel Time (s)	1	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Confl. Peds. (#/hr)	16	7	21	99	5	309	16	747	138	353	727	9
Peak Hour Factor	16	7	21	99	5	309	16	747	138	353	727	9
Adj. Flow (vph)	16	7	21	99	5	309	16	747	138	353	727	9
Shared Lane Traffic (%)	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Lane Group Flow (vph)	7	4	8	8	8	8	8	8	8	8	8	8
Turn Type	7	4	8	8	8	8	8	8	8	8	8	8
Protected Phases	4	4	4	4	4	4	4	4	4	4	4	4
Permitted Phases	4	4	4	4	4	4	4	4	4	4	4	4
Detector Phase	4	4	4	4	4	4	4	4	4	4	4	4
Switch Phase	4	4	4	4	4	4	4	4	4	4	4	4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.5	27.0	11.5	26.0	9.5	24.0	9.5	24.0	9.5	26.0	9.5	26.0
Total Split (s)	16.0	16.0	16.0	40.0	16.0	50.0	16.0	50.0	16.0	50.0	16.0	50.0
Total Split (%)	13.1%	13.1%	13.1%	32.8%	13.1%	41.0%	13.1%	41.0%	13.1%	41.0%	13.1%	41.0%
Maximum Green (s)	11.0	11.0	11.0	35.0	11.0	45.0	11.0	45.0	11.0	45.0	11.0	45.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	15.0	15.0	15.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	7.7	5.8	11.4	9.7	28.4	22.8	28.4	22.8	28.4	22.8	28.4	22.8
Actuated g/C Ratio	0.12	0.09	0.19	0.16	0.46	0.37	0.46	0.37	0.46	0.37	0.46	0.37
v/c Ratio	0.07	0.16	0.37	0.62	0.04	0.69	0.04	0.69	0.04	0.69	0.04	0.69
Control Delay	22.4	20.2	26.0	10.1	7.1	19.8	7.1	19.8	7.1	19.8	7.1	19.8

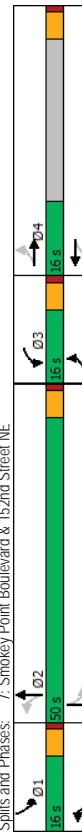
2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
7: Smokey Point Boulevard & 152nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	22.4	20.2	26.0	10.1	7.1	19.8	7.1	19.8	7.1	19.8	7.1	19.8
LOS	C	C	C	C	B	A	A	B	C	C	C	A
Approach Delay	21.0	21.0	21.0	13.9	13.9	19.6	13.9	19.6	13.9	13.9	13.9	13.0
Approach LOS	C	C	C	B	B	B	B	B	C	C	C	B
Queue Length 50th (ft)	5	2	2	32	2	116	2	116	42	38	38	38
Queue Length 95th (ft)	20	28	28	77	74	266	74	266	#267	185	185	185
Internal Link Dist (ft)	50	129	129	5061	5061	1372	5061	1372	5061	1372	5061	1276
Turn Bay Length (ft)	398	1000	1000	378	1063	589	378	1063	589	2655	482	2718
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
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	0.04	0.03	0.26	0.30	0.03	0.33	0.03	0.33	0.03	0.33	0.03	0.27

Intersection Summary  
Area Type: Other  
Cycle Length: 122  
Actuated Cycle Length: 61.6  
Natural Cycle: 90  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.73  
Intersection Signal Delay: 15.7  
Intersection LOS: B  
Intersection Capacity Utilization: 74.1%  
Analysis Period (min): 15  
ICU Level of Service: D  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.



2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
8: State Avenue/Smokey Point Boulevard & 136th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	160	216	76	152	187	149	101	512	204	152	474	214
Traffic Volume (vph)	160	216	76	152	187	149	101	512	204	152	474	214
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	150	190	200	150	200	0	300	0	300	0	300	0
Storage Length (ft)	1	1	1	1	1	0	1	0	1	0	1	0
Storage Lanes	25	25	25	25	25	0	25	0	25	0	25	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Ped Bike Factor	0.850	0.99	1.00	0.850	0.99	1.00	0.957	0.99	1.00	0.953	1.00	0.953
FIT Protected	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1752	1845	1568	1752	1721	0	1752	3354	0	1752	3315	0
FIT Permitted	0.252	0.458	0.458	0.263	0.263	0	0.263	0.205	0	0.205	0.205	0
Satd. Flow (perm)	465	1845	1547	844	1721	0	485	3354	0	378	3315	0
Right Turn on Red			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)			143	34	30	43	30	49	30	49	30	49
Link Speed (mph)			30	30	30	30	30	30	30	30	30	30
Link Distance (ft)			981	4740	2821	4424	2821	4424	2821	4424	2821	4424
Travel Time (s)			22.3	107.7	64.1	107.7	64.1	107.7	64.1	107.7	64.1	107.7
Confl. Peds. (#/hr)			1	1	1	1	1	1	1	1	1	1
Confl. Bikes (#/hr)			0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Peak Hour Factor	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Heavy Vehicles (%)	168	227	80	160	197	157	106	539	215	160	499	225
Adj. Flow (vph)			168	227	80	160	197	157	106	539	215	160
Shared Lane Traffic (%)			168	227	80	160	354	754	0	160	724	0
Lane Group Flow (vph)	pm+pt	7	4	4	8	3	8	pm+pt	5	2	1	6
Protected Phases	Permitted Phases	4	4	4	8	2	2	6	6	6	6	6
Detector Phase	Switch Phase	5.0	5.0	5.0	7.0	5.0	7.0	5.0	7.0	5.0	7.0	7.0
Minimum Initial (s)	10.0	34.0	34.0	10.0	23.0	10.0	35.0	10.0	35.0	10.0	23.0	30.0
Minimum Split (s)	15.0	35.0	35.0	30.0	40.0	35.0	35.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	11.5%	26.9%	26.9%	23.1%	30.8%	26.9%	26.9%	23.1%	23.1%	23.1%	23.1%	23.1%
Total Split (%)	10.0	30.0	30.0	25.0	35.0	30.0	30.0	25.0	25.0	25.0	25.0	25.0
Maximum Green (s)	4.0	1.0	1.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Yellow Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
All-Red Time (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
Lost Time Adjust (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Total Lost Time (s)	Lead/Lag	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead/Lag	Lead/Lag	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead-Lag Optimize?	Vehicle Extension (s)	None	None	None	None	None	None	None	None	None	None	None
Vehicle Extension (s)	Recall Mode	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Recall Mode	Walk Time (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Walk Time (s)	Flash Don't Walk (s)	0	0	0	0	0	0	0	0	0	0	0
Flash Don't Walk (s)	Pedestrian Calls (#/hr)	30.8	21.3	21.3	31.8	21.9	38.4	30.4	41.9	32.1	30.4	32.1
Pedestrian Calls (#/hr)	Act Effr Green (s)	0.34	0.23	0.23	0.35	0.24	0.42	0.33	0.46	0.35	0.33	0.35
Act Effr Green (s)	Actuated g/C Ratio											

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
8: State Avenue/Smokey Point Boulevard & 136th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
v/c Ratio	0.58	0.53	0.17	0.41	0.81	0.34	0.66	0.34	0.66	0.50	0.61	0.61	
Control Delay	27.5	36.2	1.0	21.6	45.1	17.8	29.9	17.8	29.9	20.4	27.0	27.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	27.5	36.2	1.0	21.6	45.1	17.8	29.9	17.8	29.9	20.4	27.0	27.0	
LOS	C	D	A	C	D	B	C	B	C	C	C	C	
Approach Delay		27.2		37.8		28.4		28.4		25.8		25.8	
Approach LOS		C		D		C		C		C		C	
Queue Length 50th (ft)	63	114	0	60	177	32	185	32	185	50	167	167	
Queue Length 95th (ft)	114	205	3	109	291	74	310	74	310	107	282	282	
Internal Link Dist (ft)	901	901	150	200	4660	2741	2741	2741	2741	4344	4344	4344	
Turn Bay Length (ft)	301	610	608	585	872	658	1139	658	1139	300	565	1193	
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0	
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	0.56	0.37	0.13	0.27	0.41	0.16	0.66	0.16	0.66	0.28	0.61	0.61	
Intersection Summary	Other												
Area Type:	Cycle Length: 130												
Actual Cycle Length:	91.7												
Natural Cycle:	90												
Control Type:	Actuated-Uncoordinated												
Maximum v/c Ratio:	0.81												
Intersection Signal Delay:	29.1												
Intersection Capacity Utilization:	73.6%												
Analysis Period (min):	15												
ICU Level of Service:	D												
ICU Level of Service D													
Spills and Phases:	8: State Avenue/Smokey Point Boulevard & 136th Street NE												
Ø1	30 s	Ø2	35 s	Ø3	30 s	Ø4	35 s	Ø5	35 s	Ø6	30 s	Ø7	15 s
Ø6	30 s	Ø7	15 s	Ø8	40 s	Ø9	35 s	Ø10	35 s	Ø11	35 s	Ø12	35 s

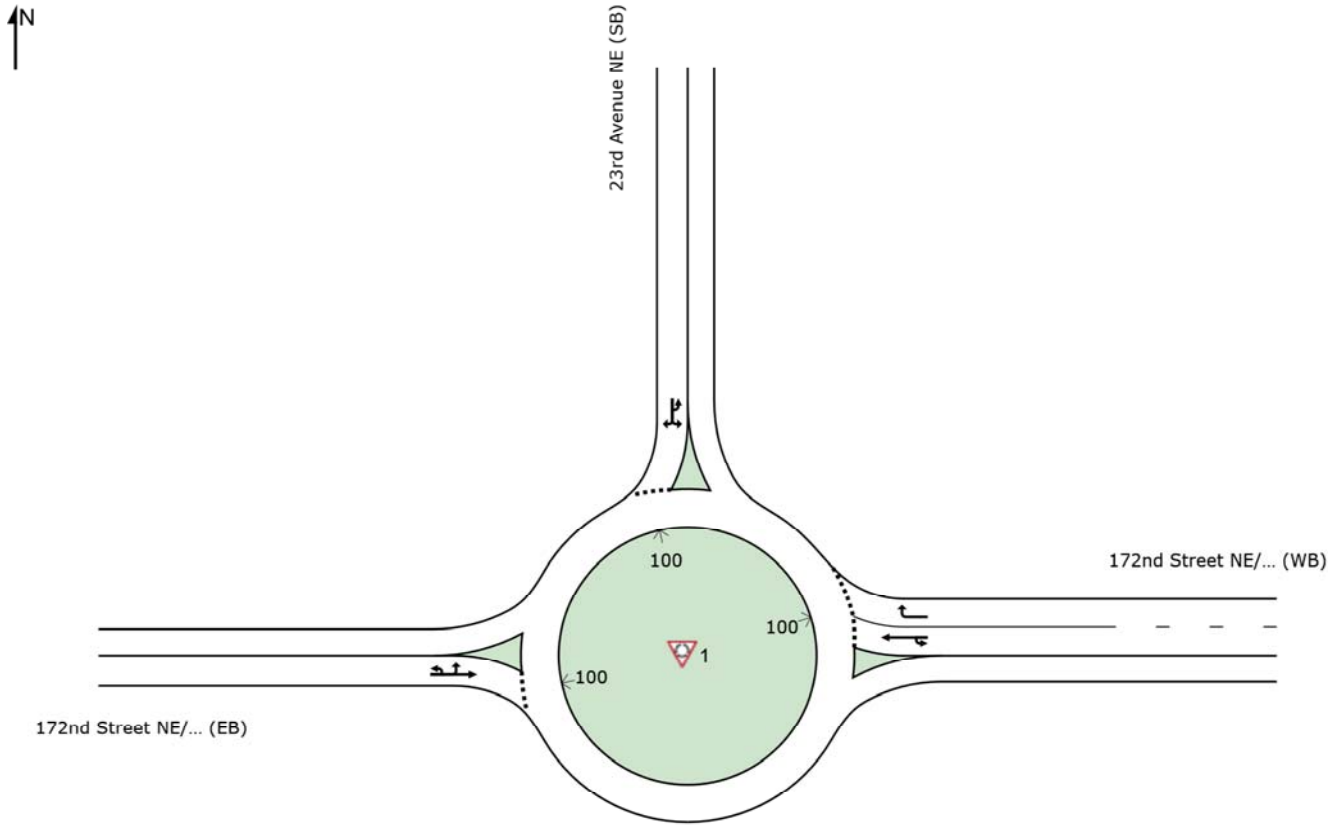
2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

# SITE LAYOUT

## Site: 1 [2030 Baseline Conditions - Weekday PM]

172nd Street NE/SR-531 at 23rd Avenue NE  
Site Category: PM Peak-Hour  
Roundabout



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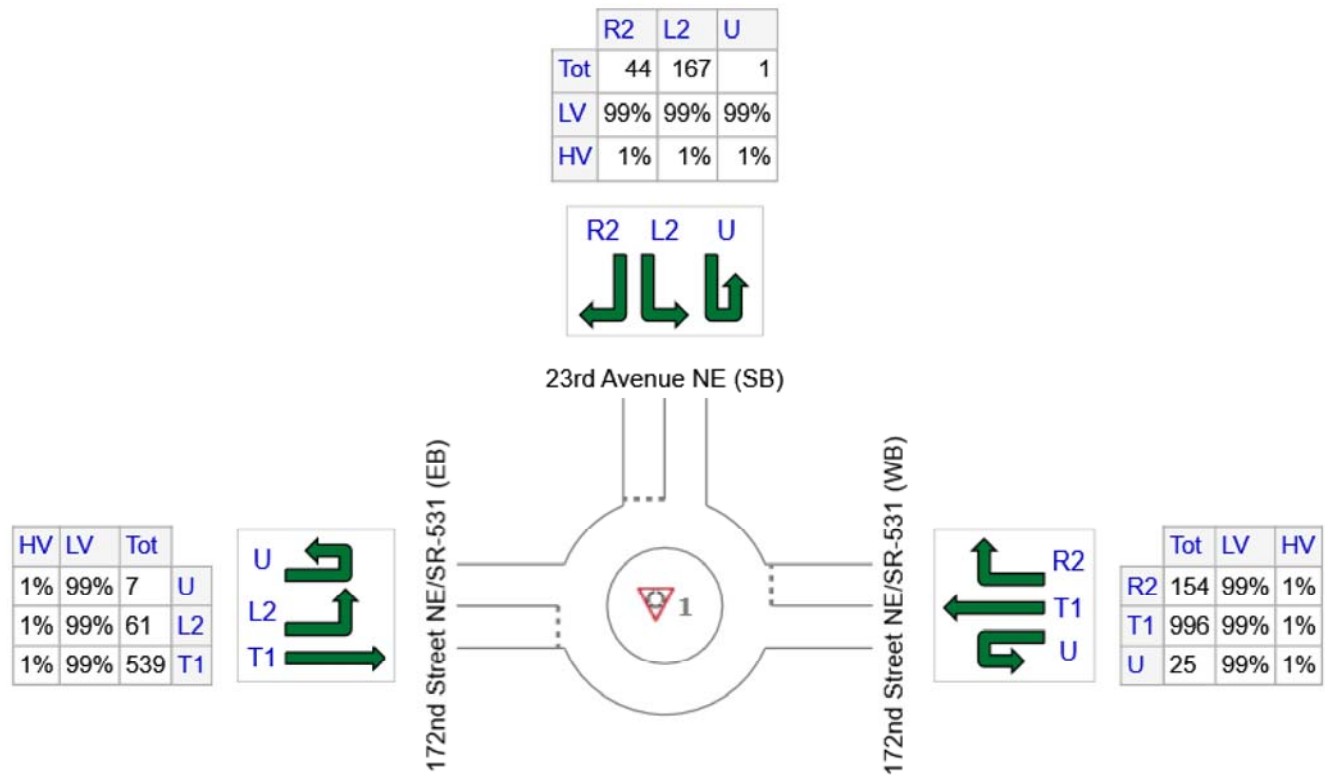
# INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

 Site: 1 [2030 Baseline Conditions - Weekday PM]

172nd Street NE/SR-531 at 23rd Avenue NE  
 Site Category: PM Peak-Hour  
 Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
E: 172nd Street NE/SR-531 (WB)	1175	1163	12
N: 23rd Avenue NE (SB)	212	210	2
W: 172nd Street NE/SR-531 (EB)	607	601	6
Total	1994	1974	20

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# MOVEMENT SUMMARY

## Site: 1 [2030 Baseline Conditions - Weekday PM]

172nd Street NE/SR-531 at 23rd Avenue NE  
 Site Category: PM Peak-Hour  
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: 172nd Street NE/SR-531 (WB)												
1u	U	27	1.0	0.679	12.7	LOS B	8.0	200.6	0.43	0.42	0.43	37.6
6	T1	1071	1.0	0.679	4.4	LOS A	8.0	200.6	0.43	0.42	0.43	36.5
16	R2	166	1.0	0.146	4.5	LOS A	0.8	20.1	0.25	0.47	0.25	36.1
Approach		1263	1.0	0.679	4.6	LOS A	8.0	200.6	0.40	0.43	0.40	36.5
North: 23rd Avenue NE (SB)												
7u	U	1	1.0	0.419	23.1	LOS C	3.4	85.8	0.97	1.01	1.08	31.1
7	L2	180	1.0	0.419	20.6	LOS C	3.4	85.8	0.97	1.01	1.08	30.5
14	R2	47	1.0	0.419	14.8	LOS B	3.4	85.8	0.97	1.01	1.08	29.7
Approach		228	1.0	0.419	19.4	LOS B	3.4	85.8	0.97	1.01	1.08	30.3
West: 172nd Street NE/SR-531 (EB)												
5u	U	8	1.0	0.537	13.5	LOS B	4.4	111.8	0.58	0.53	0.58	36.8
5	L2	66	1.0	0.537	11.0	LOS B	4.4	111.8	0.58	0.53	0.58	35.9
2	T1	580	1.0	0.537	5.1	LOS A	4.4	111.8	0.58	0.53	0.58	35.8
Approach		653	1.0	0.537	5.8	LOS A	4.4	111.8	0.58	0.53	0.58	35.8
All Vehicles		2144	1.0	0.679	6.5	LOS A	8.0	200.6	0.52	0.52	0.53	35.5

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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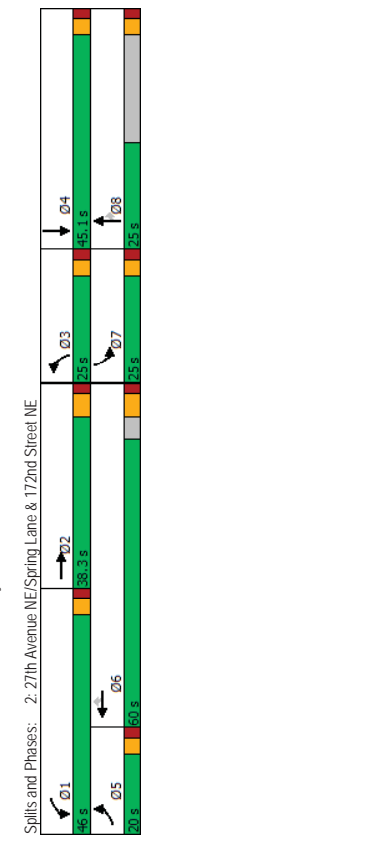
Project: H:\2021\21-190\Sidra#1 - 172nd St NE at 23rd Ave NE.sip8

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR	10 Degrees
Control Delay	83.1	78.3	87.4	37.4	12.5	175.1	47.0	48.4	92.7	43.6		
Queue Delay	0.0	0.0	0.0	1.3	0.4	0.0	0.0	0.0	0.0	0.0		
Total Delay	83.1	78.3	87.4	38.6	12.9	175.1	47.0	48.4	92.7	43.6		
LOS	F	E	F	D	B	F	D	D	F	D		
Approach Delay		78.6		53.8		78.8						
Approach LOS		E		D		E						
Queue Length 50th (ft)	44	342	-509	398	93	-335	102	357	212	126		
Queue Length 95th (ft)	87	#459	#643	493	200	#525	163	#648	#310	199		
Internal Link Dist (ft)		1232		529		650				509		
Turn Bay Length (ft)	195		400	200	150					175		
Base Capacity (vph)	174	736	923	1529	843	232	492	761	451	473		
Starvation Cap Reductn	0	0	0	346	117	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	0.25	0.92	1.01	0.80	0.57	1.19	0.26	0.98	0.91	0.36		

Intersection Summary  
Area Type: Other  
Cycle Length: 154.4  
Actuated Cycle Length: 153.9  
Natural Cycle: 145  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 1.19  
Intersection Signal Delay: 66.6  
Intersection Capacity Utilization: 109.4%  
Analysis Period (min): 15  
Intersection LOS: E  
ICU Level of Service: H

- 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.



