English Crossing

Marysville, WA

Traffic Impact Analysis

April 24, 2023

Prepared for:

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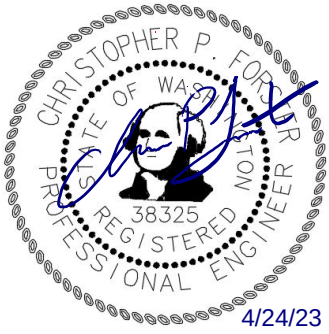

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FINDINGS/CONCLUSIONS

This traffic impact analysis (TIA) has been prepared for the proposed *English Crossing* project in the Lakewood area of the City of Marysville, WA.

Project Proposal. The proposed *English Crossing* project site is located west of 19th Ave NE and north of 172nd Street NE. The proposed project will include up to 250 Single-Family Attached townhome units on a site that is currently vacant. Vehicular access to the site would be provided be provided via a new site access roadway connection to 19th Ave NE, aligned with 174th Street NE. Secondary access for emergency vehicles only would be provided north of 174th Street NE via another new site access roadway connection to 19th Ave NE.

Trip Generation. The *English Crossing* project is estimated to generate 1,800 new weekday daily trips, with 120 new trips (30 in, 90 out) occurring during the AM peak hour and 250 new trips (147 in, 103 out) occurring during the PM peak hour.

Intersection Level of Service (LOS). The LOS analyses documented in this report were assessed during the weekday PM peak hour at seven (7) off-site study intersections. All study intersections are anticipated to operate at LOS D or better in 2026 (buildout year) and 2032 (horizon year) during the weekday PM peak hour without or with the proposed project with the exception of the following intersection:

5. 27th Ave NE / 172nd St NE (LOS E without or with the proposed project)

The City of Marysville and WSDOT LOS standard at all study intersections is LOS D with one exception. The City of Marysville *Traffic Impact Analysis Guidelines* state that WSDOT intersections on the 172nd Street NE (SR 531) corridor which have an existing LOS E prior to development submittal shall only be required to mitigate upon falling below LOS E. Therefore, no off-site mitigation is proposed at the 27th Ave NE/172nd St NE intersection.

Site Access Evaluation. The LOS results indicate that the individual movements at the proposed site access intersection are expected to operate at LOS B or better with minimal queuing during the weekday PM peak hour in 2026 (buildout year) and 2032 (horizon year).

Future City Road Plans. The City of Marysville has identified several future road improvements and connections in the vicinity of the project site. These connector roads are identified on the City's Comprehensive Plan, City's Lakewood Neighborhood Plan, the City's six-year 2023-2028 Transportation Improvement Plan (TIP), and/or the City's traffic impact fee program. The following eight (8) City planned road improvements were identified in the study area.

- 172nd Street NE / 19th Avenue NE Roundabout – construct new roundabout at 19th Avenue NE / 172nd Street NE (Marysville TIP Project #24)
- 172nd Street NE / 11th Avenue NE Roundabout – construct new roundabout at 11th Avenue NE / 172nd Street NE (Marysville TIP Project #25)
- 172nd Street NE from 27th Avenue NE to 19th Avenue NE – widen to a 4/5-lane section with pedestrian and bicycle facilities between 27th Avenue NE and 19th Avenue NE. (Marysville TIP Project #30)

- 172nd Street NW from 19th Drive NE to 11th Avenue NE – widen to a 3-lane section with pedestrian and bicycle facilities between 19th Drive NE and 11th Avenue NE. (Marysville TIP Project #31)
- 172nd Street NE Railroad Crossing – widen to a 3-lane section with pedestrian and bicycle facilities and railroad crossing improvements; this project is unfunded. (Marysville TIP Project #36)
- New 19th Avenue NE Extension – construct new 3-lane roadway between 156th Street NE and 172nd Street NE that would include pedestrian and bicycle facilities. (Marysville TIP Project #51)
- 156th Street NE Interchange – convert existing overcrossing to a full single-point urban interchange (SPUI) with Interstate 5. (Marysville TIP Project #61)
- New 23rd Avenue NE and 169th Street NE – construct new 3-lane roadways connecting to the existing street network at the existing roundabout at 23rd Avenue NE / 172nd Street NE and the existing western terminus of 169th Street NE. (Marysville TIP Project #48)

Note that portions of some of these City improvements would be completed by the *English Crossing* project as mitigation, which is further described in the Mitigation section next.

Mitigation. The following measures have been identified to mitigate traffic impacts of the proposed *English Crossing* project.

- **City of Marysville Mitigation.** The City of Marysville requires payment of transportation impact fees to help fund planned roadway improvements throughout the City. Transportation impact fees for the proposed *English Crossing* project were calculated based on the trip generation estimate documented in this TIA and the City of Marysville's currently adopted transportation impact fee rate of $6,300 per PM peak hour trip. The proposed *English Crossing* project is estimated to generate 250 new PM peak hour trips. As a result, the estimated City of Marysville transportation impact fee is **$1,575,000** ($6,300 X 250 PM peak hour trips). Actual impact fees will be calculated by the City at the time of building permit issuance.
- **Snohomish County Mitigation.** The City of Marysville and Snohomish County have adopted an interlocal agreement whereby developments in Marysville must assess potential mitigation for impacts on Snohomish County roadway facilities. Mitigation fees to Snohomish County are based on predetermined distribution percentages according to location or specific project impacts to planned roadway improvements. Mitigation fees to Snohomish County were based on the use of the standard distribution percentage based on the project location (20%) multiplied by the daily trip generation (1,800 new daily project trips) and adopted cost per ADT ($185 for residential developments within TSA A and the UGA). The resulting Snohomish County transportation impact fee is **$66,600**. A mitigation offer form to Snohomish County will be submitted separately.

- Future City Road Plans. The *English Crossing* project would build a portion of the following City planned roadway improvements:
    - Construct and dedicate right-of-way for the western half-street of a 3-lane section on 19th Avenue NE from 172nd Street NE to the northern site property line.
    - Construct and dedicate right-of-way for the northern half-street of a 3-lane section on 172nd Street NE from 19th Avenue NE to the western site property line.
    - Construct a new roundabout (or a portion of a new roundabout) at 19th Avenue NE / 172nd Street NE if not already completed by other development.

  It should be noted that it is anticipated the applicant would receive transportation impact fee credit for construction and ROW dedication of these roadway construction projects as confirmed by the City.

INTRODUCTION

This traffic impact analysis (TIA) has been prepared for the proposed *English Crossing* project located in the Lakewood area of the City of Marysville, WA. The proposed project will include up to 250 Single-Family Attached townhome units on a currently vacant site. A site vicinity map is provided in Figure 1.

Project Description

The proposed project will include up to 250 Single-Family Attached townhome units on a currently vacant site. Vehicular access to the site would be provided be provided via a new site access roadway connection to 19th Ave NE, aligned with 174th Street NE. Secondary access for emergency vehicles only would be provided north of 174th Street NE via another new site access roadway connection to 19th Ave NE. A preliminary site plan is shown in Figure 2.

Traffic Scoping & Study Area

The scope of work for this Traffic Impact Analysis was prepared consistent with City of Maryville's adopted Traffic Impact Analysis guidelines (December 2021) and confirmed by the City during the scoping process. A total of seven (7) off-site study intersections were identified for evaluation during future weekday PM peak hour conditions in 2026 (buildout year) and 2032 (horizon year):

1. 11th Ave NE / 172nd St NE
2. 19th Dr NE / 172nd St NE
3. 19th Ave NE / 172nd St NE
4. 23rd Ave NE /172nd St NE
5. 27th Ave NE /172nd St NE
6. I-5 SB Ramps /172nd St NE
7. I-5 NB Ramps /172nd St NE

Project Approach

To analyze the traffic impacts of the *English Crossing* development, the following tasks were undertaken:

- Assessment of existing conditions through field reconnaissance and review of existing planning documents.
- Estimation of weekday vehicular AM peak hour, PM peak hour, and weekday daily trips generated by the development.
- Evaluation of weekday PM peak hour level of service (LOS) at seven (7) off-site study intersections.
- Analyzed the weekday PM peak hour operations at the proposed site access intersection including LOS and queues. Review of City planning documents to evaluate long-term road improvements plans in project vicinity.
- Documentation of trip impacts at Snohomish County Key Intersections.

- Summary of mitigation including transportation impact fees to City of Marysville and Snohomish County, and construction of local roadway improvements adjacent to the site.

Primary Data and Information Sources

- Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 11th Edition, 2021.
- City of Marysville *Traffic Impact Analysis Guidelines,* December 22, 2021.
- *Highway Capacity Manual (HCM 6th Edition)*, 2016.
- 2022 and 2023 weekday PM peak period traffic counts, All Traffic Data (ATD).
- City of Marysville 2023-2028 Six Year Transportation Improvement Plan (TIP).
- *City of Marysville Comprehensive Plan – Transportation Element*, 2015.
- *Snohomish County Traffic Worksheet and Traffic Study Requirements for Developments in the City of Marysville*, October 2015.

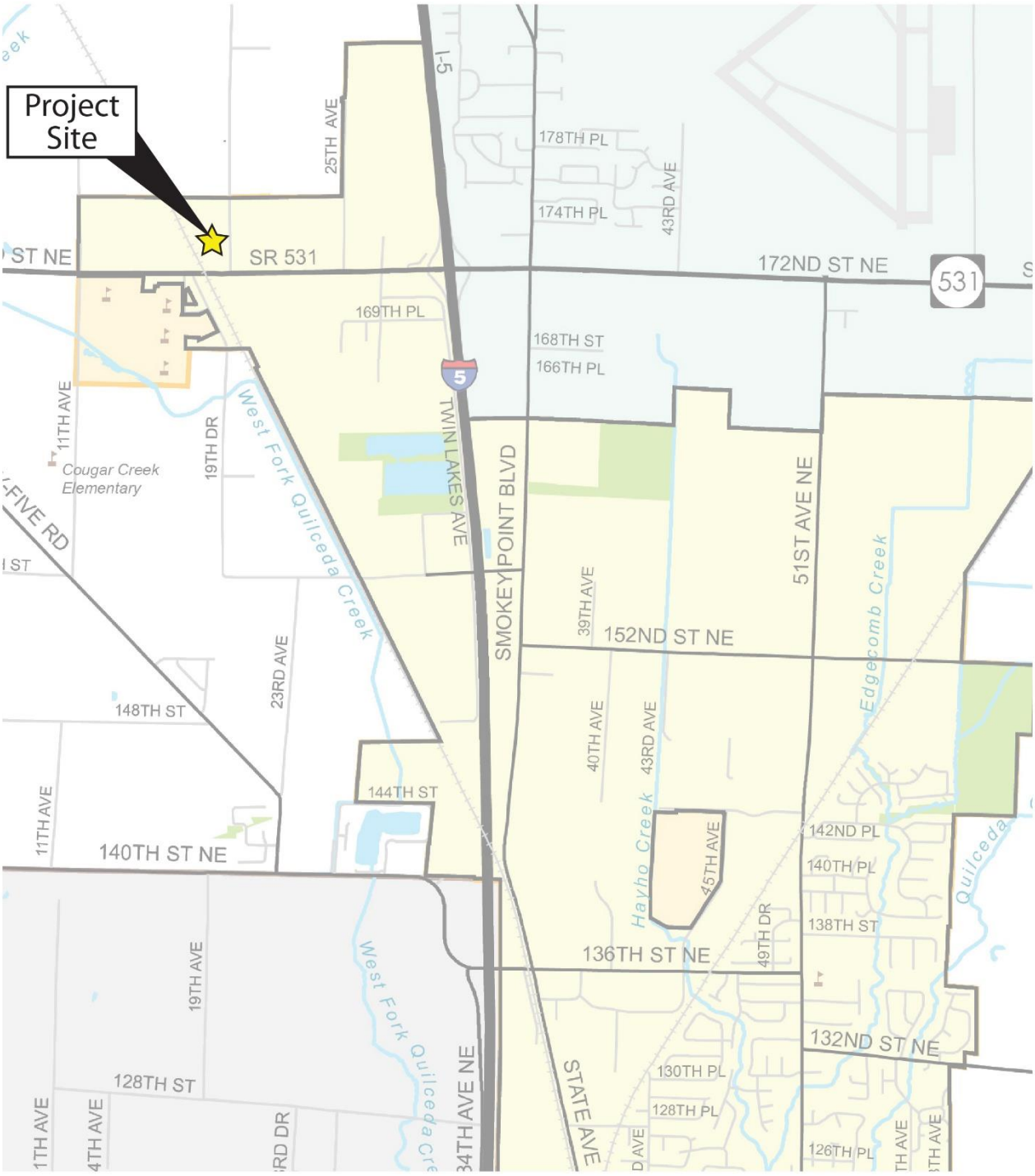


Figure 1: Project Site Vicinity

Figure 2: Preliminary Site Plan

EXISTING CONDITIONS

This section describes existing transportation system conditions in the study area. Existing conditions described include an inventory of existing roadways, public transportation services, non-motorized transportation facilities, existing traffic volumes, and intersection levels of service (LOS).

Roadway Network

The existing street characteristics in the vicinity of the proposed *English Crossing* project are described below in Table 1.

Table 1
Existing Roadway Network Summary – Project Site Vicinity

Roadway	Orientation	Classification	Speed Limit	Number of Travel Lanes	Street Parking	Sidewalks	Bicycle Facilities
172nd St NE (SR 531)	East-West	State Highway	35 mph	3 - 4	None	Intermittent	Intermittent Bike Lanes
19th Ave NE	North-South	Collector Arterial	35 mph	2	None	None	None
23rd Ave NE	North-South	Minor Arterial	25 mph	2	None	Both Sides	None
27th Ave NE	North-South	Minor Arterial	25 mph	2	None	None	None

Transit Service

Transit service in the project site vicinity is provided by Community Transit. The closest bus stops are located on 172nd Street NE at 19th Drive NE and 23rd Ave NE. The bus stops provide access to Community Transit Route 240 which provides service between Stanwood Downtown Park & Ride and Smokey Point Transit Center throughout the day with approximately 1-hour headways.

Non-motorized Transportation Facilities

Non-motorized transportation facilities in the project site vicinity include a mix of sidewalks and paved shoulders. Existing pedestrian activity is minimal in the project vicinity based on recent PM peak period traffic counts.

Collision History

Historical collisions at the seven (7) off-site study intersections were analyzed for the three-year period from 2019 to 2021. Collision data was provided by WSDOT. Summaries of the total and yearly average collisions during this period are provided in Table 2. Summaries of collisions by type are provided in Table 3.

The detailed collision history is included in Appendix A.

Table 2
Collision Data Summary, January 1, 2019, to December 31, 2021

Study Intersection	2019	2020	2021	3-Year Total Collisions	Avg. Annual Collisions	Est. AWDT[1]	Collisions per MEV[2]
1) 11th Ave NE / 172nd St NE	0	1	2	3	1.00	7,030	0.39
2) 19th Dr NE / 172nd St NE	1	2	1	4	1.33	8,090	0.45
3) 19th Ave NE / 172nd St NE	0	2	3	5	1.67	8,360	0.55
4) 23rd Ave NE / 172nd St NE	0	1	2	3	1.00	14,970	0.18
5) 27th Ave NE / 172nd St NE	7	5	7	19	6.33	34,710	0.50
6) I-5 SB Ramps / 172nd St NE	8	4	7	19	6.33	38,620	0.45
7) I-5 NB Ramps / 172nd St NE	5	6	3	14	4.67	43,270	0.30

Source: WSDOT Collision Records.
[1] AWDT = Average Weekday Daily Traffic. Estimated daily volumes are based on 2022/2023 PM volumes and a K-factor of 10.
[2] MEV = Million Entering Vehicles for Intersections.

Table 3
Collision Data Summary by Type, January 1, 2019 to December 31, 2021

	Collision Type							
Intersection	Angle (Left/Right)	Angle (T)	Head-on	Other	Parked Veh/Fixed Object	Ped/Bike	Rear end	Sideswipe
1) 11th Ave NE / 172nd St NE	1	1	0	0	0	0	0	1
2) 19th Dr NE / 172nd St NE	0	3	0	0	0	0	1	0
3) 19th Ave NE / 172nd St NE	0	0	0	0	0	0	4	1
4) 23rd Ave NE / 172nd St NE	1	1	0	0	0	0	0	1
5) 27th Ave NE / 172nd St NE	4	2	0	1	1	0	10	1
6) I-5 SB Ramps / 172nd St NE	6	0	0	0	0	0	10	3
7) I-5 NB Ramps / 172nd St NE	7	0	0	2	2	0	2	1

Source: WSDOT Collision Records.

Per the City of Marysville's *Traffic Impact Analysis Guidelines* (December 2021) intersection collision rates over 1.0 collision per MEV generally warrant further review to determine if any patterns exist. Based on the collision data, none of the seven (7) off-site study intersections have a rate that exceeds 1.0 collision per MEV.

Traffic Volumes

Existing weekday PM peak hour traffic volumes at the seven (7) off-site study intersections were based on counts conducted by All Traffic Data in 2022 and 2023. The PM peak hour represents the highest one-hour time period between 4:00 and 6:00 PM. To estimate existing 2023 traffic volumes, a three (3) percent annual growth rate was applied to the 2022 traffic volumes, consistent with City of Marysville guidelines. Figure 3 illustrates the estimated 2023 existing weekday PM peak hour traffic volumes at the seven (7) off-site study intersections. Appendix B includes the PM peak hour traffic count data sheets.

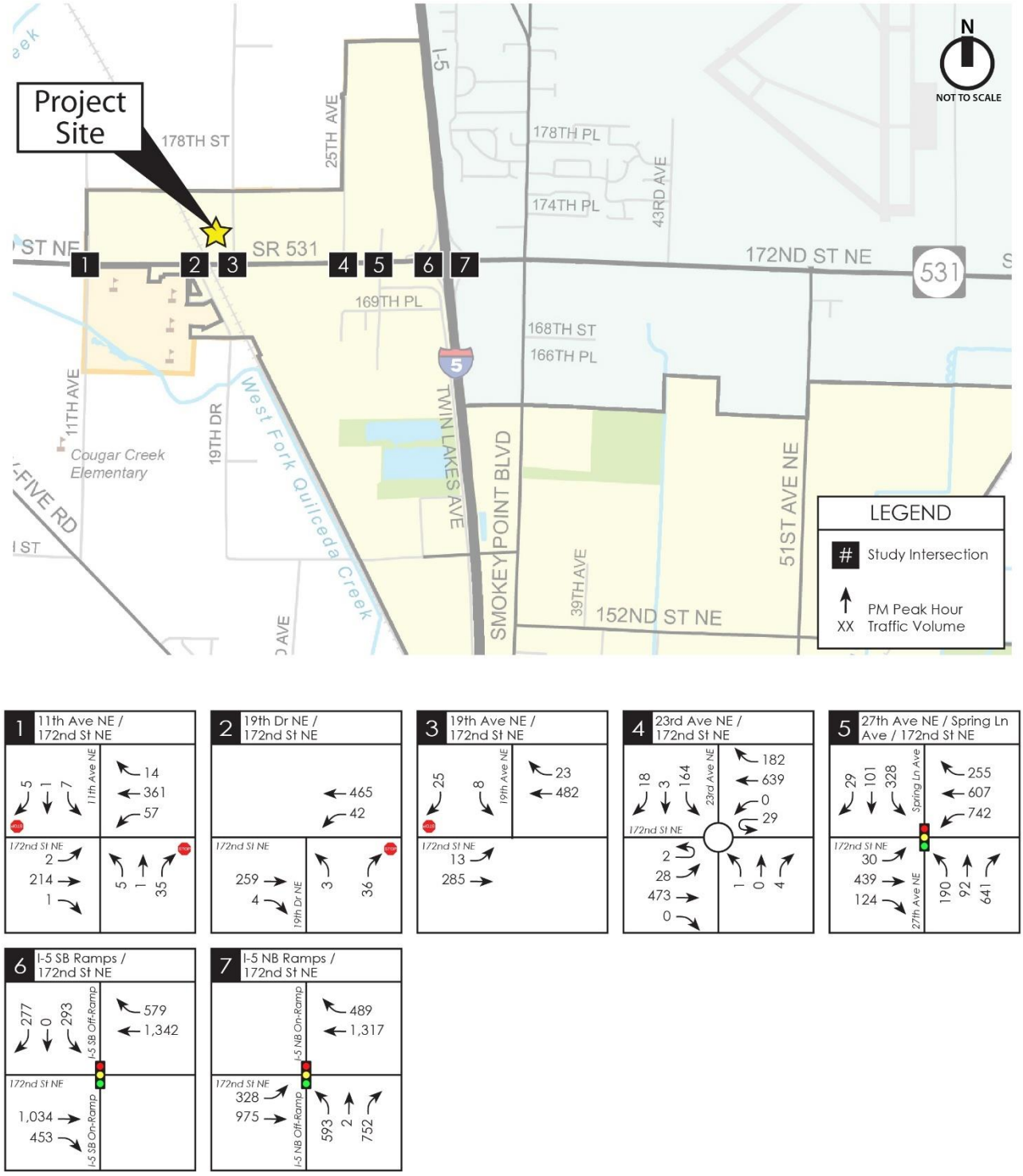


Figure 3: 2023 Existing PM Peak Hour Traffic Volumes

Intersection Levels of Service

LOS generally refers to the degree of congestion on a roadway or intersection. It is a measure of vehicle operating speed, travel time, travel delays, and driving comfort. A letter scale from A to F generally describes intersection LOS. At signalized intersections, LOS A represents free-flow conditions (motorists experience little or no delays), and LOS F represents forced-flow conditions where motorists experience an average delay in excess of 80 seconds per vehicle.

The LOS reported for signalized intersections represents the average control delay (sec/veh) and can be reported for the overall intersection, for each approach, and for each lane group (additional v/c ratio criteria apply to lane group LOS only).

The LOS reported at stop-controlled intersections is based on the average control delay and can be reported for each controlled minor approach, controlled minor lane group, and controlled major-street movement (and for the overall intersection at all-way stop controlled intersections. Additional v/c ratio criteria apply to lane group or movement LOS only). Table 4 outlines the current HCM 6th Edition LOS criteria for signalized and stop-controlled intersections based on these methodologies.

Table 4
LOS Criteria for Signalized and Two-Way Stop Controlled Intersections[1]

SIGNALIZED INTERSECTIONS			UNSGINALIZED INTERSECTIONS		
	LOS by Volume-to Capacity (V/C) Ratio[2]			LOS by Volume-to Capacity (V/C) Ratio[3]	
Control Delay (sec/veh)	≤ 1.0	> 1.0	Control Delay (sec/veh)	≤ 1.0	> 1.0
≤ 10	A	F	≤ 10	A	F
> 10 to ≤ 20	B	F	> 10 to ≤ 15	B	F
> 20 to ≤ 35	C	F	> 15 to ≤ 25	C	F
> 35 to ≤ 55	D	F	> 25 to ≤ 35	D	F
> 55 to ≤ 80	E	F	> 35 to ≤ 50	E	F
> 80	F	F	> 50	F	F

[1] Source: Highway Capacity Manual (6th Edition), Transportation Research Board, 2016.

[2] For approach-based and intersection-wide assessments at signals, LOS is defined solely by control delay.

[3] For two-way stop controlled intersections, the LOS criteria apply to each lane on a given approach and to each approach on the minor street. LOS is not calculated for major-street approaches or for the intersection as a whole at two-way stop controlled intersections. For approach-based and intersection-wide assessments at all-way stop controlled intersections, LOS is solely defined by control delay.

Level of service calculations for signalized and stop-controlled study intersections were based on methodology and procedures outlined in the latest Highway Capacity Manual (6th Edition) using *Synchro 11* traffic analysis software. Existing signal timing was provided by WSDOT and City of Marysville at the signalized study intersections. Level of service calculations for the roundabout study intersections were based on WSDOT methodology and procedures outlined in the *WSDOT Sidra Policy Settings* document using *Sidra 9* traffic analysis software. The existing LOS results at the seven (7) off-site study intersections are summarized in Table 5. Detailed LOS summary worksheets are provided in Appendix C.

Table 5
2023 Existing Weekday PM Peak Hour LOS Summary

Study Intersection / Movement	LOS	Delay (sec)
Stop-Controlled Intersections:		
1) 11th Ave NE / 172nd St NE		
Eastbound Left-Turn	A	8.1
Westbound Left-Turn	A	7.8
Northbound Approach	B	11.6
Southbound Approach	B	13.8
2) 19th Dr NE / 172nd St NE		
Westbound Left-Turn	A	8.0
Northbound Approach	B	10.6
3) 19th Ave NE / 172nd St NE		
Eastbound Left-Turn	A	8.7
Southbound Approach	B	14.1
Roundabout:		
4) 23rd Ave NE / 172nd St NE	A	4.3
Signalized Intersections:		
5) 27th Ave NE / 172nd St NE	E	63.4
6) I-5 SB / 172nd St NE	A	6.9
7) I-5 NB / 172nd St NE	C	21.2

As shown in Table 5, all study intersections operate at LOS C or better during the weekday PM peak hour under 2023 existing conditions with the exception of the following intersection:

5. 27th Ave NE / 172nd St NE (LOS E)

The City of Marysville and WSDOT LOS standard at all off-site study intersections is LOS D with one exception. The City of Marysville *Traffic Impact Analysis Guidelines* state that WSDOT intersections on the 172nd Street NE (SR 531) corridor which have an existing LOS E prior to development submittal shall only be required to mitigate upon falling below LOS E.

FUTURE CONDITIONS & PROJECT IMPACTS

This section of the report describes the traffic impacts of the proposed *English Crossing* project on the surrounding and adjacent road network, and at identified off-site study intersections in the project site vicinity. The analysis of traffic impacts includes a trip generation estimate, distribution/assignment of project trips, and PM peak hour LOS evaluation at the seven (7) off-site study intersections and the site access. Consideration of future planned roadway projects identified by the City of Marysville is also documented and considered in the evaluation of intersection LOS.

Future Planned Roadway Improvements

Marysville Comprehensive Plan

The Transportation Element of the *City of Marysville Comprehensive Plan 2015* includes a depiction of the functional classification of existing and planned future roadways within the City limits and adjacent jurisdictions. The planned roadways are intended to serve anticipated growth in Marysville and the surrounding area through 2035.

Marysville's Lakewood Neighborhood Master Plan

The City's Lakewood Neighborhood Master Plan (dated March 2017) cites that it is "consistent with the Marysville Comprehensive Plan and provides additional detail for the Lakewood Neighborhood. This plan focuses on the infrastructure and urban design aspects of the neighborhood."

The *Neighborhood Roadways* section of the Plan identifies roadway improvements to support growth in vehicular and non-motorized demand. The Plan further states that the neighborhood roads create network of minor and collector arterials that create a secondary network to provide alternate routes to 172nd Street NE and 27th Ave NE, and also supports the City's vision of a second I-5 interchange at 156th Street NE.

The Lakewood Neighborhood Master Plan identifies a similar system of north-south and east-west arterials (collector and minor) that were also identified in the City's Comprehensive Plan Transportation Element.

It should be noted that the roadway alignments shown in the Lakewood Neighborhood Master Plan and the City's Comprehensive Plan are intended to represent a planned roadway connection and not necessarily the exact alignment for a planned future roadway. The City's six-year Transportation Improvement Plan (TIP), which is typically adopted annually, implements the elements of the City Comprehensive Plan and Lakewood Neighborhood Plan; that plan is described next.

Marysville Transportation Improvement Plan

The City's plan for funding and implementing new roadway and intersection improvement projects that come out of the Comprehensive Plan and Neighborhood Master Plans is administered through a six-year Transportation Improvement Plan which is typically adopted and updated annually.

Based on review of the currently adopted *City of Marysville 2023-2028 Six Year Transportation Improvement Plan (TIP),* there are eight (8) planned improvements in the vicinity of the *English Crossing* project that impact the off-site study intersections or connectivity of the adjacent street network.

Most of these projects are included in the City's Transportation Element of the Comprehensive Plan, the City's Lakewood Neighborhood Master Plan, and the City's Traffic Impact Fee program.

The eight (8) planned improvements in the vicinity of the *English Crossing* project that impact the off-site study intersections or connectivity of the adjacent street network are as-follows:

- Marysville TIP #24 – 172nd Street NE / 19th Avenue NE Roundabout – construct new roundabout at the 19th Avenue NE / 172nd Street NE intersection. The project is anticipated to be funded by new development in the vicinity.

  Note: this improvement is required as a condition of approval for the Lodge Apartments project and is expected to be a condition of approval for English Crossing. As such, this improvement is assumed to be completed in the 2026 No Action and 2026 With Project scenarios.

- Marysville TIP #25 – 172nd Street NE / 11th Avenue NE Roundabout – construct new roundabout at the 11th Avenue NE / 172nd Street NE intersection. The project is anticipated to be funded by new development in the vicinity.

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only.

- Marysville TIP #30 – 172nd Street NE: 27th Avenue NE to 19th Avenue NE – widen 172nd Street NE from a 3-lane section to a 4/5-lane section with pedestrian and bicycle facilities between 27th Avenue NE and 19th Avenue NE. The project is anticipated to be funded by new development in the vicinity.

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only.

- Marysville TIP #31 – 172nd Street NE: 11th Avenue NE to 19th Drive NE – widen 172nd Street NE from a 2-lane section to a 3-lane section with pedestrian and bicycle facilities between 11th Avenue NE and 19th Drive NE. The project is anticipated to be funded by new development in the vicinity.

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only.

- Marysville TIP #36 – 172nd Street NE Railroad Crossing Improvements – widen 172nd Street NE from a 2-lane section to a 3-lane section with pedestrian and bicycle facilities and provide railroad crossing improvements.

  Note: this project is not funded and was not included in the future roadway network.

- TIP #48 – 23rd Avenue NE & 169th Street NE – construct new 3-lane roadways including pedestrian and bicycle facilities. Connections to the existing street network would be provided at the existing roundabout at 23rd Avenue NE / 172nd Street NE and the existing western terminus of 169th Street NE. The project is anticipated to be funded by new development in the vicinity.

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only.

- TIP #51 – 19th Avenue NE Extension from 156th Street NE to 172nd Street NE – construct new 3-lane roadway between 156th Street NE and 172nd Street NE that would include pedestrian and bicycle facilities. The project is anticipated to be funded by new development in the vicinity.

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only.

- TIP #61 – 156th Street NE Interchange – convert the existing road overcrossing at 156th Street NE and Interstate 5 to a full single-point urban interchange (SPUI). The project is funded under Connecting Washington and WSDOT is the lead agency.

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only.

Project Trip Generation

Trip generation estimates associated with full buildout of the proposed *English Crossing* project for weekday daily and AM Peak Hour were based on methodology documented in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition for Land Use Code (LUC) 215 (Single-Family Attached Housing). Average trip generation rates were used for Weekday Daily and AM peak hour trip estimates. For the weekday PM peak hour, a trip rate of 1.0 trip per single-family dwelling unit was used, consistent with the City of Marysville's *Traffic Impact Analysis Guidelines* (December 2021). It should be noted that this trip rate is 75 percent higher than the PM peak hour trip rate for Single-Family Attached Housing in the ITE Trip Generation Manual. Therefore, the City of Marysville trip rate can be considered conservative.

Table 6 summarizes the net new weekday daily, AM peak hour, and PM peak hour trip generation. Detailed trip generation estimates are provided in Appendix D.