2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR	10 Degrees
Lane Configurations	→	→	→	←	←	←	←	←	←	←	←	
Traffic Volume (vph)	42	479	163	886	903	395	262	120	707	389	100	64
Future Volume (vph)	42	479	163	886	903	395	262	120	707	389	100	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	195		375	400	200	150			0	175		175
Storage Lanes	1		1	2	1	1			1	1		1
Taper Length (ft)	25		25			25			25			25
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	1.00	1.00	1.00	0.97	1.00	1.00	1.00
Ped Bike Factor		0.962				0.850			0.850	0.942		0.942
FRT	0.950		0.950			0.950			0.950	0.950		0.950
Flt Protected	1787	3438	0	3467	3574	1599	1787	1881	1599	3467	1761	0
Satd. Flow (prot)	0.950		0.950			0.950			0.950	0.950		0.950
Flt Permitted	1787	3438	0	3467	3574	1599	1782	1881	1599	3467	1761	0
Satd. Flow (perm)			Yes			Yes			Yes	Yes		Yes
Right Turn on Red						279			465			
Satd. Flow (RTOR)		27				30			30			20
Link Speed (mph)		30				30			30			30
Link Distance (ft)		1312				730			589			589
Travel Time (s)		29.8				13.8			13.4			13.4
Confl. Peds. (#/hr)						3			3			3
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	44	504	172	933	951	416	276	126	744	409	105	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	676	0	933	951	416	276	126	744	409	172	0
Turn Type	Prot	NA	Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	NA	Prot
Protected Phases	5	2		1	6		3	8	8	7	4	
Permitted Phases												
Detector Phase	5	2		1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Split (s)	9.5	38.3		38.3	38.3	9.5	23.1	23.1	23.1	9.5	45.1	45.1
Total Split (s)	20.0	38.3		46.0	60.0	25.0	25.0	25.0	25.0	25.0	45.1	45.1
Total Split (%)	13.0%	24.8%		29.8%	38.9%	16.2%	16.2%	16.2%	16.2%	16.2%	29.2%	29.2%
Maximum Green (s)	15.0	32.0		41.0	53.7	53.7	20.0	19.9	19.9	20.0	40.0	40.0
Yellow Time (s)	3.0	4.3		3.0	4.3	3.0	3.1	3.1	3.1	3.0	3.1	3.1
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)	5.0	6.3		5.0	6.3	6.3	5.1	5.1	5.1	5.0	5.1	5.1
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lag	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	3.0		2.5	3.0	3.0	3.0	3.0	3.0	2.5	3.0	3.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0			25.0	25.0							33.0
Pedestrian Calls (#/hr)	0			0								0
Act Effct Green (s)	8.7	31.5		41.0	65.9	65.9	20.0	40.3	40.3	19.7	40.0	40.0
Actuated G/C Ratio	0.06	0.20		0.27	0.43	0.43	0.13	0.26	0.26	0.13	0.26	0.26
v/c Ratio	0.44	0.93		1.01	0.62	0.49	1.19	0.26	0.98	0.92	0.36	0.36

2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	40	13	7	3	12	209	5	355	10	290	395	53
Traffic Volume (vph)	40	13	7	3	12	209	5	355	10	290	395	53
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	0	0	0	75	0	200	0	200	0	0	0	135
Storage Length (ft)	0	0	0	1	1	1	0	1	0	0	1	1
Taper Length (ft)	25	0	0	25	0	25	25	25	0	25	25	1
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	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.96
Frt	0.985	0.985	0.985	0.985	0.985	0.985	0.996	0.985	0.985	0.985	0.985	0.850
Flt Protected	0	1788	0	0	1864	1599	1787	1872	0	1787	1881	1599
Satd. Flow (prot)	0.798	0.798	0.798	0.798	0.798	0.798	0.521	0.452	0	0.452	0.452	0.452
Flt Permitted	0	1474	0	0	1795	1599	970	1872	0	846	1881	1537
Satd. Flow (perm)	0	1474	0	0	1795	1599	970	1872	0	846	1881	1537
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	5	30	30	30	30	30	2	2	2	2	2	55
Link Speed (mph)	30	30	30	30	30	30	30	30	30	30	30	30
Link Distance (ft)	967	967	967	413	413	413	725	725	725	725	725	730
Travel Time (s)	22.0	22.0	22.0	9.4	9.4	9.4	16.5	16.5	16.5	16.5	16.5	16.6
Confl. Peds. (#/hr)	0	0	0	3	3	3	8	8	8	5	5	8
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 (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	42	14	7	3	13	218	5	370	10	302	411	55
Shared Lane Traffic (%)	0	63	0	0	16	218	5	380	0	302	411	55
Lane Group Flow (vph)	Perm	NA	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm
Turn Type	4	4	4	8	8	8	2	2	1	6	6	6
Protected Phases	4	4	4	8	8	8	5	5	2	6	6	6
Permitted Phases	4	4	4	8	8	8	5	5	2	6	6	6
Detector Phase	4	4	4	8	8	8	5	5	2	6	6	6
Switch Phase	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0	10.0	10.0	10.0
Minimum Initial (s)	22.5	22.5	22.5	26.0	26.0	26.0	9.5	22.5	9.5	26.0	26.0	26.0
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	20.0	50.0	30.0	50.0	50.0	50.0
Total Split (s)	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	19.0%	47.6%	28.6%	47.6%	47.6%	47.6%
Total Split (%)	21.0	21.0	21.0	21.0	21.0	21.0	16.0	46.0	26.0	46.0	46.0	46.0
Maximum Green (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Yellow Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
All-Red Time (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
Lost Time Adjust (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	3.0	3.0	3.0	3.0	3.0
Lead/Lag	None	None	None	None	None	None	None	None	None	None	None	None
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (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
Recall Mode	8.0	8.0	8.0	15.0	15.0	15.0	10.0	10.0	15.0	15.0	15.0	15.0
Walk Time (s)	3	3	3	3	3	3	3	3	3	3	3	3
Flash Dont Walk (s)	10.1	10.1	10.1	10.1	10.1	10.1	51.5	46.5	60.1	58.6	58.6	58.6
Pedestrian Calls (#/hr)	0.13	0.13	0.13	0.13	0.13	0.13	0.66	0.59	0.77	0.75	0.75	0.75
Act Effct Green (s)	0.32	0.32	0.32	0.32	0.32	0.32	0.34	0.34	0.40	0.29	0.29	0.29
Actuated G/C Ratio	0.32	0.32	0.32	0.32	0.32	0.32	0.34	0.34	0.40	0.29	0.29	0.29
v/c Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34

2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

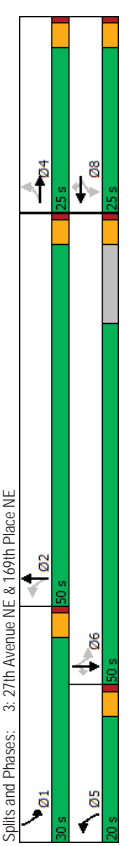
Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	33.4	33.4	33.4	10.3	10.3	10.3	4.4	10.7	4.8	5.3	5.3	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	33.4	33.4	10.3	10.3	10.3	4.4	10.7	4.8	5.3	5.3	2.0
LOS	C	C	C	B	B	B	A	B	A	A	A	A
Approach Delay	33.4	33.4	33.4	11.6	11.6	11.6	10.6	10.6	4.9	4.9	4.9	0
Approach LOS	C	C	C	B	B	B	A	B	A	A	A	A
Queue Length 50th (ft)	26	26	26	7	7	7	1	74	25	36	36	0
Queue Length 95th (ft)	63	63	63	24	24	24	4	214	95	180	180	15
Internal Link Dist (ft)	887	887	887	333	333	333	645	645	650	650	650	135
Turn Bay Length (ft)	406	406	406	490	490	490	906	1112	964	1407	1164	1164
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
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	0.16	0.16	0.16	0.03	0.37	0.01	0.01	0.34	0.31	0.29	0.29	0.05

Intersection Summary  
Area Type: Other

Cycle Length: 105  
Actuated Cycle Length: 78.3  
Natural Cycle: 65  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.55  
Intersection Signal Delay: 8.7  
Intersection Capacity Utilization 55.6%  
Analysis Period (min) 15

Intersection LOS: A  
ICU Level of Service B



2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
4: I-5 Southbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1112	612	0	1761	722	0	0	0	338	1	414
Future Volume (vph)	0	1112	612	0	1761	722	0	0	0	338	1	414
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200	0	0	0	0	0	0	0	350	0	435
Storage Lanes	0	1	0	0	1	0	0	0	0	1	0	1
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		0.98	0.96		0.96	0.850				0.99	0.850	0.99
Flt Protected		0.850								0.850		0.850
Satd. Flow (prot)	0	3539	1583	0	3539	1583	0	0	0	0.950	0.953	1583
Flt Permitted										0.950	0.953	
Satd. Flow (perm)	0	3539	1552	0	3539	1523	0	0	0	1.681	1.686	1562
Right Turn on Red		Yes	Yes		Yes	Yes		Yes	Yes			Yes
Satd. Flow (RTOR)		638			752							34
Link Speed (mph)		30			30			30				30
Link Distance (ft)		609			940			979				1126
Travel Time (s)		13.8			21.4			22.3				25.6
Confl. Peds. (#/hr)	8	0.96	0.96	4	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
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
Adj. Flow (vph)	0	1158	638	0	1834	752	0	0	0	352	1	431
Shared Lane Traffic (%)										50%		
Lane Group Flow (vph)	0	1158	638	0	1834	752	0	0	0	176	177	431
Turn Type		NA	Perm		NA	Perm		NA	Perm	NA	Perm	NA
Protected Phases		2			6			6		4		4
Permitted Phases		2	2		6	6		6		4	4	4
Detector Phase												
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0
Vehicle Extension (s)	24.8	24.8	34.1	34.1	34.1	34.1	34.1	34.1	34.1	33.8	33.8	33.8
Recall Mode	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	30.0	30.0	30.0
Walk Time (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	21.0	21.0	21.0
Flash Don't Walk (s)	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	94.2	94.2	93.9	93.9	93.9	93.9	93.9	93.9	93.9	28.0	28.0	28.0
Act Effect Green (s)	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.21	0.21	0.21
Actuated g/C Ratio	0.46	0.50	0.46	0.58	0.74	0.58	0.46	0.58	0.74	0.50	0.50	1.22
v/c Ratio	0.94	1.9	0.94	1.9	1.47	2.4	0.94	1.9	1.47	5.8	5.8	5.8
Control Delay										4.5	4.5	4.5
Max										7.0	7.0	7.0
Max										21.0	21.0	21.0
Max										0	0	0
Max										28.0	28.0	28.0
Max										0.21	0.21	0.21
Max										0.50	0.50	1.22
Max										52.5	52.5	163.2

2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
4: I-5 Southbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.7	0.6	0.6	0.7	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	2.5	2.5	15.3	2.5	2.5	52.5	52.5	52.5	52.5	163.2	163.2
LOS	B	A	A	B	B	A	D	D	D	D	D	F
Approach Delay	7.4			11.6			113.3	113.3	113.3	113.3	113.3	113.3
Approach LOS	A			B	B	A	F	F	F	F	F	F
Queue Length 50th (ft)	211	0	0	472	0	0	143	144	144	144	144	144
Queue Length 95th (ft)	253	33	33	556	35	35	224	226	226	226	226	226
Internal Link Dist (ft)	529			860			899	899	899	899	899	899
Turn Bay Length (ft)	2491	1281	1281	2483	1293	1293	350	350	350	350	350	350
Base Capacity (vph)	888	292	292	297	71	71	0	0	0	0	0	0
Stallion 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	0.72	0.65	0.65	0.84	0.62	0.62	0.50	0.50	0.50	0.50	1.22	1.22

Area Type: Other  
Cycle Length: 130  
Actuated Cycle Length: 133.8  
Natural Cycle: 90  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 1.22  
Intersection Signal Delay: 25.6  
Intersection Capacity Utilization 84.3%  
Analysis Period (min) 15  
Intersection LOS: C  
ICU Level of Service: E



Spills and Phases: 4: I-5 Southbound Ramps & 172nd Street NE

2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
5: I-5 Northbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	236	1230	0	0	1678	420	758	3	963	0	0	0
Future Volume (vph)	236	1230	0	0	1678	420	758	3	963	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	600	0	0	0	300	400	0	0	0	0	0	0
Storage Lanes	1	0	0	0	1	1	1	1	1	0	0	0
Taper Length (ft)	25	0	25	0	0	25	0	0	25	0	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				0.98	0.98			0.99			
Flt	0.950				0.850	0.850			0.850			
Flt Protected												
Sat'd. Flow (prot)	1770	3539	0	0	5085	1583	1681	1686	1583	0	0	0
Flt Permitted	0.950				0.950	0.953			0.953			
Sat'd. Flow (perm)	1768	3539	0	0	5085	1553	1681	1686	1562	0	0	0
Right Turn on Red			Yes		Yes	Yes	Yes	Yes	Yes			Yes
Sat'd. Flow (RTOR)					433				330			
Link Speed (mph)					30				30			30
Link Distance (ft)					1086				1094			999
Travel Time (s)					24.7				24.9			22.7
Confl. Peds. (#/hr)	3		9	9	3				5	5		
Confl. Bikes (#/hr)			1									
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
Adj. Flow (vph)	243	1268	0	0	1730	433	781	3	993	0	0	0
Shared Lane Traffic (%)					50%							
Lane Group Flow (vph)	243	1268	0	0	1730	433	390	394	993	0	0	0
Turn Type	Prot	INA	0	0	NA	Perm	Perm	NA	Free	0	0	0
Protected Phases	5	2			6			8				
Permitted Phases												
Detector Phase	5	2			6	6	8	8				
Switch Phase												
Minimum Initial (s)	5.0	7.0			7.0	7.0	7.0	7.0	4.5	Max	Max	4.5
Minimum Split (s)	10.6	24.1			23.8	23.8	40.8	40.8	7.0	7.0	7.0	7.0
Total Split (s)	30.0	90.0			60.0	60.0	30.0	30.0	28.0	28.0	28.0	28.0
Total Split (%)	25.0%	75.0%			50.0%	50.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Maximum Green (s)	24.4	83.9			54.2	54.2	24.2	24.2	35.0	35.0	35.0	35.0
Yellow Time (s)	3.6	4.1			3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
All-Red Time (s)	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
Total Lost Time (s)	5.6	6.1			5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Lead/Lag					Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0			4.0	4.0	4.5	4.5	4.5	4.5	4.5	4.5
Recall Mode	None	None			None	None	Max	Max	Max	Max	Max	Max
Walk Time (s)					7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)					8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)					0	0	0	0	0	0	0	0
Act Effct Green (s)	20.9	80.5			54.2	54.2	35.0	35.0	127.4			
Actuated G/C Ratio	0.16	0.63			0.43	0.43	0.27	0.27	1.00			
v/c Ratio	0.84	0.57			0.80	0.80	0.84	0.85	0.64			

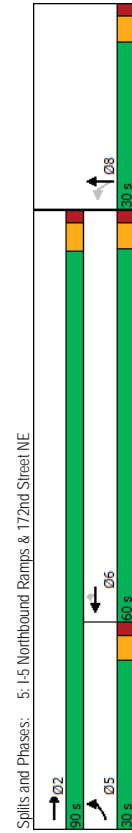
2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
5: I-5 Northbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	75.7	14.6			35.8	4.1	61.9	62.5	2.0			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	75.7	14.6			35.8	4.1	61.9	62.5	2.0			
LOS	E	B			D	A	E	E	A			
Approach Delay		24.4			29.4		28.6					
Approach LOS		C			C		C					
Queue Length 50th (ft)	197	295			460	0	327	331	0			
Queue Length 95th (ft)	#308	353			535	63	#517	#525	0			
Internal Link Dist (ft)	600	860			1006		1014					919
Turn Bay Length (ft)						300	400					
Base Capacity (vph)	339	2332			2164	909	462	463	1562			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.72	0.54			0.80	0.48	0.84	0.85	0.64			

Intersection Summary  
Area Type: Other  
Cycle Length: 120  
Actuated Cycle Length: 127.4  
Natural Cycle: 100  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.85  
Intersection Signal Delay: 27.8  
Intersection Capacity Utilization: 89.0%  
Analysis Period (min): 15  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.



Splits and Phases: 5: I-5 Northbound Ramps & 172nd Street NE  
2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
6: Smokey Point Boulevard & 156th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	→	→	→	←	←	←	←	←	←	←	←	←
Traffic Volume (vph)	29	9	297	14	9	38	258	900	12	17	902	57
Future Volume (vph)	29	9	297	14	9	38	258	900	12	17	902	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	150	200	0	250	0	200	0	0	200	0	0
Storage Lanes	1	1	1	0	1	0	1	0	0	1	0	0
Taper Length (ft)	25	25	25	0	25	0	25	0	0	25	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor								1.00	1.00	1.00	1.00	1.00
Frt	0.950	0.850	0.850	0.878	0.878	0.950	0.998	0.998	0.950	0.991	0.991	0.991
Flt Protected									0.950			
Satd. Flow (prot)	1770	1863	1583	1770	1635	0	1770	3531	0	1770	3502	0
Flt Permitted	0.633	0.752	0.752	0.158	0.158	0.307	0.307	0.307	0.307	0.307	0.307	0.307
Satd. Flow (perm)	1179	1863	1583	1401	1635	0	294	3531	0	572	3502	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			303	39	30			1			7	
Link Speed (mph)				30	30			30			30	
Link Distance (ft)				1704	1283			1356			4794	
Travel Time (s)				38.7	29.2			30.8			109.0	
Confl. Peds. (#/hr)									1	1		2
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	30	9	303	14	9	39	263	918	12	17	920	58
Lane Group Flow (vph)	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	NA	pm+pt	NA	NA	NA
Turn Type	7	4	4	8	8	5	2	2	1	6	6	6
Protected Phases	4	4	4	3	3	5	2	2	6	6	6	6
Permitted Phases	7	4	4	8	8	5	2	2	1	6	6	6
Detector Phase												
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0	7.0	7.0	10.0	10.0
Minimum Split (s)	12.0	25.0	25.0	12.0	25.0	12.0	25.0	25.0	12.0	25.0	25.0	25.0
Total Split (s)	25.0	20.0	20.0	25.0	10.0	20.0	50.0	50.0	20.0	50.0	50.0	50.0
Total Split (%)	21.7%	17.4%	17.4%	21.7%	8.7%	17.4%	43.5%	43.5%	17.4%	43.5%	43.5%	43.5%
Maximum Green (s)	20.0	15.0	15.0	20.0	5.0	15.0	45.0	45.0	15.0	45.0	45.0	45.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.5	3.5	2.0	3.5	3.5	3.5
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	11.3	10.2	10.2	10.3	8.0	48.7	47.0	47.0	37.1	29.6	29.6	29.6
Actuated g/C Ratio	0.16	0.14	0.14	0.14	0.11	0.68	0.66	0.66	0.52	0.42	0.42	0.42
v/c Ratio	0.12	0.03	0.62	0.06	0.22	0.54	0.40	0.40	0.04	0.67	0.67	0.67
Control Delay	28.6	32.8	10.9	28.0	18.5	12.6	8.0	8.0	6.4	19.9	19.9	19.9

2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
6: Smokey Point Boulevard & 156th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	28.6	32.8	10.9	28.0	18.5	12.6	8.0	8.0	6.4	19.9	19.9	19.9
LOS	C	C	B	C	B	B	A	A	A	A	A	B
Approach Delay	13.0	13.0	20.7	20.7	20.7	9.0	9.0	9.0	9.0	19.6	19.6	19.6
Approach LOS	B	B	C	C	B	A	A	A	A	A	A	B
Queue Length 50th (ft)	11	3	0	5	3	24	50	50	1	152	152	152
Queue Length 95th (ft)	38	20	78	23	38	139	247	247	11	314	314	314
Internal Link Dist (ft)	150	1624	150	200	1203	250	1276	1276	200	4714	4714	4714
Turn Bay Length (ft)	543	427	596	546	396	532	2567	2567	633	2358	2358	2358
Stallion 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	0.06	0.02	0.51	0.03	0.12	0.49	0.36	0.36	0.03	0.41	0.41	0.41

Intersection Summary  
Area Type: Other  
Cycle Length: 115  
Actuated Cycle Length: 71.3  
Natural Cycle: 80  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.67  
Intersection Signal Delay: 13.9  
Intersection LOS: B  
Intersection Capacity Utilization: 63.5%  
Analysis Period (min): 15



Spills and Phases: 6: Smokey Point Boulevard & 156th Street NE

2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings

7: Smokey Point Boulevard & 152nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	10 Degrees
Lane Configurations	1	1	1	1	1	1	1	1	1	1	1	1	10 Degrees
Traffic Volume (vph)	18	8	23	114	7	339	18	823	158	395	815	10	10
Future Volume (vph)	18	8	23	114	7	339	18	823	158	395	815	10	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50	0	0	125	0	0	150	0	200	0	0	0	0
Storage Lanes	1	0	0	1	0	0	1	0	0	1	0	0	0
Taper Length (ft)	25	0	25	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	0.95
Lane Util. Factor	1.00	1.00	1.00	0.99	0.853	0.950	0.976	0.950	0.950	0.950	0.950	0.950	0.950
Ped Bike Factor	1.00	0.887	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Flt Protected	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1770	1652	0	1770	1568	0	1770	3440	0	1770	3531	0	0
Flt Permitted	0.678	0.678	0.406	0.406	0.330	0.330	0.330	0.137	0.137	0.137	0.137	0	0
Satd. Flow (perm)	1262	1652	0	756	1568	0	614	3440	0	255	3531	0	0
Right Turn on Red			Yes			Yes			Yes			Yes	Yes
Satd. Flow (RTOR)			24	353	30	21	30	30	30	30	30	30	30
Link Speed (mph)	30	30	30	5141	5141	1452	1452	33.0	33.0	33.0	33.0	33.0	33.0
Link Distance (ft)	209	209	4.8	116.8	116.8	1	2	2	2	2	2	2	2
Travel Time (s)	4.8	4.8	4.8	116.8	116.8	1	2	2	2	2	2	2	2
Confl. Peds. (#/hr)	1	1	1	1	1	1	1	1	1	1	1	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	0.96
Adj. Flow (vph)	19	8	24	119	7	353	19	857	165	411	849	10	10
Shared Lane Traffic (%)	19	32	0	119	360	0	19	1022	0	411	859	0	0
Lane Group Flow (vph)	pm+pt	NA	NA	pm+pt	NA	NA	NA	NA	pm+pt	NA	NA	NA	NA
Turn Type	7	4	4	3	8	5	2	2	1	6	6	6	6
Protected Phases	4	4	4	3	8	5	2	2	1	6	6	6	6
Permitted Phases	7	4	4	3	8	5	2	2	1	6	6	6	6
Detector Phase	7	4	4	3	8	5	2	2	1	6	6	6	6
Switch Phase	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Initial (s)	9.5	27.0	11.5	26.0	9.5	24.0	9.5	24.0	9.5	26.0	26.0	26.0	26.0
Minimum Split (s)	16.0	16.0	16.0	40.0	16.0	50.0	16.0	50.0	16.0	50.0	50.0	50.0	50.0
Total Split (%)	13.1%	13.1%	13.1%	32.8%	13.1%	41.0%	13.1%	41.0%	13.1%	41.0%	41.0%	41.0%	41.0%
Maximum Green (s)	11.0	11.0	11.0	35.0	11.0	45.0	11.0	45.0	11.0	45.0	45.0	45.0	45.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	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	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	15.0	14.0	14.0	12.0	12.0	12.0	14.0	14.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	9.1	6.1	14.3	10.7	6.1	33.8	28.1	6.1	45.2	41.7	41.7	41.7	41.7
Actuated g/C Ratio	0.13	0.09	0.20	0.15	0.15	0.48	0.40	0.15	0.64	0.59	0.59	0.59	0.59
v/c Ratio	0.09	0.20	0.43	0.67	0.67	0.73	0.73	0.41	0.98	0.41	0.41	0.41	0.41
Control Delay	24.9	22.0	29.5	11.5	11.5	7.5	21.5	11.0	62.1	11.0	11.0	11.0	11.0

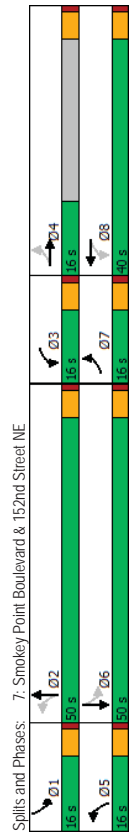
2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings

7: Smokey Point Boulevard & 152nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	10 Degrees
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	0.0
Total Delay	24.9	22.0	29.5	11.5	11.5	7.5	21.5	11.0	62.1	11.0	11.0	11.0	11.0
LOS	C	C	C	C	B	A	C	C	E	B	B	B	B
Approach Delay	23.1	16.0	16.0	16.0	16.0	21.3	21.3	21.3	27.5	21.3	21.3	21.3	21.3
Approach LOS	C	C	C	C	B	C	C	C	C	C	C	C	C
Queue Length 50th (ft)	7	3	43	2	2	3	198	92	-151	92	92	92	92
Queue Length 95th (ft)	25	32	101	87	87	13	314	226	#415	226	226	226	226
Internal Link Dist (ft)	50	129	5061	1372	1372	1372	1372	1372	200	200	200	200	200
Turn Bay Length (ft)	360	891	354	1000	1000	542	2364	418	2436	418	2436	418	2436
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0	0
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.04	0.34	0.36	0.36	0.04	0.43	0.98	0.98	0.98	0.98	0.98	0.98
Intersection Summary	Other												
Area Type:	Other												
Cycle Length:	122												
Actuated Cycle Length:	70.1												
Natural Cycle:	90												
Control Type:	Actuated-Uncoordinated												
Maximum v/c Ratio:	0.98												
Intersection Signal Delay:	23.2												
Intersection Capacity Utilization:	83.7%												
Analysis Period (min):	15												
Intersection LOS:	C												
ICU Level of Service:	E												
Volume shown is maximum after two cycles.													
Queue shown is maximum after two cycles.													
# 95th percentile volume exceeds capacity, queue may be longer.													
Queue shown is maximum after two cycles.													



2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]



Lanes, Volumes, Timings  
8: State Avenue/Smockey Point Boulevard & 136th Street NE

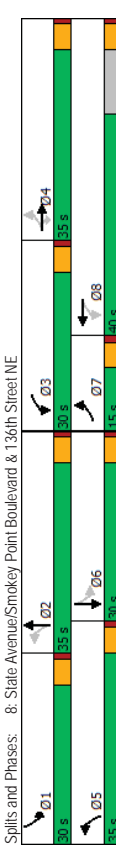
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	183	258	91	181	223	170	120	596	244	176	557	251
Traffic Volume (vph)	183	258	91	181	223	170	120	596	244	176	557	251
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	150	150	200	150	200	0	300	0	300	0	300	0
Storage Length (ft)	1	1	1	1	1	0	1	0	1	0	1	0
Storage Lanes	25	25	25	25	25	0	25	0	25	0	25	0
Taper Length (ft)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Lane Util. Factor	0.850	0.850	0.850	0.935	0.935	0.956	0.956	0.953	0.953	0.953	0.953	0.953
Ped Bike Factor	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
FIT Protected	1752	1845	1568	1752	1725	0	1752	3351	0	1752	3315	0
Satd. Flow (prot)	0.204	0.369	0.369	0.369	0.369	0.176	0.176	0.123	0.123	0.123	0.123	0.123
FIT Permitted	376	1845	1547	680	1725	0	325	3351	0	227	3315	0
Satd. Flow (perm)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Right Turn on Red	143	30	30	32	30	44	44	49	49	49	49	49
Satd. Flow (RTOR)	30	981	4740	107.7	2821	64.1	100.5	2	2	2	2	2
Link Speed (mph)	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Link Distance (ft)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Travel Time (s)	193	272	96	191	235	179	126	627	257	185	586	264
Confl. Peds. (#/hr)	193	272	96	191	235	179	126	627	257	185	586	264
Confl. Bikes (#/hr)	pm+pt	MA	Perm	pm+pt	NA	pm+pt	NA	884	0	185	850	0
Peak Hour Factor	7	4	4	3	8	5	2	2	2	6	6	6
Heavy Vehicles (%)	4	4	4	8	8	2	2	2	2	6	6	6
Adj. Flow (vph)	7	4	4	3	8	5	2	2	2	6	6	6
Shared Lane Traffic (%)	5.0	5.0	5.0	5.0	7.0	5.0	7.0	7.0	7.0	5.0	7.0	7.0
Lane Group Flow (vph)	10.0	34.0	34.0	10.0	23.0	10.0	35.0	10.0	35.0	10.0	23.0	10.0
Turn Type	15.0	35.0	35.0	30.0	40.0	35.0	35.0	30.0	40.0	30.0	30.0	30.0
Protected Phases	11.5%	26.9%	26.9%	23.1%	30.8%	26.9%	26.9%	23.1%	23.1%	23.1%	23.1%	23.1%
Permitted Phases	10.0	30.0	30.0	25.0	35.0	30.0	30.0	25.0	35.0	25.0	25.0	25.0
Detector Phase	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Switch Phase	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Initial (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
Minimum Split (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Total Split (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
Total Split (%)	None	None	None	None	None	None	None	None	None	None	None	None
Maximum Green (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Yellow Time (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
All-Red Time (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
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)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (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
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Don't Walk (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effr Green (s)	33.7	24.0	24.0	36.9	25.7	39.5	30.4	43.6	32.4	43.6	32.4	32.4
Actuated g/C Ratio	0.35	0.25	0.25	0.38	0.26	0.41	0.31	0.45	0.33	0.45	0.33	0.33

2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
8: State Avenue/Smockey Point Boulevard & 136th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.72	0.60	0.20	0.50	0.86	0.48	0.82	0.48	0.82	0.67	0.75	0.75
Control Delay	36.9	39.2	2.6	23.4	49.9	22.4	38.6	22.4	38.6	31.5	33.5	33.5
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	36.9	39.2	2.6	23.4	49.9	22.4	38.6	22.4	38.6	31.5	33.5	33.5
LOS	D	D	A	C	D	C	D	D	D	C	C	C
Approach Delay	32.1	32.1	41.5	36.6	36.6	36.6	36.6	36.6	36.6	33.2	33.2	33.2
Approach LOS	C	C	D	D	D	D	D	D	D	C	C	C
Queue Length 50th (ft)	76	148	0	75	226	43	256	43	256	65	232	232
Queue Length 95th (ft)	#168	257	14	132	363	88	#441	88	#441	146	#365	#365
Internal Link Dist (ft)	150	901	150	200	4660	300	1077	300	1077	300	1137	1137
Turn Bay Length (ft)	275	576	581	562	825	601	1077	601	1077	505	1137	1137
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
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	0.70	0.47	0.17	0.34	0.50	0.21	0.82	0.21	0.82	0.37	0.75	0.75
Intersection Summary	Other											
Area Type:	Other											
Cycle Length:	130											
Actuated Cycle Length:	97.2											
Natural Cycle:	90											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.86											
Intersection Signal Delay:	35.6											
Intersection LOS:	D											
ICU Level of Service E	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.												



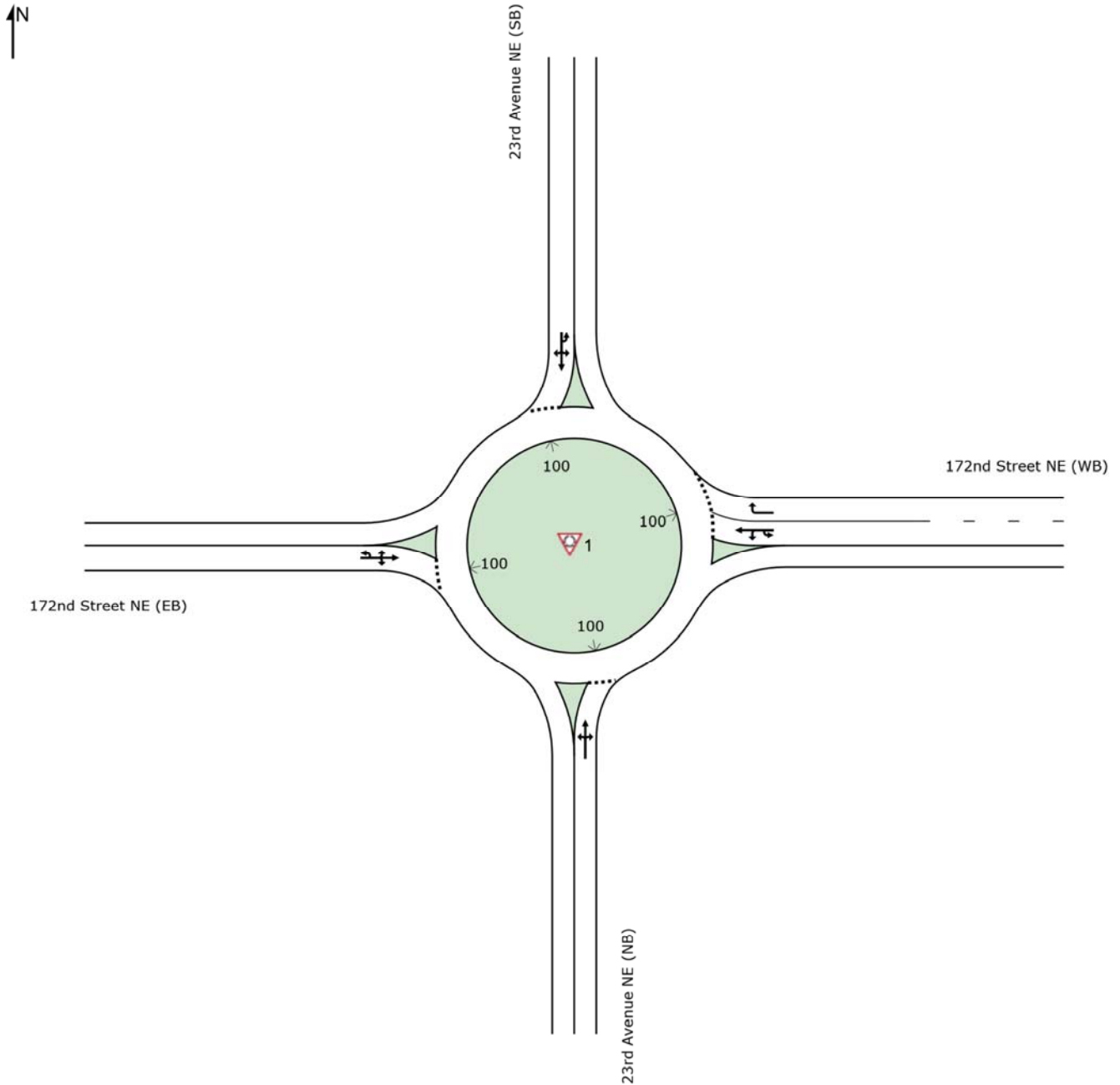
2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

# SITE LAYOUT

 **Site: 1 [2030 Horizon Conditions - Weekday PM]**

172nd Street NE at 23rd Avenue NE  
Site Category: PM Peak-Hour  
Roundabout



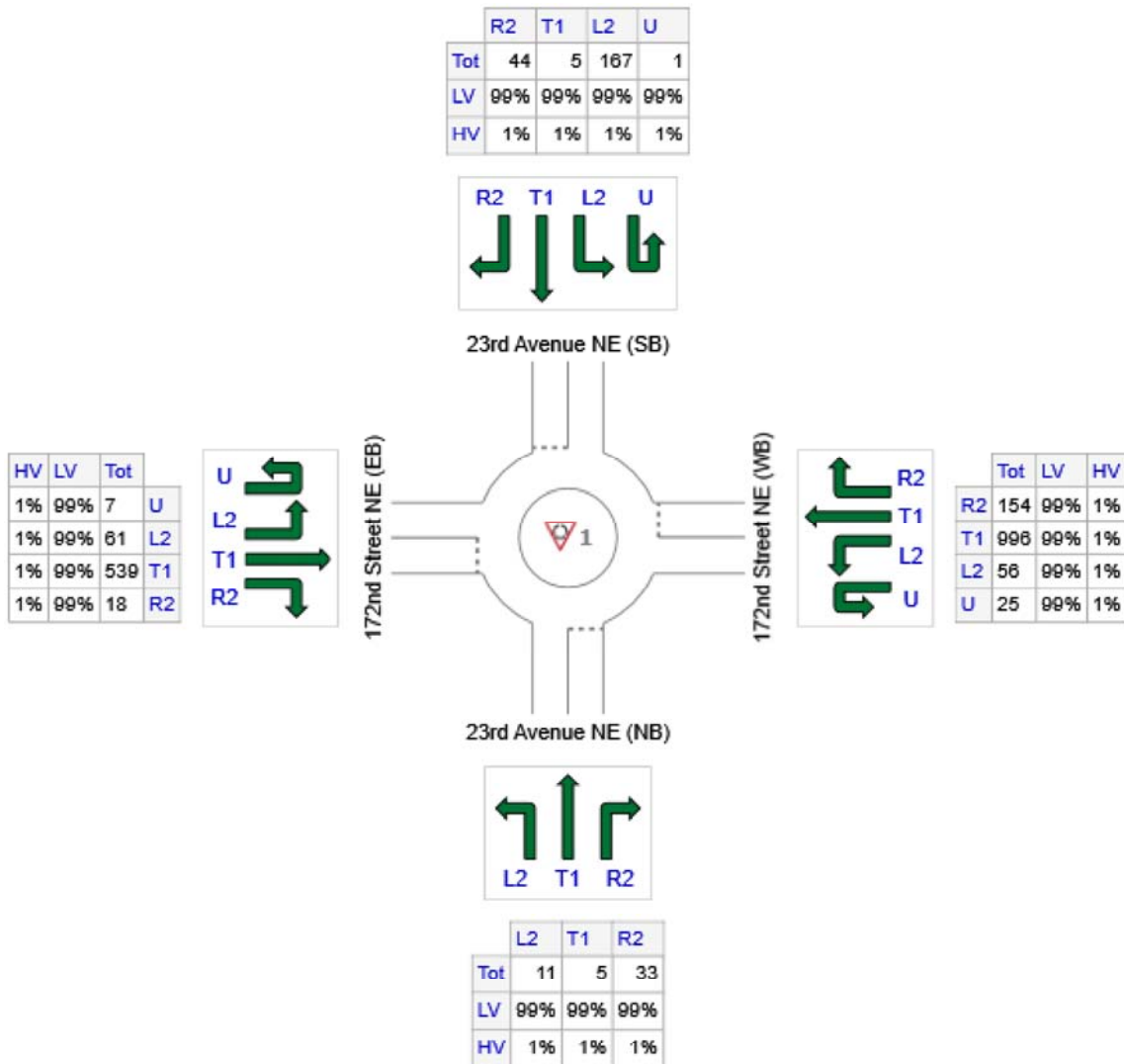
# INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 1 [2030 Horizon Conditions - Weekday PM]

172nd Street NE at 23rd Avenue NE  
 Site Category: PM Peak-Hour  
 Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 23rd Avenue NE (NB)	49	49	0
E: 172nd Street NE (WB)	1231	1219	12
N: 23rd Avenue NE (SB)	217	215	2
W: 172nd Street NE (EB)	625	619	6
Total	2122	2101	21

# MOVEMENT SUMMARY

## Site: 1 [2030 Horizon Conditions - Weekday PM]

172nd Street NE at 23rd Avenue NE  
 Site Category: PM Peak-Hour  
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: 23rd Avenue NE (NB)												
3	L2	12	1.0	0.079	15.1	LOS B	0.5	13.3	0.81	0.75	0.81	34.4
8	T1	5	1.0	0.079	9.1	LOS A	0.5	13.3	0.81	0.75	0.81	34.3
18	R2	35	1.0	0.079	9.2	LOS A	0.5	13.3	0.81	0.75	0.81	33.4
Approach		53	1.0	0.079	10.5	LOS B	0.5	13.3	0.81	0.75	0.81	33.7
East: 172nd Street NE (WB)												
1u	U	27	1.0	0.724	12.9	LOS B	9.1	229.1	0.50	0.45	0.50	37.2
1	L2	60	1.0	0.724	10.5	LOS B	9.1	229.1	0.50	0.45	0.50	36.2
6	T1	1071	1.0	0.724	4.6	LOS A	9.1	229.1	0.50	0.45	0.50	36.1
16	R2	166	1.0	0.149	4.6	LOS A	0.8	20.1	0.28	0.48	0.28	36.0
Approach		1324	1.0	0.724	5.0	LOS A	9.1	229.1	0.48	0.46	0.48	36.1
North: 23rd Avenue NE (SB)												
7u	U	1	1.0	0.497	28.2	LOS C	4.6	115.5	1.00	1.10	1.27	29.2
7	L2	180	1.0	0.497	25.8	LOS C	4.6	115.5	1.00	1.10	1.27	28.6
4	T1	5	1.0	0.497	19.8	LOS B	4.6	115.5	1.00	1.10	1.27	28.5
14	R2	47	1.0	0.497	19.9	LOS B	4.6	115.5	1.00	1.10	1.27	27.9
Approach		233	1.0	0.497	24.4	LOS C	4.6	115.5	1.00	1.10	1.27	28.4
West: 172nd Street NE (EB)												
5u	U	8	1.0	0.576	13.9	LOS B	4.7	118.5	0.65	0.58	0.65	36.6
5	L2	66	1.0	0.576	11.5	LOS B	4.7	118.5	0.65	0.58	0.65	35.7
2	T1	580	1.0	0.576	5.5	LOS A	4.7	118.5	0.65	0.58	0.65	35.6
12	R2	19	1.0	0.576	5.6	LOS A	4.7	118.5	0.65	0.58	0.65	34.5
Approach		672	1.0	0.576	6.2	LOS A	4.7	118.5	0.65	0.58	0.65	35.6
All Vehicles		2282	1.0	0.724	7.5	LOS A	9.1	229.1	0.59	0.57	0.62	34.9

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	1	1	1	1	1	1	1	1	1	1	1
Traffic Volume (vph)	42	512	163	886	959	395	262	120	707	389	100	64
Future Volume (vph)	42	512	163	886	959	395	262	120	707	389	100	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	195		375	400	200	150			0	175		175
Storage Lanes	1		1	2	1	1			1	1		1
Taper Length (ft)	25		25			25			1.00	0.97		1.00
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	1.00	1.00	1.00	1.00	0.97	0.99	1.00
Ped Bike Factor		0.964				0.850			0.850	0.950	0.942	
FRT		0.950		0.950		0.950			0.950	0.950	0.942	
FRT Protected		1787		3467		1599			1787	1881	1599	3467
Satd. Flow (prot)		0.950		0.950		0.950			0.950	0.950	0.950	
FRT Permitted		1787		3467		1599			1787	1881	1599	3467
Satd. Flow (perm)		0.950		0.950		0.950			0.950	0.950	0.950	
Right Turn on Red				Yes		Yes			Yes	Yes	Yes	Yes
Satd. Flow (RTOR)		25		263		263			461	20		20
Link Speed (mph)		30		30		30			30	30		30
Link Distance (ft)		1312		609		730			730	589		589
Travel Time (s)		29.8		13.8		16.6			13.4	13.4		13.4
Confl. Peds. (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	44	539	172	933	1009	416	276	126	744	409	105	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	711	0	933	1009	416	276	126	744	409	172	0
Turn Type	Prot	NA	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	NA
Protected Phases	5	2		1	6		3	8	8	7	4	
Permitted Phases												
Detector Phase	5	2		1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Split (s)	9.5	38.3		38.3	38.3	38.3	9.5	23.1	23.1	9.5	45.1	45.1
Total Split (s)	20.0	38.3		46.0	60.0	60.0	25.0	25.0	25.0	25.0	45.1	45.1
Total Split (%)	13.0%	24.8%		29.8%	38.9%	38.9%	16.2%	16.2%	16.2%	16.2%	29.2%	29.2%
Maximum Green (s)	15.0	32.0		41.0	53.7	53.7	20.0	19.9	19.9	20.0	40.0	40.0
Yellow Time (s)	3.0	4.3		3.0	4.3	4.3	3.0	3.1	3.1	3.0	3.1	3.1
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)	5.0	6.3		5.0	6.3	6.3	5.0	5.1	5.1	5.0	5.1	5.1
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	3.0		2.5	3.0	3.0	2.5	3.0	3.0	2.5	3.0	3.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0	25.0		25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	8.7	32.0		41.0	66.4	66.4	20.0	40.2	40.2	19.8	40.0	40.0
Actuated G/C Ratio	0.06	0.21		0.27	0.43	0.43	0.13	0.26	0.26	0.13	0.26	0.26
v/c Ratio	0.44	0.97		1.01	0.66	0.50	1.19	0.26	0.98	0.92	0.37	0.37

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2030 Horizon Conditions  
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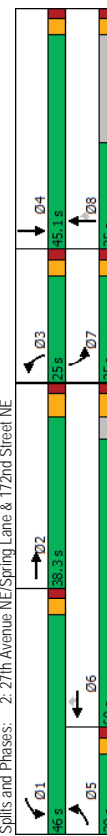
Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	83.1	84.3		88.5	38.4	13.8	176.7	47.1	50.1	93.1	43.8	43.8
Queue Delay	0.0	0.0		0.0	1.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.1	84.3		88.5	40.1	14.2	176.7	47.1	50.1	93.1	43.8	43.8
LOS	F	F		F	D	B	F	D	D	F	D	D
Approach Delay		84.3		54.7				80.2			78.5	
Approach LOS		F		D				F			E	
Queue Length 50th (ft)	44	367		-509	432	106	-335	102	363	212	126	126
Queue Length 95th (ft)	87	#500		#643	532	215	#525	163	#655	#310	199	199
Internal Link Dist (ft)		1232			529			650			509	
Turn Bay Length (ft)	195			400		200	150		175			
Base Capacity (vph)	173	734		920	1536	837	231	490	757	449	471	471
Starvation Cap Reductn	0	0		0	338	117	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	0.25	0.97		1.01	0.84	0.58	1.19	0.26	0.98	0.91	0.37	0.37

Intersection Summary

Area Type: Other  
 Cycle Length: 154.4  
 Actuated Cycle Length: 154.4  
 Natural Cycle: 145  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 1.19  
 Intersection Signal Delay: 68.2  
 Intersection Capacity Utilization: 110.3%  
 Analysis Period (min): 15  
 Intersection LOS: E  
 ICU Level of Service: H

- 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: 27th Avenue NE/Spring Lane & 172nd Street NE

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR
Control Delay	34.4	0.0	0.0	31.1	10.2	4.4	10.8	4.9	5.4	2.0	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	34.4	0.0	0.0	31.1	10.2	4.4	10.8	4.9	5.4	2.0	
LOS	C	C	C	C	B	A	B	A	A	A	
Approach Delay	34.4	0.0	0.0	12.9	0.0	0.0	10.7	4.9	0.0	0.0	
Approach LOS	C	C	C	B	B	A	B	A	A	A	
Queue Length 50th (ft)	30	0	0	14	0	1	76	26	38	0	
Queue Length 95th (ft)	71	0	0	40	57	4	214	95	180	15	
Internal Link Dist (ft)	887	0	0	333	0	0	645	650	0	0	
Turn Bay Length (ft)	0	0	0	0	0	0	0	0	0	0	
Base Capacity (vph)	413	0	0	499	593	904	1108	961	1403	1161	
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	0.18	0.07	0.37	0.01	0.34	0.01	0.34	0.31	0.29	0.05	

Intersection Summary  
Area Type: Other  
Cycle Length: 105  
Actuated Cycle Length: 78.5  
Natural Cycle: 65  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.55  
Intersection Signal Delay: 9.3  
Intersection Capacity Utilization: 56.1%  
Analysis Period (min): 15



Splits and Phases: 3: 27th Avenue NE & 169th Place NE  
Intersection LOS: A  
ICU Level of Service B

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR
Lane Configurations	40	23	7	3	29	209	5	355	10	290	395
Traffic Volume (vph)	40	23	7	3	29	209	5	355	10	290	395
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	0	0	0	75	0	0	200	0	0	0	135
Storage Length (ft)	0	0	0	1	1	1	1	1	1	1	1
Storage Lanes	25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Taper Length (ft)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.987	0.972	0.995	0.999	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Ped Bike Factor	0.1800	0.1872	0.1872	0.1872	0.1872	0.1872	0.1872	0.1872	0.1872	0.1872	0.1872
Flt Protected	0	0	0	0	0	0	0	0	0	0	0
Satd. Flow (prot)	0.813	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977
Flt Permitted	0	1505	0	0	1836	1599	970	1872	0	844	1881
Satd. Flow (perm)	5	30	30	30	30	30	30	30	30	30	30
Right Turn on Red	0	0	0	0	0	0	0	0	0	0	0
Satd. Flow (RTOR)	0	0	0	0	0	0	0	0	0	0	0
Link Speed (mph)	30	30	30	30	30	30	30	30	30	30	30
Link Distance (ft)	967	413	725	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
Travel Time (s)	22.0	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
Confl. Peds. (#/hr)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Peak Hour Factor	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Heavy Vehicles (%)	42	24	7	3	30	218	5	370	10	302	411
Adj. Flow (vph)	0	73	0	0	33	218	5	380	0	302	411
Shared Lane Traffic (%)	Perm	NA	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA	Perm
Lane Group Flow (vph)	4	4	4	4	4	4	4	4	4	4	4
Protected Phases	4	8	8	8	8	8	8	8	8	8	8
Permitted Phases	4	8	8	8	8	8	8	8	8	8	8
Detector Phase	4	4	4	4	4	4	4	4	4	4	4
Switch Phase	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Initial (s)	22.5	22.5	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%
Total Split (%)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Maximum Green (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Yellow Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
All-Red Time (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lost Time Adjust (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Lead/Lag	None	None	None	None	None	None	None	None	None	None	None
Lead-Lag Optimize?	None	None	None	None	None	None	None	None	None	None	None
Vehicle Extension (s)	8.0	8.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Recall Mode	3	3	3	3	3	3	3	3	3	3	3
Flash Don't Walk (s)	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
Pedestrian Calls (#/hr)	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Act Effct Green (s)	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Actuated G/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
v/c Ratio	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
4: I-5 Southbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1145	612	0	1792	722	0	0	0	338	4	439
Future Volume (vph)	0	1145	612	0	1792	722	0	0	0	338	1	439
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200	0	0	0	0	0	0	0	350	0	435
Storage Lanes	0	1	0	0	1	0	0	0	0	1	0	1
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		0.98	0.96		0.96	0.850				0.850	0.850	0.99
FRT		0.850								0.850	0.850	0.850
Flt Protected												
Satd. Flow (prot)	0	3539	1583	0	3539	1583	0	0	0	0.950	0.953	1583
Flt Permitted										0.950	0.953	0.953
Satd. Flow (perm)	0	3539	1552	0	3539	1523	0	0	0	1.681	1.686	1562
Right Turn on Red		Yes	Yes		Yes	Yes		Yes	Yes			Yes
Satd. Flow (RTOR)		638			752							32
Link Speed (mph)		30			30			30				30
Link Distance (ft)		609			940			979				1126
Travel Time (s)		13.8			21.4			22.3				25.6
Confl. Peds. (#/hr)	8	0	4	4	8	1	1	8	0	0	0	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
Adj. Flow (vph)	0	1193	638	0	1867	752	0	0	0	352	1	457
Shared Lane Traffic (%)										50%		
Lane Group Flow (vph)	0	1193	638	0	1867	752	0	0	0	176	177	457
Turn Type		NA	Perm		NA	Perm		NA	Perm	NA	Perm	NA
Protected Phases		2			6			6		4		4
Permitted Phases		2			6			6		4		4
Detector Phase												
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0
Vehicle Extension (s)	24.8	24.8	34.1	34.1	34.1	34.1	34.1	34.1	34.1	33.8	33.8	33.8
Recall Mode	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	30.0	30.0	30.0
Total Split (%)	76.9%	76.9%	76.9%	76.9%	76.9%	76.9%	76.9%	76.9%	76.9%	23.1%	23.1%	23.1%
Maximum Green (s)	94.2	94.2	93.9	93.9	93.9	93.9	93.9	93.9	93.9	24.2	24.2	24.2
Yellow Time (s)	3.8	3.8	4.1	4.1	4.1	4.1	4.1	4.1	4.1	3.8	3.8	3.8
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)	5.8	5.8	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.8	5.8	5.8
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5
Recall Mode	None	None	None	None	None	None	None	None	None	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	21.0	21.0	21.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	94.2	94.2	93.9	93.9	93.9	93.9	93.9	93.9	93.9	28.0	28.0	28.0
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.21	0.21	0.21
v/c Ratio	0.48	0.50	0.75	0.58	0.75	0.58	0.75	0.58	0.75	0.50	0.50	1.30
Control Delay	9.6	1.9	15.1	2.4	15.1	2.4	2.4	15.1	2.4	52.5	52.5	192.7