Table 6
English Crossing – Trip Generation Summary

	New Trips Generated		
Time Period	In	Out	Total
Weekday Daily	900	900	1,800
Weekday AM Peak Hour	30	90	120
Weekday PM Peak Hour	147	103	250

Project Trip Distribution and Assignment

The distribution of project-generated trips during the weekday PM peak hour was estimated based on traffic model distribution figures provided by the City of Marysville. These figures are included in Appendix E.

The model distribution was used to assign the new weekday PM peak hour (147 inbound and 103 outbound) trips generated by the *English Crossing* project to the adjacent street network. Separate distribution patterns were used for the 2026 (project buildout) and 2032 (horizon year) analyses due to anticipated changes in the roadway network in the site vicinity. The most significant change is a planned extension of 19th Avenue NE to the south (assumed by year 2032) where it will eventually connect to 156th Street NE.

Based on the trip distribution percentages, new PM peak hour project trips were assigned through the study intersections. The distribution and assignment of the new weekday PM peak hour trips through study intersections are shown in Figure 4 (2026 buildout) and Figure 7 (2032 horizon year).

Future Traffic Volumes

Future year 2026 and 2032 No Action PM peak hour traffic volumes were estimated by applying a three (3) percent annual growth rate to the existing traffic counts, consistent with City of Marysville guidelines. No additional pipeline projects were included in the 2026 and 2032 No Action volumes since a three (3) percent annual growth rate was used, which is also consistent with City of Marysville guidelines.

Consistent with the City Marysville's *Traffic Impact Analysis Guidelines* (Dec. 22, 2021), 25 percent of traffic on 172nd Street NE east of 19th Ave NE may be diverted to the south through the Lakewood Neighborhood to account for planned roadway improvements in the vicinity, namely the planned 156th Street NE/I-5 interchange project which is expected to shift existing traffic off 172nd Street NE. Year 2032 traffic volumes were shifted to account for planned roadway improvements as-follows:

- 25 percent of 2032 No Action traffic volumes on 172nd Street NE were diverted to the south on 19th Ave NE and Twin Lakes Ave, consistent with TIA guidelines.
- 50 percent of the eastbound right-turn and northbound left-turn volume at 27th Ave NE/172nd St NE was shifted to use the new 23rd Ave NE connector road west of 27th Ave NE due to the peak hour delays and queues at the 27th Ave NE/172nd St NE signal.

The resulting future 2026 buildout and 2032 horizon year No Action PM peak hour traffic volumes at the seven (7) off-site study intersections are shown in Figures 5 and 8, respectively. The 2026 and 2032 With Project traffic volumes were determined by adding the trip assignment from the proposed development (shown in Figures 4 and 7) to the future 2026 and 2032 No Action traffic volumes (shown in Figures 5 and 8). The 2026 buildout and 2032 horizon year With Project traffic volumes are shown in Figures 7 and 9, respectively.

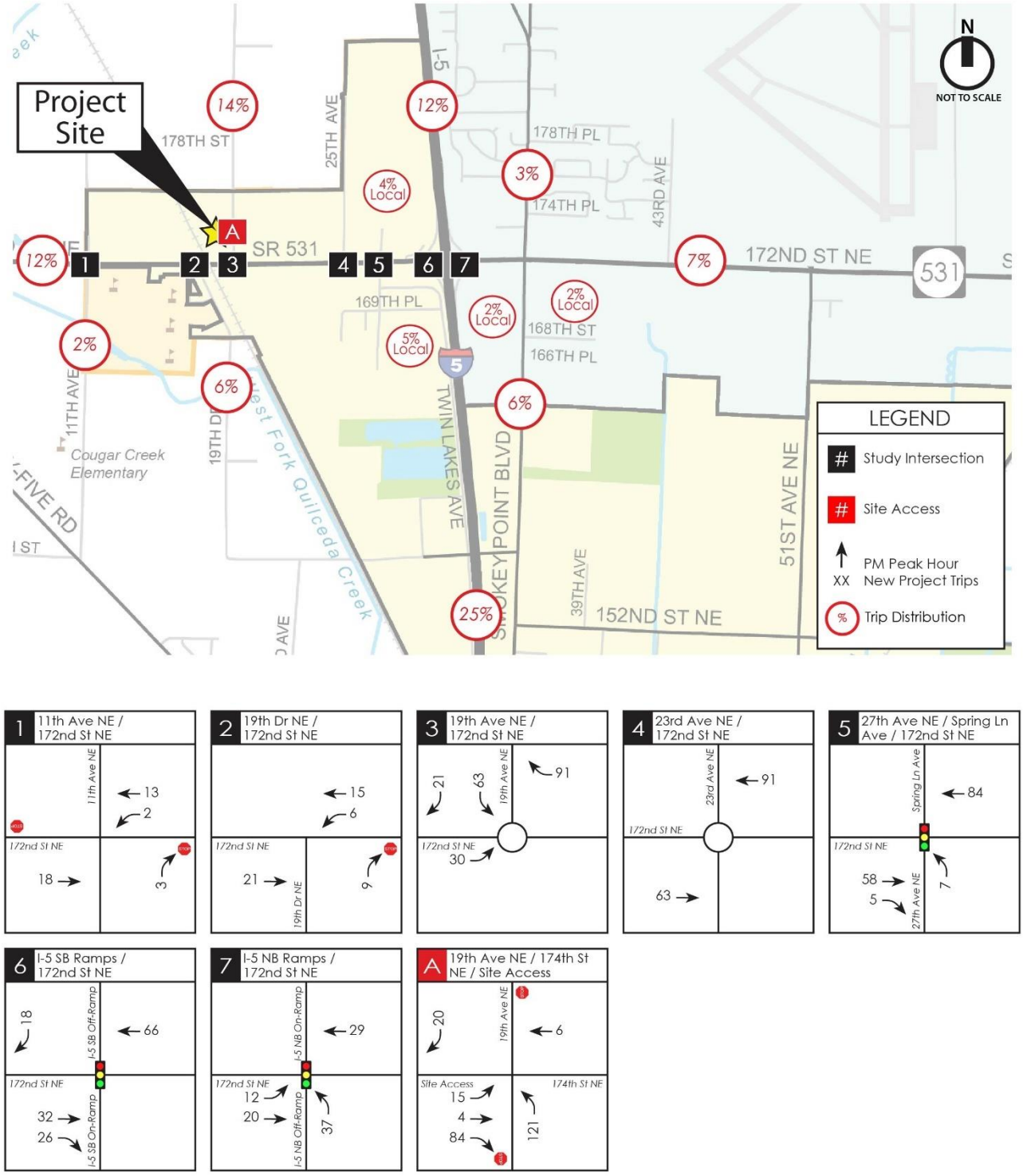


Figure 4: Weekday PM Peak Hour Project Trip Distribution and Assignment (2026 Buildout)

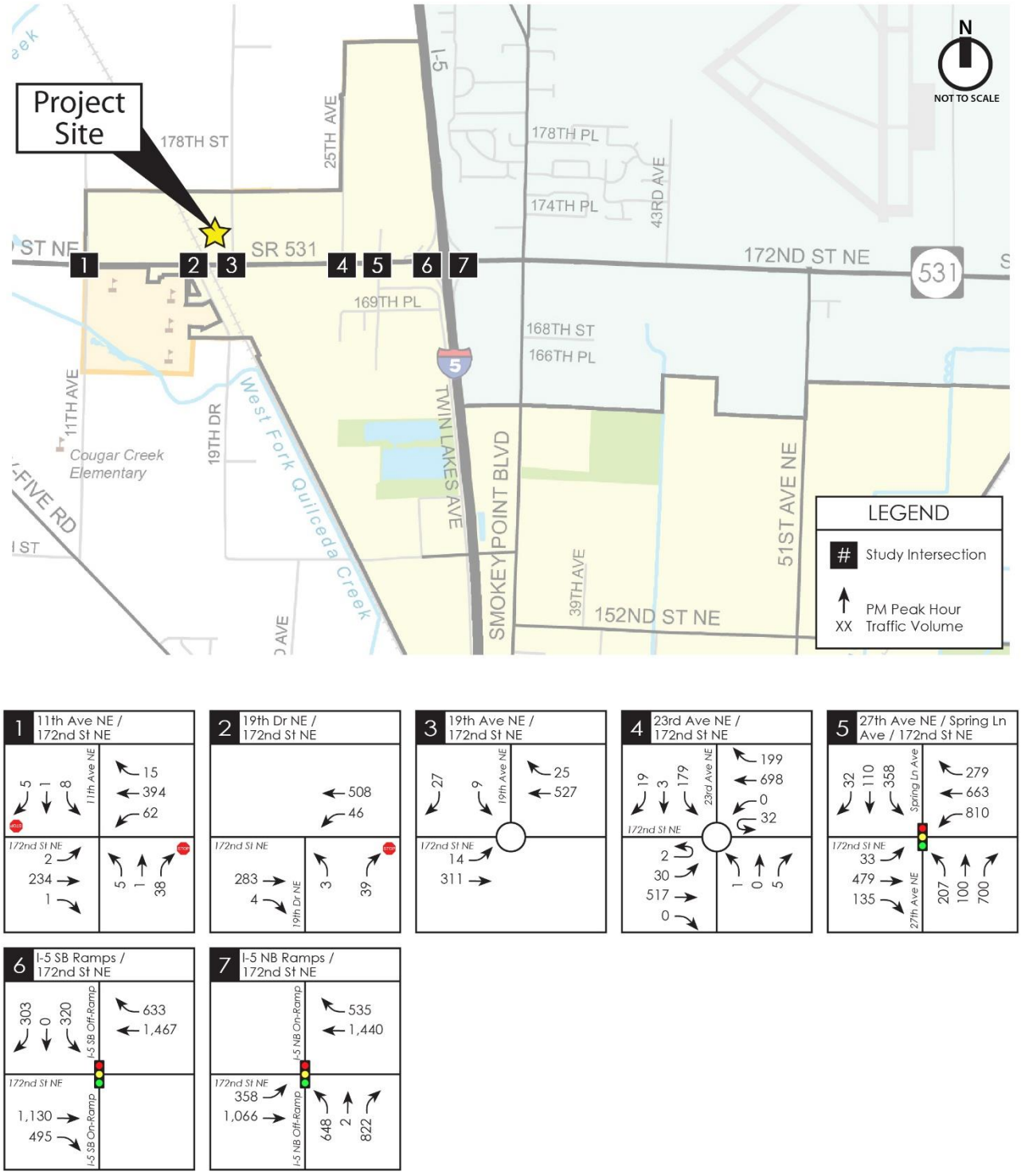


Figure 5: 2026 No Action Weekday PM Peak Hour Traffic Volumes (Buildout)

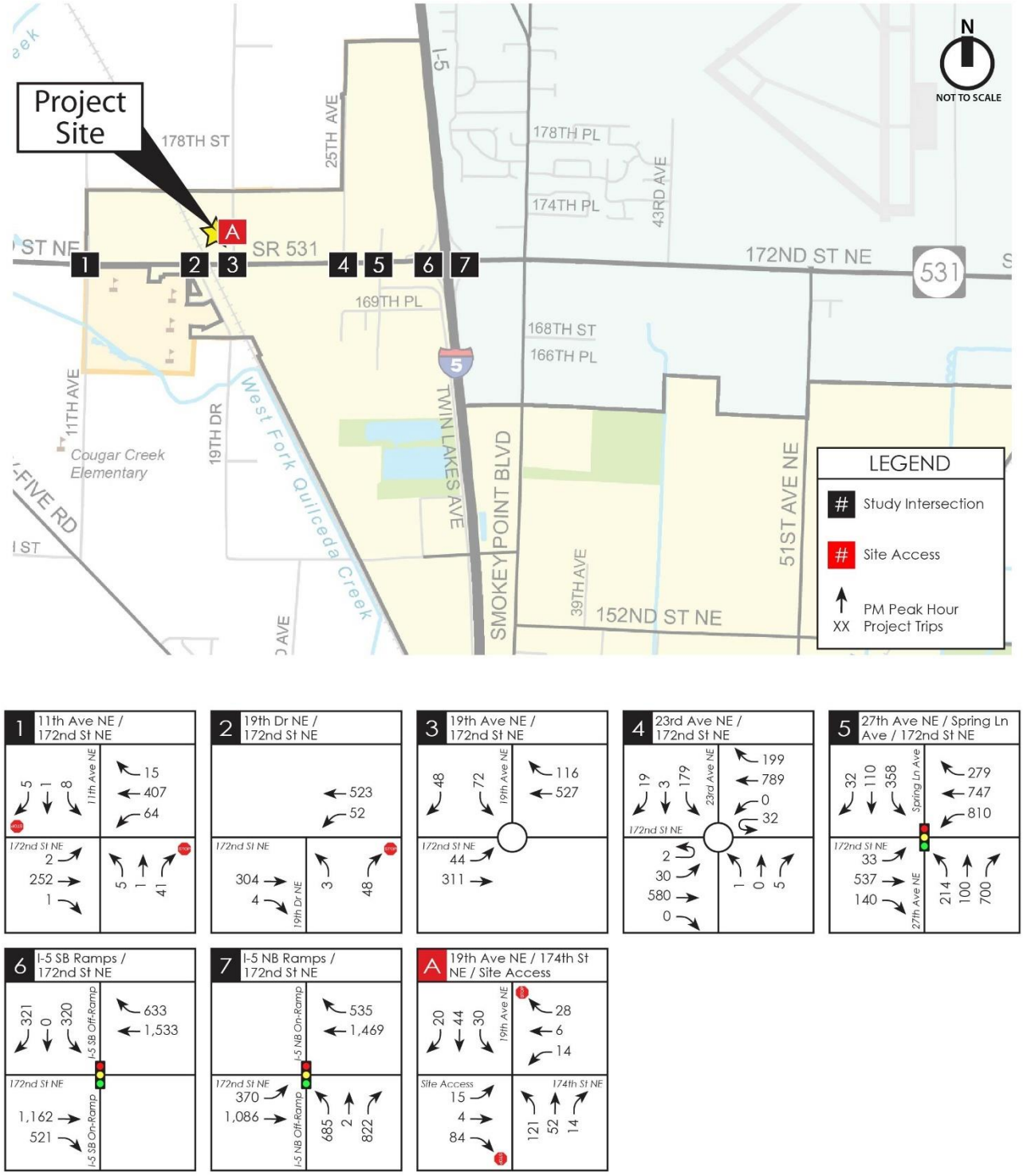


Figure 6: 2026 With Project Weekday PM Peak Hour Traffic Volumes (Buildout)

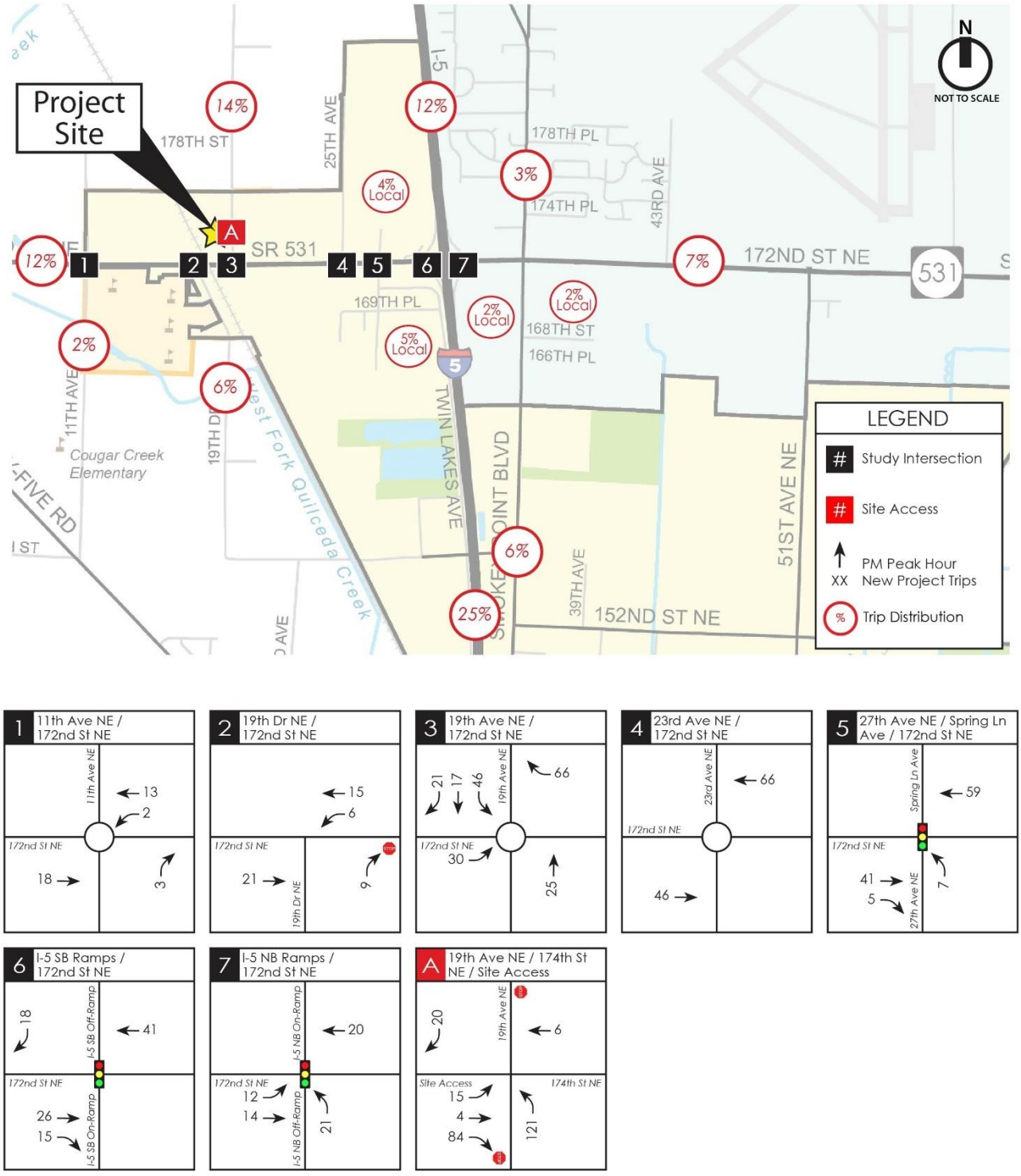


Figure 7: Weekday PM Peak Hour Project Trip Distribution and Assignment (2032 Horizon Year)

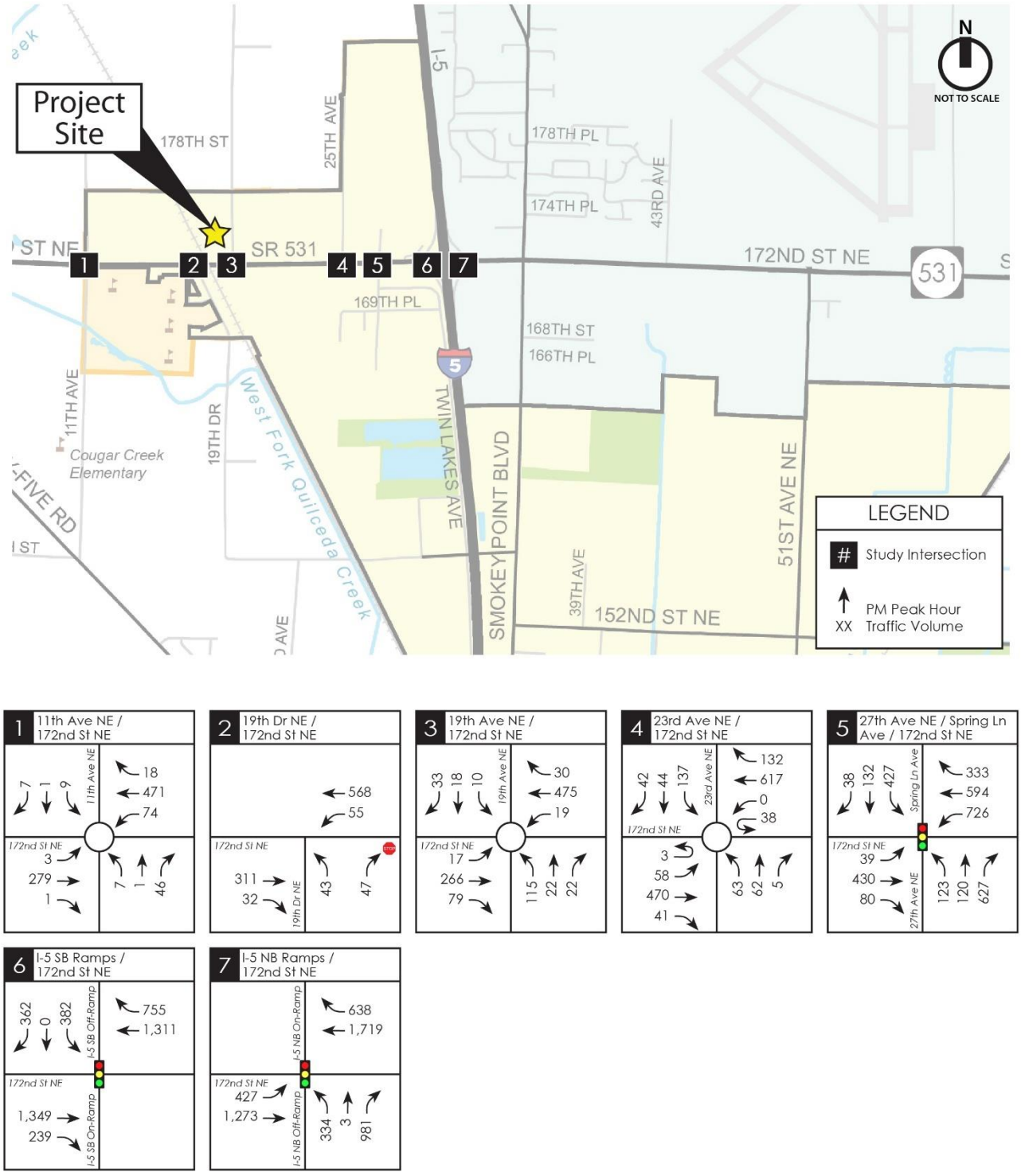


Figure 8: 2032 No Action Weekday PM Peak Hour Traffic Volumes (Horizon Year)

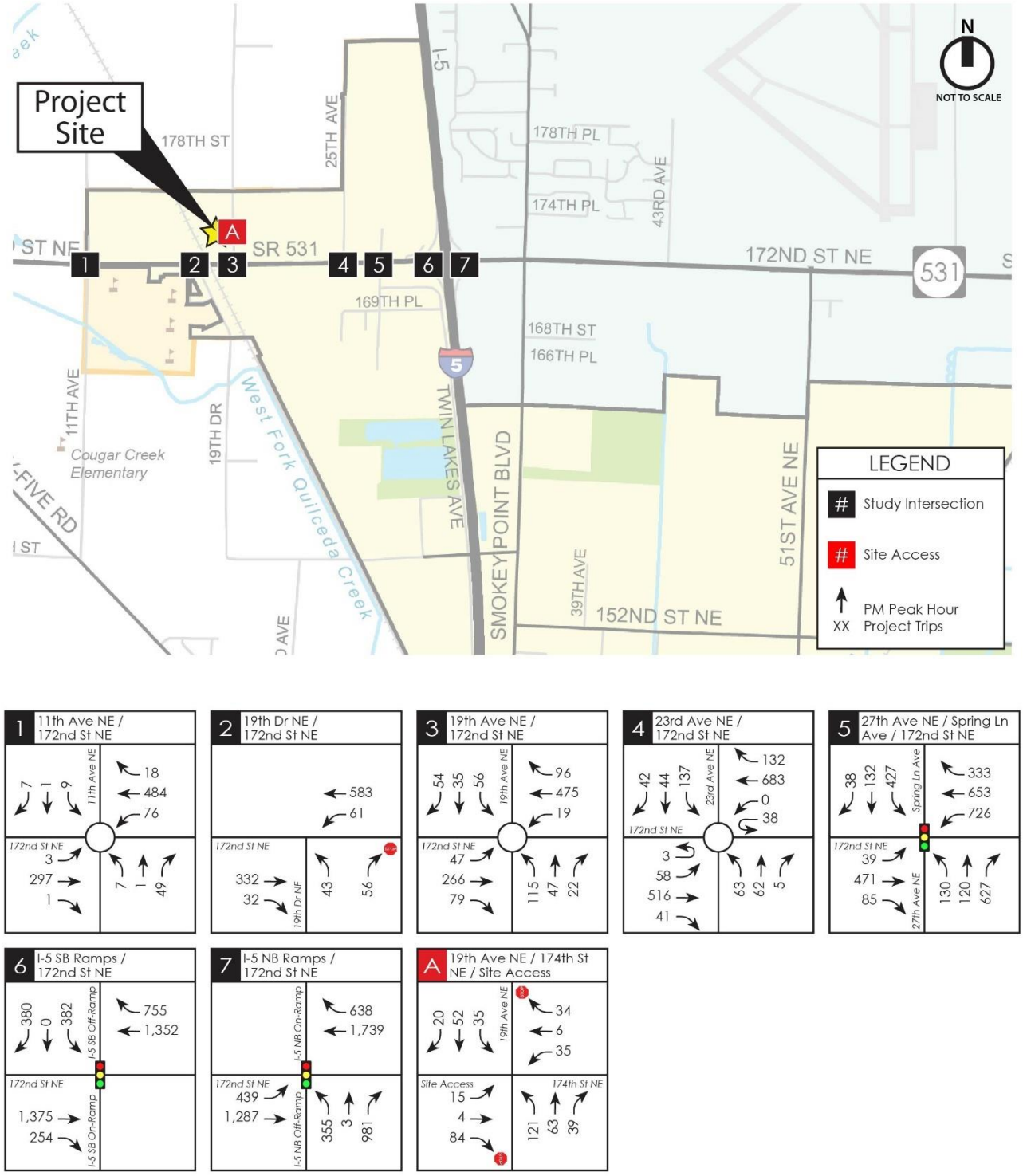


Figure 9: 2032 With Project Weekday PM Peak Hour Traffic Volumes (Horizon Year)

Intersection LOS Analysis

Future intersection LOS analyses during the weekday PM peak hour were evaluated at the seven (7) off-site study intersections for future year 2026 (buildout) and 2032 (horizon year) conditions with and without the *English Crossing* project. Off-site study intersections were identified based on the City of Marysville's *Traffic Impact Analysis Guidelines (December 2021),* and confirmed through the traffic scoping process. The signal timing data used at the off-site signalized study intersections were based on data provided by the City of Marysville and WSDOT.

The 2026 and 2032 roadway networks assumed in the future LOS analyses were based on existing intersection geometry, plus at least partial completion of the following City planned improvements:

- 172nd Street NE / 19th Avenue NE Roundabout – construct new roundabout at the 19th Avenue NE / 172nd Street NE intersection. (Marysville TIP Project #24)

  Note: this improvement is required as a condition of approval for the Lodge Apartments project and is expected to be a condition of approval for English Crossing. As such, this improvement is assumed to be completed in the 2026 No Action and 2026 With Project scenarios.

- 172nd Street NE / 11th Avenue NE Roundabout – construct new roundabout at 11th Avenue NE / 172nd Street NE. (Marysville TIP #25)

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only.

- 172nd Street NE from 27th Avenue NE to 19th Avenue NE – widen to a 4/5-lane section with pedestrian and bicycle facilities between 27th Avenue NE and 19th Avenue NE. (Marysville TIP 30)

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only.

- 172nd Street NW from 19th Drive NE to 11th Avenue NE – widen to a 3-lane section with pedestrian and bicycle facilities between 19th Drive NE and 11th Avenue NE.

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only but does not change roadway geometry at any of the off-site intersections.

- New 19th Avenue NE Extension – construct new 3-lane roadway between 156th Street NE and 172nd Street NE that would include pedestrian and bicycle facilities. (Marysville TIP #51)

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only.

- 156th Street NE Interchange – convert the existing overcrossing to a full single-point urban interchange (SPUI) with Interstate 5. (Marysville TIP #61)

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only.

- New 23rd Avenue NE and 169th Street NE – construct new 3-lane roadways connecting to the existing street network at the existing roundabout at 23rd Avenue NE / 172nd Street NE and the existing western terminus of 169th Street NE. (Marysville TIP Project #48)

  Note: this improvement is assumed to be completed in the 2032 No Action and 2032 With Project scenarios only.

The intersection LOS results are summarized in Tables 7 and 8 and detailed LOS worksheets are provided in Appendix C.

Table 7
2026 Buildout Year – Weekday PM Peak Hour LOS Summary

	No Action		With Project	
Study Intersection / Movement	LOS	Delay (sec)	LOS	Delay (sec)
Stop-Controlled Intersections:				
1) 11th Ave NE / 172nd St NE				
Eastbound Left-Turn	A	8.2	A	8.3
Westbound Left-Turn	A	7.9	A	7.9
Northbound Approach	B	12.0	B	12.2
Southbound Approach	B	14.9	C	15.4
2) 19th Dr NE / 172nd St NE				
Westbound Left-Turn	A	8.1	A	8.1
Northbound Approach	B	10.8	B	11.0
Roundabouts:				
3) 19th Ave NE / 172nd St NE	A	3.9	A	4.6
4) 23rd Ave NE / 172nd St NE	A	4.5	A	4.6
Signalized Intersections:				
5) 27th Ave NE / 172nd St NE	E	68.2	E	65.0
6) I-5 SB / 172nd St NE	A	6.8	A	6.6
7) I-5 NB / 172nd St NE	C	24.8	C	27.1

Table 8
2032 Horizon Year – Weekday PM Peak Hour LOS Summary

	No Action		With Project	
Study Intersection / Movement	LOS	Delay (sec)	LOS	Delay (sec)
Stop-Controlled Intersections:				
2) 19th Dr NE / 172nd St NE				
Westbound Left-Turn	A	8.3	A	8.4
Northbound Approach	C	15.5	C	16.1
Roundabouts:				
1) 11th Ave NE / 172nd St NE	A	4.5	A	4.5
3) 19th Ave NE / 172nd St NE	A	4.8	A	5.5
4) 23rd Ave NE / 172nd St NE	A	4.9	A	5.0
Signalized Intersections:				
5) 27th Ave NE / 172nd St NE	E	63.3	E	62.1
6) I-5 SB / 172nd St NE	A	7.5	A	7.4
7) I-5 NB / 172nd St NE	C	21.7	C	23.2

The City of Marysville and WSDOT LOS standard at all study intersections is LOS D with one exception. The City of Marysville *Traffic Impact Analysis Guidelines* state that WSDOT intersections on the 172nd Street NE (SR 531) corridor which have an existing LOS E prior to development submittal shall only be required to mitigate upon falling below LOS E. Therefore, as shown in Tables 7 and 8, all off-site study intersections are expected meet the applicable level of service standards during the weekday PM peak hour in year 2026 and 2032 without or with the proposed *English Crossing* project. Therefore, no off-site mitigation is proposed.

It should be noted that the addition of project traffic to intersections #5 and 6 results in a decrease (improvement) in the overall average intersection delay during the weekday PM peak hour. This occurs because the project adds trips to non-critical movements instead of movements with higher levels of delay. While counterintuitive, this phenomenon results in a decrease in the average delay for the entire intersection.

Site Access Evaluation

Vehicular access to the site would be provided be provided via a new site access roadway connection to 19th Ave NE, aligned with 174th Street NE. Secondary access for emergency vehicles only would be provided north of 174th Street NE via another new site access roadway connection to 19th Ave NE. To evaluate the operations of the site access intersection, a level of service (LOS) and queue analysis was completed. The weekday PM peak hour LOS and queue analysis at the site access intersection was based on the methodology outlined in the 6th Edition of the *Highway Capacity Manual* using *Synchro 11* software.