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
4: I-5 Southbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.7	0.6	0.6	0.7	0.1	0.7	0.1	0.1	0.1	0.0	0.0	0.0
Total Delay	10.3	2.5	2.5	15.8	2.5	15.8	2.5	2.5	2.5	52.5	52.5	192.7
LOS	B	A	A	B	A	B	A	B	A	D	D	F
Approach Delay	7.6			12.0		12.0				131.6		
Approach LOS	A			B		B				F		
Queue Length 50th (ft)	221	0	0	489	0	489	0	0	0	143	144	-486
Queue Length 95th (ft)	265	33	33	577	35	577	35	35	35	224	226	#702
Internal Link Dist (ft)	529			860		860		899		1046		
Turn Bay Length (ft)	2491	1281	1281	2483	1293	2483	1293	1293	1293	350	352	352
Base Capacity (vph)	873	292	292	291	71	291	71	71	71	0	0	0
Stallion 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	0.74	0.65	0.65	0.85	0.62	0.85	0.62	0.62	0.62	0.50	0.50	1.30
Intersection Summary												
Area Type:	Other											
Cycle Length:	130											
Actuated Cycle Length:	133.8											
Natural Cycle:	90											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	1.30											
Intersection Signal Delay:	28.9											
Intersection Capacity Utilization:	86.7%											
Analysis Period (min):	15											
ICU Level of Service:	E											
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.												
Spills and Phases:	4: I-5 Southbound Ramps & 172nd Street NE											

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
5: I-5 Northbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	251	1248	0	0	1709	420	758	3	963	0	0	0
Future Volume (vph)	251	1248	0	0	1709	420	758	3	963	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	600	0	0	0	300	400	0	0	0	0	0	0
Storage Lanes	1	0	0	0	1	1	1	1	1	25	1.00	1.00
Taper Length (ft)	25	0	25	1.00	0.91	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Lane Util. Factor	1.00	0.95	1.00	1.00	0.98	0.98	0.850	0.850	0.850	0.850	0.850	0.850
Ped Bike Factor	1.00											
Flt Protected	0.950											
Satd. Flow (prot)	1770	3539	0	0	5085	1583	1681	1686	1583	0	0	0
Flt Permitted	0.950											
Satd. Flow (perm)	1769	3539	0	0	5085	1553	1681	1686	1562	0	0	0
Right Turn on Red			Yes		Yes	Yes	Yes	Yes	Yes			Yes
Satd. Flow (RTOR)			327		433				327			
Link Speed (mph)	30			30			30		30			30
Link Distance (ft)	940			1086			1094		999			999
Travel Time (s)	21.4			24.7			24.9		22.7			22.7
Confl. Peds. (#/hr)	3		9	9		3			5		5	
Confl. Bikes (#/hr)			1									
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
Adj. Flow (vph)	259	1287	0	0	1762	433	781	3	993	0	0	0
Shared Lane Traffic (%)							50%					
Lane Group Flow (vph)	259	1287	0	0	1762	433	390	394	993	0	0	0
Turn Type	Ptnt	NA	NA	NA	Perm	Perm	Perm	NA	Free	Free	Free	Free
Permitted Phases	5	2		6		6	8	8				
Detector Phase	5	2		6	6	6	8	8				
Switch Phase												
Minimum Initial (s)	5.0	7.0		7.0	7.0	7.0	7.0	7.0	4.5	Max	Max	4.5
Minimum Split (s)	10.6	24.1		23.8	23.8	40.8	40.8	40.8	Max	Max	Max	7.0
Total Split (s)	30.0	90.0		60.0	60.0	30.0	30.0	30.0	28.0	28.0	28.0	28.0
Total Split (%)	25.0%	75.0%		50.0%	50.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Maximum Green (s)	24.4	83.9		54.2	54.2	24.2	24.2	24.2	8	8	8	8
Yellow Time (s)	3.6	4.1		3.8	3.8	3.8	3.8	3.8	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.0
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)	5.6	6.1		5.8	5.8	5.8	5.8	5.8	8	8	8	8
Lead/Lag				Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		4.0	4.0	4.0	4.5	4.5	4.5	4.5	4.5	4.5
Recall Mode	None	None		None	None	None	Max	Max	Max	Max	Max	Max
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)				8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0	0	0	0
Act Effct Green (s)	21.8	81.3		54.3	54.3	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Actuated G/C Ratio	0.17	0.63		0.42	0.42	0.27	0.27	0.27	0.27	0.27	0.27	0.27
v/c Ratio	0.86	0.57		0.82	0.82	0.48	0.85	0.86	0.64	0.64	0.64	0.64

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

Lanes, Volumes, Timings  
5: I-5 Northbound Ramps & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	78.2	14.7		37.0	4.1	63.0	63.5	2.0	2.0			
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay	78.2	14.7		37.0	4.1	63.0	63.5	2.0	2.0			
LOS	E	B		D	A	E	E	A	A			
Approach Delay		25.3		30.5								
Approach LOS		C		C								
Queue Length 50th (ft)	212	302		484	0	333	337	0	0			
Queue Length 95th (ft)	#340	361		550	63	#517	#525	0	0			
Internal Link Dist (ft)	600	860		1006		400	1014					919
Turn Bay Length (ft)						300	400					
Base Capacity (vph)	337	2316		2150	906	458	460	1562				
Starvation Cap Reductn	0	0		0	0	0	0	0				
Spillback Cap Reductn	0	0		0	0	0	0	0				
Storage Cap Reductn	0	0		0	0	0	0	0				
Reduced v/c Ratio	0.77	0.56		0.82	0.48	0.85	0.86	0.64				
Intersection Summary	Other											
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	128.3											
Natural Cycle:	100											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.86											
Intersection Signal Delay:	28.6											
Intersection Capacity Utilization:	90.4%											
Analysis Period (min):	15											
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
Splits and Phases:	5: I-5 Northbound Ramps & 172nd Street NE											

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

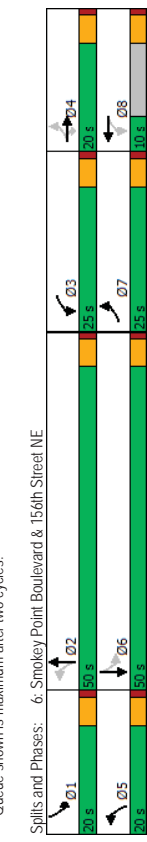
PM Peak-Hour



Lanes, Volumes, Timings  
6: Smokey Point Boulevard & 156th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	28.0	32.1	9.9	27.4	23.1	16.9	8.7	6.9	8.7	6.9	21.9	21.9
LOS	C	C	A	C	C	B	A	A	A	A	C	C
Approach Delay			12.6		23.9				10.7			21.6
Approach LOS			B		C			B				C
Queue Length 50th (ft)	13	6	0	5	10	55	96	3	203			318
Queue Length 95th (ft)	40	30	80	23	51	#192	250	11	318			4714
Internal Link Dist (ft)	150	1624	150	200	1203	501	1276	200	604	2227	0.03	0.44
Turn Bay Length (ft)	513	413	598	518	387	250	2433	604	2227	0	0	0
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
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	0.06	0.04	0.53	0.03	0.16	0.58	0.38	0.03	0.38	0.03	0.44	0.44

Area Type: Other  
 Cycle Length: 115  
 Actuated Cycle Length: 74.7  
 Natural Cycle: 80  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.70  
 Intersection Signal Delay: 15.4  
 Intersection Capacity Utilization: 64.6%  
 Analysis Period (min): 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.



Lanes, Volumes, Timings  
6: Smokey Point Boulevard & 156th Street NE

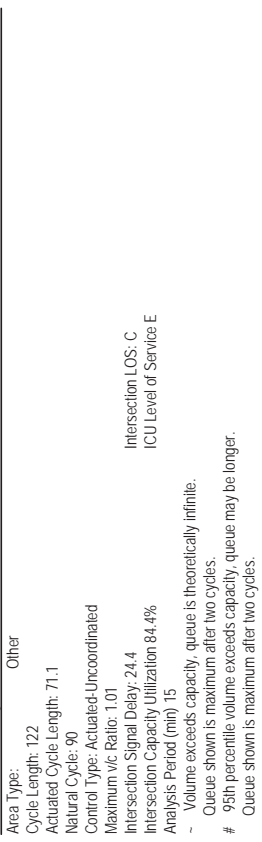
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	1	1	1	1	1	1	1	1	1	1	1
Traffic Volume (vph)	32	17	312	14	22	38	284	900	12	17	902	62
Future Volume (vph)	32	17	312	14	22	38	284	900	12	17	902	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	150	150	200	0	0	250	0	0	200	0	0
Storage Lanes	1	1	1	1	0	0	1	0	0	1	0	0
Taper Length (ft)	25	1	1	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor							0.998				0.990	
FRT	0.950		0.850	0.950	0.904		0.950			0.950		
FRT Protected	1770	1863	1583	1770	1684	0	1770	3531	0	1770	3498	0
FRT Permitted	0.553		0.746		0.148		0.148			0.307		
Said. Flow (perm)	1030	1863	1583	1390	1684	0	276	3531	0	572	3498	0
Right Turn on Red			Yes			Yes			Yes			Yes
Said. Flow (RTOR)			318		39		1				7	
Link Speed (mph)			30		30		30				30	
Link Distance (ft)			1704		1283		1356				4794	
Travel Time (s)			38.7		29.2		30.8				109.0	
Conf. Peds. (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	33	17	318	14	22	39	290	918	12	17	920	63
Lane Group Flow (vph)	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	930	0	17	983	0
Protected Phases	7	4	4	8	8	5	2	2	6	1	6	6
Permitted Phases	7	4	4	8	8	5	2	2	6	1	6	6
Detector Phase												
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0	7.0	7.0	10.0	10.0
Minimum Split (s)	12.0	25.0	25.0	12.0	25.0	12.0	25.0	25.0	12.0	25.0	25.0	25.0
Total Split (s)	25.0	20.0	20.0	25.0	10.0	20.0	50.0	50.0	20.0	50.0	50.0	50.0
Total Split (%)	21.7%	17.4%	17.4%	21.7%	8.7%	17.4%	43.5%	43.5%	17.4%	43.5%	43.5%	43.5%
Maximum Green (s)	20.0	15.0	15.0	20.0	5.0	15.0	45.0	45.0	15.0	45.0	45.0	45.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.5	2.0	3.5	2.0	3.5	3.5
Recall Mode	None	None	None	None	None	None	None	Min	None	Min	Min	Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	13.4	12.3	12.3	11.3	7.6	48.4	50.1	48.4	37.4	48.4	30.0	37.4
Actuated g/C Ratio	0.18	0.16	0.16	0.15	0.10	0.67	0.65	0.65	0.50	0.65	0.40	0.40
v/c Ratio	0.13	0.06	0.61	0.06	0.29	0.60	0.41	0.41	0.04	0.70	0.04	0.70
Control Delay	28.0	32.1	9.9	27.4	23.1	16.9	8.7	6.9	8.7	6.9	21.9	21.9

2030 Horizon Conditions  
 Gibson Traffic Consultants, Inc. [BJL #21-190]  
 PM Peak-Hour

2030 Horizon Conditions  
 Gibson Traffic Consultants, Inc. [BJL #21-190]  
 PM Peak-Hour

Lanes, Volumes, Timings  
7: Smokey Point Boulevard & 152nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	25.3	22.3	30.0	11.4	7.4	21.8	70.1	10.9				
LOS	C	C	C	B	A	C	E	B				
Approach Delay			23.4		16.0		21.6					29.9
Approach LOS			C	B	C		C					C
Queue Length 50th (ft)	7	4	44	2	3	207	-161	95				
Queue Length 95th (ft)	26	32	103	88	13	326	#430	231				
Internal Link Dist (ft)			129		5061		1372					1276
Turn Bay Length (ft)	50		125		150		200					
Base Capacity (vph)	373	877	351	990	536	2325	407	2410				
Slantion Cap Reductn	0	0	0	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0	0	0	0				
Reduced v/c Ratio	0.05	0.04	0.34	0.36	0.04	0.45	1.01	0.36				
Intersection Summary												
Area Type: Other												
Cycle Length: 122												
Actuated Cycle Length: 71.1												
Natural Cycle: 90												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 1.01												
Intersection Signal Delay: 24.4												
Intersection LOS: C												
Intersection Capacity Utilization 84.4%												
Analysis Period (min) 15												
ICU Level of Service: E												
~ 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.												



Lanes, Volumes, Timings  
7: Smokey Point Boulevard & 152nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	18	8	23	114	7	339	18	849	158	395	830	10
Traffic Volume (vph)	18	8	23	114	7	339	18	849	158	395	830	10
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	50	0	125	0	150	0	200	0	200	0	200	0
Storage Length (ft)	25	1	0	1	0	1	25	1	25	1	25	1
Taper Length (ft)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.99	0.887	0.950	0.853	0.976	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Ped Bike Factor	0.950	1770	1652	0	1770	1568	0	1770	3440	0	1770	3531
Flt Protected	0.870	0.417	0.324	0.604	3440	0	240	3531	0	0	0	0
Satd. Flow (prot)	1620	1652	0	777	1568	0	604	3440	0	240	3531	0
Flt Permitted			Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (perm)	24	30	353	20	30	30	20	30	20	30	30	1
Right Turn on Red	30	209	5141	1452	33.0	33.0	33.0	33.0	33.0	33.0	33.0	30
Satd. Flow (RTOR)	4.8	116.8	116.8	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	30.8
Link Speed (mph)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Link Distance (ft)	19	8	24	119	7	353	19	884	165	411	865	10
Travel Time (s)	1	2	2	2	2	2	2	2	2	2	2	2
Confl. Peds. (#/hr)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Peak Hour Factor	19	32	0	119	360	0	19	1049	0	411	875	0
Adj. Flow (vph)	pm-pt	NA	NA	NA	NA	NA	NA	NA	NA	pm-pt	NA	NA
Shared Lane Traffic (%)	7	4	3	8	5	2	5	2	1	6	6	6
Lane Group Flow (vph)	4	4	8	8	2	2	6	6	6	6	6	6
Detector Phase	7	4	3	8	5	2	5	2	1	6	6	6
Switch Phase	4	4	3	8	5	2	5	2	1	6	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.5	27.0	11.5	26.0	9.5	24.0	9.5	26.0	9.5	26.0	9.5	26.0
Total Split (s)	16.0	16.0	16.0	40.0	16.0	50.0	16.0	50.0	16.0	50.0	16.0	50.0
Total Split (%)	13.1%	13.1%	13.1%	32.8%	13.1%	41.0%	13.1%	41.0%	13.1%	41.0%	13.1%	41.0%
Maximum Green (s)	11.0	11.0	11.0	35.0	11.0	45.0	11.0	45.0	11.0	45.0	11.0	45.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (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
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	15.0	15.0	14.0	14.0	12.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	9.1	6.1	14.4	11.0	34.6	28.8	45.9	42.4	6.5	0.60	0.60	0.60
Actuated g/C Ratio	0.13	0.09	0.20	0.15	0.49	0.41	0.65	0.60	0.13	0.13	0.13	0.13
v/c Ratio	0.09	0.20	0.43	0.67	0.05	0.75	1.01	0.42	0.09	0.09	0.09	0.09
Control Delay	25.3	22.3	30.0	11.4	7.4	21.8	70.1	10.9				

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

PM Peak-Hour

PM Peak-Hour

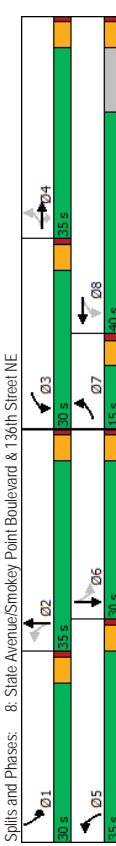
Lanes, Volumes, Timings  
8: State Avenue/Smockey Point Boulevard & 136th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	189	258	91	181	223	177	120	609	244	180	564	255
Traffic Volume (vph)	189	258	91	181	223	177	120	609	244	180	564	255
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	150	190	200	150	200	0	300	0	300	0	300	0
Storage Length (ft)	1	1	1	1	1	0	1	0	1	0	1	0
Storage Lanes	25	25	1	25	1	0	25	0	25	0	25	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99	1.00		1.00			0.99	0.99		0.99	
Frt	0.950	0.850		0.950	0.934		0.950	0.957		0.950	0.953	
Flt Protected	1752	1845	1568	1752	1723	0	1752	3354	0	1752	3315	0
Satd. Flow (prot)	0.195	0.374		0.374		0.170	0.170	0.123		0.123		
Satd. Flow (perm)	360	1845	1547	689	1723	0	314	3354	0	227	3315	0
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	Yes
Satd. Flow (RTOR)			143		34		43		49		49	
Link Speed (mph)		30		30		30		30		30		30
Link Distance (ft)		981		4740		2821		4424		4424		100.5
Travel Time (s)		22.3		107.7		64.1		107.7		100.5		100.5
Confl. Peds. (#/hr)			1		1							2
Confl. Bikes (#/hr)												0.95
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	199	272	96	191	235	186	126	641	257	189	594	268
Shared Lane Traffic (%)												
Lane Group Flow (vph)	199	272	96	191	421	0	126	898	0	189	862	0
Turn Type	pm+pt	MA	Perm	pm+pt	NA	pm+pt	NA	NA	0	pm+pt	MA	0
Protected Phases	7	4	4	3	8	5	2	2	1	6	6	6
Permitted Phases	4	4	4	8	8	2	2	2	6	6	6	6
Detector Phase	7	4	4	3	8	5	2	2	1	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	7.0	5.0	5.0	7.0	5.0	5.0	7.0	7.0
Minimum Split (s)	10.0	34.0	34.0	10.0	23.0	10.0	35.0	10.0	35.0	10.0	23.0	23.0
Total Split (s)	15.0	35.0	35.0	30.0	40.0	35.0	35.0	30.0	30.0	30.0	30.0	30.0
Total Split (%)	11.5%	26.9%	26.9%	23.1%	30.8%	26.9%	26.9%	23.1%	23.1%	23.1%	23.1%	23.1%
Maximum Green (s)	10.0	30.0	30.0	25.0	35.0	30.0	30.0	25.0	25.0	25.0	25.0	25.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (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
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Don't Walk (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effr Green (s)	34.2	24.4	24.4	37.3	26.1	39.5	30.4	43.9	32.5	43.9	32.5	32.5
Actuated g/C Ratio	0.35	0.25	0.25	0.38	0.27	0.40	0.31	0.45	0.33	0.45	0.33	0.33

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [B.J.L.#21-190]

Lanes, Volumes, Timings  
8: State Avenue/Smockey Point Boulevard & 136th Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.75	0.59	0.19	0.49	0.87	0.48	0.84	0.84	0.84	0.68	0.76	0.76
Control Delay	39.6	39.0	2.5	23.3	50.4	22.9	40.0	40.0	40.0	32.3	34.2	34.2
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	39.6	39.0	2.5	23.3	50.4	22.9	40.0	40.0	40.0	32.3	34.2	34.2
LOS	D	D	A	C	D	C	D	D	D	C	C	C
Approach Delay		33.0		42.0			37.9				33.9	
Approach LOS		C		D			D				C	
Queue Length 50th (ft)	79	148	0	75	231	43	265	68	239	68	239	239
Queue Length 95th (ft)	#185	257	14	132	370	88	#453	150	#378	150	#434	#434
Internal Link Dist (ft)	150	901		4660		2741						
Turn Bay Length (ft)	150	150	150	200	200	300	300	300	300	300	300	300
Base Capacity (vph)	271	572	578	563	820	596	1070	1070	1070	502	1135	1135
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	0.73	0.48	0.17	0.34	0.51	0.21	0.84	0.84	0.84	0.38	0.76	0.76
Intersection Summary	Other											
Area Type:	Other											
Cycle Length:	130											
Actual Cycle Length:	97.8											
Natural Cycle:	90											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.87											
Intersection Signal Delay:	36.5											
Intersection LOS:	D											
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.												



Spills and Phases: 8: State Avenue/Smockey Point Boulevard & 136th Street NE

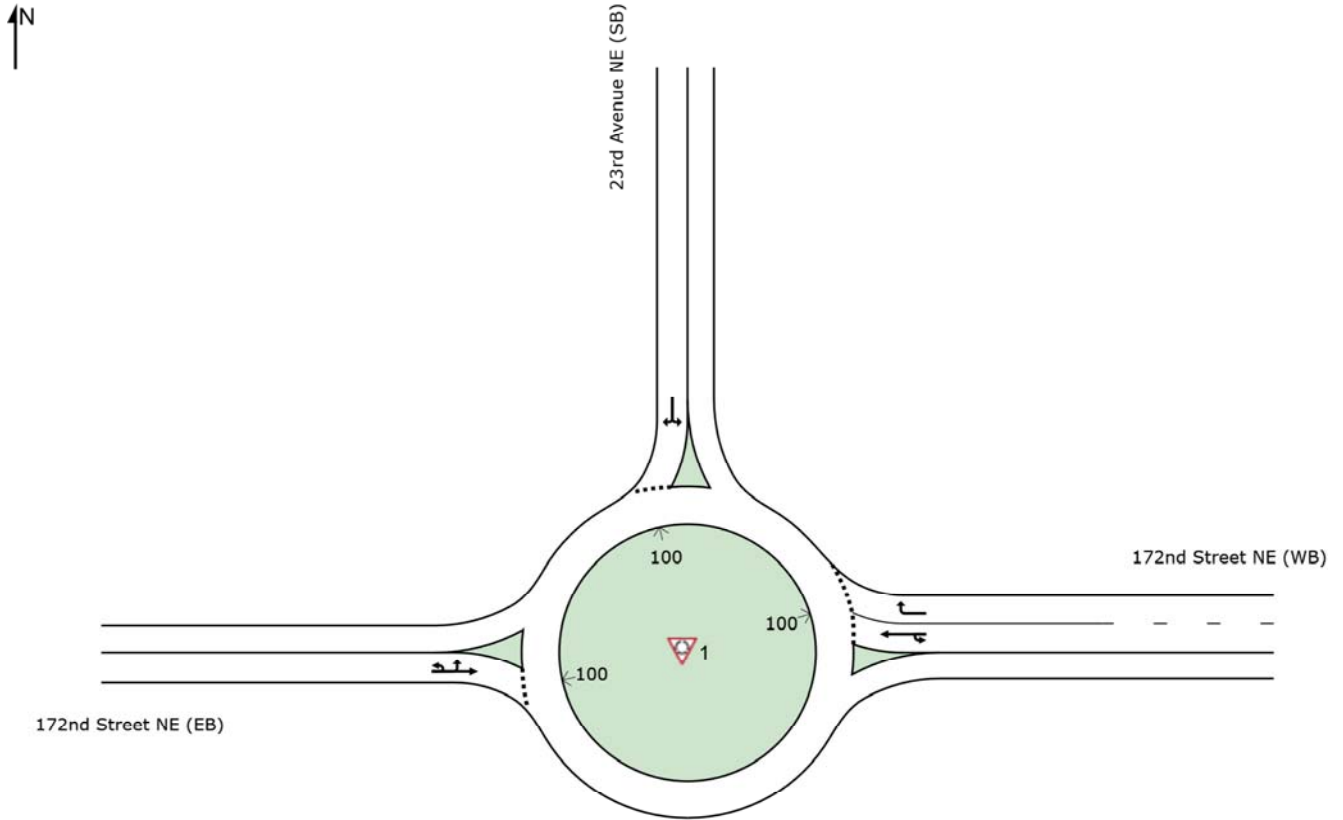
2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [B.J.L.#21-190]

# **Saturday Peak-Hour Level of Service Calculations**

# SITE LAYOUT

## Site: 1 [2021 Existing Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
Site Category: Saturday Peak-Hour  
Roundabout



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Organisation: GIBSON TRAFFIC CONSULTANTS | Created: Wednesday, August 18, 2021 7:27:42 AM  
Project: H:\2021\21-190\Sidra#1 - 172nd St NE at 23rd Ave NE.sip8

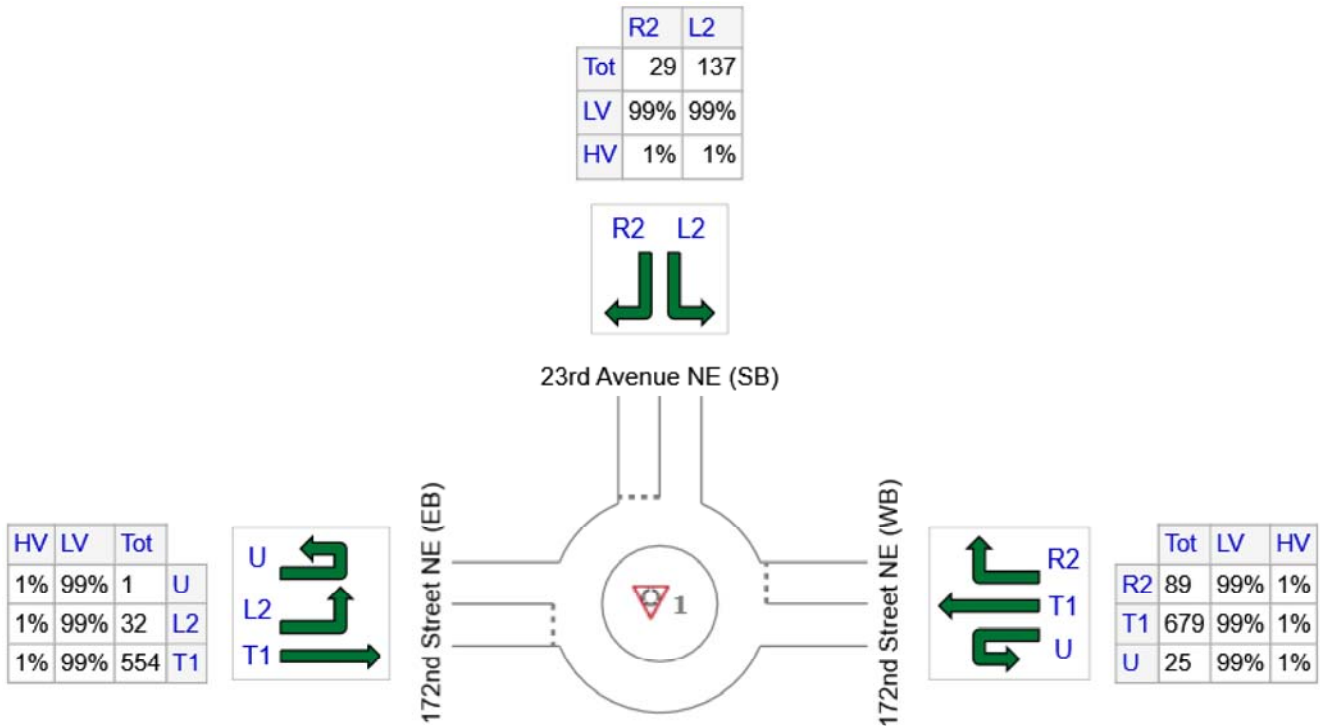
# INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

 Site: 1 [2021 Existing Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
 Site Category: Saturday Peak-Hour  
 Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
E: 172nd Street NE (WB)	793	785	8
N: 23rd Avenue NE (SB)	166	164	2
W: 172nd Street NE (EB)	587	581	6
Total	1546	1531	15

# MOVEMENT SUMMARY

## Site: 1 [2021 Existing Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
 Site Category: Saturday Peak-Hour  
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: 172nd Street NE (WB)												
1u	U	27	1.0	0.459	12.4	LOS B	3.8	95.1	0.20	0.38	0.20	38.4
6	T1	738	1.0	0.459	4.0	LOS A	3.8	95.1	0.20	0.38	0.20	37.3
16	R2	97	1.0	0.082	4.3	LOS A	0.4	10.6	0.16	0.45	0.16	36.3
Approach		862	1.0	0.459	4.3	LOS A	3.8	95.1	0.20	0.39	0.20	37.2
North: 23rd Avenue NE (SB)												
7	L2	149	1.0	0.210	13.9	LOS B	1.3	31.9	0.70	0.80	0.70	33.4
14	R2	32	1.0	0.210	8.0	LOS A	1.3	31.9	0.70	0.80	0.70	32.4
Approach		180	1.0	0.210	12.9	LOS B	1.3	31.9	0.70	0.80	0.70	33.2
West: 172nd Street NE (EB)												
5u	U	1	1.0	0.505	13.2	LOS B	3.9	97.4	0.49	0.50	0.49	37.3
5	L2	35	1.0	0.505	10.8	LOS B	3.9	97.4	0.49	0.50	0.49	36.3
2	T1	602	1.0	0.505	4.9	LOS A	3.9	97.4	0.49	0.50	0.49	36.2
Approach		638	1.0	0.505	5.2	LOS A	3.9	97.4	0.49	0.50	0.49	36.2
All Vehicles		1680	1.0	0.505	5.5	LOS A	3.9	97.4	0.36	0.48	0.36	36.4

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

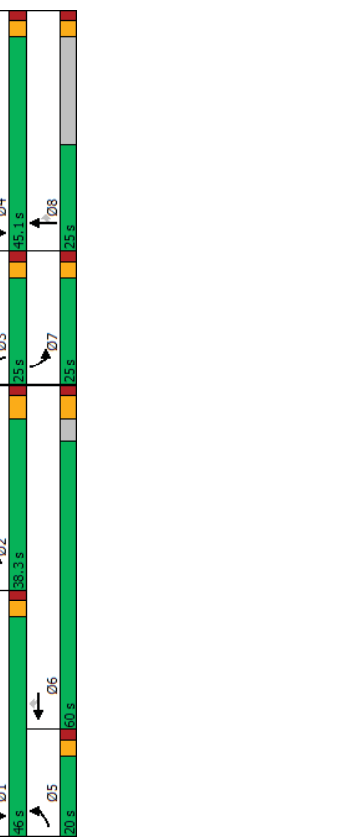
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	51	493	204	812	538	332	180	98	673	299	107	25
Future Volume (vph)	51	493	204	812	538	332	180	98	673	299	107	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	195		375	400	200	200	150		0	175		175
Storage Lanes	1		1	2	1	1	1		1	1		1
Taper Length (ft)	25		0.95	0.97	0.95	1.00	1.00		1.00	0.97		1.00
Lane Util. Factor	1.00	0.95	0.95	0.99	0.99	0.98	1.00		1.00	0.97		1.00
Ped Bike Factor	1.00	0.956				0.850			0.850	0.971		
Flt Protected	0.950			0.950		0.950			0.950	0.950		
Satd. Flow (prot)	1787	3396	0	3467	3574	1599	1787	1881	1599	3467	1820	0
Flt Permitted	0.950			0.950		0.950			0.950	0.950		
Satd. Flow (perm)	1783	3396	0	3449	3574	1559	1779	1881	1599	3467	1820	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37				342			470			7
Link Speed (mph)	30			30			30		30			30
Link Distance (ft)	1312			609			730		589			589
Travel Time (s)	29.8			13.8			16.6		13.4			13.4
Confl. Peds. (#/hr)	2		6	6		2	5		5			5
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 (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	53	508	210	837	555	342	186	101	694	308	110	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	718	0	837	555	342	186	101	694	308	136	0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8	8	7	4	
Permitted Phases												
Detector Phase	5	2		1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0	
Minimum Split (s)	9.5	38.3		9.5	38.3	38.3	9.5	23.1	23.1	9.5	45.1	
Total Split (s)	20.0	38.3		46.0	60.0	60.0	25.0	25.0	25.0	25.0	45.1	
Total Split (%)	13.0%	24.8%		29.8%	38.9%	38.9%	16.2%	16.2%	16.2%	16.2%	29.2%	
Maximum Green (s)	15.0	32.0		41.0	53.7	53.7	20.0	19.9	19.9	20.0	40.0	
Yellow Time (s)	3.0	4.3		3.0	4.3	4.3	3.0	3.1	3.1	3.0	3.1	
All-Red Time (s)	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	
Total Lost Time (s)	5.0	6.3		5.0	6.3	6.3	5.0	5.1	5.1	5.0	5.1	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	3.0		2.5	3.0	3.0	2.5	3.0	3.0	2.5	3.0	
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	25.0			25.0	25.0							33.0
Pedestrian Calls (#/hr)	0			0								0
Act Effct Green (s)	9.4	32.0		38.8	63.7	63.7	18.3	40.9	40.9	17.5	40.1	
Actuated G/C Ratio	0.06	0.21		0.26	0.42	0.42	0.12	0.27	0.27	0.12	0.27	
v/c Ratio	0.48	0.96		0.94	0.37	0.40	0.86	0.20	0.89	0.77	0.28	

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	83.0	79.0		73.2	31.8	4.3	97.9	44.8	32.1	78.1	44.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	83.0	79.0		73.2	31.8	4.3	97.9	44.8	32.1	78.1	44.3	
LOS	F	E		E	C	A	F	D	C	E	D	
Approach Delay		79.3		46.4			45.9			67.7		
Approach LOS		E		D			D			E		
Queue Length 50th (ft)	53	366		424	204	0	185	79	259	157	105	
Queue Length 95th (ft)	99	#503		#538	266	64	#312	134	#530	209	169	
Internal Link Dist (ft)		1232		529			650			509		
Turn Bay Length (ft)	195			400		200	150			175		
Base Capacity (vph)	178	751		944	1511	856	237	511	776	461	489	
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	0.30	0.96		0.89	0.37	0.40	0.78	0.20	0.89	0.67	0.28	

Intersection Summary  
Area Type: Other  
Cycle Length: 154.4  
Actuated Cycle Length: 150.6  
Natural Cycle: 145  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.96  
Intersection Signal Delay: 55.1  
Intersection Capacity Utilization: 105.8%  
Analysis Period (min): 15  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.



2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]



Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

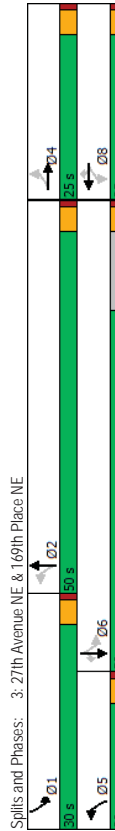
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	39	11	3	6	9	153	2	330	3	338	439	36
Traffic Volume (vph)	39	11	3	6	9	153	2	330	3	338	439	36
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	0	0	0	75	0	0	200	0	0	0	0	135
Storage Length (ft)	0	0	0	1	1	1	1	1	0	0	0	1
Taper Length (ft)	25	0	0	25	1	1	25	1	0	0	25	1
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						0.850		0.999				0.97
Frt	0.993											0.850
Flt Protected	0.964					0.980		0.950		0.950		
Satd. Flow (prot)	0	1801	0	0	1844	1599	1787	1879	0	1787	1881	1599
Flt Permitted	0.780					0.899		0.462		0.462		
Satd. Flow (perm)	0	1457	0	0	1691	1599	918	1879	0	869	1881	1552
Right Turn on Red			Yes			Yes		Yes	Yes			Yes
Satd. Flow (RTOR)	2					166		1				52
Link Speed (mph)	30					30		30				30
Link Distance (ft)	967					413		725				730
Travel Time (s)	22.0					9.4		16.5				16.6
Confl. Peds. (#/hr)							4					4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	42	12	3	7	10	166	2	359	3	367	477	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	57	0	0	17	166	2	362	0	367	477	39
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	4					5	2			1		6
Permitted Phases	4					8	2			6		6
Detector Phase	4					8	5			1		6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	5.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	22.5	22.5	26.0	26.0	26.0	9.5	22.5	9.5	26.0	26.0	26.0	26.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	20.0	50.0	30.0	50.0	50.0	50.0	50.0
Total Split (%)	23.8%	23.8%	23.8%	23.8%	23.8%	19.0%	47.6%	28.6%	47.6%	47.6%	47.6%	47.6%
Maximum Green (s)	21.0	21.0	21.0	21.0	21.0	16.0	46.0	26.0	46.0	46.0	46.0	46.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	4.0					4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	8.0	8.0	15.0	15.0	15.0	15.0	10.0	15.0	15.0	15.0	15.0	15.0
Pedestrian Calls (#/hr)	3	3	3	3	3	3	13	13	13	13	13	13
Act Effct Green (s)	10.1	10.1	10.1	10.1	10.1	51.6	46.5	61.2	59.8	59.8	59.8	59.8
Actuated G/C Ratio	0.13	0.13	0.13	0.13	0.13	0.65	0.59	0.77	0.75	0.75	0.75	0.75
v/c Ratio	0.31					0.08	0.33	0.46	0.34	0.34	0.34	0.34

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	35.1			31.2	10.3	4.5	11.2			5.3	5.5	1.6
Queue Delay	0.0			0.0	0.0	0.0	0.0			0.0	0.0	0.0
Total Delay	35.1			31.2	10.3	4.5	11.2			5.3	5.5	1.6
LOS	D			C	B	A	B			A	A	A
Approach Delay	35.1			12.2			11.1				5.2	
Approach LOS	D			B			B				A	
Queue Length 50th (ft)	24			7	0	0	72			31	43	0
Queue Length 95th (ft)	62			26	52	2	213			117	215	9
Internal Link Dist (ft)	887			333			645			650		
Turn Bay Length (ft)						200						135
Base Capacity (vph)	394			456	552	874	1101			974	1415	1181
Starvation Cap Reductn	0			0	0	0	0			0	0	0
Spillback Cap Reductn	0			0	0	0	0			0	0	0
Storage Cap Reductn	0			0	0	0	0			0	0	0
Reduced v/c Ratio	0.14			0.04	0.30	0.00	0.33			0.38	0.34	0.03

Intersection Summary  
Area Type: Other  
Cycle Length: 105  
Actuated Cycle Length: 79.4  
Natural Cycle: 65  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.48  
Intersection Signal Delay: 8.7  
Intersection Capacity Utilization: 55.9%  
Analysis Period (min): 15



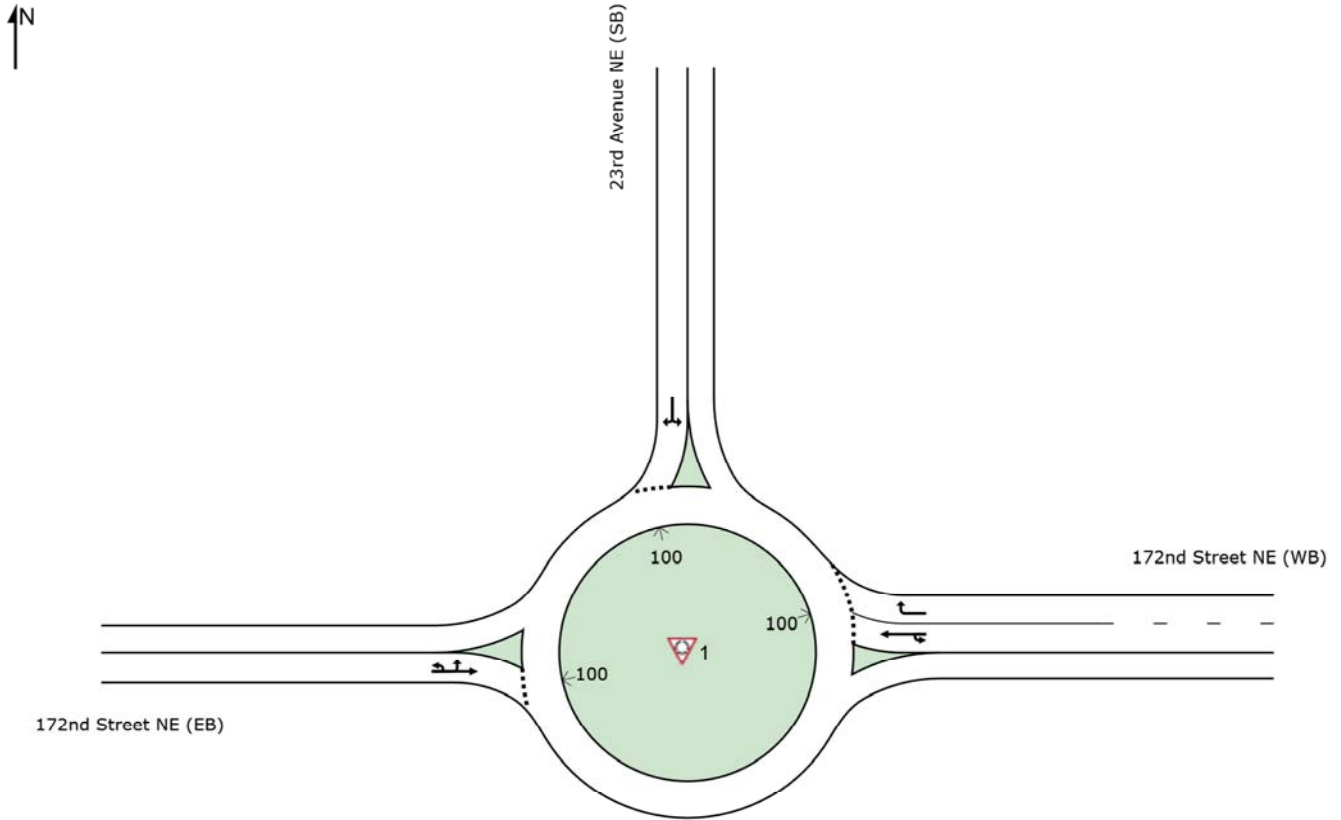
Splits and Phases: 3: 27th Avenue NE & 169th Place NE  
Intersection LOS: A  
ICU Level of Service B

2021 Existing Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

# SITE LAYOUT

## Site: 1 [2024 Baseline Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
Site Category: Saturday Peak-Hour  
Roundabout



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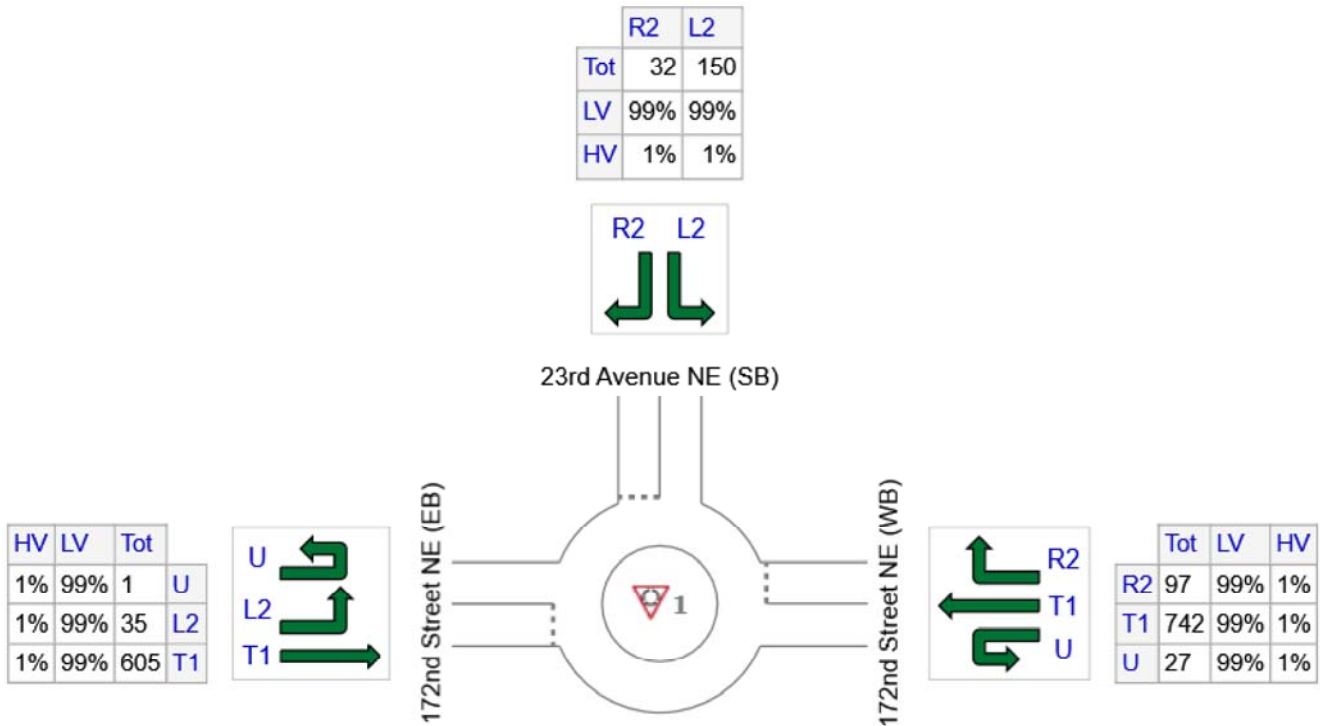
# INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

 Site: 1 [2024 Baseline Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
 Site Category: Saturday Peak-Hour  
 Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
E: 172nd Street NE (WB)	866	857	9
N: 23rd Avenue NE (SB)	182	180	2
W: 172nd Street NE (EB)	641	635	6
Total	1689	1672	17

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# MOVEMENT SUMMARY

## Site: 1 [2024 Baseline Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
 Site Category: Saturday Peak-Hour  
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: 172nd Street NE (WB)												
1u	U	29	1.0	0.503	12.4	LOS B	4.5	113.2	0.23	0.39	0.23	38.3
6	T1	807	1.0	0.503	4.0	LOS A	4.5	113.2	0.23	0.39	0.23	37.2
16	R2	105	1.0	0.090	4.3	LOS A	0.5	11.8	0.17	0.45	0.17	36.3
Approach		941	1.0	0.503	4.3	LOS A	4.5	113.2	0.22	0.39	0.22	37.1
North: 23rd Avenue NE (SB)												
7	L2	163	1.0	0.248	14.7	LOS B	1.6	39.5	0.76	0.84	0.76	33.0
14	R2	35	1.0	0.248	8.8	LOS A	1.6	39.5	0.76	0.84	0.76	32.0
Approach		198	1.0	0.248	13.7	LOS B	1.6	39.5	0.76	0.84	0.76	32.8
West: 172nd Street NE (EB)												
5u	U	1	1.0	0.560	13.4	LOS B	4.6	116.3	0.56	0.51	0.56	37.0
5	L2	38	1.0	0.560	11.0	LOS B	4.6	116.3	0.56	0.51	0.56	36.1
2	T1	658	1.0	0.560	5.0	LOS A	4.6	116.3	0.56	0.51	0.56	36.0
Approach		697	1.0	0.560	5.4	LOS A	4.6	116.3	0.56	0.51	0.56	36.0
All Vehicles		1836	1.0	0.560	5.7	LOS A	4.6	116.3	0.41	0.49	0.41	36.2