Table 9 summarizes the calculated LOS and the 95th percentile queues of the controlled movements at the site access intersection during the weekday PM peak hour in 2026 (buildout year) and 2032 (horizon year) with the proposed project. The reported 95th percentile queues represent a condition that is exceeded only 5 percent of the time. Detailed LOS and queue calculation worksheets are included in Appendix C.

Table 9
PM Peak Hour Site Access LOS and Queuing

	2026 With Project			2032 With Project		
Controlled Movements	LOS [1]	Delay	95th % Queue (ft)[3]	LOS [1]	Delay	95th % Queue (ft)[3]
A. 19th Ave NE / 174th St NE / Site Access						
Eastbound Approach	B	10.2	25'	B	10.4	25'
Westbound Approach	B	11.1	<25'	B	12.8	25'
Northbound Left-Turn	A	7.6	<25'	A	7.6	<25'
Southbound Left-Turn	A	7.4	<25'	A	7.5	<25'

1. LOS = Level of Service
2. Delay refers to average control delay expressed in seconds per vehicle.
3. Queues are 95th Percentile queues. <25' indicates 95th Percentile queue statistically less than 1 vehicle.

Snohomish County Key Intersections

In accordance with the *Snohomish County Traffic Worksheet and Traffic Study Requirements for Developments in the City of Marysville*, project trip impacts at Snohomish County key intersections were identified. Weekday AM and PM peak hour Trip Distribution and Assignment figures and tables were prepared consistent with these guidelines and are included in **Appendix F**.

MITIGATION

The following measures have been identified to mitigate traffic impacts of the proposed *English Crossing* project.

City of Marysville Mitigation. The City of Marysville requires payment of transportation impact fees to help fund planned roadway improvements throughout the City. Transportation impact fees for the proposed *English Crossing* project were calculated based on the trip generation estimate documented in this TIA and the City of Marysville's currently adopted transportation impact fee rate of $6,300 per PM peak hour trip. The proposed *English Crossing* project is estimated to generate 250 new PM peak hour trips. As a result, the estimated City of Marysville transportation impact fee is **$1,575,000** ($6,300 X 250 PM peak hour trips). Actual impact fees will be calculated by the City at the time of building permit issuance.

Snohomish County Mitigation. The City of Marysville and Snohomish County have adopted an interlocal agreement whereby developments in Marysville must assess potential mitigation for impacts on Snohomish County roadway facilities. Mitigation fees to Snohomish County are based on predetermined distribution percentages according to location or specific project impacts to planned roadway improvements. Mitigation fees to Snohomish County were based on the use of the standard distribution percentage based on the project location (20%) multiplied by the daily trip generation (1,800 new daily project trips) and adopted cost per ADT ($185 for residential developments within TSA A and the UGA). The resulting Snohomish County transportation impact fee is **$66,600**. A mitigation offer form to Snohomish County will be submitted separately.

Future City Road Plans. The *English Crossing* project would build a portion of the following City planned roadway improvements:

- Construct and dedicate right-of-way for the western half-street of a 3-lane section on 19th Avenue NE from 172nd Street NE to the northern site property line.
- Construct and dedicate right-of-way for the northern half-street of a 3-lane section on 172nd Street NE from 19th Avenue NE to the western site property line.
- Construct a new roundabout (or a portion of a new roundabout) at 19th Avenue NE / 172nd Street NE if not already completed by other development.

It should be noted that it is anticipated the applicant would receive transportation impact fee credit for construction and ROW dedication of all of these roadway construction projects as confirmed by the City.

Appendix A

Crash Data

JURISDICTION	COUNTY	CITY	PRIMARY TRAFFIC WAY	Milepost	BLOCK NUMBER	INTERSECTING TRAFFIC WAY	DIST FROM REF POINT	MI or FT	COMP DIR FROM REF POINT	REFERENCE POINT NAME	MILEPOST	A/B	SR ONLY HISTORY/SUSPENSE	REPORT NUMBER	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	# FAT	# VEH	# PEDS	# BIKES
State Route	Snohomish	Marysville	531								5.87		No	EA95075	01/02/2021	20:40	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								5.88		No	EA96978	01/09/2021	18:51	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								5.88		No	EA53194	08/06/2020	16:00	Suspected	1	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	EB96947	12/05/2021	08:05	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	EA88298	12/10/2020	13:30	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	EB56258	08/09/2021	11:45	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	E998353	12/28/2019	17:33	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	E998294	12/28/2019	16:36	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	E985594	11/19/2019	15:26	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	EB52175	07/26/2021	15:27	No Appare	0	0	3	0	0
State Route	Snohomish	Marysville	531								6.13		No	E963624	09/24/2019	21:09	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	E996798	12/13/2019	13:06	Possible Ir	1	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	E880144	01/07/2019	09:57	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	E999665	01/03/2020	21:10	No Appare	0	0	1	0	0
State Route	Snohomish	Marysville	531								6.13		No	EA80137	11/11/2020	15:55	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	EB49467	07/17/2021	21:08	Possible Ir	1	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	EA18428	02/25/2020	18:37	Possible Ir	2	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	EA33409	05/12/2020	15:44	No Appare	0	0	3	0	0
State Route	Snohomish	Marysville	531								6.13		No	EB46760	07/09/2021	08:56	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.13		No	EB03808	02/04/2021	05:23	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.14		No	E909295	04/07/2019	15:07	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531								6.19		No	EB96946	12/04/2021	14:31	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.23		No	E921631	05/18/2019	13:26	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.25		No	EB59354	08/17/2021	15:21	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.26		No	EA43470	06/28/2020	19:41	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.26		No	E987213	11/27/2019	11:41	Possible Ir	1	0	2	0	0
State Route	Snohomish	Arlington	531								6.26		No	E951777	08/20/2019	06:11	No Appare	0	0	3	0	0
State Route	Snohomish	Arlington	531								6.26		No	EB00580	01/24/2021	15:15	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.26		No	EA98863	01/17/2021	18:10	Possible Ir	1	0	3	0	0
State Route	Snohomish	Arlington	531								6.26		No	EB64120	09/03/2021	07:19	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.26		No	E982869	11/16/2019	15:53	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.26		No	E985667	11/23/2019	10:31	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.26		No	EA35499	05/22/2020	16:36	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.28		No	E890807	02/07/2019	11:47	Possible Ir	1	0	2	0	0
State Route	Snohomish	Arlington	531								6.42		No	EB39901	05/31/2021	22:40	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.42		No	EA92442	12/24/2020	00:03	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.42		No	EB31799	05/13/2021	21:41	Suspected	2	0	2	0	0
State Route	Snohomish	Arlington	531								6.42		No	EB70805	09/23/2021	13:00	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.42		No	EA53141	07/31/2020	18:54	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.42		No	E882174	01/12/2019	08:55	Possible Ir	1	0	2	0	0
State Route	Snohomish	Arlington	531								6.42		No	EA23706	03/14/2020	11:31	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.42		No	EA80405	10/22/2020	11:02	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.42		No	E919356	05/05/2019	16:51	No Appare	0	0	1	0	0
State Route	Snohomish	Arlington	531								6.42		No	E971184	10/16/2019	08:45	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.42		No	E959783	09/13/2019	17:02	Suspected	1	0	2	0	0
State Route	Snohomish	Arlington	531								6.42		No	EA81802	11/10/2020	13:45	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	531								6.44		No	E997199	12/19/2019	17:08	No Appare	0	0	2	0	0
State Route	Snohomish	Arlington	005P120538								0.70		No	EA12927	02/09/2020	03:45	No Appare	0	0	1	0	0
State Route	Snohomish	Marysville	005R120644								0.37		No	EB52176	07/26/2021	17:06	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	005R120644								0.38		No	EB94466	02/18/2019	10:32	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	005R120644								0.38		No	EB37584	06/03/2021	08:43	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	005R120644								0.38		No	EA63338	09/13/2020	18:00	Suspected	2	0	2	0	0
State Route	Snohomish	Marysville	005R120644								0.38		No	E908658	03/24/2019	14:32	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	005R120644								0.38		No	EB95358	11/21/2021	12:41	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	005R120644								0.39		No	EA37573	06/03/2020	15:14	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531	5.12									No	EB38002	06/10/2021	15:17	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531	5.12									No	EA91462	12/20/2020	20:45	Possible Ir	2	0	2	0	0
State Route	Snohomish	Marysville	531	5.12									No	EB55808	08/07/2021	14:43	Suspected	2	0	2	0	0
State Route	Snohomish	Marysville	531	5.50									No	EB25616	04/26/2021	10:40	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531	5.50									No	E886346	01/25/2019	06:56	Possible Ir	1	0	2	0	0
State Route	Snohomish	Marysville	531	5.50									No	EA90716	12/17/2020	19:28	Possible Ir	2	0	2	0	0
State Route	Snohomish	Marysville	531	5.50									No	EA18864	02/27/2020	20:17	Possible Ir	2	0	2	0	0
State Route	Snohomish	Marysville	531	5.61									No	EB44743	06/27/2021	21:20	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531	5.62									No	EA30735	04/26/2020	14:15	Possible Ir	1	0	2	0	0
State Route	Snohomish	Marysville	531	5.62									No	EB14526	03/17/2021	14:02	No Appare	0	0	2	0	0
State Route	Snohomish	Marysville	531	5.62									No	EA00763	01/08/2020	15:18	Possible Ir	1	0	2	0	0
State Route	Snohomish	Marysville	531	5.62									No	EB44742	06/27/2021	21:20	No Appare	0	0	2	0	0

REPORT NUMBER	VEHICLE 1 TYPE	VEHICLE 2 TYPE	JUNCTION RELATIONSHIP	WEATHER	ROADWAY SURFACE CONDITION	LIGHTING CONDITION	FIRST COLLISION TYPE / OBJECT STRUCK	VEHICLE 1 ACTION	VEHICLE 2 ACTION	VEHICLE 1 COMPASS DIRECTION FROM	VEHICLE 1 COMPASS DIRECTION TO	VEHICLE 2 COMPASS DIRECTION FROM	VEHICLE 2 COMPASS DIRECTION TO	MV DRIVER CONTRIBUTING CIRCUMSTANCE 1 (UNIT 1)	MV DRIVER CONTRIBUTING CIRCUMSTANCE 2 (UNIT 1)	MV DRIVER CONTRIBUTING CIRCUMSTANCE 3 (UNIT 1)	MV DRIVER CONTRIBUTING CIRCUMSTANCE 1 (UNIT 2)	MV DRIVER CONTRIBUTING CIRCUMSTANCE 2 (UNIT 2)	MV DRIVER CONTRIBUTING CIRCUMSTANCE 3 (UNIT 2)	BICYCLIST CONTRIBUTING CIRCUMSTANCE 1 (UNIT 1)	BICYCLIST CONTRIBUTING CIRCUMSTANCE 2 (UNIT 1)	BICYCLIST CONTRIBUTING CIRCUMSTANCE 3 (UNIT 1)	BICYCLIST CONTRIBUTING CIRCUMSTANCE 1 (UNIT 2)	BICYCLIST CONTRIBUTING CIRCUMSTANCE 2 (UNIT 2)	BICYCLIST CONTRIBUTING CIRCUMSTANCE 3 (UNIT 2)	PEDESTRIAN CONTRIBUTING CIRCUMSTANCE 1 (UNIT 2)	PEDESTRIAN CONTRIBUTING CIRCUMSTANCE 2 (UNIT 2)	PEDESTRIAN CONTRIBUTING CIRCUMSTANCE 3 (UNIT 2)	FIRST IMPACT LOCATION (City, County & Misc Trafficways - 2010 forward)	WA STATE PLANE SOUTH - X 2010 - FORWARD	WA STATE PLANE SOUTH - Y 2010 - FORWARD
EA95075	Pickup,Pa	Passenger	Entering R	Raining	Wet	Dark - Unk	Entering a	Merging (I	Going Stra	West	East	North	South	Improper Turn/Merge			None												Lane 1 Inc	1225521.75	1032540.86
EA96978	Pickup,Pa	Passenger	Entering R	Clear	Dry	Dark - Unk	From opp	Making Ri	Going Stra	West	East	South	North	Improper Turn/Merge			None												Lane 2 De	1225531.58	1032539.37
EA53194	Not Stated	Passenger	Entering R	Clear	Dry	Daylight	From sam	Going Stra	Making Ri	East	West	East	North	Other Contributing Circ Not List			None												Lane 1 De	1225554.29	1032535.13
EB96947	Passenger	Pickup,Pa	At Interse	Fog or Sm	Ice	Daylight	From sam	Making U-	Making Le	East	East	East	South	Did Not Grant RW to Vehicle			None												Left Turn L	1226882.24	1032564.86
EA88298	Passenger	Passenger	At Interse	Overcast	Wet	Daylight	From sam	Overtaking	Stopped a	North	South	North	Vehicle St	Apparently Asleep or Fatigued			None												Intersecti	1226882.24	1032564.86
EB56258	Passenger	Passenger	At Interse	Clear or P	Dry	Daylight	From sam	Going Stra	Stopped a	North	South	Vehicle St	Vehicle St	Distractions Outside Vehicle			None												Intersecti	1226882.24	1032564.86
E998353	Passenger	Passenger	At Interse	Clear or P	Dry	Dark-Stree	Same dire	Making Le	Making Le	East	South	East	South	Improper Turn/Merge			None												Lane 1 Inc	1226889.4	1032533.48
E998294	Passenger	Pickup,Pa	At Interse	Overcast	Dry	Dark-Stree	From sam	Going Stra	Slowing	East	West	East	West	Inattention			None												Left Turn L	1226867.42	1032547.71
E985594	Pickup,Pa	Pickup,Pa	At Interse	Clear or P	Dry	Daylight	From sam	Going Stra	Stopped a	West	East	Vehicle St	Vehicle St	Follow Too Closely			None												Lane 1 Inc	1226869.38	1032547.48
EB52175	Passenger	Pickup,Pa	At Interse	Clear	Dry	Daylight	From opp	Making Le	Going Stra	West	North	East	West	Improper Turn/Merge			None												Lane 1 De	1226869.38	1032547.48
E963624	Passenger	Passenger	At Interse	Clear or P	Dry	Dark-Stree	From sam	Going Stra	Stopped a	North	South	Vehicle St	Vehicle St	Inattention			None												Intersecti	1226867.16	1032545.95
E996798	Passenger	Pickup,Pa	At Interse	Clear or P	Dry	Daylight	From sam	Stopped a	Going Stra	Vehicle St	Vehicle St	North	South	None			Other Contributing Circ Not Listed												Intersecti	1226889.4	1032533.48
E880144	Pickup,Pa	Passenger	At Interse	Clear or P	Dry	Daylight	From sam	Going Stra	Stopped a	East	West	Vehicle St	Vehicle St	Other Contributing Circ Not List			None												Left Turn L	1226867.1	1032548.89
E999665	Passenger Car		At Interse	Raining	Wet	Dark-Stree	Linear Cur	Making Left Turn		South	West			Exceeding Reas. Safe Speed															Right Shou	1226893.46	1032543.39
EA80137	Passenger	Passenger	At Interse	Overcast	Dry	Daylight	From opp	Going Stra	Making Le	West	South	South	West	Disregard Traffic Sign and Signal			None												Lane 2 De	1226882.24	1032564.86
EB49467	Passenger	Passenger	At Interse	Clear	Dry	Dusk	Entering a	Going Stra	Going Stra	East	West	South	North	Unknown Distraction			None												Lane 1 De	1226868.71	1032547.42
EA18428	Pickup,Pa	Pickup,Pa	At Interse	Overcast	Dry	Dark-Stree	Entering a	Going Stra	Going Stra	South	North	East	West	Disregard Traffic Sign and Signal			None												Lane 2 De	1226868.35	1032546.45
EA33409	Pickup,Pa	Passenger	At Interse	Clear or P	Dry	Daylight	Entering a	Going Stra	Going Stra	West	East	South	North	Other Distractions			Other Distractions												Lane 1 Inc	1226889.4	1032533.48
EB46760	Pickup,Pa	Pickup,Pa	At Interse	Clear	Dry	Daylight	From sam	Going Stra	Stopped a	West	East	Vehicle St	Vehicle St	Exceeding Reas. Safe Speed			None												Lane 1 Inc	1226869.38	1032547.48
EB03808	Pickup,Pa	Passenger	At Interse	Raining	Wet	Dark-Stree	From sam	Going Stra	Stopped a	West	East	Vehicle St	Vehicle St	Lost in Thought / Day Dreaming			None												Lane 2 Inc	1226882.24	1032564.86
E909295	Pickup,Pa	Pickup,Pa	At Interse	Clear or P	Dry	Daylight	From sam	Going Stra	Stopped f	North	West	North	West	Inattention			None												Intersecti	1226846.76	1032645.74
EB96946	Passenger	Pickup,Pa	At Interse	Raining	Wet	Daylight	Entering a	Making Ri	Going Stra	South	East	West	East	Did Not Grant RW to Vehicle			None												Lane 1 Inc	1227190.29	1032531.4
E921631	Passenger	Passenger	At Interse	Clear or P	Dry	Daylight	From sam	Making Ri	Going Stra	North	West	East	West	Inattentio	Did Not Grant RW to		None												Lane 2 De	1227322.16	1032572.83
EB59354	Passenger	Pickup,Pa	At Interse	Clear	Dry	Daylight	Same dire	Making Ri	Stopped f	North	South	Vehicle St	Vehicle St	Follow Too Closely			None												Lane 1 Off	1227416.53	1032567.84
EA43470	Motorcycl	Passenger	At Interse	Clear or P	Dry	Daylight	Entering a	Making Ri	Going Stra	North	West	East	West	None			Disregard Traffic Sign and Signals												Lane 1 De	1227512.98	1032575.87
E987213	Pickup,Pa	Pickup,Pa	At Interse	Clear or P	Dry	Daylight	From sam	Going Stra	Stopped a	East	West	Vehicle St	Vehicle St	Eating or Drinking			None												Lane 2 De	1227513.04	1032573.81
E951777	Passenger	Passenger	At Interse	Clear or P	Dry	Daylight	Entering a	Going Stra	Making Le	East	West	North	East	Disregard Stop and Go Light			None												Lane 2 De	1227512.98	1032575.87
EB00580	Truck Trac	Pickup,Pa	At Interse	Clear	Wet	Daylight	From sam	Going Stra	Going Stra	East	West	East	West	Distractions Outside Vehicle			None												Lane 2 De	1227514.38	1032576.2
EA98863	Passenger	Passenger	At Interse	Clear	Dry	Dark-Stree	Entering a	Going Stra	Making Le	East	West	North	East	Under Infl	Disregard Traffic Sign		None												Lane 1 De	1227512.11	1032582.59
EB64120	Passenger	Truck (Fla	At Interse	Clear or P	Dry	Daylight	Entering a	Making Le	Going Stra	North	East	East	West	Disregard Traffic Sign and Signal			None												Lane 1 De	1227512.21	1032577.4
E982869	Passenger	Pickup,Pa	At Interse	Raining	Wet	Dusk	Entering a	Going Stra	Making Le	West	East	North	East	Disregard Stop and Go Light			None												Lane 2 Inc	1227519.14	1032541.58
E985667	Pickup,Pa	Pickup,Pa	At Interse	Overcast	Dry	Daylight	Entering a	Going Stra	Going Stra	North	South	East	West	Inattentio	Did Not Grant RW to		None												Lane 2 De	1227512.98	1032575.87
EA35499	Passenger	Passenger	At Interse	Overcast	Dry	Daylight	From sam	Going Stra	Stopped a	East	West	East	Vehicle St	Distractio	Follow Too Closely		None												Lane 2 De	1227513.07	1032572.92
E890807	Pickup,Pa	Pickup,Pa	At Interse	Clear or P	Dry	Daylight	From sam	Going Stra	Stopped a	East	West	Vehicle St	Vehicle St	Inattention			None												Lane 2 De	1227599.94	1032577.52
EB39901	Not Stated	Passenger	At Interse	Clear	Dry	Dark-Stree	From sam	Going Stra	Stopped a	South	North	Vehicle St	Vehicle St	Follow Too Closely			None												Left Turn L	1228402.14	1032564.44
EA92442	Passenger	Passenger	At Interse	Clear or P	Dry	Dark-Stree	Entering a	Going Stra	Making Le	West	East	South	West	Unknown Distraction			None												Lane 1 Inc	1228399.27	1032556.45
EB31799	Passenger	Pickup,Pa	At Interse	Clear	Dry	Dusk	Entering a	Going Stra	Making Le	West	East	South	West	Lost in Thought / Day Dreaming			None												Lane 2 Inc	1228402.16	1032556.39
EB70805	Passenger	Pickup,Pa	At Interse	Clear	Dry	Daylight	From opp	Making U-	Going Stra	West	West	West	East	None			None												Lane 2 Inc	1228399.27	1032556.57
EA53141	Pickup,Pa	Pickup,Pa	At Interse	Clear or P	Dry	Daylight	Entering a	Going Stra	Making Le	West	East	North	East	Other Dist	Disregard Traffic Sign		None												Lane 2 Inc	1228399.27	1032556.59
E882174	Pickup,Pa	Passenger	At Interse	Clear or P	Dry	Daylight	Entering a	Going Stra	Making Le	West	East	South	West	Inattentio	Did Not Grant RW to		None												Lane 1 Inc	1228395.84	1032555.23
EA23706	Pickup,Pa	Pickup,Pa	At Interse	Clear or P	Dry	Daylight	Entering a	Going Stra	Going Stra	East	West	South	North	Did Not Gr	Other Distractions		None												Lane 2 Inc	1228399.4	1032558.49
EA80405	Pickup,Pa	Pickup,Pa	At Interse	Clear or P	Dry	Daylight	Entering a	Going Stra	Making Le	West	West	South	West	Did Not Grant RW to Vehicle			None												Lane 2 Inc	1228398.6	1032556.76
E919356	Pickup,Panel Truck o		At Interse	Clear or P	Dry	Daylight	Signal Pole	Going Straight Ahead		East	South			Under Infl	Apparently Asleep or Fatigued														Increasing	1228397.06	1032554.49
E971184	Passenger	Pickup,Pa	At Interse	Raining	Wet	Daylight	From sam	Going Stra	Stopped a	West	West	Vehicle St	Vehicle St	Follow Too Closely			None												Lane 3 De	1228402.14	1032600.88
E959783	Passenger	Pickup,Pa	At Interse	Raining	Wet	Daylight	Entering a	Going Stra	Going Stra	West	East	South	North	Inattentio	Did Not Grant RW to		None												Lane 2 Inc	1228399.27	1032556.59
EA81802	Passenger	Passenger	At Interse	Raining	Wet	Daylight	From sam	Making Le	Making Le	South	West	South	West	Operating Recklessly or Aggress			Operating Recklessly or Aggressively												Left Turn L	1228397.98	1032560.27
E997199	Pickup,Pa	Pickup,Pa	At Interse	Raining	Wet	Dark-Stree	Same dire	Making Ri	Stopped f	South	East	South	East	Did Not Gr	Distractions Outside		None												Intersecti	1228511.25	1032550.25
EA12927	Passenger Car		At Interse	Fog or Sm	Wet	Dark-Stree	Traffic Isla	Negotiating a Curve		South	East			Exceeding Reas. Safe Speed															Increasing	1228455.83	1032525.33
EB52176	Pickup,Pa	Passenger	At Interse	Clear	Dry	Daylight	Same dire	Making Ri	Stopped f	North	South	Vehicle St	Vehicle St	None			None												Lane 1 Off	1227445.87	1032632.45
EB94466	Pickup,Pa	Pickup,Pa	At Interse	Clear or P	Dry	Daylight	Same dire	Going Stra	Stopped a	North	Southwes	North	Vehicle St	Inattention			None												Lane 1 Off	1227429.75	1032602.81
EB37584	Passenger	Pickup,Pa	At Interse	Clear	Dry	Daylight	Same dire	Making Ri	Stopped f	North	South	Vehicle St	Vehicle St	Follow Too Closely			None												Lane 1 Off	1227426.75	1032593.15
EA63338	Pickup,Pa	Motorcycl	At Interse	Fog or Sm	Dry	Daylight	Same dire	Making Ri	Stopped a	North	Southwes	North	Vehicle St	Follow Too Closely			None												Lane 1 Off	1227498.34	1032632.17
E908658	Passenger	Pickup,Pa	At Interse	Overcast	Dry	Daylight	Same dire	Making Ri	Stopped f	Vehicle St	South	Vehicle St	Vehicle St	Follow Too Closely			None												Lane 1 Off	1227434.49	1032610.25
EB95358	Pickup,Pa	Passenger	At Interse	Overcast	Dry	Daylight	From sam	Going Stra	Slowing	North	South	North	South	Follow Too Closely			None												Lane 1 Off	1227505.78	1032620.41
EA37573	Pickup,Pa	Passenger	At Interse	Clear or P	Dry	Daylight	Same dire	Making Ri	Stopped f	North	West	Vehicle St	Vehicle St	Follow Too Closely			None												Lane 1 Off	1227358.06	1032567.43
EB38002	Pickup,Pa	Passenger	At Interse	Clear or P	Dry	Daylight	From sam	Overtaking	Stopped a	South	East	Vehicle St	Vehicle St	Improper Passing			None												Intersecti	1221549.39	1032495.93
EA91462	Pickup,Pa	Passenger	At Interse	Raining	Wet	Dark-Stree	From opp	Going Stra	Making Le	West	East	East	South	None			None												Lane 1 Inc	1221566.48	1032524.83
EB55808	Passenger	Passenger	At Interse	Raining	Wet	Daylight	Entering a	Going Stra	Going Stra	North	South	West	East	Unknown Distraction			None												Lane 1 De	1221566.48	1032524.83
EB25616	Passenger	Pickup,Pa	At Interse	Overcast	Dry	Daylight	From sam	Going Stra	Stopped a	South	North	Vehicle St	Vehicle St	Follow Too Closely			None												Intersecti	1223532.8	1032521.82
E886346	Passenger	Passenger	At Interse	Fog or Sm	Dry	Dawn	From opp	Making Le	Going Stra	East	South	West	East	Did Not Grant RW to Vehicle			None												Lane 1 Inc	1223532.64	1032521.62
EA90716	Passenger	Pickup,Pa	At Interse	Raining	Wet	Dark-Stree	From opp	Making Le	Going Stra	West	Northwes	West	East	Unknown Distraction			None												Lane 1 Inc	1223532.8	1032521.82
EA18864	Passenger	Passenger	At Interse	Clear	Dry	Dark-No S	From opp	Going Stra	Making Le	West	East	East	South	Light Violation: No Lights/Fail to			None												Lane 1 Inc	1223532.63	1032521.61
EB44743	Passenger	Passenger	At Interse	Clear	Dry	Dusk	From sam	Going Stra	Slowing	West	East	West	East	Unknown Distraction			None												Lane 1 Inc	1224152.48	1032510.82
EA30735	Pickup,Pa	Pickup,Pa	At Interse	Clear or P	Dry	Daylight	From sam	Going Stra	Stopped i	West	East	Vehicle St	Vehicle St	Follow Too Closely			None												Lane 1 Inc	1224199.73	1032513.32
EB14526	Pickup,Pa	Pickup,Pa	At Interse	Clear or P	Dry	Daylight	From sam	Going Stra	Stopped f	West	East	West	Vehicle St	Unknown Distraction			None												Lane 1 Inc	1224203.97	1032511.63
EA00763	Pickup,Pa	Passenger	At Interse	Sleet or H	Wet	Daylight	From sam	Going Stra	Stopped f	West	East	Vehicle St	Vehicle St	Follow Too Closely			None												Lane 1 Inc	1224187.9	1032511.69
EB44742	Passenger	Passenger	At Interse	Clear	Dry	Dusk	From sam	Slowing	Slowing	West	East	West	East	Follow Too Closely			None												Lane 1 Inc	1224199.62	1032512.21

Appendix B

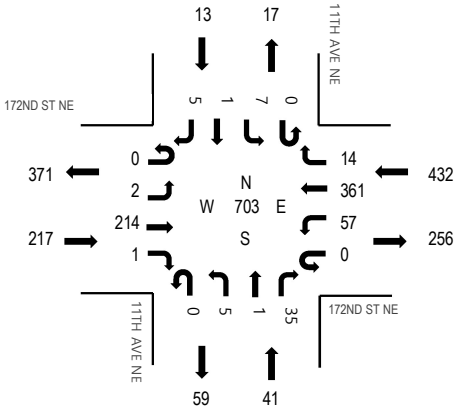
Existing Traffic Count Data

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

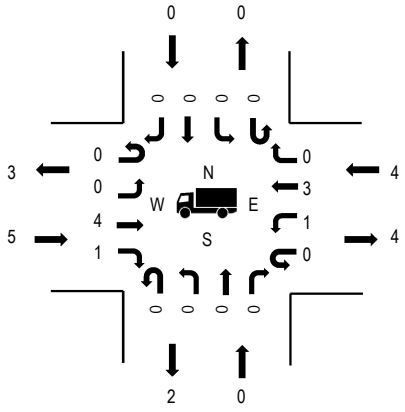
Location: 1 11TH AVE NE & 172ND ST NE PM
Date: Tuesday, February 28, 2023
Peak Hour: 05:00 PM - 06:00 PM

Peak Hour

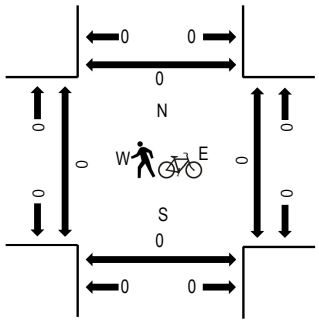
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	2.3%	0.82
WB	0.9%	0.95
NB	0.0%	0.85
SB	0.0%	0.81
All	1.3%	0.91

Traffic Counts - Motorized Vehicles

Interval Start Time	172ND ST NE Eastbound				172ND ST NE Westbound				11TH AVE NE Northbound				11TH AVE NE Southbound					Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	
4:00 PM	0	0	40	1	0	11	93	1	0	3	0	12	0	3	0	0	164	698
4:15 PM	0	0	54	4	0	20	104	0	0	1	1	12	0	0	0	0	196	701
4:30 PM	0	0	56	1	0	13	88	5	0	2	1	11	0	0	1	0	178	658
4:45 PM	0	1	40	1	0	15	88	3	0	1	1	9	0	1	0	0	160	670
5:00 PM	0	0	42	0	0	17	89	3	0	0	0	12	0	3	0	1	167	703
5:15 PM	0	0	46	0	0	12	78	6	0	1	0	8	0	0	1	1	153	
5:30 PM	0	1	62	0	0	14	97	2	0	1	1	9	0	3	0	0	190	
5:45 PM	0	1	64	1	0	14	97	3	0	3	0	6	0	1	0	3	193	
Count Total	0	3	404	8	0	116	734	23	0	12	4	79	0	11	2	5	1,401	
Peak Hour	0	2	214	1	0	57	361	14	0	5	1	35	0	7	1	5	703	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