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	10 Degrees
Lane Configurations	5	4	4	4	4	4	4	4	4	4	4	4	↔
Traffic Volume (vph)	56	539	223	887	588	363	197	107	735	327	117	27	↔
Future Volume (vph)	56	539	223	887	588	363	197	107	735	327	117	27	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	↔
Storage Length (ft)	195		375	400	200	200	150		0	175		175	↔
Storage Lanes	1		1	2	1	1	1		1	1		1	↔
Taper Length (ft)	25		25	25	100	100	100		100	25		25	↔
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	1.00	1.00		1.00	0.97		1.00	↔
Ped Bike Factor	1.00	0.99	1.00	1.00	0.98	1.00	1.00		1.00	0.972		1.00	↔
Frt	0.950	0.956		0.950	0.850	0.850	0.950		0.850	0.950		0.950	↔
Flt Protected	1787	3396	0	3467	3574	1599	1787	1881	1599	3467	1822	0	↔
Flt Permitted	0.950			0.950		0.950	0.950		0.950	0.950		0	↔
Said. Flow (perm)	1783	3396	0	3450	3574	1559	1779	1881	1599	3467	1822	0	↔
Right Turn on Red			Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	↔
Said. Flow (RTOR)			37		374		374		463		7		↔
Link Speed (mph)	30		30		30		30		30		30		↔
Link Distance (ft)	1312		609		730		730		589		589		↔
Travel Time (s)	29.8		13.8		16.6		16.6		13.4		13.4		↔
Confl. Peds. (#/hr)	2		6		6		6		6		6		↔
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	↔
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%		1%	1%	1%	1%	↔
Adj. Flow (vph)	58	556	230	914	606	374	203	110	758	337	121	28	↔
Shared Lane Traffic (%)													↔
Lane Group Flow (vph)	58	786	0	914	606	374	203	110	758	337	149	0	↔
Turn Type	Prot	NA	Prot	NA	Perm	NA	Prot	NA	Perm	Prot	NA	NA	↔
Protected Phases	5	2		1	6		3	8	8	7	4		↔
Permitted Phases	5	2		1	6		3	8	8	7	4		↔
Detector Phase	5	2		1	6		3	8	8	7	4		↔
Switch Phase													↔
Minimum Initial (s)	3.0	7.0		3.0	7.0		3.0	5.0	5.0	3.0	5.0		↔
Minimum Split (s)	9.5	38.3		38.3	38.3		9.5	23.1	23.1	9.5	45.1		↔
Total Split (s)	20.0	38.3		46.0	60.0		25.0	25.0	25.0	25.0	45.1		↔
Total Split (%)	13.0%	24.8%		29.8%	38.9%		16.2%	16.2%	16.2%	16.2%	29.2%		↔
Maximum Green (s)	15.0	32.0		41.0	53.7		20.0	19.9	19.9	20.0	40.0		↔
Yellow Time (s)	3.0	4.3		3.0	4.3		3.0	3.1	3.1	3.0	3.1		↔
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0		↔
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0		↔
Total Lost Time (s)	5.0	6.3		5.0	6.3		5.0	5.1	5.1	5.0	5.1		↔
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag		↔
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes		↔
Vehicle Extension (s)	2.5	3.0		3.0	3.0		3.0	3.0	3.0	2.5	3.0		↔
Recall Mode	None	None		None	None		None	Max	Max	None	Max		↔
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0		↔
Flash Don't Walk (s)	25.0	25.0		25.0	25.0		25.0	25.0	25.0	25.0	25.0		↔
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0		↔
Act Effct Green (s)	9.9	32.0		41.0	65.3		19.3	40.9	40.9	18.4	40.0		↔
Actuated G/C Ratio	0.06	0.21		0.27	0.42		0.13	0.27	0.27	0.12	0.26		↔
v/c Ratio	0.51	1.07		0.99	0.40		0.43	0.91	0.22	0.99	0.81		↔

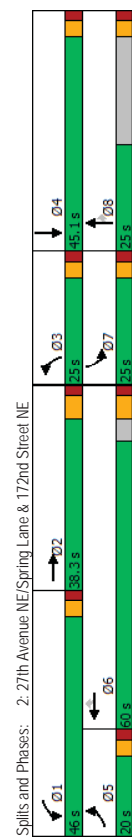
2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	10 Degrees
Control Delay	84.2	106.5		82.6	32.7	4.4	105.7	45.9	51.9	82.0	45.9		↔
Queue Delay	0.0	0.0		0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0		↔
Total Delay	84.2	106.5		82.6	32.7	4.6	105.7	45.9	51.9	82.0	45.9		↔
LOS	F	F		F	C	A	F	D	D	F	D		↔
Approach Delay		105.0			51.2			61.5			70.9		↔
Approach LOS		F			D			E			E		↔
Queue Length 50th (ft)	58	-445		477	227	0	204	88	385	172	116		↔
Queue Length 95th (ft)	105	#581		#623	295	68	#352	144	#681	228	183		↔
Internal Link Dist (ft)	195	1232		400	529		200	150	765	451	175		↔
Turn Bay Length (ft)	174	736		924	1519		877	232	500	765	451		↔
Base Capacity (vph)	0	0		0	0	99	0	0	0	0	0		↔
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	0.33	1.07		0.99	0.40	0.48	0.88	0.22	0.99	0.75	0.31		↔

Intersection Summary  
Area Type: Other  
Cycle Length: 154.4  
Actuated Cycle Length: 153.7  
Natural Cycle: 145  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 1.07  
Intersection Signal Delay: 66.6  
Intersection Capacity Utilization: 110.4%  
Analysis Period (min): 15  
Intersection LOS: E  
ICU Level of Service: H

- 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.



2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

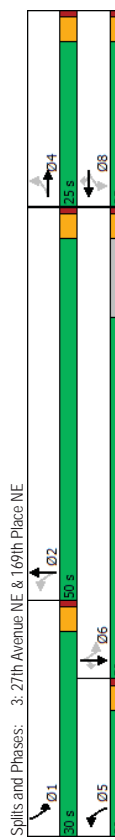
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	43	12	3	7	10	167	2	361	3	369	480	39
Traffic Volume (vph)	43	12	3	7	10	167	2	361	3	369	480	39
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	0	0	0	75	0	0	200	0	0	0	0	135
Storage Length (ft)	0	0	0	1	1	1	1	1	1	1	1	1
Storage Lanes	25	0	0	25	0	0	25	0	0	0	25	1
Taper Length (ft)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor												
Ped Bike Factor	0.994			0.850			0.999				0.850	
Frt	0.964			0.979			0.950				0.950	
Flt Protected	0	1803	0	0	1842	1599	1787	1879	0	1787	1881	1599
Satd. Flow (prot)	0.772			0.893			0.471			0.436		
Flt Permitted	0	1444	0	0	1680	1599	883	1879	0	820	1881	1552
Satd. Flow (perm)	Yes			Yes			Yes		Yes		Yes	
Right Turn on Red	2			182			30			30		52
Satd. Flow (RTOR)	30			30			725			730		4
Link Speed (mph)	967			9.4			16.5			16.6		4
Link Distance (ft)	22.0			9.4			4			4		4
Travel Time (s)	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Peak Hour Factor	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Heavy Vehicles (%)	47	13	3	8	11	182	2	392	3	401	522	42
Adj. Flow (vph)	0	63	0	0	19	182	2	395	0	401	522	42
Shared Lane Traffic (%)	Perm	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Lane Group Flow (vph)	4	4	4	8	8	8	2	2	6	6	6	6
Protected Phases	4	4	4	8	8	8	5	5	1	1	1	6
Permitted Phases	4	4	4	8	8	8	2	2	6	6	6	6
Detector Phase	4	4	4	8	8	8	5	5	1	1	1	6
Switch Phase	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0	10.0
Minimum Initial (s)	22.5	22.5	22.5	26.0	26.0	26.0	9.5	9.5	9.5	9.5	26.0	26.0
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	20.0	20.0	20.0	20.0	50.0	50.0
Total Split (s)	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	19.0%	19.0%	19.0%	19.0%	47.6%	47.6%
Total Split (%)	21.0	21.0	21.0	21.0	21.0	21.0	16.0	16.0	16.0	16.0	46.0	46.0
Maximum Green (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Yellow Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
All-Red Time (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
Lost Time Adjust (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	3.0	3.0
Lead/Lag	None	None	None	None	None	None	None	None	None	None	None	Max
Lead-Lag Optimize?	None	None	None	None	None	None	None	None	None	None	None	Max
Vehicle Extension (s)	8.0	8.0	8.0	15.0	15.0	15.0	10.0	10.0	10.0	10.0	15.0	15.0
Recall Mode	3	3	3	3	3	3	3	3	3	3	3	13
Flash Don't Walk (s)	10.3	10.3	10.3	10.3	10.3	10.3	51.6	46.6	46.6	46.6	60.5	60.5
Pedestrian Calls (#/hr)	0.13	0.13	0.13	0.13	0.13	0.13	0.64	0.58	0.58	0.58	0.75	0.75
Act Effct Green (s)	0.34	0.34	0.34	0.09	0.09	0.09	0.00	0.36	0.36	0.36	0.37	0.37
Actuated G/C Ratio	0.37	0.37	0.37	0.04	0.04	0.04	0.00	0.36	0.36	0.36	0.37	0.37
v/c Ratio												

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	36.4			31.8			10.4	5.0	12.0	6.0	5.8	1.6
Queue Delay	0.0			0.0			0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4			31.8			10.4	5.0	12.0	6.0	5.8	1.6
LOS	D			C			B	A	B	A	A	A
Approach Delay	36.4			12.4			12.4	12.0	12.0	5.7	5.7	0
Approach LOS	D			B			B	B	B	A	A	A
Queue Length 50th (ft)	28			8			0	0	85	36	51	0
Queue Length 95th (ft)	68			29			54	2	242	129	241	10
Internal Link Dist (ft)	887			333			200		645	650	650	135
Turn Bay Length (ft)	386			448			560	851	1089	949	1416	1181
Base Capacity (vph)	0			0			0	0	0	0	0	0
Starvation Cap Reductn	0			0			0	0	0	0	0	0
Spillback Cap Reductn	0			0			0	0	0	0	0	0
Storage Cap Reductn	0			0			0	0	0	0	0	0
Reduced v/c Ratio	0.16			0.04			0.33	0.00	0.36	0.42	0.37	0.04

Intersection Summary  
Area Type: Other  
Cycle Length: 105  
Actuated Cycle Length: 80.3  
Natural Cycle: 65  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.52  
Intersection Signal Delay: 9.2  
Intersection Capacity Utilization 59.5%  
Analysis Period (min) 15



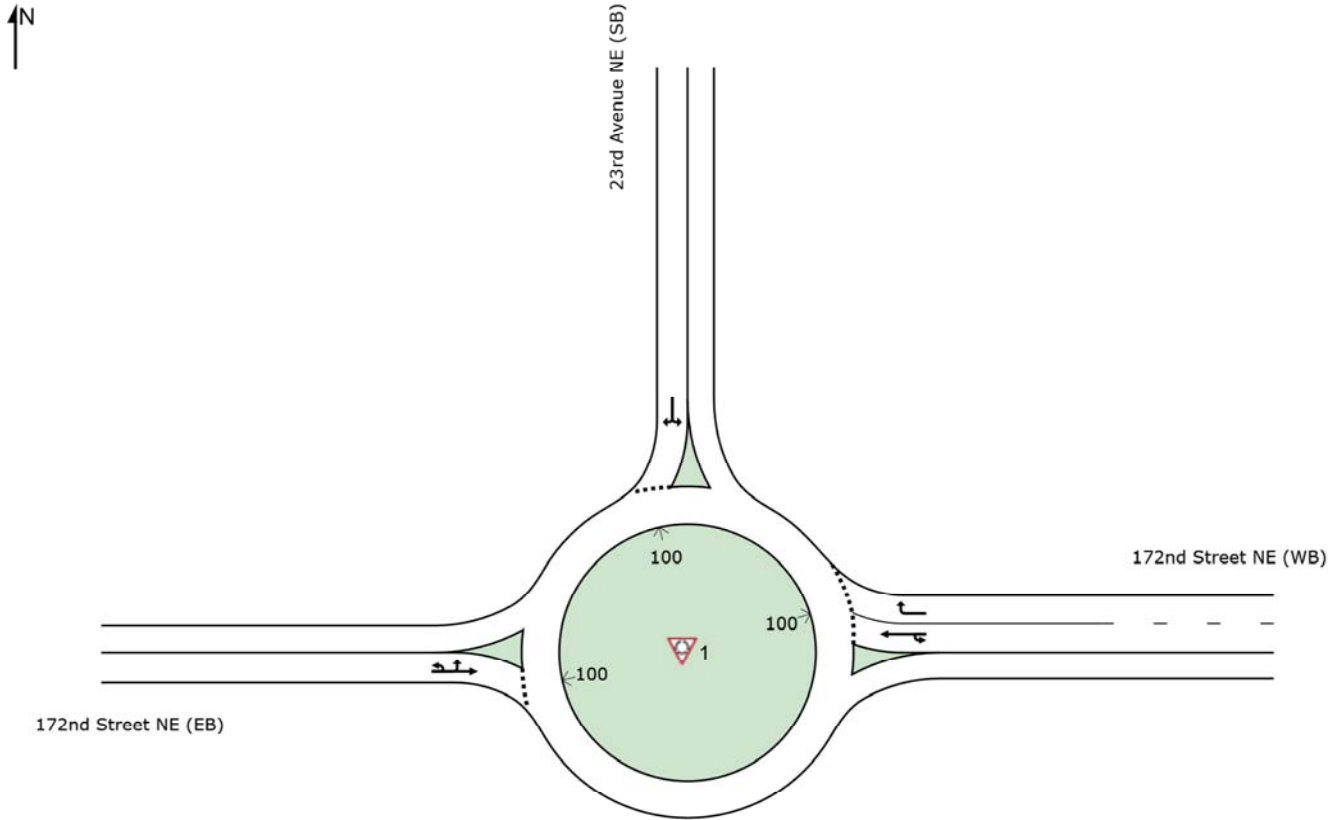
Splits and Phases: 3: 27th Avenue NE & 169th Place NE  
Intersection LOS: A  
ICU Level of Service B

2024 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

# SITE LAYOUT

## Site: 1 [2024 Opening Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
Site Category: Saturday Peak-Hour  
Roundabout



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Organisation: GIBSON TRAFFIC CONSULTANTS | Created: Wednesday, August 18, 2021 7:28:22 AM  
Project: H:\2021\21-190\Sidra#1 - 172nd St NE at 23rd Ave NE.sip8

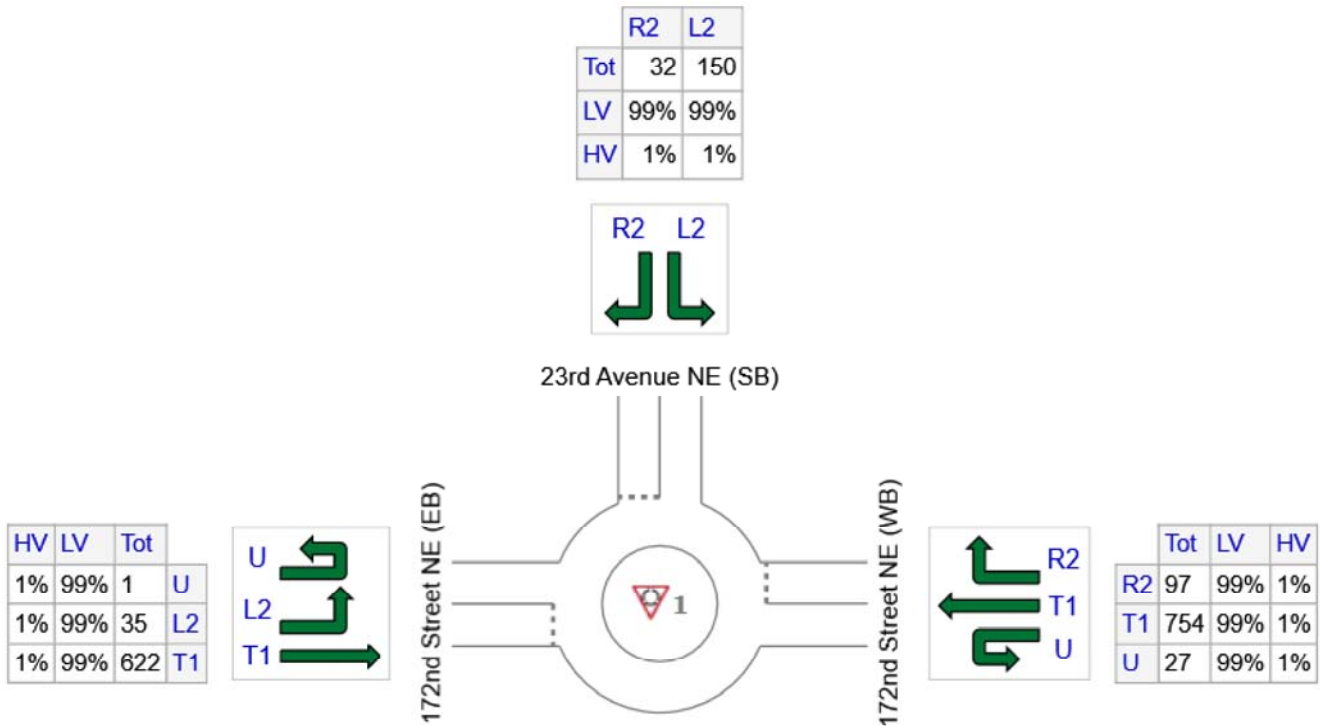
# INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

 Site: 1 [2024 Opening Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
 Site Category: Saturday Peak-Hour  
 Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
E: 172nd Street NE (WB)	878	869	9
N: 23rd Avenue NE (SB)	182	180	2
W: 172nd Street NE (EB)	658	651	7
Total	1718	1701	17



# MOVEMENT SUMMARY

## Site: 1 [2024 Opening Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
 Site Category: Saturday Peak-Hour  
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: 172nd Street NE (WB)												
1u	U	29	1.0	0.511	12.4	LOS B	4.6	116.8	0.23	0.38	0.23	38.3
6	T1	820	1.0	0.511	4.0	LOS A	4.6	116.8	0.23	0.38	0.23	37.2
16	R2	105	1.0	0.090	4.3	LOS A	0.5	11.9	0.17	0.45	0.17	36.3
Approach		954	1.0	0.511	4.3	LOS A	4.6	116.8	0.23	0.39	0.23	37.1
North: 23rd Avenue NE (SB)												
7	L2	163	1.0	0.251	14.8	LOS B	1.6	40.3	0.77	0.84	0.77	32.9
14	R2	35	1.0	0.251	9.0	LOS A	1.6	40.3	0.77	0.84	0.77	32.0
Approach		198	1.0	0.251	13.8	LOS B	1.6	40.3	0.77	0.84	0.77	32.8
West: 172nd Street NE (EB)												
5u	U	1	1.0	0.575	13.5	LOS B	4.8	122.0	0.57	0.52	0.57	37.0
5	L2	38	1.0	0.575	11.0	LOS B	4.8	122.0	0.57	0.52	0.57	36.1
2	T1	676	1.0	0.575	5.1	LOS A	4.8	122.0	0.57	0.52	0.57	36.0
Approach		715	1.0	0.575	5.4	LOS A	4.8	122.0	0.57	0.52	0.57	36.0
All Vehicles		1867	1.0	0.575	5.7	LOS A	4.8	122.0	0.41	0.49	0.41	36.2

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

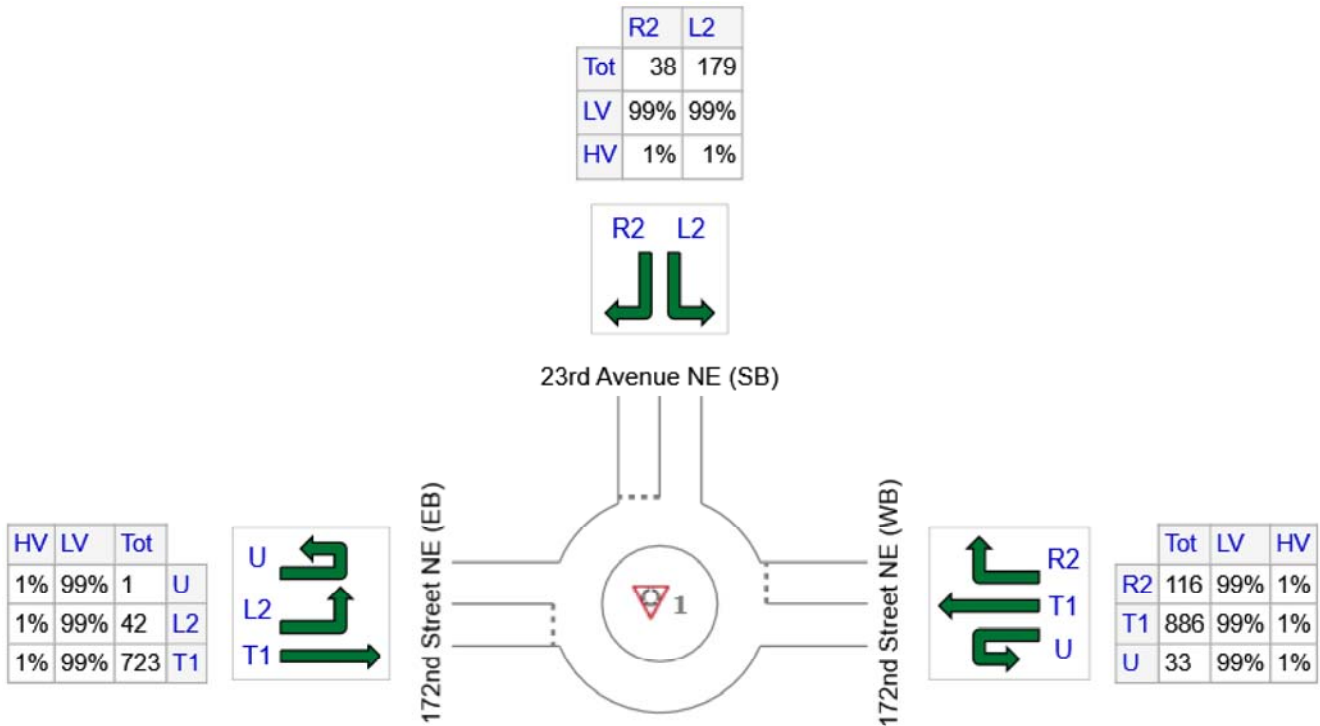
# INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

 Site: 1 [2030 Baseline Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
 Site Category: Saturday Peak-Hour  
 Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
E: 172nd Street NE (WB)	1035	1025	10
N: 23rd Avenue NE (SB)	217	215	2
W: 172nd Street NE (EB)	766	758	8
Total	2018	1998	20

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (vph)	56	539	240	969	588	363	209	107	795	327	117	27
Future Volume (vph)	56	539	240	969	588	363	209	107	795	327	117	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	195		375	400	200	150			0	175		175
Storage Lanes	1		1	2	1	1			1	1		1
Taper Length (ft)	25		0.95	0.97	0.95	1.00			1.00	0.97		1.00
Lane Util. Factor	1.00	0.99	0.99	1.00	0.98	1.00			0.850	0.972		1.00
Ped Bike Factor	0.954				0.850				0.850	0.950		0.972
Flt Protected	0.950			0.950		0.950			0.850	0.950		0.950
Satd. Flow (prot)	1787	3388	0	3467	3574	1599	1787	1881	1599	3467	1822	0
Flt Permitted	0.950			0.950		0.950			0.950	0.950		0.950
Satd. Flow (perm)	1783	3388	0	3451	3574	1599	1779	1881	1599	3467	1822	0
Right Turn on Red			Yes		Yes	Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			41		374				463			7
Link Speed (mph)	30		30		30				30			30
Link Distance (ft)	1312		609		730				730			589
Travel Time (s)	29.8		13.8		16.6				13.4			13.4
Confl. Peds. (#/hr)			6	6	6	2	5		6			5
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 (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	58	556	247	999	606	374	215	110	820	337	121	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	803	0	999	606	374	215	110	820	337	149	0
Turn Type	Prot	NA	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	0
Protected Phases	5	2		1	6		3	8	8	7	4	
Permitted Phases												
Detector Phase	5	2		1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Split (s)	9.5	38.3		9.5	38.3	38.3	9.5	23.1	23.1	9.5	45.1	45.1
Total Split (s)	20.0	38.3		46.0	60.0	60.0	25.0	25.0	25.0	25.0	45.1	45.1
Total Split (%)	13.0%	24.8%		29.8%	38.9%	38.9%	16.2%	16.2%	16.2%	16.2%	29.2%	29.2%
Maximum Green (s)	15.0	32.0		41.0	53.7	53.7	20.0	19.9	19.9	20.0	40.0	40.0
Yellow Time (s)	3.0	4.3		3.0	4.3	4.3	3.0	3.1	3.1	3.0	3.1	3.1
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)	5.0	6.3		5.0	6.3	6.3	5.0	5.1	5.1	5.0	5.1	5.1
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	3.0		2.5	3.0	3.0	2.5	3.0	3.0	2.5	3.0	3.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0	25.0		25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	9.9	32.0		41.0	65.3	65.3	19.8	19.8	19.8	18.4	40.0	40.0
Actuated G/C Ratio	0.06	0.21		0.27	0.42	0.42	0.13	0.27	0.27	0.12	0.26	0.26
v/c Ratio	0.51	1.09		1.08	0.40	0.43	0.94	0.22	1.07	0.81	0.31	0.31

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	84.3	113.9		107.3	32.9	4.4	111.2	45.9	75.3	82.2	46.0	46.0
Queue Delay	0.0	0.0		0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.3	113.9		107.3	32.9	4.6	111.2	45.9	75.3	82.2	46.0	46.0
LOS	F	F		F	C	A	F	D	E	F	D	D
Approach Delay		111.9		65.1			79.2				71.1	
Approach LOS		F		E			E				E	
Queue Length 50th (ft)	58	-461		-580	227	0	218	88	-555	172	116	
Queue Length 95th (ft)	105	#597		#715	295	68	#381	144	#814	228	183	
Internal Link Dist (ft)	195	1232		400	529		200	150	767	450	175	
Turn Bay Length (ft)	173	735		921	1513	875	231	504	767	450	478	
Base Capacity (vph)	0	0		0	0	99	0	0	0	0	0	0
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	0.34	1.09		1.08	0.40	0.48	0.93	0.22	1.07	0.75	0.31	0.31
Intersection Summary												
Area Type:	Other											
Cycle Length:	154.4											
Actuated Cycle Length:	154.2											
Natural Cycle:	145											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	1.09											
Intersection Signal Delay:	78.4											
Intersection Capacity Utilization:	113.9%											
Analysis Period (min):	15											
ICU Level of Service:	E											
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: 27th Avenue NE/Spring Lane & 172nd Street NE											

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

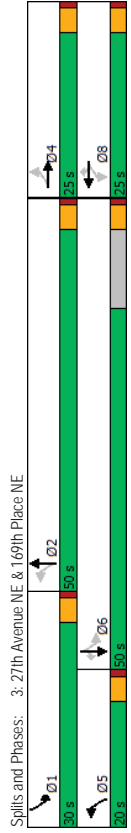
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	43	12	10	239	2	361	3	468	480	39	39	1.5
Traffic Volume (vph)	43	12	3	7	10	239	2	361	3	468	480	39
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	0	0	0	75	0	200	0	0	0	0	0	135
Storage Length (ft)	0	0	0	1	1	1	0	0	0	0	0	1
Taper Length (ft)	25	0	0	25	1.00	1.00	25	1.00	1.00	1.00	1.00	1.00
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												
Frt	0.994			0.850		0.999		0.950		0.950		0.850
Flt Protected	0.964			0.979		0.979		1.787		1.787		1.599
Satd. Flow (prot)	0	1803	0	0	1842	1599	0	1787		1881		1599
Flt Permitted	0.770			0.892		0.471		0.430		0.430		1552
Satd. Flow (perm)	0	1440	0	0	1678	1599	883	1879	0	809	1881	1552
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	Yes
Satd. Flow (RTOR)	2			260		30		30		30		52
Link Speed (mph)	30			30		30		30		30		30
Link Distance (ft)	967			413		725		730		730		730
Travel Time (s)	22.0			9.4		16.5		16.6		16.6		16.6
Confl. Peds. (#/hr)							4					4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	47	13	3	8	11	260	2	392	3	509	522	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	63	0	0	19	260	2	395	0	509	522	42
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	4	4	8	8	8	2	5	2	1	6	6	6
Permitted Phases	4	4	8	8	8	5	2	6	6	6	6	6
Detector Phase	4	4	8	8	8	5	2	1	6	6	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	5.0	10.0	5.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.5	22.5	26.0	26.0	26.0	9.5	22.5	9.5	26.0	26.0	26.0	26.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	20.0	50.0	30.0	50.0	50.0	50.0	50.0
Total Split (%)	23.8%	23.8%	23.8%	23.8%	23.8%	19.0%	47.6%	28.6%	47.6%	47.6%	47.6%	47.6%
Maximum Green (s)	21.0	21.0	21.0	21.0	16.0	46.0	26.0	46.0	46.0	46.0	46.0	46.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	8.0	8.0	15.0	15.0	15.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0
Pedestrian Calls (#/hr)	3	3	3	3	3	13	13	13	13	13	13	13
Act Effct Green (s)	10.3	10.3	10.3	10.3	51.8	46.7	64.4	63.0	63.0	63.0	63.0	63.0
Actuated G/C Ratio	0.12	0.12	0.12	0.12	0.63	0.56	0.78	0.76	0.76	0.76	0.76	0.76
v/c Ratio	0.35	0.35	0.09	0.61	0.00	0.37	0.65	0.37	0.65	0.37	0.65	0.37

2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	38.5			33.7		11.2	5.5	13.5		7.6	5.5	1.5
Queue Delay	0.0			0.0		0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	38.5			33.7		11.2	5.5	13.5		7.6	5.5	1.5
LOS	D			C		B	A	B		A	A	A
Approach Delay	38.5			12.8				13.4			6.4	
Approach LOS	D			B				B			A	
Queue Length 50th (ft)	28			9		0	0	91		51	51	0
Queue Length 95th (ft)	72			30		65	2	268		172	238	10
Internal Link Dist (ft)	887			333				645		650		
Turn Bay Length (ft)						200						135
Base Capacity (vph)	375			435		607	838	1060		941	1430	1192
Starvation Cap Reductn	0			0		0	0	0		0	0	0
Spillback Cap Reductn	0			0		0	0	0		0	0	0
Storage Cap Reductn	0			0		0	0	0		0	0	0
Reduced v/c Ratio	0.17			0.04		0.43	0.00	0.37		0.54	0.37	0.04

Intersection Summary  
Area Type: Other  
Cycle Length: 105  
Actuated Cycle Length: 82.8  
Natural Cycle: 70  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.65  
Intersection Signal Delay: 10.0  
Intersection Capacity Utilization: 65.0%  
Analysis Period (min): 15  
Intersection LOS: B  
ICU Level of Service: C



2024 Opening Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

# MOVEMENT SUMMARY

## Site: 1 [2030 Baseline Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
 Site Category: Saturday Peak-Hour  
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: 172nd Street NE (WB)												
1u	U	36	1.0	0.607	12.5	LOS B	6.7	169.5	0.31	0.39	0.31	38.0
6	T1	963	1.0	0.607	4.1	LOS A	6.7	169.5	0.31	0.39	0.31	36.9
16	R2	126	1.0	0.109	4.3	LOS A	0.6	15.1	0.20	0.46	0.20	36.2
Approach		1125	1.0	0.607	4.4	LOS A	6.7	169.5	0.30	0.40	0.30	36.8
North: 23rd Avenue NE (SB)												
7	L2	195	1.0	0.361	17.2	LOS B	2.6	64.6	0.89	0.92	0.89	31.9
14	R2	41	1.0	0.361	11.3	LOS B	2.6	64.6	0.89	0.92	0.89	31.0
Approach		236	1.0	0.361	16.2	LOS B	2.6	64.6	0.89	0.92	0.89	31.7
West: 172nd Street NE (EB)												
5u	U	1	1.0	0.694	14.5	LOS B	7.5	188.2	0.72	0.63	0.76	36.4
5	L2	46	1.0	0.694	12.0	LOS B	7.5	188.2	0.72	0.63	0.76	35.5
2	T1	786	1.0	0.694	6.1	LOS A	7.5	188.2	0.72	0.63	0.76	35.4
Approach		833	1.0	0.694	6.4	LOS A	7.5	188.2	0.72	0.63	0.76	35.4
All Vehicles		2193	1.0	0.694	6.4	LOS A	7.5	188.2	0.52	0.54	0.54	35.7

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

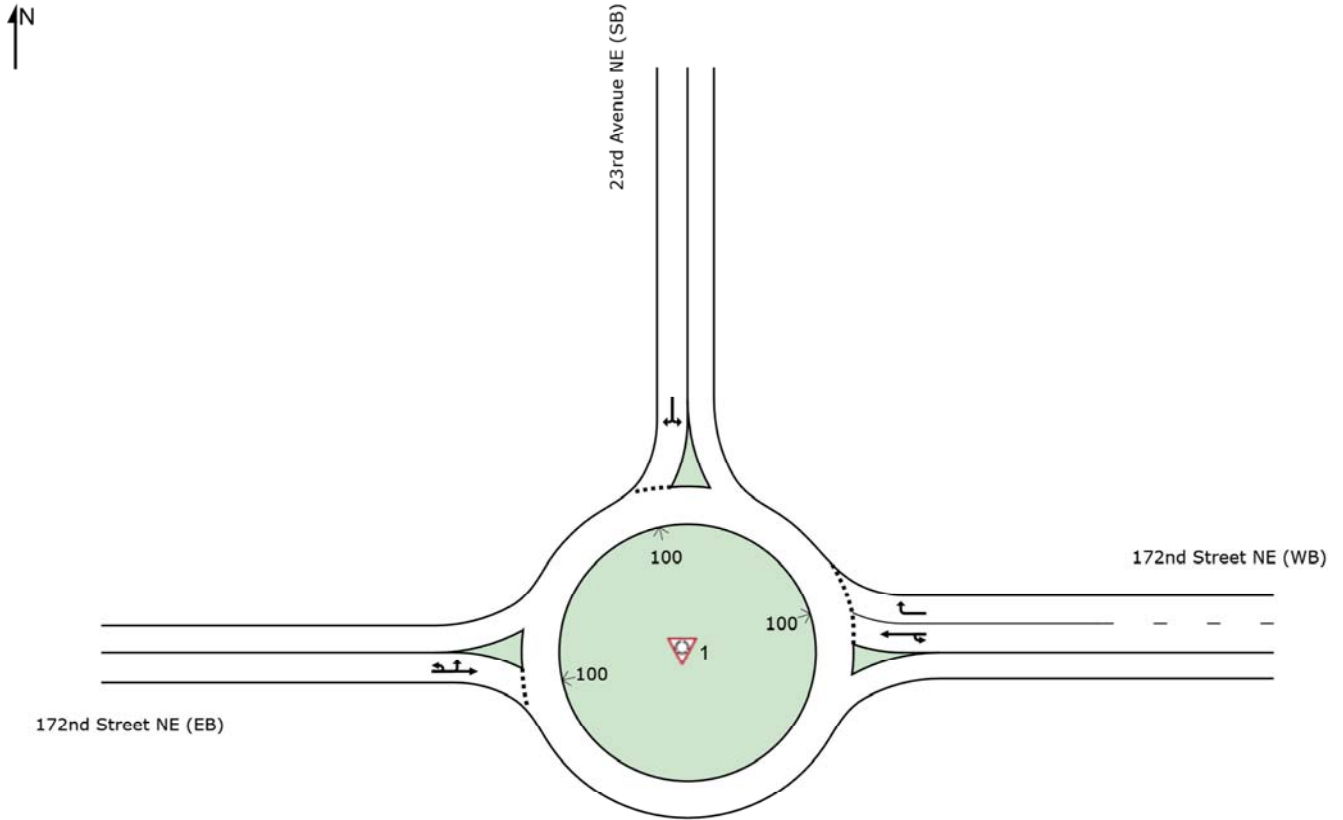
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

# SITE LAYOUT

## Site: 1 [2030 Baseline Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
Site Category: Saturday Peak-Hour  
Roundabout



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Organisation: GIBSON TRAFFIC CONSULTANTS | Created: Wednesday, August 18, 2021 7:28:42 AM  
Project: H:\2021\21-190\Sidra#1 - 172nd St NE at 23rd Ave NE.sip8



Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

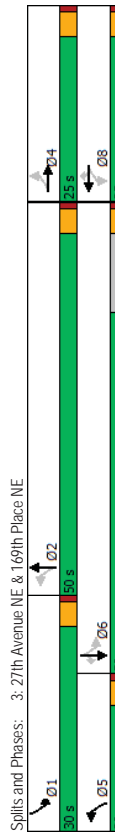
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	14	4	8	12	200	3	431	4	441	573	47
Future Volume (vph)	51	14	4	8	12	200	3	431	4	441	573	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0	75	0	0	200	0	0	0	0	135
Storage Lanes	0	0	0	1	1	1	1	0	0	1	1	1
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
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						0.850		0.999				0.97
Frt	0.993											0.850
Flt Protected	0.964					0.980				0.950		
Satd. Flow (prot)	0	1801	0	0	1844	1599	1787	1879	0	1787	1881	1599
Flt Permitted	0.767					0.891		0.429		0.375		
Satd. Flow (perm)	0	1433	0	0	1676	1599	805	1879	0	705	1881	1552
Right Turn on Red			Yes			Yes		Yes	Yes			Yes
Satd. Flow (RTOR)	2					217		1				52
Link Speed (mph)	30					30		30				30
Link Distance (ft)	967					413		725				730
Travel Time (s)	22.0					9.4		16.5				16.6
Confl. Peds. (#/hr)							4					4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	55	15	4	9	13	217	3	468	4	479	623	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	74	0	0	22	217	3	472	0	479	623	51
Turn Type	Perm	NA	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	Perm
Protected Phases	4						5	2		1	6	
Permitted Phases	4						8	2		6	6	
Detector Phase	4						8	5		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	22.5	22.5	26.0	26.0	26.0	26.0	9.5	22.5	9.5	26.0	26.0	26.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	20.0	50.0	30.0	50.0	50.0	50.0
Total Split (%)	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	19.0%	47.6%	28.6%	47.6%	47.6%	47.6%
Maximum Green (s)	21.0	21.0	21.0	21.0	21.0	21.0	16.0	46.0	26.0	46.0	46.0	46.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	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	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lag	Lead	Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	3	3	3	3	3	3	3	3	3	3	3	3
Act Effct Green (s)	10.7	10.7	10.7	10.7	10.7	10.7	51.9	46.8	64.5	63.1	63.1	63.1
Actuated G/C Ratio	0.13	0.13	0.13	0.13	0.13	0.13	0.62	0.56	0.77	0.76	0.76	0.76
v/c Ratio	0.40	0.40	0.40	0.40	0.40	0.40	0.55	0.01	0.66	0.66	0.66	0.66

2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	40.1			34.0	10.8	5.3	14.8			8.3	6.2	1.8
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	40.1			34.0	10.8	5.3	14.8			8.3	6.2	1.8
LOS	D			C	B	A	B			A	A	A
Approach Delay	40.1			12.9			14.8			6.9		
Approach LOS	D			B			B			A		
Queue Length 50th (ft)	34			10	0	0	117			49	71	0
Queue Length 95th (ft)	83			34	61	3	340			158	303	13
Internal Link Dist (ft)	887			333			645			650		
Turn Bay Length (ft)						200						135
Base Capacity (vph)	371			432	573	789	1065			889	1424	1188
Starvation Cap Reductn	0			0	0	0	0			0	0	0
Spillback Cap Reductn	0			0	0	0	0			0	0	0
Storage Cap Reductn	0			0	0	0	0			0	0	0
Reduced v/c Ratio	0.20			0.05	0.38	0.00	0.45			0.54	0.44	0.04

Intersection Summary  
Area Type: Other  
Cycle Length: 105  
Actuated Cycle Length: 83.3  
Natural Cycle: 75  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.66  
Intersection Signal Delay: 10.8  
Intersection LOS: B  
ICU Level of Service C  
Analysis Period (min) 15



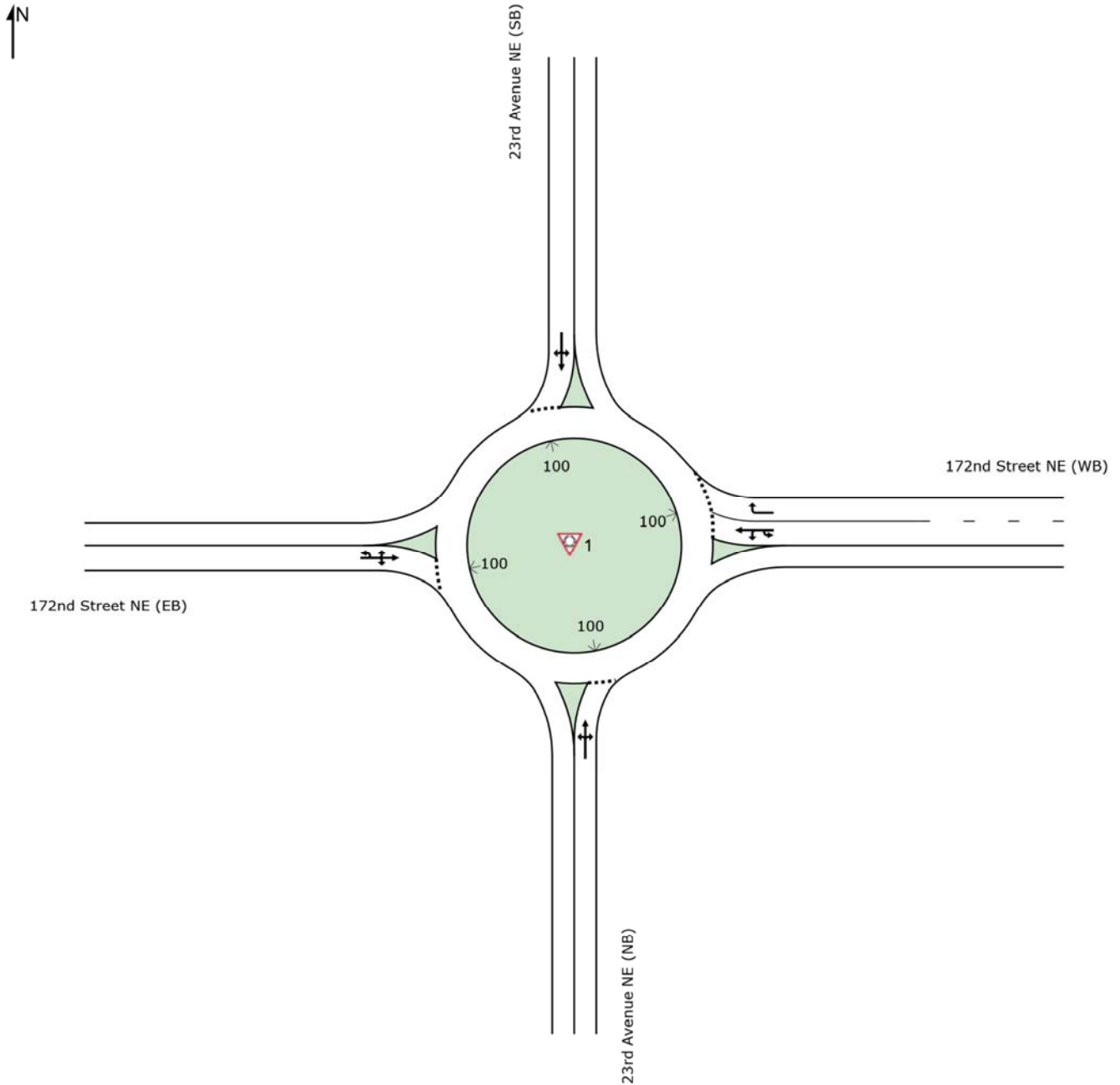
2030 Baseline Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]



# SITE LAYOUT

## Site: 1 [2030 Horizon Year Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
Site Category: Saturday Peak-Hour  
Roundabout



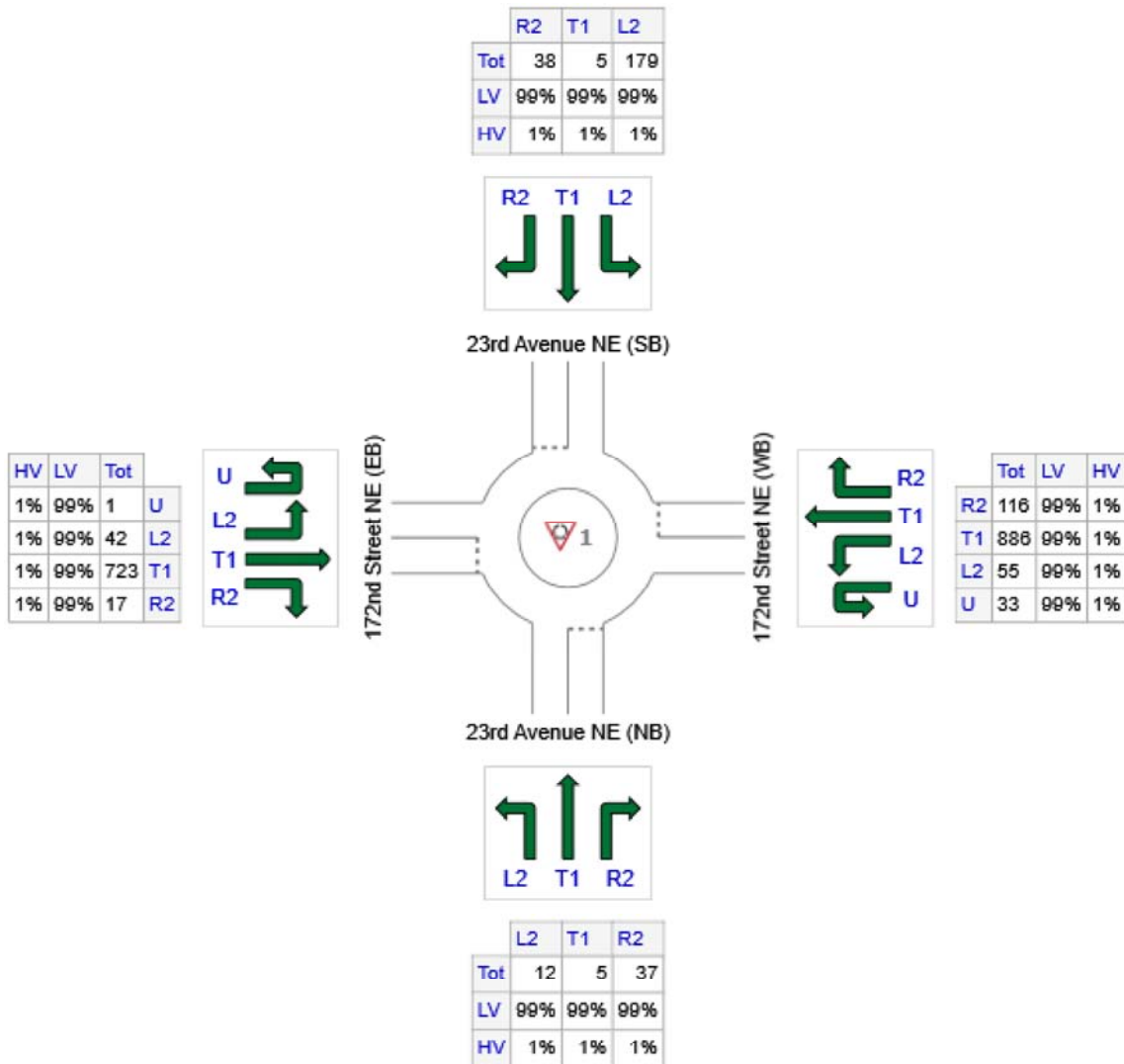
# INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 1 [2030 Horizon Year Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
 Site Category: Saturday Peak-Hour  
 Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 23rd Avenue NE (NB)	54	53	1
E: 172nd Street NE (WB)	1090	1079	11
N: 23rd Avenue NE (SB)	222	220	2
W: 172nd Street NE (EB)	783	775	8
Total	2149	2128	21

# MOVEMENT SUMMARY

## Site: 1 [2030 Horizon Year Conditions - Saturday]

172nd Street NE at 23rd Avenue NE  
 Site Category: Saturday Peak-Hour  
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: 23rd Avenue NE (NB)												
3	L2	13	1.0	0.123	18.3	LOS B	0.9	22.9	0.94	0.85	0.94	32.8
8	T1	5	1.0	0.123	12.3	LOS B	0.9	22.9	0.94	0.85	0.94	32.7
18	R2	40	1.0	0.123	12.4	LOS B	0.9	22.9	0.94	0.85	0.94	31.9
Approach		59	1.0	0.123	13.7	LOS B	0.9	22.9	0.94	0.85	0.94	32.1
East: 172nd Street NE (WB)												
1u	U	36	1.0	0.651	12.6	LOS B	7.3	184.5	0.38	0.43	0.38	37.6
1	L2	60	1.0	0.651	10.2	LOS B	7.3	184.5	0.38	0.43	0.38	36.6
6	T1	963	1.0	0.651	4.3	LOS A	7.3	184.5	0.38	0.43	0.38	36.5
16	R2	126	1.0	0.111	4.4	LOS A	0.6	14.8	0.23	0.46	0.23	36.1
Approach		1185	1.0	0.651	4.8	LOS A	7.3	184.5	0.37	0.43	0.37	36.5
North: 23rd Avenue NE (SB)												
7	L2	195	1.0	0.416	19.8	LOS B	3.3	83.3	0.95	1.00	1.05	30.8
4	T1	5	1.0	0.416	13.8	LOS B	3.3	83.3	0.95	1.00	1.05	30.7
14	R2	41	1.0	0.416	13.9	LOS B	3.3	83.3	0.95	1.00	1.05	30.0
Approach		241	1.0	0.416	18.6	LOS B	3.3	83.3	0.95	1.00	1.05	30.7
West: 172nd Street NE (EB)												
5u	U	1	1.0	0.740	16.1	LOS B	9.1	230.3	0.81	0.77	0.93	36.1
5	L2	46	1.0	0.740	13.7	LOS B	9.1	230.3	0.81	0.77	0.93	35.2
2	T1	786	1.0	0.740	7.7	LOS A	9.1	230.3	0.81	0.77	0.93	35.1
12	R2	18	1.0	0.740	7.8	LOS A	9.1	230.3	0.81	0.77	0.93	34.1
Approach		851	1.0	0.740	8.1	LOS A	9.1	230.3	0.81	0.77	0.93	35.1
All Vehicles		2336	1.0	0.740	7.7	LOS A	9.1	230.3	0.60	0.62	0.66	35.2