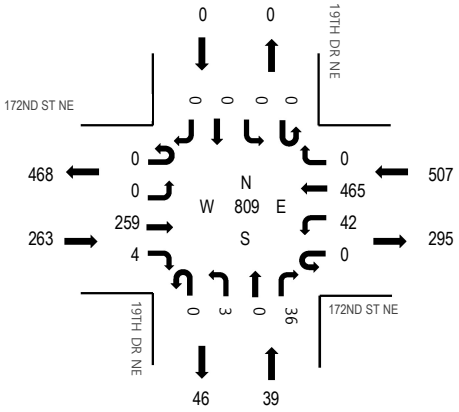
Interval Start Time	Heavy Vehicles					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	1	0	1	4:00 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:30 PM	0	0	1	0	1	4:30 PM	0	0	0	0	0
4:45 PM	2	0	0	0	2	4:45 PM	0	0	0	0	0
5:00 PM	1	0	1	0	2	5:00 PM	0	0	0	0	0
5:15 PM	0	0	2	0	2	5:15 PM	0	0	0	0	0
5:30 PM	0	0	1	0	1	5:30 PM	0	0	0	0	0
5:45 PM	4	0	0	0	4	5:45 PM	0	0	0	0	0
Count Total	7	0	6	0	13	Count Total	0	0	0	0	0
Peak Hour	5	0	4	0	9	Peak Hour	0	0	0	0	0

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

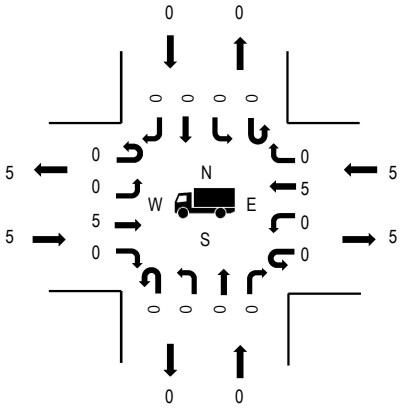
Location: 2 19TH DR NE & 172ND ST NE PM
Date: Tuesday, February 28, 2023
Peak Hour: 04:00 PM - 05:00 PM

Peak Hour

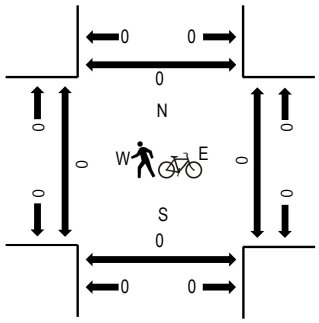
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	1.9%	0.88
WB	1.0%	0.87
NB	0.0%	0.70
SB	0.0%	0.00
All	1.2%	0.86

Traffic Counts - Motorized Vehicles

Interval Start Time	172ND ST NE Eastbound				172ND ST NE Westbound				19TH DR NE Northbound				19TH DR NE Southbound					Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	
4:00 PM	0	0	59	2	0	11	111	0	0	0	0	10	0	0	0	0	193	809
4:15 PM	0	0	74	1	0	9	136	0	0	2	0	12	0	0	0	0	234	794
4:30 PM	0	0	74	0	0	11	94	0	0	1	0	4	0	0	0	0	184	750
4:45 PM	0	0	52	1	0	11	124	0	0	0	0	10	0	0	0	0	198	782
5:00 PM	0	0	60	0	0	9	100	0	0	1	0	8	0	0	0	0	178	802
5:15 PM	0	0	57	1	0	9	106	0	0	1	0	16	0	0	0	0	190	
5:30 PM	0	0	76	1	0	12	117	0	0	1	0	9	0	0	0	0	216	
5:45 PM	0	0	80	0	0	15	117	0	0	0	0	6	0	0	0	0	218	
Count Total	0	0	532	6	0	87	905	0	0	6	0	75	0	0	0	0	1,611	
Peak Hour	0	0	259	4	0	42	465	0	0	3	0	36	0	0	0	0	809	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

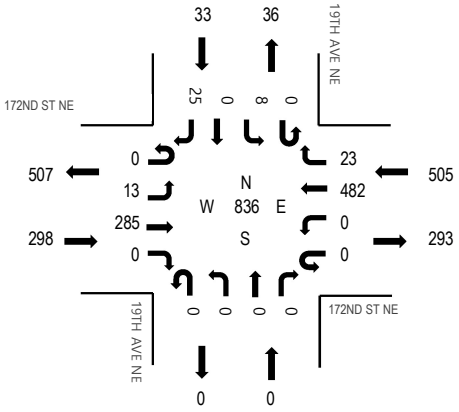
Interval Start Time	Heavy Vehicles					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	2	0	2	4:00 PM	0	0	0	0	0
4:15 PM	2	0	2	0	4	4:15 PM	0	0	0	0	0
4:30 PM	0	0	1	0	1	4:30 PM	0	0	0	0	0
4:45 PM	3	0	0	0	3	4:45 PM	0	0	0	0	0
5:00 PM	1	0	1	0	2	5:00 PM	0	0	0	0	0
5:15 PM	0	0	2	0	2	5:15 PM	0	0	0	0	0
5:30 PM	0	0	1	0	1	5:30 PM	0	0	0	0	0
5:45 PM	3	0	0	0	3	5:45 PM	0	0	0	0	0
Count Total	9	0	9	0	18	Count Total	0	0	0	0	0
Peak Hour	5	0	5	0	10	Peak Hour	0	0	0	0	0

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

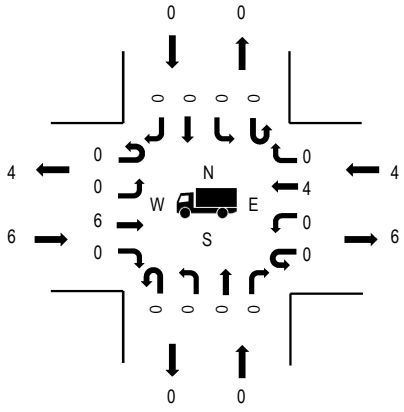
Location: 3 19TH AVE NE & 172ND ST NE PM
Date: Tuesday, February 28, 2023
Peak Hour: 04:00 PM - 05:00 PM

Peak Hour

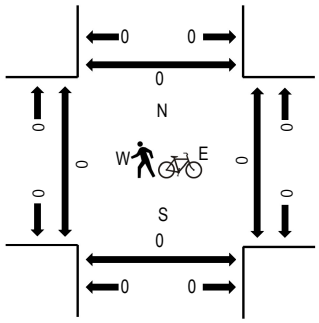
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	2.0%	0.84
WB	0.8%	0.87
NB	0.0%	0.00
SB	0.0%	0.63
All	1.2%	0.85

Traffic Counts - Motorized Vehicles

Interval Start Time	172ND ST NE Eastbound				172ND ST NE Westbound				19TH AVE NE Northbound				19TH AVE NE Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	2	66	0	0	0	117	8	0	0	0	0	0	1	0	5	199	836
4:15 PM	0	7	82	0	0	0	138	7	0	0	0	0	0	3	0	10	247	817
4:30 PM	0	4	74	0	0	0	104	4	0	0	0	0	0	3	0	3	192	765
4:45 PM	0	0	63	0	0	0	123	4	0	0	0	0	0	1	0	7	198	805
5:00 PM	0	1	66	0	0	0	106	3	0	0	0	0	0	1	0	3	180	825
5:15 PM	0	5	69	0	0	0	109	6	0	0	0	0	0	1	0	5	195	
5:30 PM	0	12	74	0	0	0	128	9	0	0	0	0	0	5	0	4	232	
5:45 PM	0	5	82	0	0	0	118	4	0	0	0	0	0	3	0	6	218	
Count Total	0	36	576	0	0	0	943	45	0	0	0	0	0	18	0	43	1,661	
Peak Hour	0	13	285	0	0	0	482	23	0	0	0	0	0	8	0	25	836	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

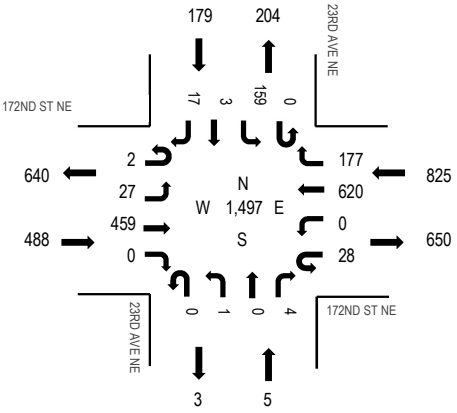
Interval Start Time	Heavy Vehicles					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	2	0	2	4:00 PM	0	0	0	0	0
4:15 PM	3	0	1	0	4	4:15 PM	0	0	0	0	0
4:30 PM	0	0	1	0	1	4:30 PM	0	0	0	0	0
4:45 PM	3	0	0	0	3	4:45 PM	0	0	0	0	0
5:00 PM	1	0	1	0	2	5:00 PM	0	0	0	0	0
5:15 PM	0	0	3	0	3	5:15 PM	0	0	0	0	0
5:30 PM	0	0	3	0	3	5:30 PM	0	0	0	0	0
5:45 PM	4	0	0	0	4	5:45 PM	0	0	0	0	0
Count Total	11	0	11	0	22	Count Total	0	0	0	0	0
Peak Hour	6	0	4	0	10	Peak Hour	0	0	0	0	0

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

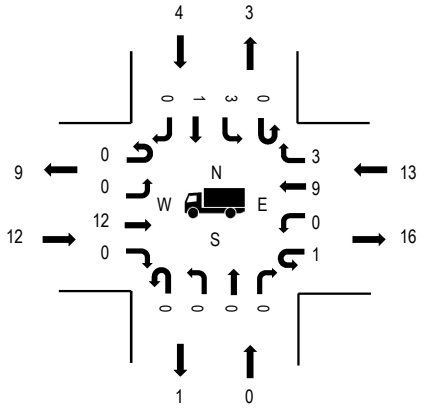
Location: 1 23RD AVE NE & 172ND ST NE PM
Date: Thursday, June 2, 2022
Peak Hour: 04:30 PM - 05:30 PM

Peak Hour

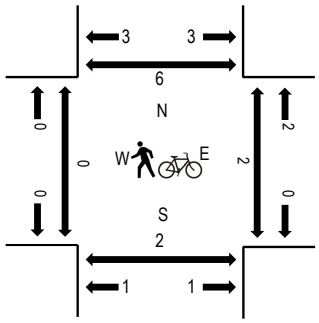
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	2.5%	0.90
WB	1.6%	0.92
NB	0.0%	0.63
SB	2.2%	0.95
All	1.9%	0.94

Traffic Counts - Motorized Vehicles

Interval Start Time	172ND ST NE Eastbound				172ND ST NE Westbound				23RD AVE NE Northbound				23RD AVE NE Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	11	134	0	11	0	147	29	0	0	0	4	0	33	0	8	377	1,468
4:15 PM	0	9	125	0	5	0	164	36	0	0	0	0	0	33	1	7	380	1,478
4:30 PM	0	8	127	0	7	0	141	40	0	0	0	2	0	39	0	2	366	1,497
4:45 PM	0	2	101	0	5	0	150	39	0	0	0	1	0	41	0	6	345	1,443
5:00 PM	1	6	111	0	5	0	165	53	0	0	0	0	0	40	3	3	387	1,449
5:15 PM	1	11	120	0	11	0	164	45	0	1	0	1	0	39	0	6	399	
5:30 PM	1	8	94	0	4	0	133	45	0	0	0	0	0	25	0	2	312	
5:45 PM	3	10	111	0	7	0	141	46	0	1	0	0	0	28	0	4	351	
Count Total	6	65	923	0	55	0	1,205	333	0	2	0	8	0	278	4	38	2,917	
Peak Hour	2	27	459	0	28	0	620	177	0	1	0	4	0	159	3	17	1,497	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles in Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	3	3	2	0	8	4:00 PM	0	0	0	0	0	4:00 PM	0	1	0	0	1
4:15 PM	2	0	3	0	5	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	1	1
4:30 PM	2	0	6	1	9	4:30 PM	0	0	0	0	0	4:30 PM	0	1	0	1	2
4:45 PM	5	0	1	1	7	4:45 PM	0	0	0	0	0	4:45 PM	0	1	2	5	8
5:00 PM	4	0	3	2	9	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:15 PM	1	0	3	0	4	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:30 PM	3	0	4	0	7	5:30 PM	0	0	0	0	0	5:30 PM	1	3	0	0	4
5:45 PM	3	1	0	0	4	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
Count Total	23	4	22	4	53	Count Total	0	0	0	0	0	Count Total	1	6	2	7	16
Peak Hour	12	0	13	4	29	Peak Hour	0	0	0	0	0	Peak Hour	0	2	2	6	10

ALL TRAFFIC DATA SERVICES
(303) 216-2439
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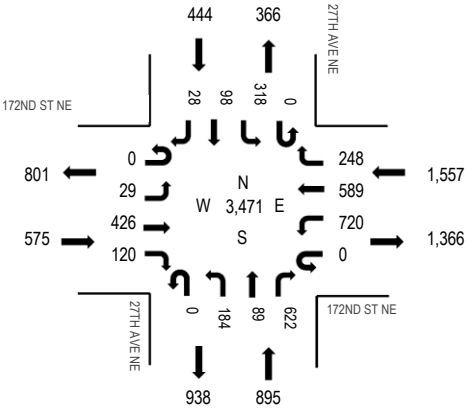
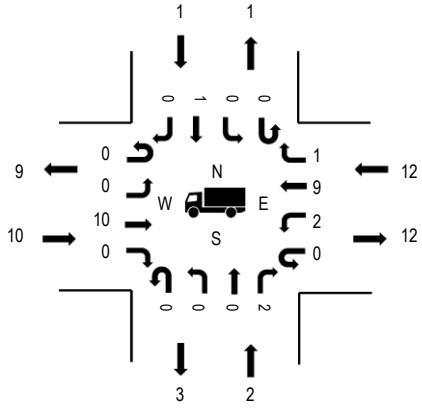
Location: 2 27TH AVE NE & 172ND ST NE PM
Date: Tuesday, June 7, 2022
Peak Hour: 04:15 PM - 05:15 PM

Peak Hour

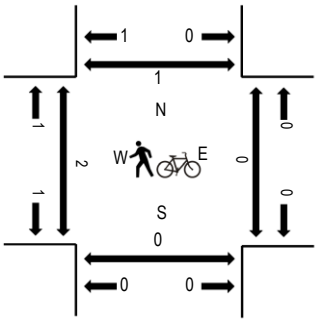
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	1.7%	0.91
WB	0.8%	0.95
NB	0.2%	0.97
SB	0.2%	0.85
All	0.7%	1.00

Traffic Counts - Motorized Vehicles

Interval Start Time	172ND ST NE Eastbound				172ND ST NE Westbound				27TH AVE NE Northbound				27TH AVE NE Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	3	115	36	0	147	104	57	0	62	23	145	0	77	32	3	804	3,405
4:15 PM	0	9	102	28	0	194	139	77	0	45	23	157	0	61	22	8	865	3,471
4:30 PM	0	8	116	34	0	149	148	66	0	42	28	161	0	83	21	8	864	3,457
4:45 PM	0	7	100	26	0	191	140	57	0	52	16	153	0	93	33	4	872	3,459
5:00 PM	0	5	108	32	0	186	162	48	0	45	22	151	0	81	22	8	870	3,328
5:15 PM	0	5	112	32	0	174	156	58	0	38	15	159	0	70	24	8	851	
5:30 PM	0	3	122	31	0	192	142	59	0	39	26	147	0	74	21	10	866	
5:45 PM	0	5	71	24	0	152	136	58	1	41	13	165	0	49	23	3	741	
Count Total	0	45	846	243	0	1,385	1,127	480	1	364	166	1,238	0	588	198	52	6,733	
Peak Hour	0	29	426	120	0	720	589	248	0	184	89	622	0	318	98	28	3,471	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles in Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	3	1	2	1	7	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:15 PM	1	0	4	0	5	4:15 PM	0	0	0	0	0	4:15 PM	1	0	0	0	1
4:30 PM	3	2	5	0	10	4:30 PM	0	0	0	0	0	4:30 PM	1	0	0	1	2
4:45 PM	5	0	2	1	8	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
5:00 PM	1	0	1	0	2	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:15 PM	0	1	2	0	3	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:30 PM	3	0	2	0	5	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:45 PM	1	0	5	0	6	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
Count Total	17	4	23	2	46	Count Total	0	0	0	0	0	Count Total	2	0	0	1	3
Peak Hour	10	2	12	1	25	Peak Hour	0	0	0	0	0	Peak Hour	2	0	0	1	3

ALL TRAFFIC DATA SERVICES
(303) 216-2439
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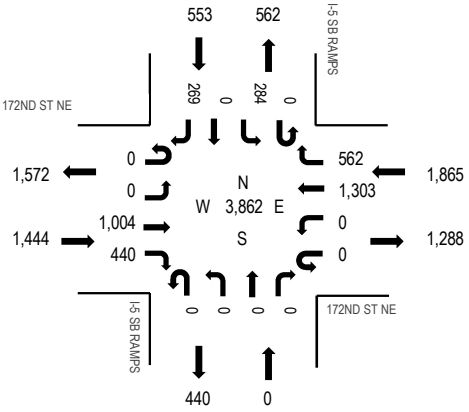
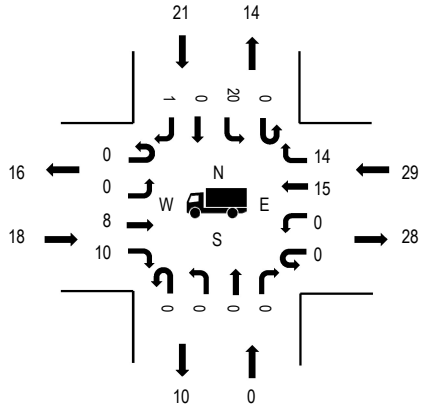
Location: 4 I-5 SB RAMPS & 172ND ST NE PM
Date: Thursday, June 2, 2022
Peak Hour: 04:15 PM - 05:15 PM

Peak Hour

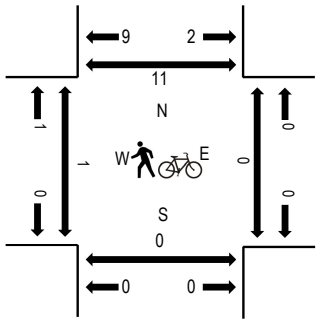
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	1.2%	0.95
WB	1.6%	0.97
NB	0.0%	0.00
SB	3.8%	0.89
All	1.8%	0.97

Traffic Counts - Motorized Vehicles

Interval Start Time	172ND ST NE Eastbound				172ND ST NE Westbound				I-5 SB RAMPS Northbound				I-5 SB RAMPS Southbound					Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	
4:00 PM	0	0	258	123	0	0	274	148	0	0	0	0	0	73	0	68	944	3,828
4:15 PM	0	0	266	113	0	0	328	134	0	0	0	0	0	88	0	67	996	3,862
4:30 PM	0	0	235	114	0	0	299	165	0	0	0	0	0	70	0	58	941	3,798
4:45 PM	0	0	262	103	0	0	336	120	0	0	0	0	0	62	0	64	947	3,788
5:00 PM	0	0	241	110	0	0	340	143	0	0	0	0	0	64	0	80	978	3,724
5:15 PM	0	0	224	116	0	0	323	127	0	0	0	0	0	67	0	75	932	
5:30 PM	0	0	224	121	0	0	315	130	0	0	0	0	0	74	0	67	931	
5:45 PM	0	0	215	89	0	0	323	110	0	0	0	0	0	63	0	83	883	
Count Total	0	0	1,925	889	0	0	2,538	1,077	0	0	0	0	0	561	0	562	7,552	
Peak Hour	0	0	1,004	440	0	0	1,303	562	0	0	0	0	0	284	0	269	3,862	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles in Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	11	0	7	5	23	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	4	4
4:15 PM	4	0	10	6	20	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	1	1
4:30 PM	4	0	11	3	18	4:30 PM	1	0	0	0	1	4:30 PM	0	0	0	2	2
4:45 PM	6	0	2	7	15	4:45 PM	0	0	0	0	0	4:45 PM	1	0	0	2	3
5:00 PM	4	0	6	5	15	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	6	6
5:15 PM	0	0	6	4	10	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	2	2
5:30 PM	2	0	3	5	10	5:30 PM	0	0	0	0	0	5:30 PM	3	0	0	2	5
5:45 PM	11	0	1	1	13	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
Count Total	42	0	46	36	124	Count Total	1	0	0	0	1	Count Total	4	0	0	19	23
Peak Hour	18	0	29	21	68	Peak Hour	1	0	0	0	1	Peak Hour	1	0	0	11	12

ALL TRAFFIC DATA SERVICES
(303) 216-2439
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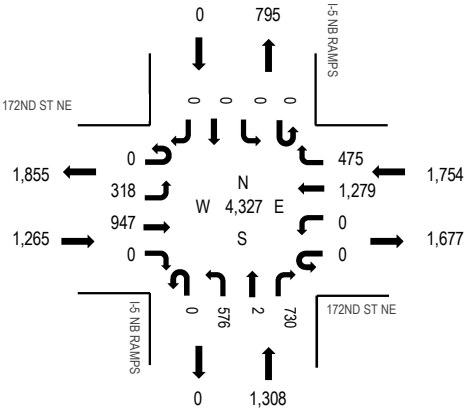
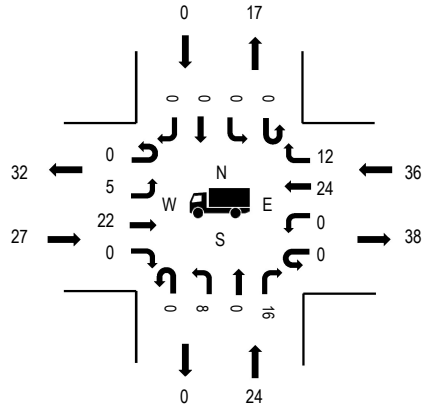
Location: 5 I-5 NB RAMPS & 172ND ST NE PM
Date: Thursday, June 2, 2022
Peak Hour: 04:15 PM - 05:15 PM

Peak Hour

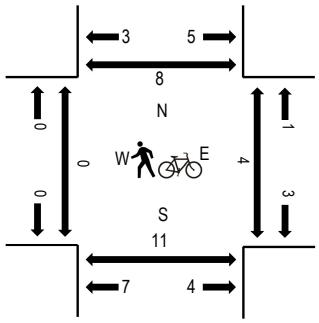
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	2.1%	0.90
WB	2.1%	0.93
NB	1.8%	0.96
SB	0.0%	0.00
All	2.0%	0.98

Traffic Counts - Motorized Vehicles

Interval Start Time	172ND ST NE Eastbound				172ND ST NE Westbound				I-5 NB RAMPS Northbound				I-5 NB RAMPS Southbound					Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	
4:00 PM	0	86	241	0	0	0	296	101	0	115	0	189	0	0	0	0	1,028	4,300
4:15 PM	0	83	270	0	0	0	306	129	0	138	0	176	0	0	0	0	1,102	4,327
4:30 PM	0	76	230	0	0	0	355	119	0	133	1	191	0	0	0	0	1,105	4,235
4:45 PM	0	77	229	0	0	0	306	111	0	150	0	192	0	0	0	0	1,065	4,139
5:00 PM	0	82	218	0	0	0	312	116	0	155	1	171	0	0	0	0	1,055	4,004
5:15 PM	0	52	214	0	0	0	312	113	0	135	0	184	0	0	0	0	1,010	
5:30 PM	0	86	209	0	0	0	310	111	0	131	1	161	0	0	0	0	1,009	
5:45 PM	1	72	203	0	0	0	273	85	0	141	0	155	0	0	0	0	930	
Count Total	1	614	1,814	0	0	0	2,470	885	0	1,098	3	1,419	0	0	0	0	8,304	
Peak Hour	0	318	947	0	0	0	1,279	475	0	576	2	730	0	0	0	0	4,327	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles in Crosswalk

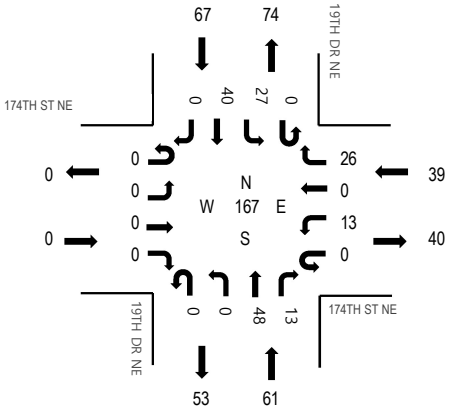
Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	12	6	11	0	29	4:00 PM	0	0	0	0	0	4:00 PM	0	2	0	4	6
4:15 PM	7	8	17	0	32	4:15 PM	0	0	0	0	0	4:15 PM	0	5	0	1	6
4:30 PM	2	8	4	0	14	4:30 PM	0	0	0	0	0	4:30 PM	0	3	2	0	5
4:45 PM	11	6	5	0	22	4:45 PM	0	0	0	0	0	4:45 PM	0	1	0	2	3
5:00 PM	7	2	10	0	19	5:00 PM	0	0	0	0	0	5:00 PM	0	2	2	5	9
5:15 PM	5	10	6	0	21	5:15 PM	0	0	0	0	0	5:15 PM	0	5	0	0	5
5:30 PM	6	1	3	0	10	5:30 PM	0	0	0	0	0	5:30 PM	0	2	0	2	4
5:45 PM	5	2	2	0	9	5:45 PM	0	0	0	0	0	5:45 PM	0	3	0	0	3
Count Total	55	43	58	0	156	Count Total	0	0	0	0	0	Count Total	0	23	4	14	41
Peak Hour	27	24	36	0	87	Peak Hour	0	0	0	0	0	Peak Hour	0	11	4	8	23

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

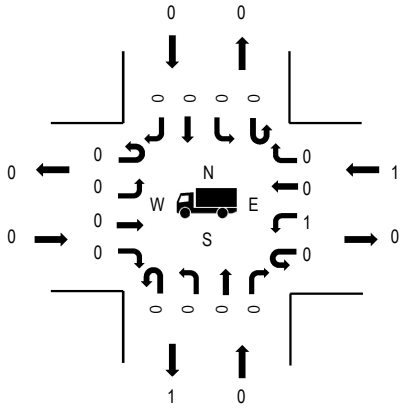
Location: 1 19TH DR NE & 174TH ST NE PM
Date: Tuesday, March 14, 2023
Peak Hour: 04:00 PM - 05:00 PM

Peak Hour

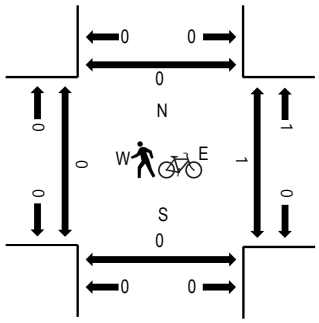
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	0.0%	0.00
WB	2.6%	0.81
NB	0.0%	0.85
SB	0.0%	0.84
All	0.6%	0.84

Traffic Counts - Motorized Vehicles

Interval Start Time	174TH ST NE Eastbound				174TH ST NE Westbound				19TH DR NE Northbound				19TH DR NE Southbound					Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	
4:00 PM	0	0	0	0	0	2	0	5	0	0	15	0	0	6	10	0	38	167
4:15 PM	0	0	0	0	0	4	0	7	0	0	10	5	0	11	8	0	45	164
4:30 PM	0	0	0	0	0	5	0	7	0	0	12	6	0	7	13	0	50	147
4:45 PM	0	0	0	0	0	2	0	7	0	0	11	2	0	3	9	0	34	127
5:00 PM	0	0	0	0	0	5	0	3	0	0	14	1	0	4	8	0	35	127
5:15 PM	0	0	0	0	0	3	0	5	0	0	13	1	0	2	4	0	28	
5:30 PM	0	0	0	0	0	1	0	5	0	0	7	0	0	8	9	0	30	
5:45 PM	0	0	0	0	0	1	0	9	0	0	9	1	0	3	11	0	34	
Count Total	0	0	0	0	0	23	0	48	0	0	91	16	0	44	72	0	294	
Peak Hour	0	0	0	0	0	13	0	26	0	0	48	13	0	27	40	0	167	

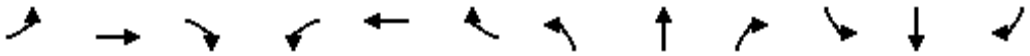
Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0	4:00 PM	0	0	1	0	1
4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:30 PM	0	0	1	0	1	4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:15 PM	0	1	0	0	1	5:15 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
Count Total	0	1	1	0	2	Count Total	0	0	1	0	1
Peak Hour	0	0	1	0	1	Peak Hour	0	0	1	0	1

Appendix C

Level of Service (LOS) Calculations

2023 Existing – Weekday PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	214	1	57	361	14	5	1	35	7	1	5
Future Volume (vph)	2	214	1	57	361	14	5	1	35	7	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			5%			-4%	
Storage Length (ft)	0		0	175		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		35			25			25			25	
Link Distance (ft)		369			1809			529			387	
Travel Time (s)		7.2			49.3			14.4			10.6	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	214	1	57	361	14	5	1	35	7	1	5
Future Vol, veh/h	2	214	1	57	361	14	5	1	35	7	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	5	-	-	-4	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	2	235	1	63	397	15	5	1	38	8	1	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	412	0	0	236	0	0	774	778	236	790	771	405
Stage 1	-	-	-	-	-	-	240	240	-	531	531	-
Stage 2	-	-	-	-	-	-	534	538	-	259	240	-
Critical Hdwy	4.12	-	-	4.11	-	-	8.1	7.5	6.7	6.3	5.7	5.8
Critical Hdwy Stg 1	-	-	-	-	-	-	7.1	6.5	-	5.3	4.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.1	6.5	-	5.3	4.7	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1147	-	-	1337	-	-	257	266	782	370	395	680
Stage 1	-	-	-	-	-	-	718	665	-	603	596	-
Stage 2	-	-	-	-	-	-	460	453	-	795	750	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1147	-	-	1337	-	-	245	253	782	337	376	680
Mov Cap-2 Maneuver	-	-	-	-	-	-	245	253	-	337	376	-
Stage 1	-	-	-	-	-	-	717	664	-	602	568	-
Stage 2	-	-	-	-	-	-	434	432	-	753	749	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1	11.6	13.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	593	1147	-	-	1337	-	-	422
HCM Lane V/C Ratio	0.076	0.002	-	-	0.047	-	-	0.034
HCM Control Delay (s)	11.6	8.1	0	-	7.8	-	-	13.8
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.1

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	259	4	42	465	3	36
Future Volume (vph)	259	4	42	465	3	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	25		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Link Speed (mph)	25			25	35	
Link Distance (ft)	124			686	769	
Travel Time (s)	3.4			18.7	15.0	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	1%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

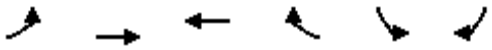
Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	259	4	42	465	3	36
Future Vol, veh/h	259	4	42	465	3	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	25	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	301	5	49	541	3	42

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	306	0	943	304
Stage 1	-	-	-	-	304	-
Stage 2	-	-	-	-	639	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1260	-	294	740
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	530	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1260	-	283	740
Mov Cap-2 Maneuver	-	-	-	-	398	-
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	509	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	10.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	694	-	-	1260	-
HCM Lane V/C Ratio	0.065	-	-	0.039	-
HCM Control Delay (s)	10.6	-	-	8	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	13	285	482	23	8	25
Future Volume (vph)	13	285	482	23	8	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25	25		35	
Link Distance (ft)		686	653		670	
Travel Time (s)		18.7	17.8		13.1	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	1%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	13	285	482	23	8	25
Future Vol, veh/h	13	285	482	23	8	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	15	335	567	27	9	29

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	594	0	-	0	946	581
Stage 1	-	-	-	-	581	-
Stage 2	-	-	-	-	365	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	982	-	-	-	293	517
Stage 1	-	-	-	-	563	-
Stage 2	-	-	-	-	707	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	982	-	-	-	287	517
Mov Cap-2 Maneuver	-	-	-	-	287	-
Stage 1	-	-	-	-	552	-
Stage 2	-	-	-	-	707	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	14.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	982	-	-	-	433
HCM Lane V/C Ratio	0.016	-	-	-	0.09
HCM Control Delay (s)	8.7	0	-	-	14.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

LANE LEVEL OF SERVICE

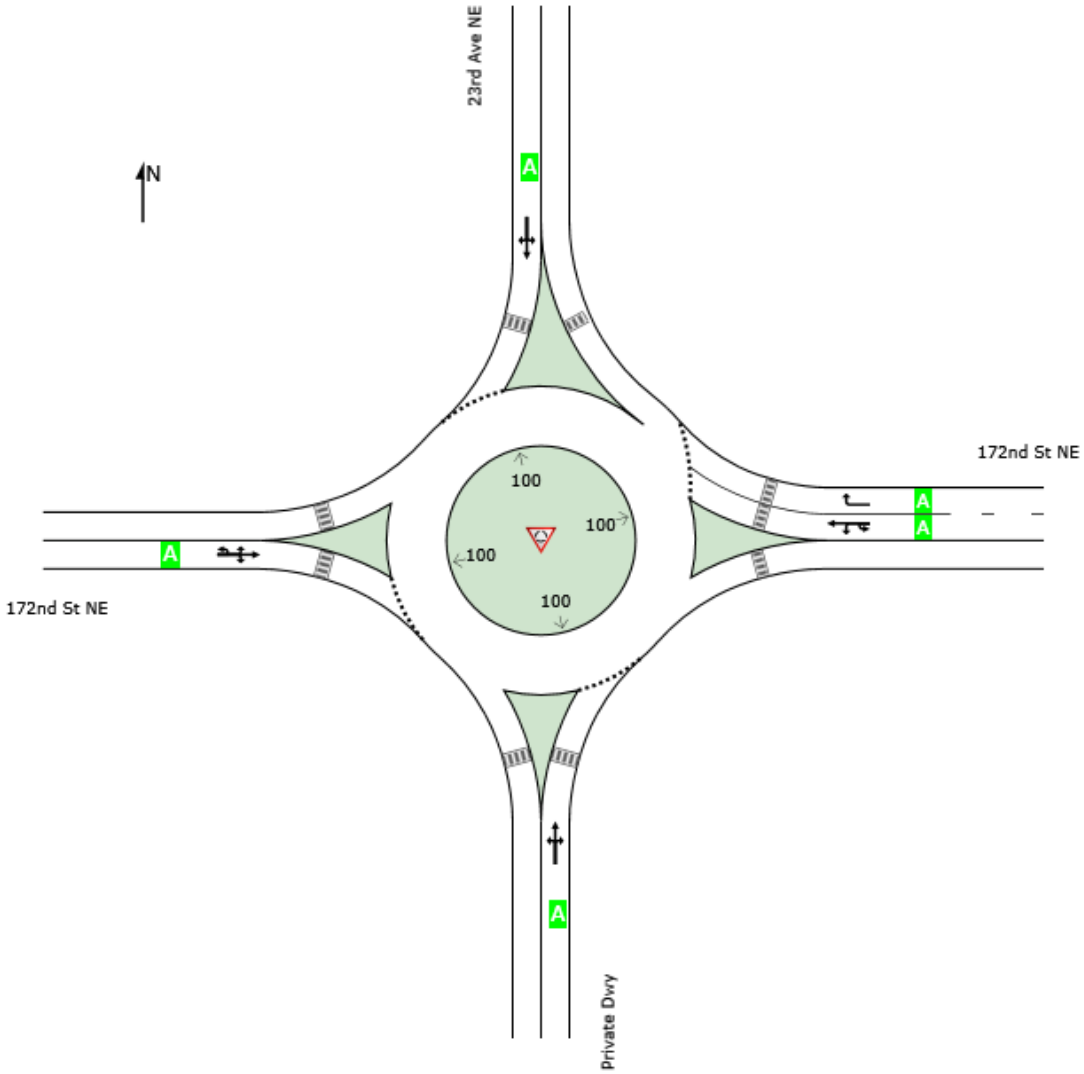
Lane Level of Service

Site: 4 [2023 Existing - PM Peak Hour (Site Folder: 23rd Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

23rd Ave NE / 172nd St NE
Site Category: 2023 Existing - PM Peak Hour
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	A	A



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 4 [2023 Existing - PM Peak Hour (Site Folder: 23rd Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

23rd Ave NE / 172nd St NE
Site Category: 2023 Existing - PM Peak Hour
Roundabout

Vehicle Movement Performance

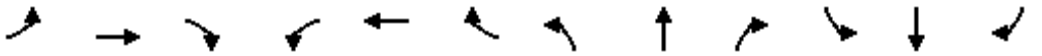
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Private Dwy															
3	L2	All MCs	1	0.0	1	0.0	0.008	8.6	LOS A	0.0	1.1	0.66	0.49	0.66	23.5
8	T1	All MCs	1	0.0	1	0.0	0.008	3.6	LOS A	0.0	1.1	0.66	0.49	0.66	23.7
18	R2	All MCs	4	0.0	4	0.0	0.008	4.3	LOS A	0.0	1.1	0.66	0.49	0.66	23.6
Approach			6	0.0	6	0.0	0.008	4.9	LOS A	0.0	1.1	0.66	0.49	0.66	23.6
East: 172nd St NE															
1u	U	All MCs	31	1.6	31	1.6	0.422	10.9	LOS B	3.2	82.2	0.18	0.33	0.18	31.9
1	L2	All MCs	1	1.6	1	1.6	0.422	8.7	LOS A	3.2	82.2	0.18	0.33	0.18	31.9
6	T1	All MCs	680	1.6	680	1.6	0.422	3.1	LOS A	3.2	82.2	0.18	0.33	0.18	32.5
16	R2	All MCs	194	1.6	194	1.6	0.157	3.6	LOS A	0.9	21.8	0.16	0.41	0.16	32.2
Approach			905	1.6	905	1.6	0.422	3.5	LOS A	3.2	82.2	0.18	0.35	0.18	32.4
North: 23rd Ave NE															
7	L2	All MCs	174	2.2	174	2.2	0.226	9.2	LOS A	1.3	33.4	0.68	0.68	0.68	22.7
4	T1	All MCs	3	2.2	3	2.2	0.226	3.9	LOS A	1.3	33.4	0.68	0.68	0.68	22.9
14	R2	All MCs	19	2.2	19	2.2	0.226	5.0	LOS A	1.3	33.4	0.68	0.68	0.68	22.8
Approach			197	2.2	197	2.2	0.226	8.7	LOS A	1.3	33.4	0.68	0.68	0.68	22.7
West: 172nd St NE															
5u	U	All MCs	2	2.5	2	2.5	0.436	11.9	LOS B	3.0	76.8	0.49	0.44	0.49	31.3
5	L2	All MCs	30	2.5	30	2.5	0.436	9.7	LOS A	3.0	76.8	0.49	0.44	0.49	31.3
2	T1	All MCs	503	2.5	503	2.5	0.436	3.7	LOS A	3.0	76.8	0.49	0.44	0.49	31.8
12	R2	All MCs	1	2.5	1	2.5	0.436	4.0	LOS A	3.0	76.8	0.49	0.44	0.49	31.6
Approach			536	2.5	536	2.5	0.436	4.1	LOS A	3.0	76.8	0.49	0.44	0.49	31.8
All Vehicles			1645	2.0	1645	2.0	0.436	4.3	LOS A	3.2	82.2	0.34	0.42	0.34	30.6

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	439	124	742	607	255	190	92	641	328	101	29
Future Volume (vph)	30	439	124	742	607	255	190	92	641	328	101	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	425		200	125		0	150		150
Storage Lanes	1		0	2		1	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		394			613			444			470	
Travel Time (s)		7.7			11.9			12.1			12.8	
Confl. Peds. (#/hr)	1					1	2					2
Peak Hour 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
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases						6						
Detector Phase	5	2		1	6	6	3	8	8 1	7	4	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0	7.0	3.0	5.0		3.0	5.0	
Minimum Split (s)	9.0	38.0		9.0	38.0	38.0	9.0	11.0		9.0	46.0	
Total Split (s)	20.0	40.0		40.0	60.0	60.0	35.0	15.0		35.0	15.0	
Total Split (%)	15.4%	30.8%		30.8%	46.2%	46.2%	26.9%	11.5%		26.9%	11.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
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)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	Min		C-Min	C-Min	C-Min	None	None		Min	Min	

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 75 (58%), Referenced to phase 1:WBL and 6:WBT, Start of Red	
Natural Cycle: 135	
Control Type: Actuated-Coordinated	

Splits and Phases: 5: 27th Ave NE/Spring Ln Ave & 172nd St NE



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	439	124	742	607	255	190	92	641	328	101	29
Future Volume (veh/h)	30	439	124	742	607	255	190	92	641	328	101	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	30	439	124	742	607	255	190	92	641	328	101	29
Peak Hour 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
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	1	1	1
Cap, veh/h	38	1084	304	797	2160	963	218	146	488	396	97	28
Arrive On Green	0.02	0.40	0.40	0.38	1.00	1.00	0.12	0.08	0.08	0.11	0.07	0.07
Sat Flow, veh/h	1781	2741	768	3483	3582	1596	1795	1885	1585	3483	1405	403
Grp Volume(v), veh/h	30	283	280	742	607	255	190	92	641	328	0	130
Grp Sat Flow(s),veh/h/ln	1781	1777	1732	1742	1791	1596	1795	1885	1585	1742	0	1808
Q Serve(g_s), s	2.2	14.9	15.1	26.6	0.0	0.0	13.5	6.2	9.2	12.0	0.0	9.0
Cycle Q Clear(g_c), s	2.2	14.9	15.1	26.6	0.0	0.0	13.5	6.2	9.2	12.0	0.0	9.0
Prop In Lane	1.00		0.44	1.00		1.00	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	38	703	685	797	2160	963	218	146	488	396	0	125
V/C Ratio(X)	0.79	0.40	0.41	0.93	0.28	0.26	0.87	0.63	1.31	0.83	0.00	1.04
Avail Cap(c_a), veh/h	192	703	685	911	2160	963	401	146	488	777	0	125
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.78	0.78	0.78	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	63.3	28.3	28.3	39.2	0.0	0.0	56.1	58.2	20.7	56.4	0.0	60.5
Incr Delay (d2), s/veh	22.9	0.4	0.4	11.8	0.3	0.5	7.8	8.5	154.8	3.4	0.0	91.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	6.4	6.3	11.2	0.1	0.1	6.6	3.3	30.3	5.5	0.0	7.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	86.2	28.6	28.7	50.9	0.3	0.5	63.9	66.7	175.4	59.8	0.0	151.5
LnGrp LOS	F	C	C	D	A	A	E	E	F	E	A	F
Approach Vol, veh/h		593			1604			923			458	
Approach Delay, s/veh		31.6			23.7			141.6			85.8	
Approach LOS		C			C			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	35.8	57.4	21.8	15.0	8.8	84.4	20.8	16.1
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	34.0	34.0	29.0	9.0	14.0	54.0	29.0	9.0
Max Q Clear Time (g_c+I1), s	28.6	17.1	15.5	11.0	4.2	2.0	14.0	11.2
Green Ext Time (p_c), s	1.2	3.1	0.3	0.0	0.0	5.6	0.8	0.0

Intersection Summary	
HCM 6th Ctrl Delay	63.4
HCM 6th LOS	E

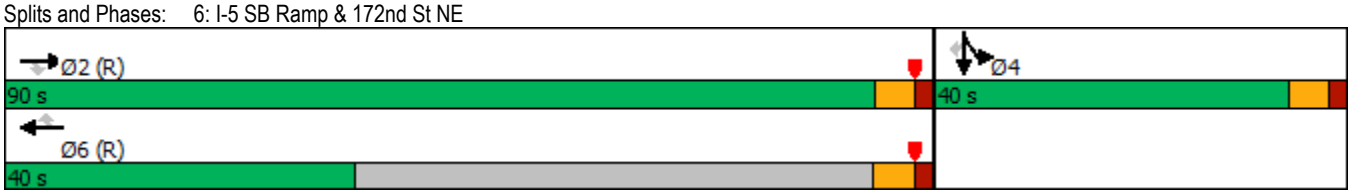
Notes

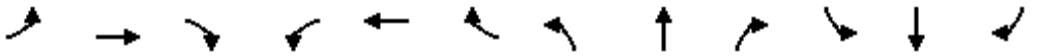
User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1034	453	0	1342	579	0	0	0	293	0	277
Future Volume (vph)	0	1034	453	0	1342	579	0	0	0	293	0	277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-3%			0%			3%	
Storage Length (ft)	0		250	0		0	0		0	400		400
Storage Lanes	0		1	0		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		613			915			299			608	
Travel Time (s)		11.9			17.8			6.8			13.8	
Confl. Peds. (#/hr)	11					11	1					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
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)										50%		
Turn Type		NA	Perm		NA	Perm				Split	NA	Perm
Protected Phases		2			6					4	4	
Permitted Phases			2			6						4
Detector Phase		2	2		6	6				4	4	4
Switch Phase												
Minimum Initial (s)		7.0	7.0		7.0	7.0				5.0	5.0	5.0
Minimum Split (s)		24.8	24.8		34.1	34.1				33.8	33.8	33.8
Total Split (s)		90.0	90.0		40.0	40.0				40.0	40.0	40.0
Total Split (%)		69.2%	69.2%		30.8%	30.8%				30.8%	30.8%	30.8%
Yellow Time (s)		3.8	3.8		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
Lost Time Adjust (s)		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				5.8	5.8	5.8
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min	C-Min		C-Min	C-Min				None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Red	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	

Splits and Phases: 6: I-5 SB Ramp & 172nd St NE





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1034	453	0	1342	579	0	0	0	293	0	277
Future Volume (veh/h)	0	1034	453	0	1342	579	0	0	0	293	0	277
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1832	1832	0	1988	1988				1788	1788	1788
Adj Flow Rate, veh/h	0	1066	0	0	1384	0				302	0	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97				0.97	0.97	0.97
Percent Heavy Veh, %	0	1	1	0	2	2				4	4	4
Cap, veh/h	0	2752		0	2986					401	0	
Arrive On Green	0.00	1.00	0.00	0.00	1.00	0.00				0.12	0.00	0.00
Sat Flow, veh/h	0	3573	1553	0	3877	1685				3405	0	1515
Grp Volume(v), veh/h	0	1066	0	0	1384	0				302	0	0
Grp Sat Flow(s),veh/h/ln	0	1741	1553	0	1889	1685				1703	0	1515
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0				11.2	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0				11.2	0.0	0.0
Prop In Lane	0.00		1.00	0.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2752		0	2986					401	0	
V/C Ratio(X)	0.00	0.39		0.00	0.46					0.75	0.00	
Avail Cap(c_a), veh/h	0	2752		0	2986					896	0	
HCM Platoon Ratio	1.00	2.00	2.00	1.00	2.00	2.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.56	0.00	0.00	0.69	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0				55.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.0	0.4	0.0				4.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	0.0	0.0	0.1	0.0				5.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.2	0.0	0.0	0.4	0.0				60.4	0.0	0.0
LnGrp LOS	A	A		A	A					E	A	
Approach Vol, veh/h		1066			1384						302	
Approach Delay, s/veh		0.2			0.4						60.4	
Approach LOS		A			A						E	

Timer - Assigned Phs	2	4	6
Phs Duration (G+Y+Rc), s	108.9	21.1	108.9
Change Period (Y+Rc), s	* 6.1	* 5.8	6.1
Max Green Setting (Gmax), s	* 84	* 34	33.9
Max Q Clear Time (g_c+I1), s	2.0	13.2	2.0
Green Ext Time (p_c), s	15.7	1.9	17.6

Intersection Summary	
HCM 6th Ctrl Delay	6.9
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

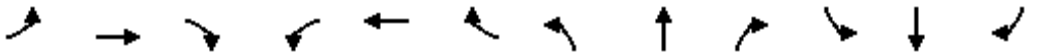
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	328	975	0	0	1317	489	593	2	752	0	0	0
Future Volume (vph)	328	975	0	0	1317	489	593	2	752	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			6%			5%			0%	
Storage Length (ft)	600		0	0		300	400		0	0		0
Storage Lanes	1		0	0		1	1		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		915			978			589			234	
Travel Time (s)		17.8			19.1			13.4			5.3	
Confl. Peds. (#/hr)	8		11	11		8			4	4		
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	0%	0%	0%
Shared Lane Traffic (%)							50%					
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Detector Phase	5	2			6	6	8	8	8			
Switch Phase												
Minimum Initial (s)	5.0	7.0			7.0	7.0	5.0	5.0	5.0			
Minimum Split (s)	10.6	24.1			23.8	23.8	40.8	40.8	40.8			
Total Split (s)	40.0	89.0			49.0	49.0	41.0	41.0	41.0			
Total Split (%)	30.8%	68.5%			37.7%	37.7%	31.5%	31.5%	31.5%			
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	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Min			C-Min	C-Min	None	None	None			

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Red	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	

Splits and Phases: 7: I-5 NB Ramps & 172nd St NE



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	328	975	0	0	1317	489	593	2	752	0	0	0
Future Volume (veh/h)	328	975	0	0	1317	489	593	2	752	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1658	1658	1723	1723	1723			
Adj Flow Rate, veh/h	335	995	0	0	1344	0	606	0	0			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	392	2450	0	0	2419		719	0				
Arrive On Green	0.22	1.00	0.00	0.00	0.53	0.00	0.22	0.00	0.00			
Sat Flow, veh/h	1781	3647	0	0	4676	1405	3282	0	1460			
Grp Volume(v), veh/h	335	995	0	0	1344	0	606	0	0			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1509	1405	1641	0	1460			
Q Serve(g_s), s	11.6	0.0	0.0	0.0	25.6	0.0	23.0	0.0	0.0			
Cycle Q Clear(g_c), s	11.6	0.0	0.0	0.0	25.6	0.0	23.0	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	392	2450	0	0	2419		719	0				
V/C Ratio(X)	0.85	0.41	0.00	0.00	0.56		0.84	0.00				
Avail Cap(c_a), veh/h	664	2450	0	0	2419		889	0				
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.90	0.90	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	16.4	0.0	0.0	0.0	20.0	0.0	48.6	0.0	0.0			
Incr Delay (d2), s/veh	5.0	0.5	0.0	0.0	0.9	0.0	7.3	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	5.3	0.2	0.0	0.0	8.9	0.0	10.1	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.4	0.5	0.0	0.0	21.0	0.0	55.9	0.0	0.0			
LnGrp LOS	C	A	A	A	C		E	A				
Approach Vol, veh/h		1330			1344			606				
Approach Delay, s/veh		5.7			21.0			55.9				
Approach LOS		A			C			E				

Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		95.7			20.1	75.6		34.3				
Change Period (Y+Rc), s		6.1			5.6	* 6.1		5.8				
Max Green Setting (Gmax), s		82.9			34.4	* 43		35.2				
Max Q Clear Time (g_c+I1), s		2.0			13.6	27.6		25.0				
Green Ext Time (p_c), s		14.0			1.0	10.3		3.0				

Intersection Summary												
HCM 6th Ctrl Delay			21.2									
HCM 6th LOS			C									

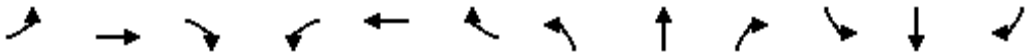
Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

2026 No Action – Weekday PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	234	1	62	394	15	5	1	38	8	1	5
Future Volume (vph)	2	234	1	62	394	15	5	1	38	8	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			5%			-4%	
Storage Length (ft)	0		0	175		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		35			25			25			25	
Link Distance (ft)		369			1809			529			387	
Travel Time (s)		7.2			49.3			14.4			10.6	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	234	1	62	394	15	5	1	38	8	1	5
Future Vol, veh/h	2	234	1	62	394	15	5	1	38	8	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	5	-	-	-4	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	2	257	1	68	433	16	5	1	42	9	1	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	449	0	0	258	0	0	842	847	258	860	839	441
Stage 1	-	-	-	-	-	-	262	262	-	577	577	-
Stage 2	-	-	-	-	-	-	580	585	-	283	262	-
Critical Hdwy	4.12	-	-	4.11	-	-	8.1	7.5	6.7	6.3	5.7	5.8
Critical Hdwy Stg 1	-	-	-	-	-	-	7.1	6.5	-	5.3	4.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.1	6.5	-	5.3	4.7	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1111	-	-	1313	-	-	227	238	758	337	367	652
Stage 1	-	-	-	-	-	-	695	646	-	575	574	-
Stage 2	-	-	-	-	-	-	429	426	-	776	737	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1111	-	-	1313	-	-	215	225	758	304	347	652
Mov Cap-2 Maneuver	-	-	-	-	-	-	215	225	-	304	347	-
Stage 1	-	-	-	-	-	-	694	645	-	574	544	-
Stage 2	-	-	-	-	-	-	403	404	-	731	736	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1	12	14.9
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	565	1111	-	-	1313	-	-	380
HCM Lane V/C Ratio	0.086	0.002	-	-	0.052	-	-	0.04
HCM Control Delay (s)	12	8.2	0	-	7.9	-	-	14.9
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0.1

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	283	4	46	508	3	39
Future Volume (vph)	283	4	46	508	3	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	25		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Link Speed (mph)	25			25	35	
Link Distance (ft)	124			686	769	
Travel Time (s)	3.4			18.7	15.0	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	1%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	283	4	46	508	3	39
Future Vol, veh/h	283	4	46	508	3	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	25	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	329	5	53	591	3	45

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	334	0	1029	332
Stage 1	-	-	-	-	332	-
Stage 2	-	-	-	-	697	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1231	-	261	714
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	498	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1231	-	250	714
Mov Cap-2 Maneuver	-	-	-	-	369	-
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	477	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	669	-	-	1231	-
HCM Lane V/C Ratio	0.073	-	-	0.043	-
HCM Control Delay (s)	10.8	-	-	8.1	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

LANE LEVEL OF SERVICE

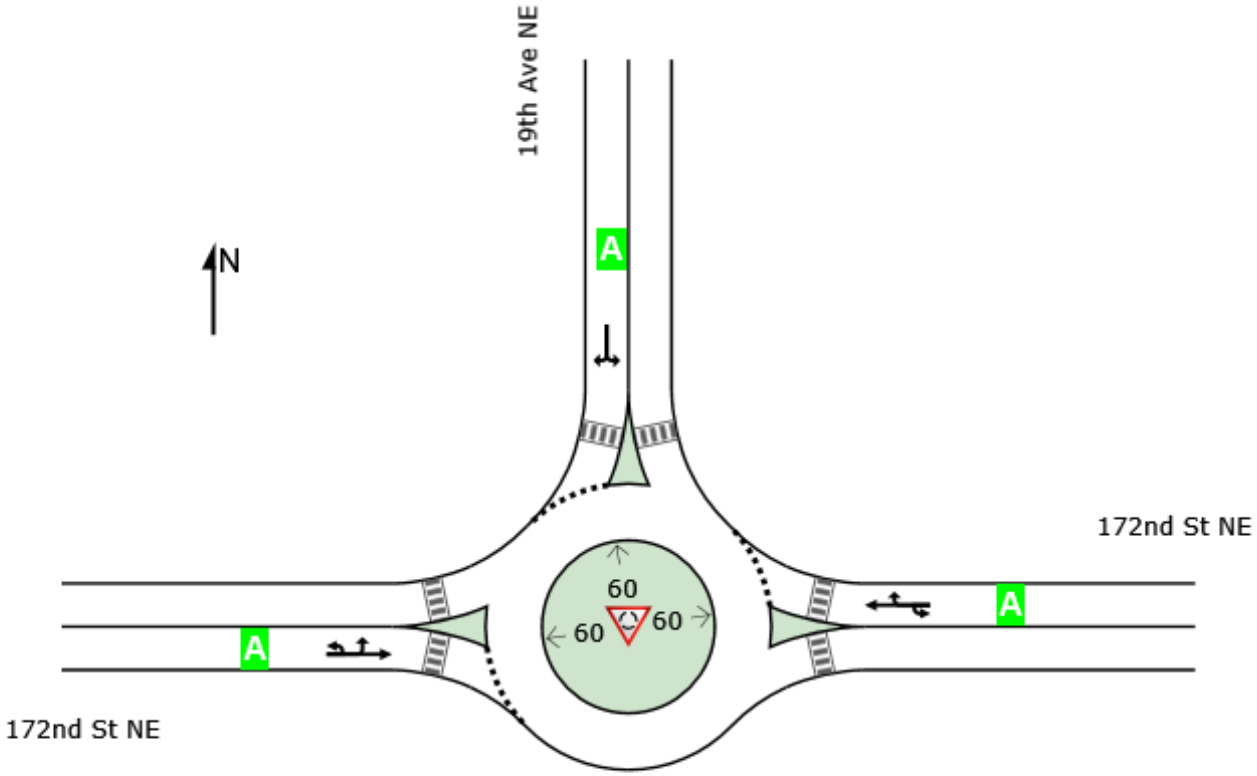
Lane Level of Service

Site: 3 [2026 No Action - PM Peak Hour (Site Folder: 19th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

19th Ave NE / 172nd St NE
Site Category: 2026 No Action - PM Peak Hour
Roundabout

	Approaches			Intersection
	East	North	West	
LOS	A	A	A	A



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 3 [2026 No Action - PM Peak Hour (Site Folder: 19th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

19th Ave NE / 172nd St NE
Site Category: 2026 No Action - PM Peak Hour
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: 172nd St NE															
1u	U	All MCs	1	0.8	1	0.8	0.486	10.1	LOS B	3.4	85.4	0.13	0.38	0.13	31.7
6	T1	All MCs	620	0.8	620	0.8	0.486	3.7	LOS A	3.4	85.4	0.13	0.38	0.13	32.2
16	R2	All MCs	29	0.8	29	0.8	0.486	3.7	LOS A	3.4	85.4	0.13	0.38	0.13	32.0
Approach			651	0.8	651	0.8	0.486	3.8	LOS A	3.4	85.4	0.13	0.38	0.13	32.2
North: 19th Ave NE															
7	L2	All MCs	11	0.0	11	0.0	0.048	8.4	LOS A	0.2	5.9	0.57	0.59	0.57	23.3
14	R2	All MCs	32	0.0	32	0.0	0.048	4.7	LOS A	0.2	5.9	0.57	0.59	0.57	23.4
Approach			42	0.0	42	0.0	0.048	5.6	LOS A	0.2	5.9	0.57	0.59	0.57	23.4
West: 172nd St NE															
5u	U	All MCs	1	2.0	1	2.0	0.289	10.0	LOS B	1.8	44.9	0.09	0.39	0.09	31.7
5	L2	All MCs	16	2.0	16	2.0	0.289	8.1	LOS A	1.8	44.9	0.09	0.39	0.09	31.7
2	T1	All MCs	366	2.0	366	2.0	0.289	3.7	LOS A	1.8	44.9	0.09	0.39	0.09	32.2
Approach			384	2.0	384	2.0	0.289	3.9	LOS A	1.8	44.9	0.09	0.39	0.09	32.2
All Vehicles			1076	1.2	1076	1.2	0.486	3.9	LOS A	3.4	85.4	0.13	0.39	0.13	31.8

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

LANE LEVEL OF SERVICE

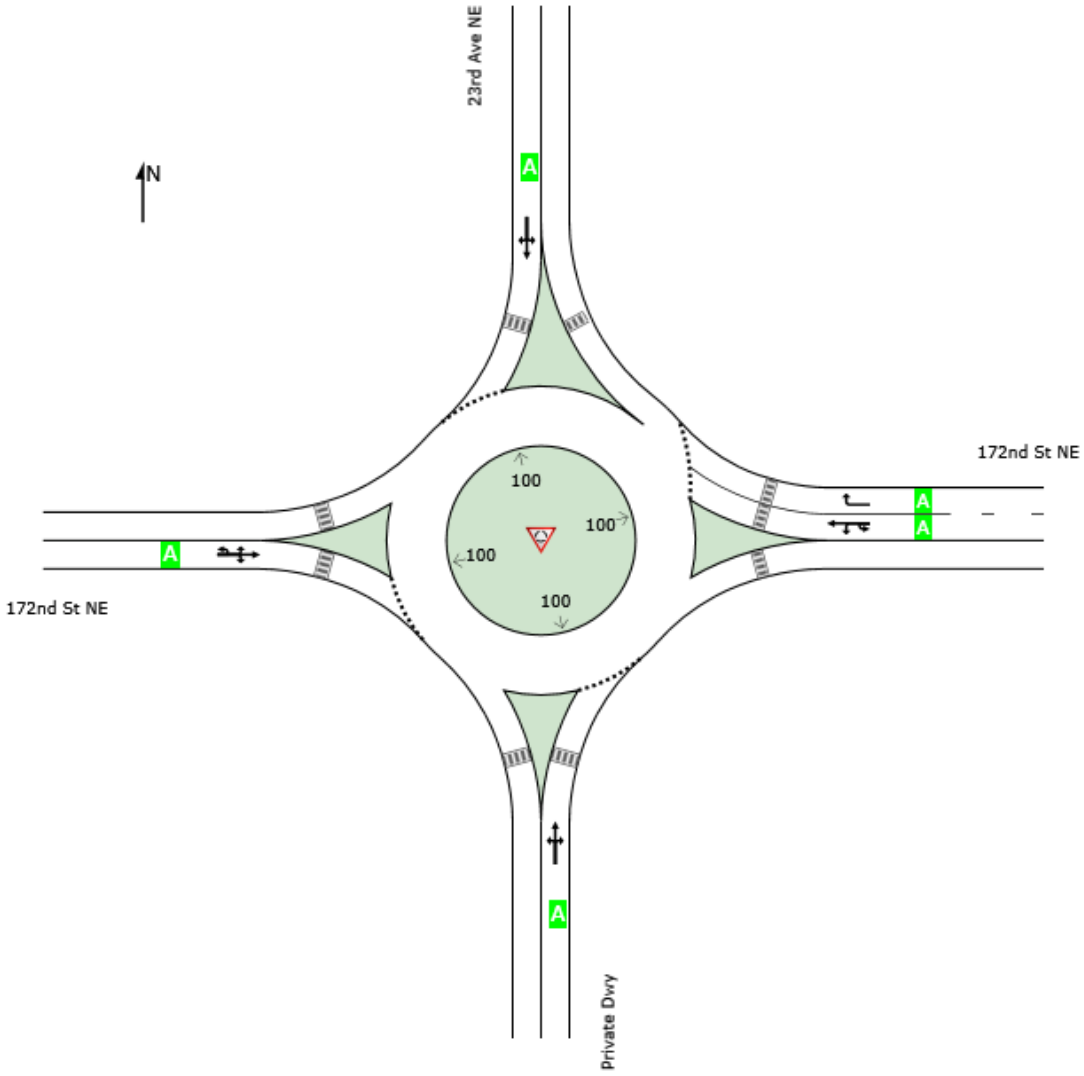
Lane Level of Service

Site: 4 [2026 No Action - PM Peak Hour (Site Folder: 23rd Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

23rd Ave NE / 172nd St NE
Site Category: 2026 No Action - PM Peak Hour
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	A	A