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

Lanes, Volumes, Timings

2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	67	680	266	1059	757	433	235	128	878	390	140	33
Future Volume (vph)	67	680	266	1059	757	433	235	128	878	390	140	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	195		375	400	200	150			0	175		175
Storage Lanes	1		1	2	1	1			1	1		1
Taper Length (ft)	25		0.95	0.97	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Lane Util. Factor	1.00	0.99	1.00	1.00	0.98	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor	1.00	0.98	1.00	1.00	0.850	1.00	1.00	1.00	1.00	0.971	1.00	1.00
Frt	0.950		0.950	0.950	0.850	0.950	0.950	0.950	0.850	0.950	0.971	0.950
Flt Protected	1787	3404	0	3467	3574	1599	1787	1881	1599	3467	1820	0
Satd. Flow (prot)	0.950		0.950	0.950	0.850	0.950	0.950	0.950	0.850	0.950	0.971	0.950
Satd. Flow (perm)	1784	3404	0	3454	3574	1599	1779	1881	1599	3467	1820	0
Right Turn on Red			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	34		365						453			7
Link Speed (mph)	30		30						30			30
Link Distance (ft)	1312		609						730			589
Travel Time (s)	29.8		13.8						16.6			13.4
Confl. Peds. (#/hr)	2		6						5			5
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 (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	69	701	274	1092	780	446	242	132	905	402	144	34
Shared Lane Traffic (%)	69	975	0	1092	780	446	242	132	905	402	178	0
Lane Group Flow (vph)	Prot	NA	NA	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	NA
Turn Type	5	2		1	6		3	8	8	7	4	4
Protected Phases	5	2		1	6		3	8	8	7	4	4
Permitted Phases	5	2		1	6		3	8	8	7	4	4
Detector Phase	5	2		1	6		3	8	8	7	4	4
Switch Phase	5	2		1	6		3	8	8	7	4	4
Minimum Initial (s)	3.0	7.0		3.0	7.0		3.0	5.0	5.0	3.0	5.0	5.0
Minimum Split (s)	9.5	38.3		9.5	38.3		9.5	23.1	23.1	9.5	45.1	45.1
Total Split (s)	20.0	38.3		46.0	60.0		25.0	25.0	25.0	25.0	45.1	45.1
Total Split (%)	13.0%	24.8%		29.8%	38.9%		16.2%	16.2%	16.2%	16.2%	29.2%	29.2%
Maximum Green (s)	15.0	32.0		41.0	53.7		20.0	19.9	19.9	20.0	40.0	40.0
Yellow Time (s)	3.0	4.3		3.0	4.3		3.0	3.1	3.1	3.0	3.1	3.1
All-Red Time (s)	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
Total Lost Time (s)	5.0	6.3		5.0	6.3		5.0	5.1	5.1	5.0	5.1	5.1
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
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	3.0	3.0	2.5	3.0	3.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0			25.0	25.0		25.0	25.0	25.0	25.0	25.0	25.0
Pedestrian Calls (#/hr)	0			0			0			0		0
Act Effct Green (s)	10.8	32.0		41.0	62.2		20.0	40.3	40.3	19.7	40.0	40.0
Actuated G/C Ratio	0.07	0.21		0.27	0.40		0.13	0.26	0.26	0.13	0.26	0.26
v/c Ratio	0.56	1.33		1.19	0.54		0.53	1.05	0.27	1.20	0.91	0.37

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [B.J.L.#21-190]

Saturday Peak-hour

Lanes, Volumes, Timings

2: 27th Avenue NE/Spring Lane & 172nd Street NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	85.5	202.8		143.2	37.4	9.2	134.8	47.3	128.2	91.6	47.8	47.8
Queue Delay	0.0	0.0		0.0	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.5	202.8		143.2	38.1	9.5	134.8	47.3	128.2	91.6	47.8	47.8
LOS	F	F		F	D	A	F	D	F	F	F	D
Approach Delay		195.0			82.1			121.1				78.1
Approach LOS		F			F			F				E
Queue Length 50th (ft)	69	-657		-680	314	51	-264	107	-752	209	142	142
Queue Length 95th (ft)	121	#798		#817	398	159	#446	169	#1017	#302	218	218
Internal Link Dist (ft)		1232			529			650			509	509
Turn Bay Length (ft)	195			400		200	150		752	449	175	175
Base Capacity (vph)	173	732		920	1440	846	231	491	752	449	476	476
Starvation Cap Reductn	0	0		0	329	86	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	0.40	1.33		1.19	0.70	0.59	1.05	0.27	1.20	0.90	0.37	0.37
Intersection Summary												
Area Type:	Other											
Cycle Length:	154.4											
Actuated Cycle Length:	154.4											
Natural Cycle:	145											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	1.33											
Intersection Signal Delay:	113.8											
Intersection Capacity Utilization:	121.9%											
Analysis Period (min):	15											
ICU Level of Service:	H											
Intersection LOS:	F											
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: 27th Avenue NE/Spring Lane & 172nd Street NE											

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [B.J.L.#21-190]

Saturday Peak-hour

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

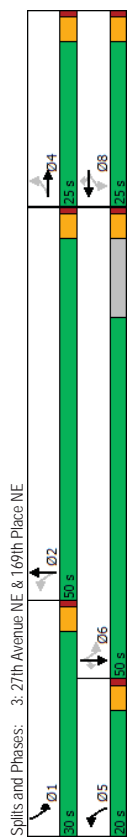
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	51	30	4	8	24	200	3	431	4	441	573	47
Traffic Volume (vph)	51	30	4	8	24	200	3	431	4	441	573	47
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	0	0	0	75	0	200	0	0	0	0	135	0
Storage Length (ft)	25	0	1	1	1	1	25	25	0	25	1	1
Taper Length (ft)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.994	0.971	0.987	0.987	0.987	0.850	0.999	0.999	0.950	0.950	0.850	0.97
Ped Bike Factor	0	1816	0	0	1857	1599	1787	1879	0	1787	1881	1599
Flt Protected	0.796	0.796	0.925	0.925	0.925	0.429	0.373	0.373	0.373	0.373	0.373	0.373
Satd. Flow (prot)	0	1488	0	0	1740	1599	805	1879	0	702	1881	1552
Flt Permitted	2	Yes	Yes	Yes	Yes	217	1	1	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	30	30	30	30	30	30	30	30	30	30	30	30
Link Speed (mph)	967	967	967	967	967	967	967	967	967	967	967	967
Link Distance (ft)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Travel Time (s)	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Peak Hour Factor	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Heavy Vehicles (%)	55	33	4	9	26	217	3	468	4	479	623	51
Adj. Flow (vph)	0	92	0	0	35	217	3	472	0	479	623	51
Shared Lane Traffic (%)	Perm	NA	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Lane Group Flow (vph)	4	4	4	8	8	8	2	2	6	6	6	6
Protected Phases	4	4	4	8	8	8	5	5	1	1	1	1
Permitted Phases	4	4	4	8	8	8	5	5	1	1	1	1
Detector Phase	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0	5.0
Switch Phase	22.5	22.5	22.5	26.0	26.0	26.0	9.5	9.5	9.5	9.5	9.5	9.5
Minimum Initial (s)	25.0	25.0	25.0	25.0	25.0	25.0	20.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Total Split (%)	21.0	21.0	21.0	21.0	21.0	21.0	16.0	16.0	16.0	16.0	16.0	16.0
Total Split (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Maximum Green (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Yellow Time (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
All-Red Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	None	None	None	None	None	None	None	None	None	None	None	None
Lead/Lag	None	None	None	None	None	None	None	None	None	None	None	None
Lead-Lag Optimize?	8.0	8.0	8.0	15.0	15.0	15.0	10.0	10.0	10.0	10.0	10.0	10.0
Vehicle Extension (s)	3	3	3	3	3	3	3	3	3	3	3	3
Recall Mode	11.2	11.2	11.2	11.2	11.2	11.2	51.9	46.8	64.8	63.3	63.3	63.3
Flash Don't Walk (s)	0.13	0.13	0.13	0.13	0.13	0.13	0.62	0.56	0.77	0.75	0.75	0.75
Pedestrian Calls (#/hr)	0.46	0.46	0.46	0.46	0.46	0.46	0.01	0.45	0.67	0.44	0.44	0.44
Act Effct Green (s)												
Actuated G/C Ratio												
v/c Ratio												

2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Lanes, Volumes, Timings  
3: 27th Avenue NE & 169th Place NE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	41.4	41.4	41.4	34.5	34.5	34.5	10.5	10.5	10.5	15.2	15.2	15.2
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	41.4	41.4	41.4	34.5	34.5	34.5	10.5	10.5	10.5	15.2	15.2	15.2
LOS	D	D	D	C	C	C	B	B	B	A	A	A
Approach Delay	41.4	41.4	41.4	13.8	13.8	13.8	0	0	0	15.2	15.2	15.2
Approach LOS	D	D	D	B	B	B	B	B	B	A	A	A
Queue Length 50th (ft)	43	43	43	16	16	16	0	0	0	122	122	122
Queue Length 95th (ft)	100	100	100	47	47	47	61	61	61	340	340	340
Internal Link Dist (ft)	887	887	887	333	333	333	200	200	200	645	645	645
Turn Bay Length (ft)	382	382	382	445	445	445	570	570	570	1045	1045	1045
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
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	0.24	0.24	0.24	0.08	0.08	0.08	0.38	0.38	0.38	0.00	0.45	0.44

Intersection Summary  
Area Type: Other  
Cycle Length: 105  
Actuated Cycle Length: 84.1  
Natural Cycle: 75  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.67  
Intersection Signal Delay: 11.5  
Intersection Capacity Utilization: 68.7%  
Analysis Period (min): 15  
Intersection LOS: B  
ICU Level of Service: C



Splits and Phases: 3: 27th Avenue NE & 169th Place NE  
2030 Horizon Conditions  
Gibson Traffic Consultants, Inc. [BJL #21-190]

Saturday Peak-hour

# **WSDOT Exhibit C List**

LIST OF PROGRAMMED  
WSDOT PROJECTS IN  
SNOHOMISH COUNTY  
AS OF Nov. 2008

County ID#	TSA	SR	MP1	MP2	Title/Description	Design/Construction year	Total Cost (M)	TOTAL CAPACITY (ADT)	PRESENT VOLUME	RESERVE CAPACITY (ADT)	TRUE CONTRIBUTION PER ADT	50% TRIP END DEDUCTION	TAX DEDUCTION	Proportionate Share Per Development Generated ADT
DOT-11	D	5	186.42	186.42	128th ST SW Interchange - Construct Loop Ramps / HOV Bypass	2014	\$13.30	99,000	65,000	34,000	\$391.18	\$195.15	\$40.98	\$154.17
DOT-01	A	5	205.85	205.85	172nd Street NE (SR 531) interchange improvements, SB loop ramp, bridge widening	2009	\$41.00	90,000	34,900	55,100	\$744.10	\$372.05	\$63.25	\$308.80
DOT-30	E	9	1.66	4.04	212th Street SE to 176th Street SE, widen to 5 lanes	2011	\$80.80	54,000	21,000	33,000	2,448.48	\$1,224.24	\$183.64	\$1,040.60
DOT-56	B	9	16.48	17.49	Lundeen Parkway to SR-92, Widen to 4 lanes & RT-LT lanes	2009	\$38.90	54,000	24,000	30,000	\$1,296.67	\$648.34	\$123.18	\$525.16
DOT-37	B	9	17.96	17.96	SR-9 at 60th Street NE, add LT & RT lanes at Tee intersection	2011	\$2.95	54,000	36,000	18,000	\$163.89	\$81.95	\$13.91	\$67.94
DOT-22	A	9	18.88	19.46	SR 9/SR 528 intersection improvements, Signal & Channelization	2010	\$17.13	54,000	36,000	18,000	\$951.67	\$475.83	\$80.89	\$394.94
DOT-57	A	9	20.51	20.59	SR-9/84th Street NE intersection improvements, LT & RT lanes	2011	\$17.13	54,000	12,000	42,000	\$407.88	\$203.93	\$55.06	\$148.87
DOT-58	A	9	26.00	26.09	SR-9/SR-531/172nd St. NE intersection improvement, Roundabout	2011	\$15.60	54,000	11,000	43,000	\$362.80	\$181.40	\$45.87	\$135.53
DOT-33	B	92	1.46	1.46	SR-92 at 113th Avenue NE, Roundabout	2009	\$2.36	54,000	19,600	34,000	\$68.60	\$34.30	\$6.52	\$27.78
DOT-31	B	92	1.73	1.73	SR-92 at Callow/Grade Road, turn lanes to SR-92	2009	\$1.90	54,000	19,600	34,400	\$55.24	\$27.62	\$5.25	\$22.37
DOT-46	C	203	22.36	22.38	SR-203 at North High Rock/Tualco Roads, Re-align cross street for I/S and add LT & RT lanes on SR-203	2009	\$3.34	18,000	13,000	5,000	\$688.00	\$344.00	\$73.48	\$270.52
DOT-36	C	203	23.01	23.01	Ben Howard Rd channelization, LT lanes on SR-203	2009	\$1.07	54,000	13,000	41,000	\$26.10	\$13.05	\$2.87	\$10.18
DOT-16	E	522	13.82	16.61	Paradise Lake Road I/C, Stage 3, new interchange	2010	\$27.95	81,000	48,000	33,000	\$847.03	\$423.52	\$63.53	\$359.99
DOT-17	E	522	16.80	20.41	Paradise Lake Road to Snohomish River, Bridge, Stage 2, widen to 4 lanes	2009	\$33.48	80,000	21,900	58,100	\$576.25	\$288.13	\$43.22	\$244.91
DOT-28	C	522	20.50	24.68	Snohomish River Bridge to SR 2, widen to 4 lanes	2010	\$171.98	80,000	20,000	60,000	\$2,866.33	\$1,433.17	\$315.30	\$1,117.87

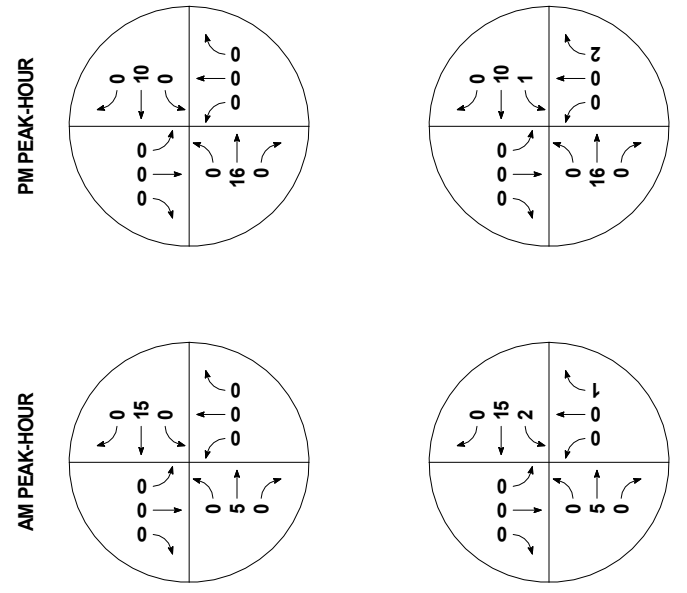
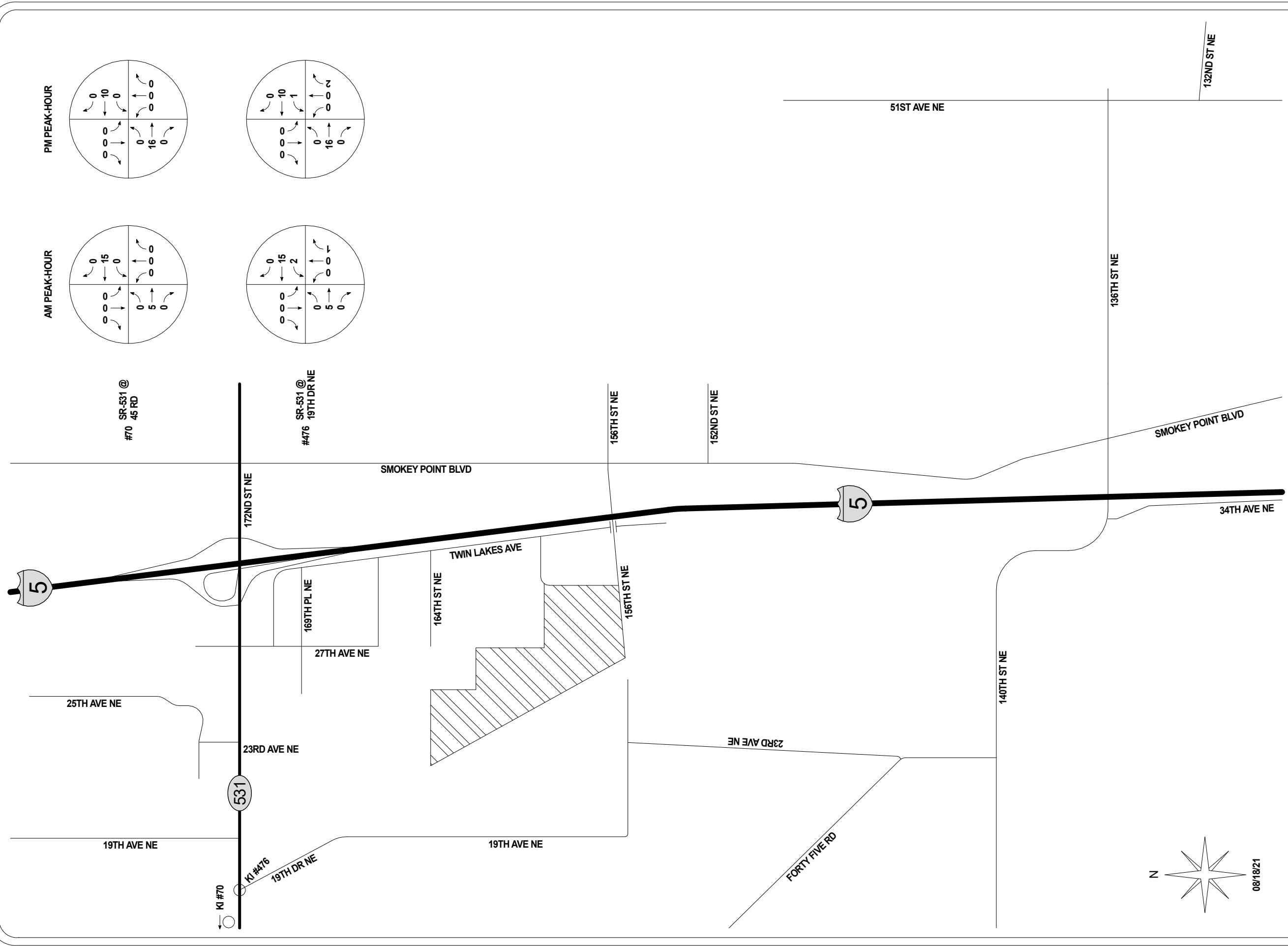
LIST OF PROGRAMMED  
WSDOT PROJECTS IN  
SNOHOMISH COUNTY  
AS OF Nov. 2008

County ID#	TSA SR	MP1	MP2 Title/Description	Design/Construction year	Total Cost (M)	TOTAL CAPACITY (ADT)	PRESENT VOLUME	RESERVE CAPACITY (ADT)	TRUE CONTRIBUTION PER ADT	50% TRIP END DEDUCTION	TAX DEDUCTION	Proportionate Share Per Development Generated ADT
DOT-19	F 524	5.87	9.50 24th Avenue SE to I-405, widen to 5 Lanes	2012	\$33.34	54,000	15,300	38,700	\$861.50	\$430.75	\$77.54	\$353.21
DOT-20	F 524	5.87	9.50 I-405 to Royal Ann Road, widen to 5 Lanes	2011	\$71.06	54,000	15,300	38,700	\$1,836.18	\$918.09	\$165.26	\$752.83
DOT-60	E 524	6.79	Larch Way intersection, LT lanes, signal	2009	\$2.59	54,000	15,300	38,700	\$66.93	\$33.47	\$5.02	\$28.45
DOT-59	D 525	6.25	SR-525/68th St. SW intersection improvements, NBRT, NBLT & SBLT	2011	\$3.70	25,700	17,000	8,700	\$425.29	\$212.64	\$89.31	\$123.33
DOT-49	A 530	17.30	SR-530 at Old 99, Roundabout	2011	\$8.00	18,000	10,000	8,000	\$1,000.00	\$500.00	\$85.00	\$415.00
DOT-62	A 530	19.71	211th Place NE, Intersection Roundabout	2011	\$6.10	24,000	15,000	9,000	\$677.78	\$338.89	\$57.61	\$281.28
DOT-52	A 531	1.95	SR-531/Jct. Freestad Road Intersection, LT lanes	2011	\$1.55	18,000	7,900	10,100	\$140.14	\$70.07	\$11.92	\$58.15
DOT-05	A 531	7.00	8.59 43rd Ave. NE to 67th Ave. NE, NE, Widen to 5 lanes (Arlington)	2014	\$20.78	54,000	11,000	43,000	\$483.14	\$241.57	\$41.07	\$200.50
			270th St. NW Vic. To 72nd Ave. NW, EB Climbing Lane, intersection improvements & signal.	2009	\$19.00	54,000	16,000	38,000	500	\$250.00	\$28.75	\$221.25
DOT-53	A 532	5.25	64th Ave. NW to 12th Ave. NW, Climbing lane & LT Lanes	2010	\$22.40	54,000	17,000	37,000	\$605.41	\$302.70	\$33.75	\$268.95
			TAX DEDUCTIONS									
			TSA A = 17%									
			TSA B = 19%									
			TSA C = 22%									
			TSA D = 21%									
			TSA E = 15%									
			TSA F = 18%									



# **Snohomish County Key Intersections**





**GIBSON TRAFFIC CONSULTANTS**

**TRAFFIC IMPACT STUDY**  
GTC #21-190

**10 DEGREES**

**CITY OF MARYSVILLE**

**LEGEND**

XXX → DEVELOPMENT TURNING MOVEMENT VOLUMES

**FIGURE B**

**SNOHOMISH COUNTY**

**KEY INTERSECTION**

**TURNING MOVEMENTS**

**Table A: AM Peak-Hour Key Intersection Volumes**

<b>Intersection</b>	<b>EBL</b>	<b>EBT</b>	<b>EBR</b>	<b>WBL</b>	<b>WBT</b>	<b>WBR</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>
#70: Forty-Five Rd at SR-531	0	5	0	0	15	0	0	0	0	0	0	0
#476: 19 <sup>th</sup> Dr NE at SR-531	0	5	0	2	15	0	0	0	1	0	0	0

**Table B: PM Peak-Hour Key Intersection Volumes**

<b>Intersection</b>	<b>EBL</b>	<b>EBT</b>	<b>EBR</b>	<b>WBL</b>	<b>WBT</b>	<b>WBR</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>
#70: Forty-Five Rd at SR-531	0	16	0	0	10	0	0	0	0	0	0	0
#476: 19 <sup>th</sup> Dr NE at SR-531	0	16	0	1	10	0	0	0	2	0	0	0