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 4 [2026 No Action - PM Peak Hour (Site Folder: 23rd Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

23rd Ave NE / 172nd St NE
Site Category: 2026 No Action - PM Peak Hour
Roundabout

Vehicle Movement Performance

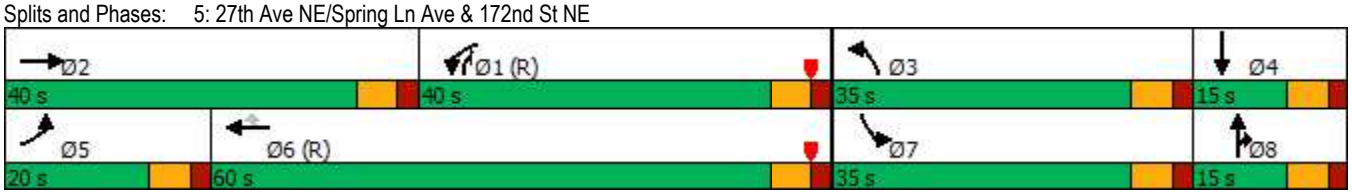
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Private Dwy															
3	L2	All MCs	1	0.0	1	0.0	0.009	9.2	LOS A	0.1	1.4	0.71	0.53	0.71	23.4
8	T1	All MCs	1	0.0	1	0.0	0.009	4.2	LOS A	0.1	1.4	0.71	0.53	0.71	23.6
18	R2	All MCs	5	0.0	5	0.0	0.009	4.9	LOS A	0.1	1.4	0.71	0.53	0.71	23.5
Approach			7	0.0	7	0.0	0.009	5.4	LOS A	0.1	1.4	0.71	0.53	0.71	23.5
East: 172nd St NE															
1u	U	All MCs	34	1.6	34	1.6	0.462	11.0	LOS B	3.8	96.6	0.20	0.34	0.20	31.9
1	L2	All MCs	1	1.6	1	1.6	0.462	8.7	LOS A	3.8	96.6	0.20	0.34	0.20	31.9
6	T1	All MCs	743	1.6	743	1.6	0.462	3.2	LOS A	3.8	96.6	0.20	0.34	0.20	32.4
16	R2	All MCs	212	1.6	212	1.6	0.172	3.6	LOS A	1.0	24.5	0.17	0.41	0.17	32.2
Approach			989	1.6	989	1.6	0.462	3.5	LOS A	3.8	96.6	0.20	0.35	0.20	32.3
North: 23rd Ave NE															
7	L2	All MCs	190	2.2	190	2.2	0.261	9.9	LOS A	1.6	40.4	0.73	0.70	0.73	22.6
4	T1	All MCs	3	2.2	3	2.2	0.261	4.6	LOS A	1.6	40.4	0.73	0.70	0.73	22.7
14	R2	All MCs	20	2.2	20	2.2	0.261	5.7	LOS A	1.6	40.4	0.73	0.70	0.73	22.7
Approach			214	2.2	214	2.2	0.261	9.4	LOS A	1.6	40.4	0.73	0.70	0.73	22.6
West: 172nd St NE															
5u	U	All MCs	2	2.5	2	2.5	0.484	12.1	LOS B	3.5	90.2	0.54	0.45	0.54	31.1
5	L2	All MCs	32	2.5	32	2.5	0.484	9.9	LOS A	3.5	90.2	0.54	0.45	0.54	31.1
2	T1	All MCs	550	2.5	550	2.5	0.484	3.9	LOS A	3.5	90.2	0.54	0.45	0.54	31.7
12	R2	All MCs	1	2.5	1	2.5	0.484	4.2	LOS A	3.5	90.2	0.54	0.45	0.54	31.5
Approach			585	2.5	585	2.5	0.484	4.3	LOS A	3.5	90.2	0.54	0.45	0.54	31.7
All Vehicles			1796	2.0	1796	2.0	0.484	4.5	LOS A	3.8	96.6	0.38	0.43	0.38	30.5

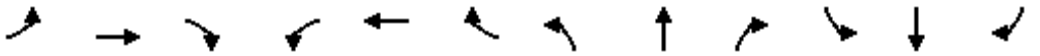
Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	479	135	810	663	279	207	100	700	358	110	32
Future Volume (vph)	33	479	135	810	663	279	207	100	700	358	110	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	425		200	125		0	150		150
Storage Lanes	1		0	2		1	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		394			613			444			470	
Travel Time (s)		7.7			11.9			12.1			12.8	
Confl. Peds. (#/hr)	1					1	2					2
Peak Hour 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
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases						6						
Detector Phase	5	2		1	6	6	3	8	8 1	7	4	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0	7.0	3.0	5.0		3.0	5.0	
Minimum Split (s)	9.0	38.0		9.0	38.0	38.0	9.0	11.0		9.0	46.0	
Total Split (s)	20.0	40.0		40.0	60.0	60.0	35.0	15.0		35.0	15.0	
Total Split (%)	15.4%	30.8%		30.8%	46.2%	46.2%	26.9%	11.5%		26.9%	11.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
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)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	Min		C-Min	C-Min	C-Min	None	None		Min	Min	

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 75 (58%), Referenced to phase 1:WBL and 6:WBT, Start of Red	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	

Splits and Phases: 5: 27th Ave NE/Spring Ln Ave & 172nd St NE





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	479	135	810	663	279	207	100	700	358	110	32
Future Volume (veh/h)	33	479	135	810	663	279	207	100	700	358	110	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	33	479	135	810	663	279	207	100	700	358	110	32
Peak Hour 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
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	1	1	1
Cap, veh/h	42	1012	283	857	2118	944	235	147	516	426	97	28
Arrive On Green	0.02	0.37	0.37	0.41	0.99	0.99	0.13	0.08	0.08	0.12	0.07	0.07
Sat Flow, veh/h	1781	2741	767	3483	3582	1596	1795	1885	1585	3483	1400	407
Grp Volume(v), veh/h	33	309	305	810	663	279	207	100	700	358	0	142
Grp Sat Flow(s),veh/h/ln	1781	1777	1731	1742	1791	1596	1795	1885	1585	1742	0	1808
Q Serve(g_s), s	2.4	17.3	17.5	29.1	0.4	0.4	14.7	6.7	10.1	13.1	0.0	9.0
Cycle Q Clear(g_c), s	2.4	17.3	17.5	29.1	0.4	0.4	14.7	6.7	10.1	13.1	0.0	9.0
Prop In Lane	1.00		0.44	1.00		1.00	1.00		1.00	1.00		0.23
Lane Grp Cap(c), veh/h	42	656	639	857	2118	944	235	147	516	426	0	125
V/C Ratio(X)	0.78	0.47	0.48	0.95	0.31	0.30	0.88	0.68	1.36	0.84	0.00	1.13
Avail Cap(c_a), veh/h	192	656	639	911	2118	944	401	147	516	777	0	125
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.71	0.71	0.71	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	63.1	31.3	31.4	37.5	0.3	0.3	55.5	58.4	19.9	55.8	0.0	60.5
Incr Delay (d2), s/veh	20.5	0.5	0.6	13.6	0.3	0.6	9.0	12.0	172.3	3.4	0.0	121.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	7.5	7.4	12.3	0.2	0.3	7.3	3.7	34.3	6.0	0.0	8.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	83.6	31.9	31.9	51.1	0.6	0.9	64.5	70.4	192.1	59.2	0.0	181.7
LnGrp LOS	F	C	C	D	A	A	E	E	F	E	A	F
Approach Vol, veh/h		647			1752			1007			500	
Approach Delay, s/veh		34.5			24.0			153.8			94.0	
Approach LOS		C			C			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	38.0	54.0	23.0	15.0	9.1	82.9	21.9	16.1
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	34.0	34.0	29.0	9.0	14.0	54.0	29.0	9.0
Max Q Clear Time (g_c+I1), s	31.1	19.5	16.7	11.0	4.4	2.4	15.1	12.1
Green Ext Time (p_c), s	0.8	3.2	0.3	0.0	0.0	6.3	0.8	0.0

Intersection Summary	
HCM 6th Ctrl Delay	68.2
HCM 6th LOS	E

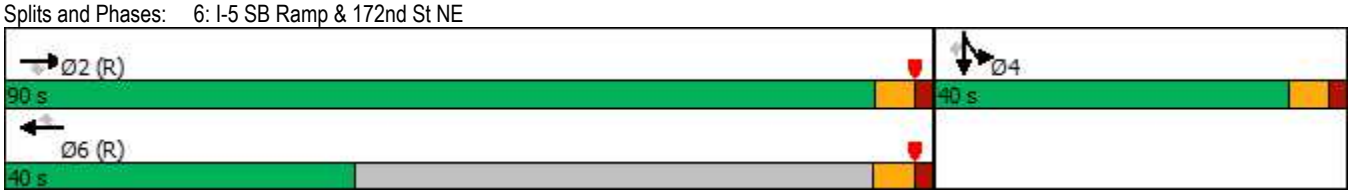
Notes

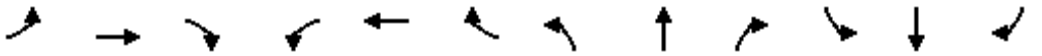
User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1130	495	0	1467	633	0	0	0	320	0	303
Future Volume (vph)	0	1130	495	0	1467	633	0	0	0	320	0	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-3%			0%			3%	
Storage Length (ft)	0		250	0		0	0		0	400		400
Storage Lanes	0		1	0		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		613			915			299			608	
Travel Time (s)		11.9			17.8			6.8			13.8	
Confl. Peds. (#/hr)	11					11	1					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
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)										50%		
Turn Type		NA	Perm		NA	Perm				Split	NA	Perm
Protected Phases		2			6					4	4	
Permitted Phases			2			6						4
Detector Phase		2	2		6	6				4	4	4
Switch Phase												
Minimum Initial (s)		7.0	7.0		7.0	7.0				5.0	5.0	5.0
Minimum Split (s)		24.8	24.8		34.1	34.1				33.8	33.8	33.8
Total Split (s)		90.0	90.0		40.0	40.0				40.0	40.0	40.0
Total Split (%)		69.2%	69.2%		30.8%	30.8%				30.8%	30.8%	30.8%
Yellow Time (s)		3.8	3.8		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
Lost Time Adjust (s)		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				5.8	5.8	5.8
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min	C-Min		C-Min	C-Min				None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Red	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	

Splits and Phases: 6: I-5 SB Ramp & 172nd St NE





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1130	495	0	1467	633	0	0	0	320	0	303
Future Volume (veh/h)	0	1130	495	0	1467	633	0	0	0	320	0	303
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1832	1832	0	1988	1988				1788	1788	1788
Adj Flow Rate, veh/h	0	1165	0	0	1512	0				330	0	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97				0.97	0.97	0.97
Percent Heavy Veh, %	0	1	1	0	2	2				4	4	4
Cap, veh/h	0	2721		0	2952					432	0	
Arrive On Green	0.00	1.00	0.00	0.00	1.00	0.00				0.13	0.00	0.00
Sat Flow, veh/h	0	3573	1553	0	3877	1685				3405	0	1515
Grp Volume(v), veh/h	0	1165	0	0	1512	0				330	0	0
Grp Sat Flow(s),veh/h/ln	0	1741	1553	0	1889	1685				1703	0	1515
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0				12.2	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0				12.2	0.0	0.0
Prop In Lane	0.00		1.00	0.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2721		0	2952					432	0	
V/C Ratio(X)	0.00	0.43		0.00	0.51					0.76	0.00	
Avail Cap(c_a), veh/h	0	2721		0	2952					896	0	
HCM Platoon Ratio	1.00	2.00	2.00	1.00	2.00	2.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.47	0.00	0.00	0.58	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0				54.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.0	0.4	0.0				4.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	0.0	0.0	0.2	0.0				5.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.2	0.0	0.0	0.4	0.0				59.7	0.0	0.0
LnGrp LOS	A	A		A	A					E	A	
Approach Vol, veh/h		1165			1512						330	
Approach Delay, s/veh		0.2			0.4						59.7	
Approach LOS		A			A						E	

Timer - Assigned Phs	2	4	6
Phs Duration (G+Y+Rc), s	107.7	22.3	107.7
Change Period (Y+Rc), s	* 6.1	* 5.8	6.1
Max Green Setting (Gmax), s	* 84	* 34	33.9
Max Q Clear Time (g_c+I1), s	2.0	14.2	2.0
Green Ext Time (p_c), s	18.4	2.1	19.6

Intersection Summary	
HCM 6th Ctrl Delay	6.8
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

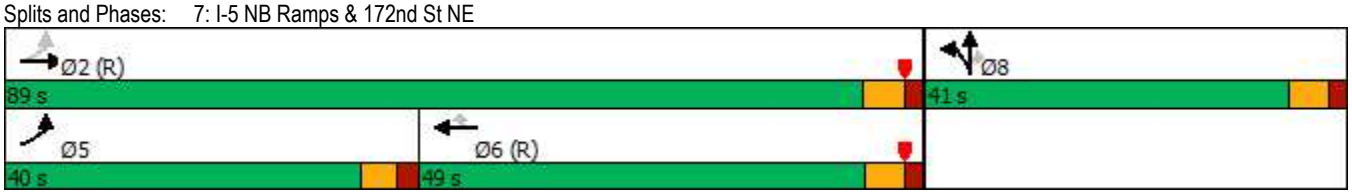
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

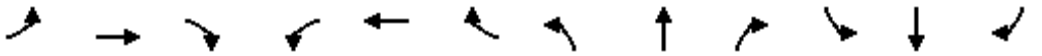
Unsignalized Delay for [EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	358	1066	0	0	1440	535	648	2	822	0	0	0
Future Volume (vph)	358	1066	0	0	1440	535	648	2	822	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			6%			5%			0%	
Storage Length (ft)	600		0	0		300	400		0	0		0
Storage Lanes	1		0	0		1	1		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		915			978			589			234	
Travel Time (s)		17.8			19.1			13.4			5.3	
Confl. Peds. (#/hr)	8		11	11		8			4	4		
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	0%	0%	0%
Shared Lane Traffic (%)							50%					
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Detector Phase	5	2			6	6	8	8	8			
Switch Phase												
Minimum Initial (s)	5.0	7.0			7.0	7.0	5.0	5.0	5.0			
Minimum Split (s)	10.6	24.1			23.8	23.8	40.8	40.8	40.8			
Total Split (s)	40.0	89.0			49.0	49.0	41.0	41.0	41.0			
Total Split (%)	30.8%	68.5%			37.7%	37.7%	31.5%	31.5%	31.5%			
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	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Min			C-Min	C-Min	None	None	None			

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Red	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	

Splits and Phases: 7: I-5 NB Ramps & 172nd St NE





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	358	1066	0	0	1440	535	648	2	822	0	0	0
Future Volume (veh/h)	358	1066	0	0	1440	535	648	2	822	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1658	1658	1723	1723	1723			
Adj Flow Rate, veh/h	365	1088	0	0	1469	0	662	0	0			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	389	2399	0	0	2244		766	0				
Arrive On Green	0.27	1.00	0.00	0.00	0.50	0.00	0.23	0.00	0.00			
Sat Flow, veh/h	1781	3647	0	0	4676	1405	3282	0	1460			
Grp Volume(v), veh/h	365	1088	0	0	1469	0	662	0	0			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1509	1405	1641	0	1460			
Q Serve(g_s), s	14.7	0.0	0.0	0.0	31.5	0.0	25.2	0.0	0.0			
Cycle Q Clear(g_c), s	14.7	0.0	0.0	0.0	31.5	0.0	25.2	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	389	2399	0	0	2244		766	0				
V/C Ratio(X)	0.94	0.45	0.00	0.00	0.65		0.86	0.00				
Avail Cap(c_a), veh/h	618	2399	0	0	2244		889	0				
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	20.7	0.0	0.0	0.0	24.5	0.0	47.8	0.0	0.0			
Incr Delay (d2), s/veh	14.3	0.5	0.0	0.0	1.5	0.0	8.9	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	6.3	0.2	0.0	0.0	11.3	0.0	11.2	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.0	0.5	0.0	0.0	26.0	0.0	56.7	0.0	0.0			
LnGrp LOS	C	A	A	A	C		E	A				
Approach Vol, veh/h		1453			1469			662				
Approach Delay, s/veh		9.2			26.0			56.7				
Approach LOS		A			C			E				

Timer - Assigned Phs	2			5	6		8					
Phs Duration (G+Y+Rc), s	93.9			23.3	70.5		36.1					
Change Period (Y+Rc), s	6.1			5.6	* 6.1		5.8					
Max Green Setting (Gmax), s	82.9			34.4	* 43		35.2					
Max Q Clear Time (g_c+I1), s	2.0			16.7	33.5		27.2					
Green Ext Time (p_c), s	16.3			1.0	7.5		2.8					

Intersection Summary												
HCM 6th Ctrl Delay			24.8									
HCM 6th LOS			C									

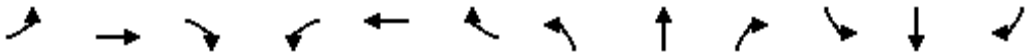
Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

2026 With Project – Weekday PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	252	1	64	407	15	5	1	41	8	1	5
Future Volume (vph)	2	252	1	64	407	15	5	1	41	8	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			5%			-4%	
Storage Length (ft)	0		0	175		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		35			25			25			25	
Link Distance (ft)		369			1809			529			387	
Travel Time (s)		7.2			49.3			14.4			10.6	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	252	1	64	407	15	5	1	41	8	1	5
Future Vol, veh/h	2	252	1	64	407	15	5	1	41	8	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	5	-	-	-4	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	2	277	1	70	447	16	5	1	45	9	1	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	463	0	0	278	0	0	880	885	278	900	877	455
Stage 1	-	-	-	-	-	-	282	282	-	595	595	-
Stage 2	-	-	-	-	-	-	598	603	-	305	282	-
Critical Hdwy	4.12	-	-	4.11	-	-	8.1	7.5	6.7	6.3	5.7	5.8
Critical Hdwy Stg 1	-	-	-	-	-	-	7.1	6.5	-	5.3	4.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.1	6.5	-	5.3	4.7	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1098	-	-	1291	-	-	211	224	737	319	351	641
Stage 1	-	-	-	-	-	-	674	630	-	564	566	-
Stage 2	-	-	-	-	-	-	417	416	-	759	725	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1098	-	-	1291	-	-	200	211	737	286	331	641
Mov Cap-2 Maneuver	-	-	-	-	-	-	200	211	-	286	331	-
Stage 1	-	-	-	-	-	-	673	629	-	563	535	-
Stage 2	-	-	-	-	-	-	390	394	-	710	724	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1	12.2	15.4
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	551	1098	-	-	1291	-	-	361
HCM Lane V/C Ratio	0.094	0.002	-	-	0.054	-	-	0.043
HCM Control Delay (s)	12.2	8.3	0	-	7.9	-	-	15.4
HCM Lane LOS	B	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0.1

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	304	4	52	523	3	48
Future Volume (vph)	304	4	52	523	3	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	25		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Link Speed (mph)	25			25	35	
Link Distance (ft)	124			686	769	
Travel Time (s)	3.4			18.7	15.0	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	1%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	304	4	52	523	3	48
Future Vol, veh/h	304	4	52	523	3	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	25	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	353	5	60	608	3	56

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	358	0	1084	356
Stage 1	-	-	-	-	356	-
Stage 2	-	-	-	-	728	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1206	-	242	693
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	482	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1206	-	230	693
Mov Cap-2 Maneuver	-	-	-	-	351	-
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	458	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	11
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	655	-	-	1206	-
HCM Lane V/C Ratio	0.091	-	-	0.05	-
HCM Control Delay (s)	11	-	-	8.1	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.2	-

LANE LEVEL OF SERVICE

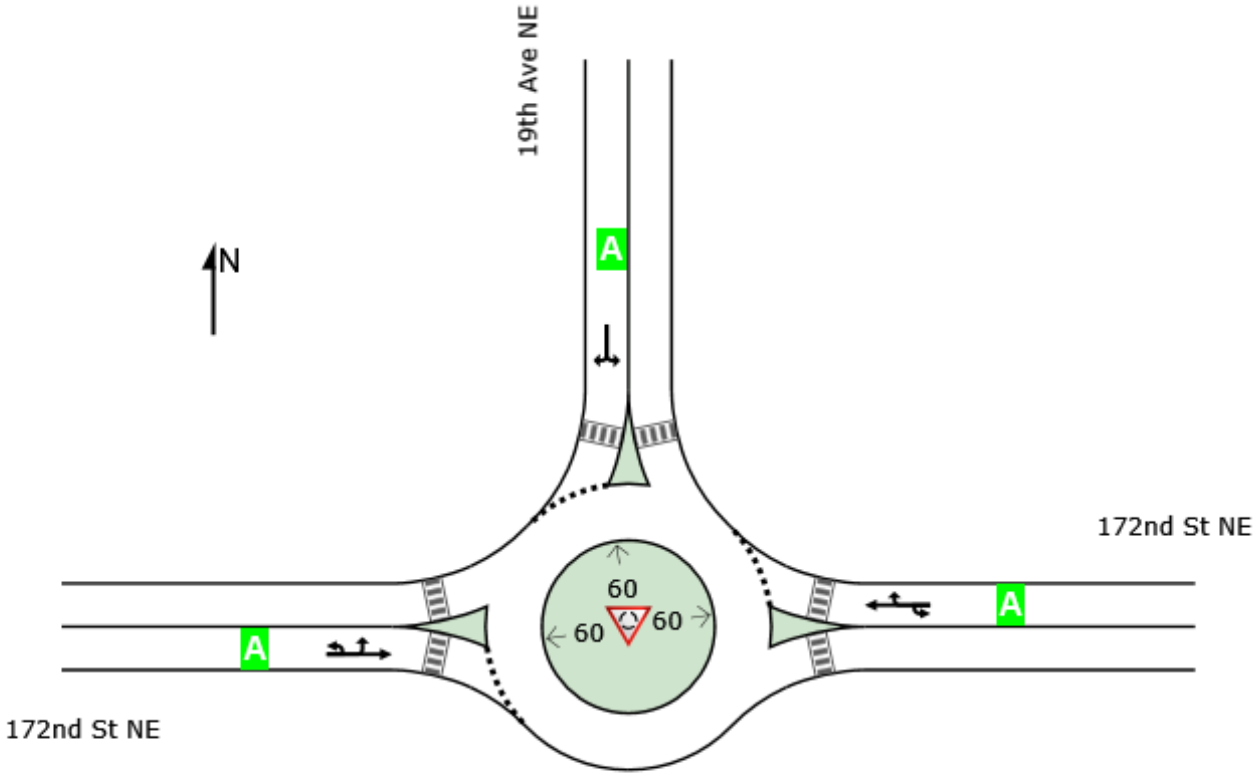
Lane Level of Service

Site: 3 [2026 With Project - PM Peak Hour (Site Folder: 19th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

19th Ave NE / 172nd St NE
Site Category: 2026 With Project - PM Peak Hour
Roundabout

	Approaches			Intersection
	East	North	West	
LOS	A	A	A	A



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 3 [2026 With Project - PM Peak Hour (Site Folder: 19th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

19th Ave NE / 172nd St NE
Site Category: 2026 With Project - PM Peak Hour
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: 172nd St NE															
1u	U	All MCs	1	0.8	1	0.8	0.584	10.4	LOS B	5.1	127.1	0.31	0.41	0.31	31.3
6	T1	All MCs	620	0.8	620	0.8	0.584	4.1	LOS A	5.1	127.1	0.31	0.41	0.31	31.8
16	R2	All MCs	136	0.8	136	0.8	0.584	4.1	LOS A	5.1	127.1	0.31	0.41	0.31	31.6
Approach			758	0.8	758	0.8	0.584	4.1	LOS A	5.1	127.1	0.31	0.41	0.31	31.8
North: 19th Ave NE															
7	L2	All MCs	85	0.0	85	0.0	0.164	8.7	LOS A	0.9	22.7	0.63	0.66	0.63	22.9
14	R2	All MCs	56	0.0	56	0.0	0.164	5.0	LOS A	0.9	22.7	0.63	0.66	0.63	23.0
Approach			141	0.0	141	0.0	0.164	7.2	LOS A	0.9	22.7	0.63	0.66	0.63	23.0
West: 172nd St NE															
5u	U	All MCs	1	2.0	1	2.0	0.338	10.4	LOS B	2.2	55.3	0.30	0.44	0.30	31.1
5	L2	All MCs	52	2.0	52	2.0	0.338	8.6	LOS A	2.2	55.3	0.30	0.44	0.30	31.1
2	T1	All MCs	366	2.0	366	2.0	0.338	4.1	LOS A	2.2	55.3	0.30	0.44	0.30	31.6
Approach			419	2.0	419	2.0	0.338	4.7	LOS A	2.2	55.3	0.30	0.44	0.30	31.5
All Vehicles			1318	1.1	1318	1.1	0.584	4.6	LOS A	5.1	127.1	0.34	0.44	0.34	30.4

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

LANE LEVEL OF SERVICE

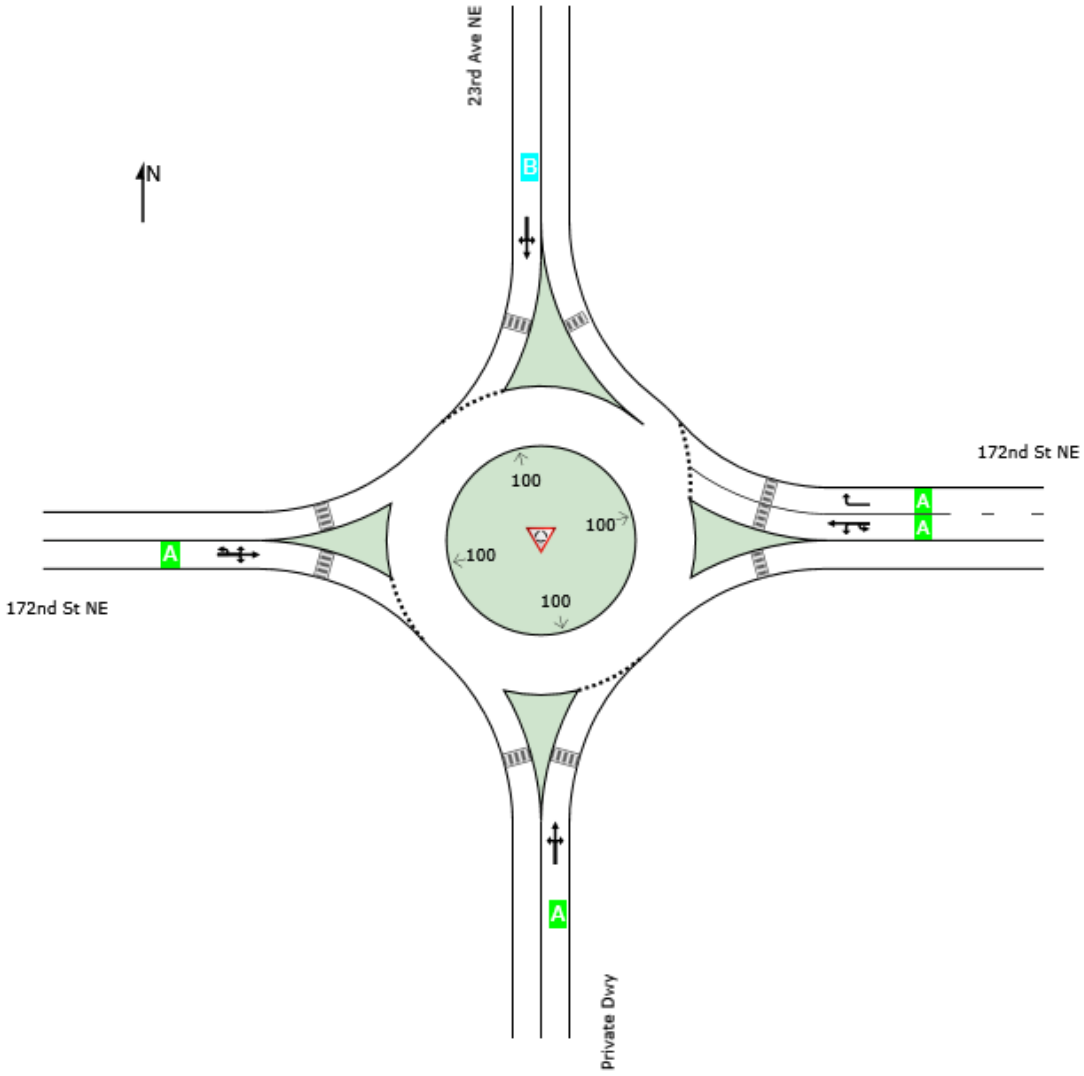
Lane Level of Service

Site: 4 [2026 With Project - PM Peak Hour (Site Folder: 23rd Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

23rd Ave NE / 172nd St NE
Site Category: 2026 With Project - PM Peak Hour
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	B	A	A



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 4 [2026 With Project - PM Peak Hour (Site Folder: 23rd Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

23rd Ave NE / 172nd St NE
Site Category: 2026 With Project - PM Peak Hour
Roundabout

Vehicle Movement Performance

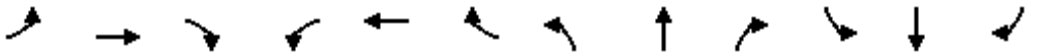
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Private Dwy															
3	L2	All MCs	1	0.0	1	0.0	0.010	9.8	LOS A	0.1	1.6	0.76	0.56	0.76	23.2
8	T1	All MCs	1	0.0	1	0.0	0.010	4.8	LOS A	0.1	1.6	0.76	0.56	0.76	23.4
18	R2	All MCs	5	0.0	5	0.0	0.010	5.6	LOS A	0.1	1.6	0.76	0.56	0.76	23.4
Approach			7	0.0	7	0.0	0.010	6.1	LOS A	0.1	1.6	0.76	0.56	0.76	23.4
East: 172nd St NE															
1u	U	All MCs	34	1.6	34	1.6	0.519	11.0	LOS B	4.7	120.1	0.23	0.33	0.23	31.8
1	L2	All MCs	1	1.6	1	1.6	0.519	8.8	LOS A	4.7	120.1	0.23	0.33	0.23	31.8
6	T1	All MCs	839	1.6	839	1.6	0.519	3.2	LOS A	4.7	120.1	0.23	0.33	0.23	32.3
16	R2	All MCs	212	1.6	212	1.6	0.176	3.6	LOS A	1.0	25.3	0.17	0.41	0.17	32.2
Approach			1086	1.6	1086	1.6	0.519	3.5	LOS A	4.7	120.1	0.22	0.35	0.22	32.3
North: 23rd Ave NE															
7	L2	All MCs	190	2.2	190	2.2	0.287	11.0	LOS B	1.8	46.7	0.79	0.73	0.79	22.3
4	T1	All MCs	3	2.2	3	2.2	0.287	5.7	LOS A	1.8	46.7	0.79	0.73	0.79	22.5
14	R2	All MCs	20	2.2	20	2.2	0.287	6.8	LOS A	1.8	46.7	0.79	0.73	0.79	22.4
Approach			214	2.2	214	2.2	0.287	10.6	LOS B	1.8	46.7	0.79	0.73	0.79	22.3
West: 172nd St NE															
5u	U	All MCs	2	2.5	2	2.5	0.541	12.2	LOS B	4.3	109.1	0.58	0.46	0.58	31.0
5	L2	All MCs	32	2.5	32	2.5	0.541	10.0	LOS B	4.3	109.1	0.58	0.46	0.58	31.0
2	T1	All MCs	617	2.5	617	2.5	0.541	4.0	LOS A	4.3	109.1	0.58	0.46	0.58	31.6
12	R2	All MCs	1	2.5	1	2.5	0.541	4.3	LOS A	4.3	109.1	0.58	0.46	0.58	31.4
Approach			652	2.5	652	2.5	0.541	4.3	LOS A	4.3	109.1	0.58	0.46	0.58	31.6
All Vehicles			1960	2.0	1960	2.0	0.541	4.6	LOS A	4.7	120.1	0.40	0.43	0.40	30.5

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	537	140	810	747	279	214	100	700	358	110	32
Future Volume (vph)	33	537	140	810	747	279	214	100	700	358	110	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	425		200	125		0	150		150
Storage Lanes	1		0	2		1	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		394			613			444			470	
Travel Time (s)		7.7			11.9			12.1			12.8	
Confl. Peds. (#/hr)	1					1	2					2
Peak Hour 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
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases						6						
Detector Phase	5	2		1	6	6	3	8	8 1	7	4	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0	7.0	3.0	5.0		3.0	5.0	
Minimum Split (s)	9.0	38.0		9.0	38.0	38.0	9.0	11.0		9.0	46.0	
Total Split (s)	20.0	40.0		40.0	60.0	60.0	35.0	15.0		35.0	15.0	
Total Split (%)	15.4%	30.8%		30.8%	46.2%	46.2%	26.9%	11.5%		26.9%	11.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
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)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	Min		C-Min	C-Min	C-Min	None	None		Min	Min	

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 75 (58%), Referenced to phase 1:WBL and 6:WBT, Start of Red	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	

Splits and Phases: 5: 27th Ave NE/Spring Ln Ave & 172nd St NE



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	537	140	810	747	279	214	100	700	358	110	32
Future Volume (veh/h)	33	537	140	810	747	279	214	100	700	358	110	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	33	537	140	810	747	279	214	100	700	358	110	32
Peak Hour 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
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	1	1	1
Cap, veh/h	42	1019	265	857	2104	938	242	154	523	426	97	28
Arrive On Green	0.02	0.37	0.37	0.41	0.98	0.98	0.14	0.08	0.08	0.12	0.07	0.07
Sat Flow, veh/h	1781	2791	725	3483	3582	1596	1795	1885	1586	3483	1400	407
Grp Volume(v), veh/h	33	341	336	810	747	279	214	100	700	358	0	142
Grp Sat Flow(s),veh/h/ln	1781	1777	1739	1742	1791	1596	1795	1885	1586	1742	0	1808
Q Serve(g_s), s	2.4	19.6	19.8	29.1	0.8	0.6	15.2	6.7	10.6	13.1	0.0	9.0
Cycle Q Clear(g_c), s	2.4	19.6	19.8	29.1	0.8	0.6	15.2	6.7	10.6	13.1	0.0	9.0
Prop In Lane	1.00		0.42	1.00		1.00	1.00		1.00	1.00		0.23
Lane Grp Cap(c), veh/h	42	649	635	857	2104	938	242	154	523	426	0	125
V/C Ratio(X)	0.78	0.53	0.53	0.95	0.36	0.30	0.88	0.65	1.34	0.84	0.00	1.13
Avail Cap(c_a), veh/h	192	649	635	911	2104	938	401	154	523	777	0	125
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.66	0.66	0.66	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	63.1	32.4	32.5	37.5	0.5	0.5	55.2	57.9	19.3	55.8	0.0	60.5
Incr Delay (d2), s/veh	20.5	0.8	0.8	12.9	0.3	0.5	10.2	9.1	165.2	3.4	0.0	121.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	8.5	8.4	12.2	0.3	0.3	7.6	3.6	33.5	6.0	0.0	8.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	83.6	33.2	33.3	50.3	0.8	1.0	65.4	67.0	184.5	59.2	0.0	181.7
LnGrp LOS	F	C	C	D	A	A	E	E	F	E	A	F
Approach Vol, veh/h		710			1836			1014			500	
Approach Delay, s/veh		35.6			22.7			147.8			94.0	
Approach LOS		D			C			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	38.0	53.5	23.6	15.0	9.1	82.4	21.9	16.6
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	34.0	34.0	29.0	9.0	14.0	54.0	29.0	9.0
Max Q Clear Time (g_c+I1), s	31.1	21.8	17.2	11.0	4.4	2.8	15.1	12.6
Green Ext Time (p_c), s	0.8	3.3	0.3	0.0	0.0	7.2	0.8	0.0

Intersection Summary	
HCM 6th Ctrl Delay	65.0
HCM 6th LOS	E

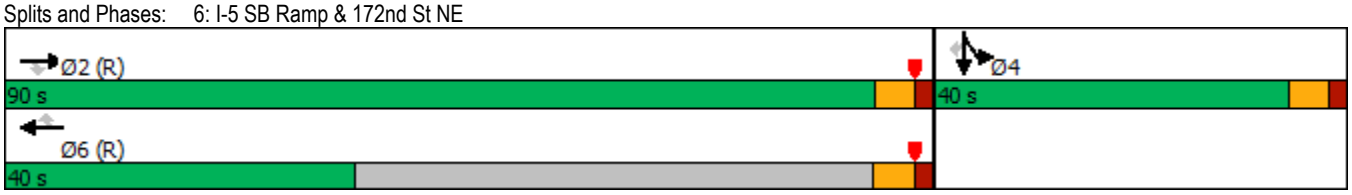
Notes

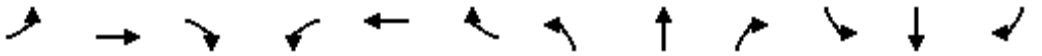
User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1162	521	0	1533	633	0	0	0	320	0	321
Future Volume (vph)	0	1162	521	0	1533	633	0	0	0	320	0	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-3%			0%			3%	
Storage Length (ft)	0		250	0		0	0		0	400		400
Storage Lanes	0		1	0		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		613			915			299			608	
Travel Time (s)		11.9			17.8			6.8			13.8	
Confl. Peds. (#/hr)	11					11	1					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
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)										50%		
Turn Type		NA	Perm		NA	Perm				Split	NA	Perm
Protected Phases		2			6					4	4	
Permitted Phases			2			6						4
Detector Phase		2	2		6	6				4	4	4
Switch Phase												
Minimum Initial (s)		7.0	7.0		7.0	7.0				5.0	5.0	5.0
Minimum Split (s)		24.8	24.8		34.1	34.1				33.8	33.8	33.8
Total Split (s)		90.0	90.0		40.0	40.0				40.0	40.0	40.0
Total Split (%)		69.2%	69.2%		30.8%	30.8%				30.8%	30.8%	30.8%
Yellow Time (s)		3.8	3.8		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
Lost Time Adjust (s)		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				5.8	5.8	5.8
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min	C-Min		C-Min	C-Min				None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Red	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	

Splits and Phases: 6: I-5 SB Ramp & 172nd St NE





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1162	521	0	1533	633	0	0	0	320	0	321
Future Volume (veh/h)	0	1162	521	0	1533	633	0	0	0	320	0	321
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1832	1832	0	1988	1988				1788	1788	1788
Adj Flow Rate, veh/h	0	1198	0	0	1580	0				330	0	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97				0.97	0.97	0.97
Percent Heavy Veh, %	0	1	1	0	2	2				4	4	4
Cap, veh/h	0	2721		0	2952					432	0	
Arrive On Green	0.00	1.00	0.00	0.00	1.00	0.00				0.13	0.00	0.00
Sat Flow, veh/h	0	3573	1553	0	3877	1685				3405	0	1515
Grp Volume(v), veh/h	0	1198	0	0	1580	0				330	0	0
Grp Sat Flow(s),veh/h/ln	0	1741	1553	0	1889	1685				1703	0	1515
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0				12.2	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0				12.2	0.0	0.0
Prop In Lane	0.00		1.00	0.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2721		0	2952					432	0	
V/C Ratio(X)	0.00	0.44		0.00	0.54					0.76	0.00	
Avail Cap(c_a), veh/h	0	2721		0	2952					896	0	
HCM Platoon Ratio	1.00	2.00	2.00	1.00	2.00	2.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.43	0.00	0.00	0.53	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0				54.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.0	0.4	0.0				4.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	0.0	0.0	0.2	0.0				5.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.2	0.0	0.0	0.4	0.0				59.7	0.0	0.0
LnGrp LOS	A	A		A	A					E	A	
Approach Vol, veh/h		1198			1580						330	
Approach Delay, s/veh		0.2			0.4						59.7	
Approach LOS		A			A						E	

Timer - Assigned Phs	2	4	6
Phs Duration (G+Y+Rc), s	107.7	22.3	107.7
Change Period (Y+Rc), s	* 6.1	* 5.8	6.1
Max Green Setting (Gmax), s	* 84	* 34	33.9
Max Q Clear Time (g_c+I1), s	2.0	14.2	2.0
Green Ext Time (p_c), s	19.3	2.1	20.6

Intersection Summary	
HCM 6th Ctrl Delay	6.6
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

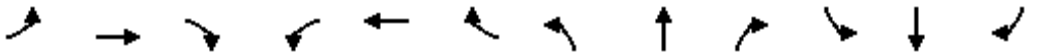
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	370	1086	0	0	1469	535	685	2	822	0	0	0
Future Volume (vph)	370	1086	0	0	1469	535	685	2	822	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			6%			5%			0%	
Storage Length (ft)	600		0	0		300	400		0	0		0
Storage Lanes	1		0	0		1	1		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		915			978			589			234	
Travel Time (s)		17.8			19.1			13.4			5.3	
Confl. Peds. (#/hr)	8		11	11		8			4	4		
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	0%	0%	0%
Shared Lane Traffic (%)							50%					
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Detector Phase	5	2			6	6	8	8	8			
Switch Phase												
Minimum Initial (s)	5.0	7.0			7.0	7.0	5.0	5.0	5.0			
Minimum Split (s)	10.6	24.1			23.8	23.8	40.8	40.8	40.8			
Total Split (s)	40.0	89.0			49.0	49.0	41.0	41.0	41.0			
Total Split (%)	30.8%	68.5%			37.7%	37.7%	31.5%	31.5%	31.5%			
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	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Min			C-Min	C-Min	None	None	None			

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Red	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	

Splits and Phases: 7: I-5 NB Ramps & 172nd St NE



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	370	1086	0	0	1469	535	685	2	822	0	0	0
Future Volume (veh/h)	370	1086	0	0	1469	535	685	2	822	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1658	1658	1723	1723	1723			
Adj Flow Rate, veh/h	378	1108	0	0	1499	0	700	0	0			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	402	2367	0	0	2123		796	0				
Arrive On Green	0.31	1.00	0.00	0.00	0.47	0.00	0.24	0.00	0.00			
Sat Flow, veh/h	1781	3647	0	0	4676	1405	3282	0	1460			
Grp Volume(v), veh/h	378	1108	0	0	1499	0	700	0	0			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1509	1405	1641	0	1460			
Q Serve(g_s), s	17.0	0.0	0.0	0.0	34.2	0.0	26.7	0.0	0.0			
Cycle Q Clear(g_c), s	17.0	0.0	0.0	0.0	34.2	0.0	26.7	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	402	2367	0	0	2123		796	0				
V/C Ratio(X)	0.94	0.47	0.00	0.00	0.71		0.88	0.00				
Avail Cap(c_a), veh/h	599	2367	0	0	2123		889	0				
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.86	0.86	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	22.6	0.0	0.0	0.0	27.4	0.0	47.4	0.0	0.0			
Incr Delay (d2), s/veh	16.1	0.6	0.0	0.0	2.0	0.0	10.2	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	6.5	0.2	0.0	0.0	12.4	0.0	12.0	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.7	0.6	0.0	0.0	29.4	0.0	57.6	0.0	0.0			
LnGrp LOS	D	A	A	A	C		E	A				
Approach Vol, veh/h		1486			1499			700				
Approach Delay, s/veh		10.3			29.4			57.6				
Approach LOS		B			C			E				

Timer - Assigned Phs	2			5	6		8					
Phs Duration (G+Y+Rc), s	92.7			25.6	67.1		37.3					
Change Period (Y+Rc), s	6.1			5.6	* 6.1		5.8					
Max Green Setting (Gmax), s	82.9			34.4	* 43		35.2					
Max Q Clear Time (g_c+I1), s	2.0			19.0	36.2		28.7					
Green Ext Time (p_c), s	16.8			1.0	5.7		2.6					

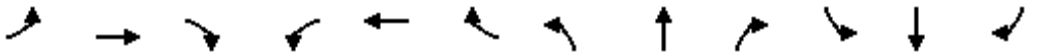
Intersection Summary												
HCM 6th Ctrl Delay			27.1									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	84	14	6	28	121	52	14	30	44	20
Future Volume (vph)	15	4	84	14	6	28	121	52	14	30	44	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	50		0	50		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		94			694			670			298	
Travel Time (s)		2.6			18.9			13.1			5.8	
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	0%	0%	0%	0%	3%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	4	84	14	6	28	121	52	14	30	44	20
Future Vol, veh/h	15	4	84	14	6	28	121	52	14	30	44	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	1	1	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	3	3	3	3	3	3	3	0	0	0	0	3
Mvmt Flow	18	5	100	17	7	33	144	62	17	36	52	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	515	504	64	549	508	72	76	0	0	80	0	0
Stage 1	136	136	-	360	360	-	-	-	-	-	-	-
Stage 2	379	368	-	189	148	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	469	469	998	445	466	987	1517	-	-	1531	-	-
Stage 1	865	782	-	656	625	-	-	-	-	-	-	-
Stage 2	641	620	-	810	773	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	408	414	998	361	411	986	1517	-	-	1530	-	-
Mov Cap-2 Maneuver	450	454	-	428	454	-	-	-	-	-	-	-
Stage 1	783	763	-	593	565	-	-	-	-	-	-	-
Stage 2	553	560	-	707	754	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	11.1	4.9	2.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1517	-	-	815	646	1530	-	-
HCM Lane V/C Ratio	0.095	-	-	0.15	0.088	0.023	-	-
HCM Control Delay (s)	7.6	-	-	10.2	11.1	7.4	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.5	0.3	0.1	-	-

2032 No Action – Weekday PM Peak Hour

LANE LEVEL OF SERVICE

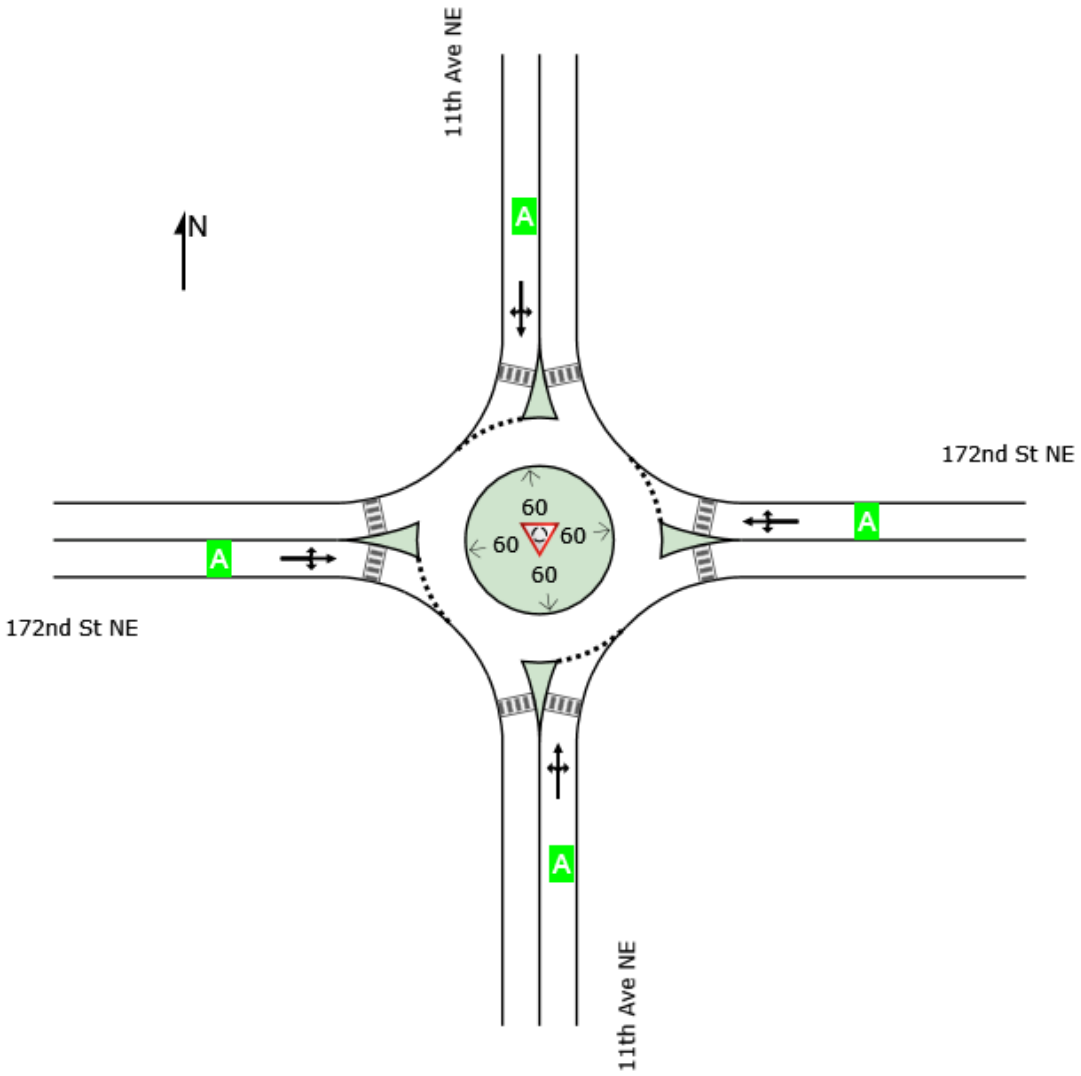
Lane Level of Service

Site: 1 [2032 No Action - PM Peak Hour (Site Folder: 11th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

11th Ave NE / 172nd St NE
Site Category: 2032 No Action - PM Peak Hour
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	A	A



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 1 [2032 No Action - PM Peak Hour (Site Folder: 11th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

11th Ave NE / 172nd St NE
Site Category: 2032 No Action - PM Peak Hour
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: 11th Ave NE															
3	L2	All MCs	8	0.0	8	0.0	0.055	10.3	LOS B	0.3	6.3	0.41	0.59	0.41	34.2
8	T1	All MCs	1	0.0	1	0.0	0.055	5.8	LOS A	0.3	6.3	0.41	0.59	0.41	34.8
18	R2	All MCs	51	0.0	51	0.0	0.055	5.6	LOS A	0.3	6.3	0.41	0.59	0.41	34.5
Approach			59	0.0	59	0.0	0.055	6.3	LOS A	0.3	6.3	0.41	0.59	0.41	34.5
East: 172nd St NE															
1	L2	All MCs	81	0.9	81	0.9	0.461	9.1	LOS A	3.3	83.6	0.11	0.42	0.11	33.3
6	T1	All MCs	518	0.9	518	0.9	0.461	3.7	LOS A	3.3	83.6	0.11	0.42	0.11	32.3
16	R2	All MCs	20	0.9	20	0.9	0.461	3.7	LOS A	3.3	83.6	0.11	0.42	0.11	32.0
Approach			619	0.9	619	0.9	0.461	4.4	LOS A	3.3	83.6	0.11	0.42	0.11	32.4
North: 11th Ave NE															
7	L2	All MCs	10	0.0	10	0.0	0.021	8.2	LOS A	0.1	2.5	0.55	0.59	0.55	23.3
4	T1	All MCs	1	0.0	1	0.0	0.021	7.2	LOS A	0.1	2.5	0.55	0.59	0.55	27.8
14	R2	All MCs	8	0.0	8	0.0	0.021	4.5	LOS A	0.1	2.5	0.55	0.59	0.55	23.4
Approach			19	0.0	19	0.0	0.021	6.6	LOS A	0.1	2.5	0.55	0.59	0.55	23.6
West: 172nd St NE															
5	L2	All MCs	3	2.3	3	2.3	0.250	8.5	LOS A	1.3	31.8	0.25	0.41	0.25	31.4
2	T1	All MCs	307	2.3	307	2.3	0.250	4.1	LOS A	1.3	31.8	0.25	0.41	0.25	31.9
12	R2	All MCs	1	2.3	1	2.3	0.250	4.9	LOS A	1.3	31.8	0.25	0.41	0.25	33.2
Approach			311	2.3	311	2.3	0.250	4.2	LOS A	1.3	31.8	0.25	0.41	0.25	31.9
All Vehicles			1008	1.3	1008	1.3	0.461	4.5	LOS A	3.3	83.6	0.18	0.43	0.18	32.1

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	311	32	55	568	43	47
Future Volume (vph)	311	32	55	568	43	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	25		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Link Speed (mph)	25			25	35	
Link Distance (ft)	124			686	769	
Travel Time (s)	3.4			18.7	15.0	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	1%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	311	32	55	568	43	47
Future Vol, veh/h	311	32	55	568	43	47
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	25	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	362	37	64	660	50	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	399	0	1169	381
Stage 1	-	-	-	-	381	-
Stage 2	-	-	-	-	788	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1165	-	215	671
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	452	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1165	-	203	671
Mov Cap-2 Maneuver	-	-	-	-	326	-
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	427	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	15.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	446	-	-	1165	-
HCM Lane V/C Ratio	0.235	-	-	0.055	-
HCM Control Delay (s)	15.5	-	-	8.3	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.9	-	-	0.2	-

LANE LEVEL OF SERVICE

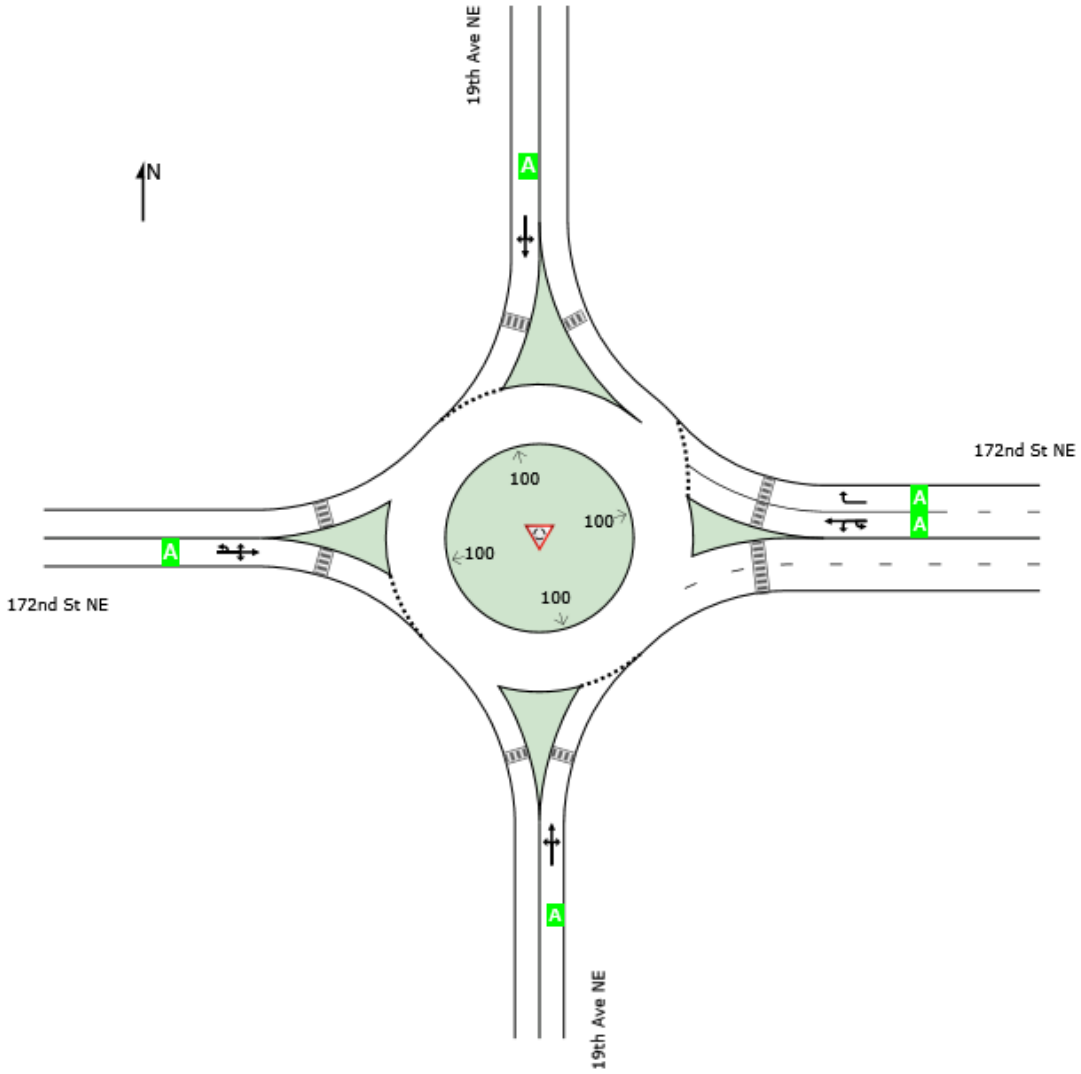
Lane Level of Service

Site: 3 [2032 No Action - PM Peak Hour (Site Folder: 19th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

19th Ave NE / 172nd St NE
Site Category: 2032 No Action - PM Peak Hour
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	A	A



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 3 [2032 No Action - PM Peak Hour (Site Folder: 19th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

19th Ave NE / 172nd St NE
Site Category: 2032 No Action - PM Peak Hour
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: 19th Ave NE															
3	L2	All MCs	135	3.0	135	3.0	0.176	11.6	LOS B	1.0	24.9	0.51	0.64	0.51	32.7
8	T1	All MCs	26	3.0	26	3.0	0.176	5.9	LOS A	1.0	24.9	0.51	0.64	0.51	33.3
18	R2	All MCs	26	3.0	26	3.0	0.176	5.7	LOS A	1.0	24.9	0.51	0.64	0.51	33.1
Approach			187	3.0	187	3.0	0.176	10.0	LOS A	1.0	24.9	0.51	0.64	0.51	32.8
East: 172nd St NE															
1u	U	All MCs	1	3.0	1	3.0	0.389	11.6	LOS B	2.7	69.5	0.43	0.42	0.43	31.3
1	L2	All MCs	22	3.0	22	3.0	0.389	10.6	LOS B	2.7	69.5	0.43	0.42	0.43	32.8
6	T1	All MCs	559	3.0	559	3.0	0.389	3.8	LOS A	2.7	69.5	0.43	0.42	0.43	31.9
16	R2	All MCs	35	3.0	35	3.0	0.034	4.3	LOS A	0.2	4.1	0.35	0.46	0.35	31.8
Approach			618	3.0	618	3.0	0.389	4.1	LOS A	2.7	69.5	0.42	0.42	0.42	31.9
North: 19th Ave NE															
7	L2	All MCs	12	3.0	12	3.0	0.088	9.0	LOS A	0.5	12.8	0.67	0.62	0.67	24.5
4	T1	All MCs	21	3.0	21	3.0	0.088	7.3	LOS A	0.5	12.8	0.67	0.62	0.67	29.7
14	R2	All MCs	39	3.0	39	3.0	0.088	4.7	LOS A	0.5	12.8	0.67	0.62	0.67	24.7
Approach			72	3.0	72	3.0	0.088	6.2	LOS A	0.5	12.8	0.67	0.62	0.67	25.9
West: 172nd St NE															
5u	U	All MCs	1	3.0	1	3.0	0.309	11.1	LOS B	1.8	47.1	0.22	0.35	0.22	32.3
5	L2	All MCs	20	3.0	20	3.0	0.309	8.8	LOS A	1.8	47.1	0.22	0.35	0.22	32.3
2	T1	All MCs	313	3.0	313	3.0	0.309	2.8	LOS A	1.8	47.1	0.22	0.35	0.22	33.0
12	R2	All MCs	93	3.0	93	3.0	0.309	4.0	LOS A	1.8	47.1	0.22	0.35	0.22	34.4
Approach			427	3.0	427	3.0	0.309	3.4	LOS A	1.8	47.1	0.22	0.35	0.22	33.2
All Vehicles			1304	3.0	1304	3.0	0.389	4.8	LOS A	2.7	69.5	0.38	0.44	0.38	32.0

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

LANE LEVEL OF SERVICE

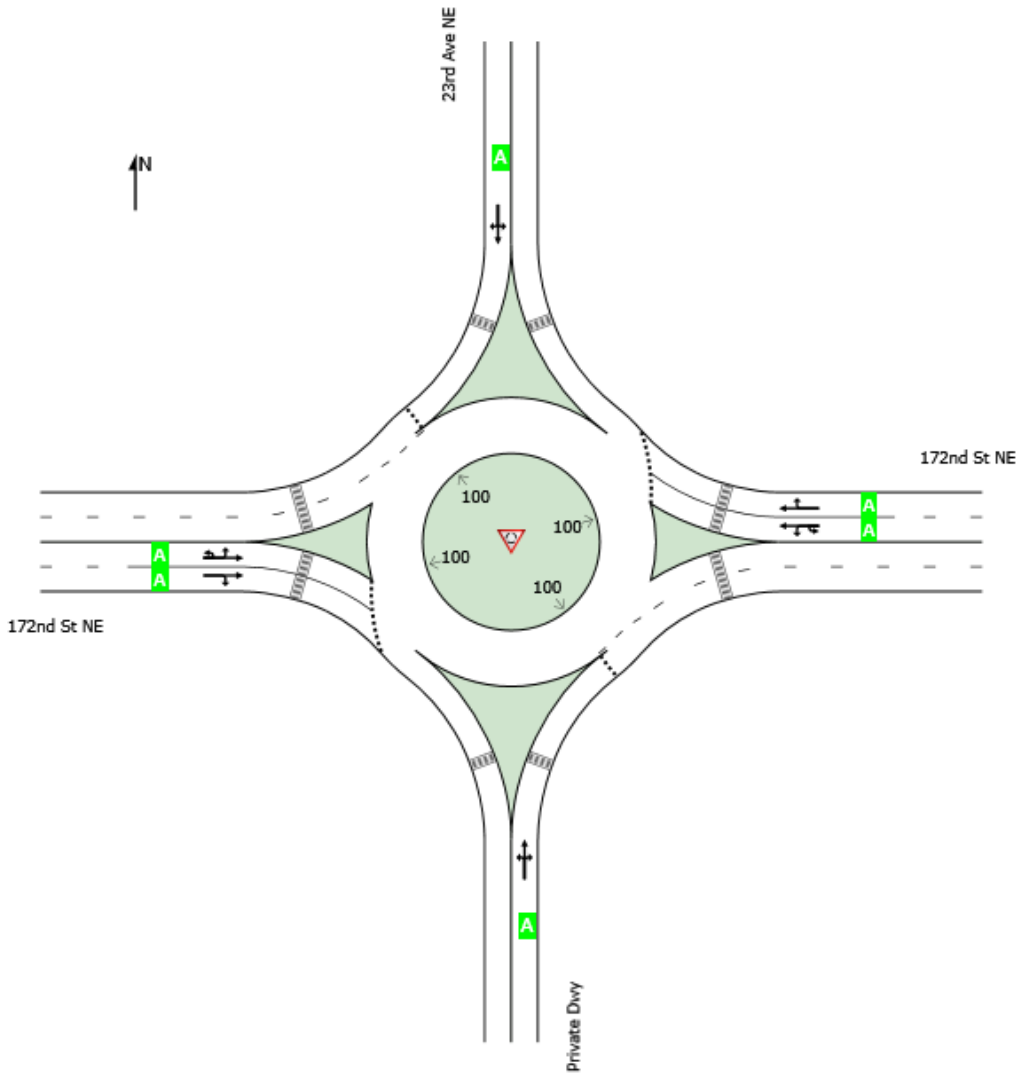
Lane Level of Service

Site: 4 [2032 No Action - PM Peak Hour (Site Folder: 23rd Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

23rd Ave NE / 172nd St NE
Site Category: 2032 No Action - PM Peak Hour
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	A	A



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 4 [2032 No Action - PM Peak Hour (Site Folder: 23rd Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

23rd Ave NE / 172nd St NE
Site Category: 2032 No Action - PM Peak Hour
Roundabout

Vehicle Movement Performance

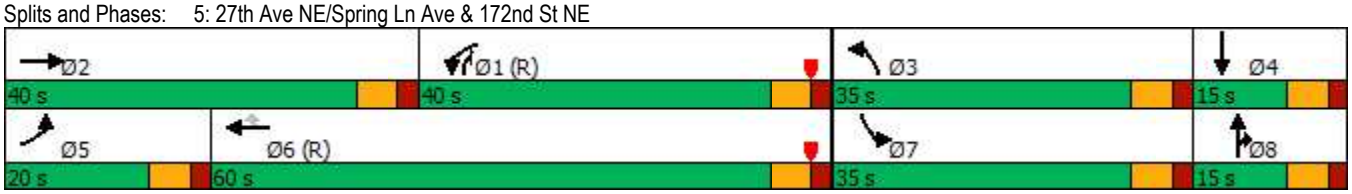
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Private Dwy															
3	L2	All MCs	67	0.0	67	0.0	0.161	9.2	LOS A	1.0	24.0	0.70	0.63	0.70	23.1
8	T1	All MCs	66	0.0	66	0.0	0.161	4.1	LOS A	1.0	24.0	0.70	0.63	0.70	23.3
18	R2	All MCs	5	0.0	5	0.0	0.161	5.0	LOS A	1.0	24.0	0.70	0.63	0.70	23.2
Approach			138	0.0	138	0.0	0.161	6.6	LOS A	1.0	24.0	0.70	0.63	0.70	23.2
East: 172nd St NE															
1u	U	All MCs	40	1.6	40	1.6	0.297	11.8	LOS B	1.8	46.6	0.42	0.44	0.42	31.2
1	L2	All MCs	1	1.6	1	1.6	0.297	9.5	LOS A	1.8	46.6	0.42	0.44	0.42	31.2
6	T1	All MCs	656	1.6	656	1.6	0.297	3.7	LOS A	1.9	48.7	0.41	0.42	0.41	31.9
16	R2	All MCs	140	1.6	140	1.6	0.297	4.0	LOS A	1.9	48.7	0.40	0.40	0.40	31.8
Approach			838	1.6	838	1.6	0.297	4.1	LOS A	1.9	48.7	0.41	0.42	0.41	31.8
North: 23rd Ave NE															
7	L2	All MCs	146	2.2	146	2.2	0.291	9.8	LOS A	1.8	46.4	0.75	0.68	0.75	22.8
4	T1	All MCs	47	2.2	47	2.2	0.291	4.7	LOS A	1.8	46.4	0.75	0.68	0.75	23.0
14	R2	All MCs	45	2.2	45	2.2	0.291	5.6	LOS A	1.8	46.4	0.75	0.68	0.75	22.9
Approach			237	2.2	237	2.2	0.291	8.0	LOS A	1.8	46.4	0.75	0.68	0.75	22.9
West: 172nd St NE															
5u	U	All MCs	3	2.5	3	2.5	0.226	11.9	LOS B	1.4	34.6	0.45	0.48	0.45	30.9
5	L2	All MCs	62	2.5	62	2.5	0.226	9.7	LOS A	1.4	34.6	0.45	0.48	0.45	30.9
2	T1	All MCs	500	2.5	500	2.5	0.226	3.8	LOS A	1.4	36.5	0.44	0.43	0.44	31.7
12	R2	All MCs	44	2.5	44	2.5	0.226	4.0	LOS A	1.4	36.5	0.43	0.40	0.43	31.7
Approach			609	2.5	609	2.5	0.226	4.4	LOS A	1.4	36.5	0.44	0.44	0.44	31.7
All Vehicles			1822	1.9	1822	1.9	0.297	4.9	LOS A	1.9	48.7	0.49	0.48	0.49	29.4

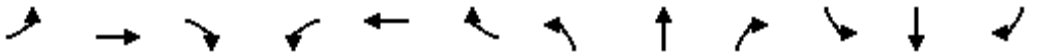
Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	430	80	726	594	333	123	120	627	427	132	38
Future Volume (vph)	39	430	80	726	594	333	123	120	627	427	132	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	425		200	125		0	150		150
Storage Lanes	1		0	2		1	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		394			613			444			470	
Travel Time (s)		7.7			11.9			12.1			12.8	
Confl. Peds. (#/hr)	1					1	2					2
Peak Hour 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
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases						6						
Detector Phase	5	2		1	6	6	3	8	8 1	7	4	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0	7.0	3.0	5.0		3.0	5.0	
Minimum Split (s)	9.0	38.0		9.0	38.0	38.0	9.0	11.0		9.0	46.0	
Total Split (s)	20.0	40.0		40.0	60.0	60.0	35.0	15.0		35.0	15.0	
Total Split (%)	15.4%	30.8%		30.8%	46.2%	46.2%	26.9%	11.5%		26.9%	11.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
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)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	Min		C-Min	C-Min	C-Min	None	None		Min	Min	

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 75 (58%), Referenced to phase 1:WBL and 6:WBT, Start of Red	
Natural Cycle: 125	
Control Type: Actuated-Coordinated	

Splits and Phases: 5: 27th Ave NE/Spring Ln Ave & 172nd St NE





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	430	80	726	594	333	123	120	627	427	132	38
Future Volume (veh/h)	39	430	80	726	594	333	123	120	627	427	132	38
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	39	430	80	726	594	333	123	120	627	427	132	38
Peak Hour 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
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	1	1	1
Cap, veh/h	50	1134	209	783	2061	918	150	131	469	497	181	52
Arrive On Green	0.03	0.38	0.38	0.38	0.96	0.96	0.08	0.07	0.07	0.14	0.13	0.13
Sat Flow, veh/h	1781	2994	553	3483	3582	1596	1795	1885	1584	3483	1405	405
Grp Volume(v), veh/h	39	254	256	726	594	333	123	120	627	427	0	170
Grp Sat Flow(s),veh/h/ln	1781	1777	1770	1742	1791	1596	1795	1885	1584	1742	0	1810
Q Serve(g_s), s	2.8	13.5	13.7	26.0	1.2	1.6	8.8	8.2	9.0	15.6	0.0	11.7
Cycle Q Clear(g_c), s	2.8	13.5	13.7	26.0	1.2	1.6	8.8	8.2	9.0	15.6	0.0	11.7
Prop In Lane	1.00		0.31	1.00		1.00	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	50	673	671	783	2061	918	150	131	469	497	0	233
V/C Ratio(X)	0.78	0.38	0.38	0.93	0.29	0.36	0.82	0.92	1.34	0.86	0.00	0.73
Avail Cap(c_a), veh/h	192	673	671	911	2061	918	401	131	469	777	0	233
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.73	0.73	0.73	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	62.8	29.3	29.3	39.6	1.1	1.1	58.6	60.1	21.8	54.5	0.0	54.5
Incr Delay (d2), s/veh	17.1	0.3	0.4	10.6	0.3	0.8	8.1	54.8	165.9	5.0	0.0	11.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	5.8	5.8	10.8	0.4	0.6	4.4	5.9	30.6	7.2	0.0	6.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.8	29.6	29.7	50.2	1.4	1.9	66.7	114.9	187.6	59.5	0.0	65.6
LnGrp LOS	E	C	C	D	A	A	E	F	F	E	A	E
Approach Vol, veh/h		549			1653			870			597	
Approach Delay, s/veh		33.2			22.9			160.5			61.2	
Approach LOS		C			C			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	35.2	55.2	16.8	22.7	9.7	80.8	24.5	15.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	34.0	34.0	29.0	9.0	14.0	54.0	29.0	9.0
Max Q Clear Time (g_c+I1), s	28.0	15.7	10.8	13.7	4.8	3.6	17.6	11.0
Green Ext Time (p_c), s	1.3	2.8	0.2	0.0	0.0	5.9	1.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	63.3
HCM 6th LOS	E

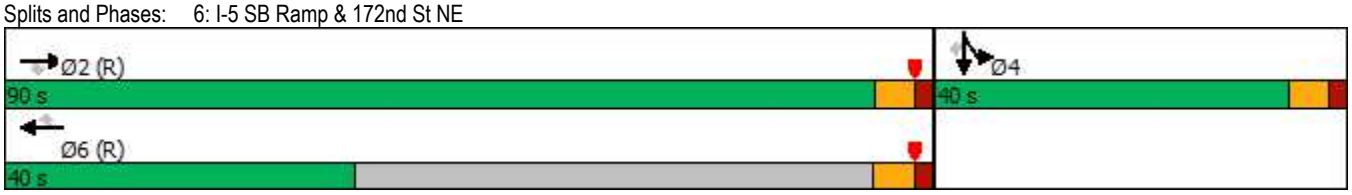
Notes

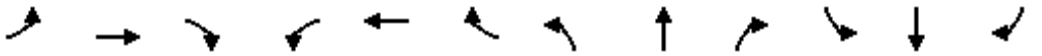
User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1349	239	0	1311	755	0	0	0	382	0	362
Future Volume (vph)	0	1349	239	0	1311	755	0	0	0	382	0	362
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-3%			0%			3%	
Storage Length (ft)	0		250	0		0	0		0	400		400
Storage Lanes	0		1	0		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		613			915			299			608	
Travel Time (s)		11.9			17.8			6.8			13.8	
Confl. Peds. (#/hr)	11					11	1					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
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)										50%		
Turn Type		NA	Perm		NA	Perm				Split	NA	Perm
Protected Phases		2			6					4	4	
Permitted Phases			2			6						4
Detector Phase		2	2		6	6				4	4	4
Switch Phase												
Minimum Initial (s)		7.0	7.0		7.0	7.0				5.0	5.0	5.0
Minimum Split (s)		24.8	24.8		34.1	34.1				33.8	33.8	33.8
Total Split (s)		90.0	90.0		40.0	40.0				40.0	40.0	40.0
Total Split (%)		69.2%	69.2%		30.8%	30.8%				30.8%	30.8%	30.8%
Yellow Time (s)		3.8	3.8		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
Lost Time Adjust (s)		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				5.8	5.8	5.8
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min	C-Min		C-Min	C-Min				None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Red	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	

Splits and Phases: 6: I-5 SB Ramp & 172nd St NE





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1349	239	0	1311	755	0	0	0	382	0	362
Future Volume (veh/h)	0	1349	239	0	1311	755	0	0	0	382	0	362
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1832	1832	0	1988	1988				1788	1788	1788
Adj Flow Rate, veh/h	0	1391	0	0	1352	0				394	0	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97				0.97	0.97	0.97
Percent Heavy Veh, %	0	1	1	0	2	2				4	4	4
Cap, veh/h	0	2651		0	2876					501	0	
Arrive On Green	0.00	1.00	0.00	0.00	1.00	0.00				0.15	0.00	0.00
Sat Flow, veh/h	0	3573	1553	0	3877	1685				3405	0	1515
Grp Volume(v), veh/h	0	1391	0	0	1352	0				394	0	0
Grp Sat Flow(s),veh/h/ln	0	1741	1553	0	1889	1685				1703	0	1515
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0				14.5	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0				14.5	0.0	0.0
Prop In Lane	0.00		1.00	0.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2651		0	2876					501	0	
V/C Ratio(X)	0.00	0.52		0.00	0.47					0.79	0.00	
Avail Cap(c_a), veh/h	0	2651		0	2876					896	0	
HCM Platoon Ratio	1.00	2.00	2.00	1.00	2.00	2.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.55	0.00	0.00	0.25	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0				53.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.4	0.0	0.0	0.1	0.0				4.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.2	0.0	0.0	0.1	0.0				6.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.4	0.0	0.0	0.1	0.0				58.2	0.0	0.0
LnGrp LOS	A	A		A	A					E	A	
Approach Vol, veh/h		1391			1352						394	
Approach Delay, s/veh		0.4			0.1						58.2	
Approach LOS		A			A						E	

Timer - Assigned Phs	2	4	6
Phs Duration (G+Y+Rc), s	105.1	24.9	105.1
Change Period (Y+Rc), s	* 6.1	* 5.8	6.1
Max Green Setting (Gmax), s	* 84	* 34	33.9
Max Q Clear Time (g_c+I1), s	2.0	16.5	2.0
Green Ext Time (p_c), s	25.7	2.4	17.1

Intersection Summary	
HCM 6th Ctrl Delay	7.5
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

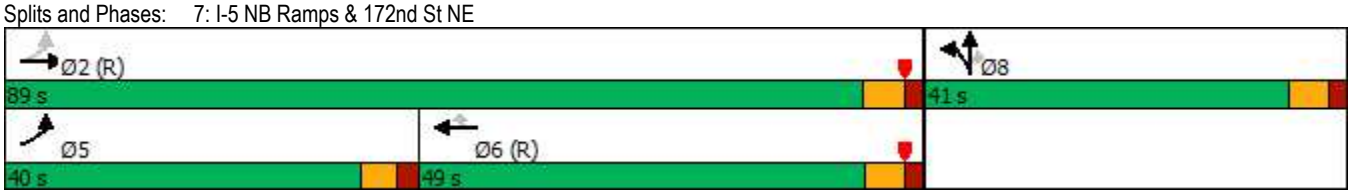
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

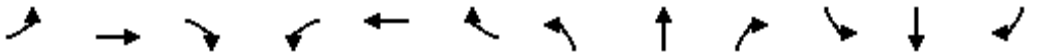
Unsignalized Delay for [EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	427	1273	0	0	1719	638	334	3	981	0	0	0
Future Volume (vph)	427	1273	0	0	1719	638	334	3	981	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			6%			5%			0%	
Storage Length (ft)	600		0	0		300	400		0	0		0
Storage Lanes	1		0	0		1	1		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		915			978			589			234	
Travel Time (s)		17.8			19.1			13.4			5.3	
Confl. Peds. (#/hr)	8		11	11		8			4	4		
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	0%	0%	0%
Shared Lane Traffic (%)							50%					
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Detector Phase	5	2			6	6	8	8	8			
Switch Phase												
Minimum Initial (s)	5.0	7.0			7.0	7.0	5.0	5.0	5.0			
Minimum Split (s)	10.6	24.1			23.8	23.8	40.8	40.8	40.8			
Total Split (s)	40.0	89.0			49.0	49.0	41.0	41.0	41.0			
Total Split (%)	30.8%	68.5%			37.7%	37.7%	31.5%	31.5%	31.5%			
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	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Min			C-Min	C-Min	None	None	None			

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Red	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	

Splits and Phases: 7: I-5 NB Ramps & 172nd St NE





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	427	1273	0	0	1719	638	334	3	981	0	0	0
Future Volume (veh/h)	427	1273	0	0	1719	638	334	3	981	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1658	1658	1723	1723	1723			
Adj Flow Rate, veh/h	436	1299	0	0	1754	0	343	0	0			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	458	2724	0	0	2420		466	0				
Arrive On Green	0.38	1.00	0.00	0.00	0.53	0.00	0.14	0.00	0.00			
Sat Flow, veh/h	1781	3647	0	0	4676	1405	3282	0	1460			
Grp Volume(v), veh/h	436	1299	0	0	1754	0	343	0	0			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1509	1405	1641	0	1460			
Q Serve(g_s), s	21.5	0.0	0.0	0.0	38.3	0.0	13.0	0.0	0.0			
Cycle Q Clear(g_c), s	21.5	0.0	0.0	0.0	38.3	0.0	13.0	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	458	2724	0	0	2420		466	0				
V/C Ratio(X)	0.95	0.48	0.00	0.00	0.72		0.74	0.00				
Avail Cap(c_a), veh/h	592	2724	0	0	2420		889	0				
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.79	0.79	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	24.7	0.0	0.0	0.0	23.0	0.0	53.4	0.0	0.0			
Incr Delay (d2), s/veh	19.3	0.5	0.0	0.0	1.9	0.0	3.9	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	12.2	0.2	0.0	0.0	13.5	0.0	5.6	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.0	0.5	0.0	0.0	24.9	0.0	57.3	0.0	0.0			
LnGrp LOS	D	A	A	A	C		E	A				
Approach Vol, veh/h		1735			1754			343				
Approach Delay, s/veh		11.4			24.9			57.3				
Approach LOS		B			C			E				

Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		105.7			30.2	75.6		24.3				
Change Period (Y+Rc), s		6.1			5.6	* 6.1		5.8				
Max Green Setting (Gmax), s		82.9			34.4	* 43		35.2				
Max Q Clear Time (g_c+I1), s		2.0			23.5	40.3		15.0				
Green Ext Time (p_c), s		22.5			1.1	2.7		2.2				

Intersection Summary	
HCM 6th Ctrl Delay	21.7
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

2032 With Project – Weekday PM Peak Hour

LANE LEVEL OF SERVICE

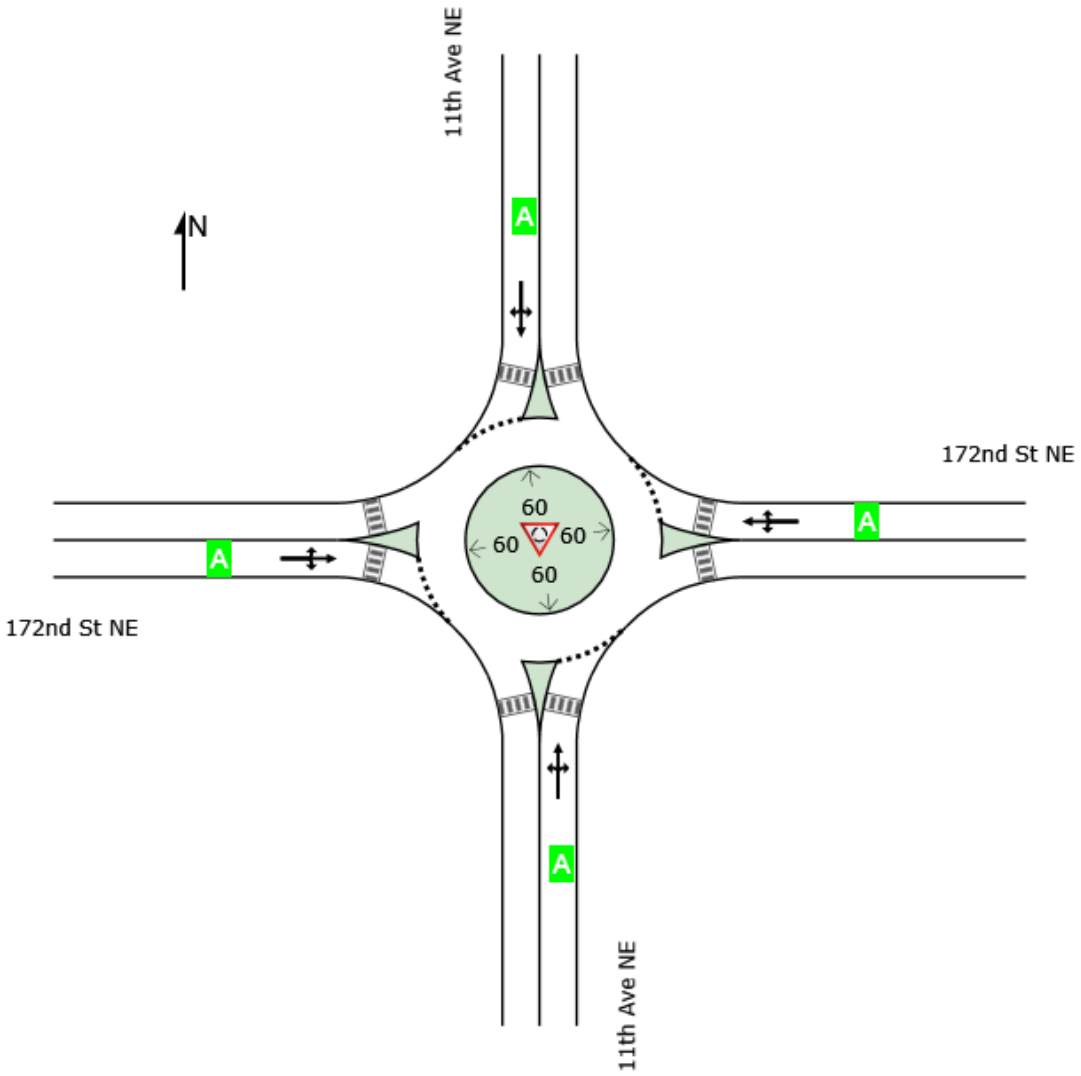
Lane Level of Service

Site: 1 [2032 With Project - PM Peak Hour (Site Folder: 11th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

11th Ave NE / 172nd St NE
Site Category: 2032 With Project - PM Peak Hour
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	A	A



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 1 [2032 With Project - PM Peak Hour (Site Folder: 11th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

11th Ave NE / 172nd St NE
Site Category: 2032 With Project - PM Peak Hour
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: 11th Ave NE															
3	L2	All MCs	8	0.0	8	0.0	0.059	10.4	LOS B	0.3	6.8	0.43	0.59	0.43	34.2
8	T1	All MCs	1	0.0	1	0.0	0.059	5.9	LOS A	0.3	6.8	0.43	0.59	0.43	34.8
18	R2	All MCs	54	0.0	54	0.0	0.059	5.7	LOS A	0.3	6.8	0.43	0.59	0.43	34.5
Approach			63	0.0	63	0.0	0.059	6.3	LOS A	0.3	6.8	0.43	0.59	0.43	34.5
East: 172nd St NE															
1	L2	All MCs	84	0.9	84	0.9	0.473	9.1	LOS A	3.5	88.4	0.11	0.42	0.11	33.3
6	T1	All MCs	532	0.9	532	0.9	0.473	3.7	LOS A	3.5	88.4	0.11	0.42	0.11	32.2
16	R2	All MCs	20	0.9	20	0.9	0.473	3.7	LOS A	3.5	88.4	0.11	0.42	0.11	32.0
Approach			635	0.9	635	0.9	0.473	4.4	LOS A	3.5	88.4	0.11	0.42	0.11	32.4
North: 11th Ave NE															
7	L2	All MCs	10	0.0	10	0.0	0.021	8.3	LOS A	0.1	2.5	0.56	0.59	0.56	23.3
4	T1	All MCs	1	0.0	1	0.0	0.021	7.3	LOS A	0.1	2.5	0.56	0.59	0.56	27.8
14	R2	All MCs	8	0.0	8	0.0	0.021	4.6	LOS A	0.1	2.5	0.56	0.59	0.56	23.4
Approach			19	0.0	19	0.0	0.021	6.7	LOS A	0.1	2.5	0.56	0.59	0.56	23.5
West: 172nd St NE															
5	L2	All MCs	3	2.3	3	2.3	0.266	8.6	LOS A	1.4	34.6	0.25	0.41	0.25	31.4
2	T1	All MCs	326	2.3	326	2.3	0.266	4.1	LOS A	1.4	34.6	0.25	0.41	0.25	31.9
12	R2	All MCs	1	2.3	1	2.3	0.266	4.9	LOS A	1.4	34.6	0.25	0.41	0.25	33.2
Approach			331	2.3	331	2.3	0.266	4.2	LOS A	1.4	34.6	0.25	0.41	0.25	31.9
All Vehicles			1047	1.3	1047	1.3	0.473	4.5	LOS A	3.5	88.4	0.18	0.43	0.18	32.1

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	332	32	61	583	43	56
Future Volume (vph)	332	32	61	583	43	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	25		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Link Speed (mph)	25			25	35	
Link Distance (ft)	124			686	769	
Travel Time (s)	3.4			18.7	15.0	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	1%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	332	32	61	583	43	56
Future Vol, veh/h	332	32	61	583	43	56
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	25	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	386	37	71	678	50	65

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	423	0	1225	405
Stage 1	-	-	-	-	405	-
Stage 2	-	-	-	-	820	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1142	-	199	650
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	436	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1142	-	187	650
Mov Cap-2 Maneuver	-	-	-	-	310	-
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	409	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	16.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	440	-	-	1142	-
HCM Lane V/C Ratio	0.262	-	-	0.062	-
HCM Control Delay (s)	16.1	-	-	8.4	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1	-	-	0.2	-

LANE LEVEL OF SERVICE

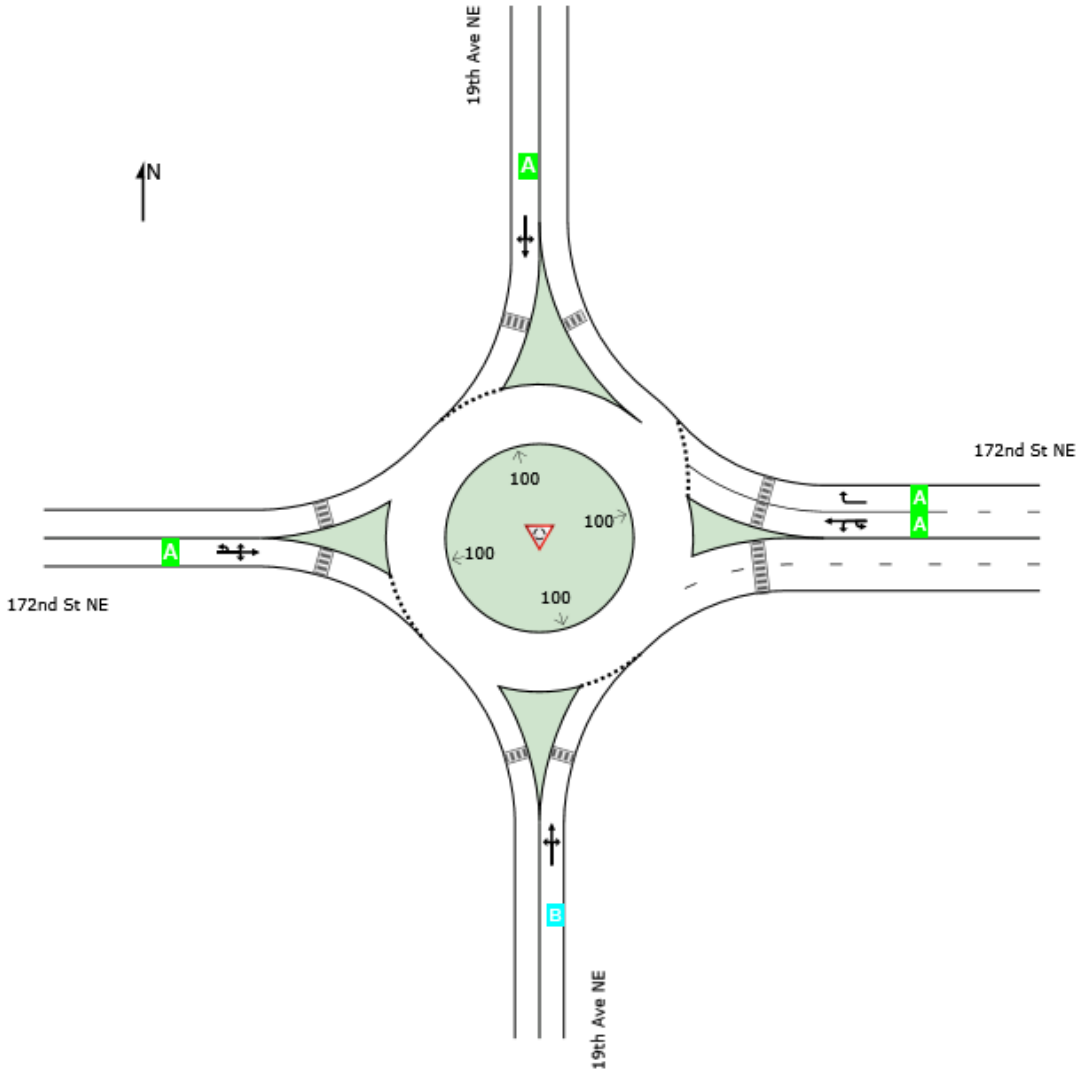
Lane Level of Service

Site: 3 [2032 With Project - PM Peak Hour (Site Folder: 19th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

19th Ave NE / 172nd St NE
Site Category: 2032 With Project - PM Peak Hour
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	B	A	A	A	A



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 3 [2032 With Project - PM Peak Hour (Site Folder: 19th Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

19th Ave NE / 172nd St NE
Site Category: 2032 With Project - PM Peak Hour
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: 19th Ave NE															
3	L2	All MCs	135	3.0	135	3.0	0.221	12.2	LOS B	1.3	33.4	0.60	0.66	0.60	32.6
8	T1	All MCs	55	3.0	55	3.0	0.221	6.5	LOS A	1.3	33.4	0.60	0.66	0.60	33.3
18	R2	All MCs	26	3.0	26	3.0	0.221	6.3	LOS A	1.3	33.4	0.60	0.66	0.60	33.0
Approach			216	3.0	216	3.0	0.221	10.1	LOS B	1.3	33.4	0.60	0.66	0.60	32.8
East: 172nd St NE															
1u	U	All MCs	1	3.0	1	3.0	0.405	11.9	LOS B	2.9	73.7	0.50	0.45	0.50	31.1
1	L2	All MCs	22	3.0	22	3.0	0.405	10.9	LOS B	2.9	73.7	0.50	0.45	0.50	32.6
6	T1	All MCs	559	3.0	559	3.0	0.405	4.1	LOS A	2.9	73.7	0.50	0.45	0.50	31.7
16	R2	All MCs	113	3.0	113	3.0	0.113	4.8	LOS A	0.6	14.8	0.43	0.51	0.43	31.6
Approach			695	3.0	695	3.0	0.405	4.4	LOS A	2.9	73.7	0.49	0.46	0.49	31.7
North: 19th Ave NE															
7	L2	All MCs	66	3.0	66	3.0	0.213	9.3	LOS A	1.3	33.3	0.72	0.67	0.72	24.0
4	T1	All MCs	41	3.0	41	3.0	0.213	7.6	LOS A	1.3	33.3	0.72	0.67	0.72	28.8
14	R2	All MCs	64	3.0	64	3.0	0.213	5.1	LOS A	1.3	33.3	0.72	0.67	0.72	24.1
Approach			171	3.0	171	3.0	0.213	7.3	LOS A	1.3	33.3	0.72	0.67	0.72	25.1
West: 172nd St NE															
5u	U	All MCs	1	3.0	1	3.0	0.357	11.5	LOS B	2.3	59.3	0.37	0.42	0.37	31.8
5	L2	All MCs	55	3.0	55	3.0	0.357	9.2	LOS A	2.3	59.3	0.37	0.42	0.37	31.8
2	T1	All MCs	313	3.0	313	3.0	0.357	3.2	LOS A	2.3	59.3	0.37	0.42	0.37	32.4
12	R2	All MCs	93	3.0	93	3.0	0.357	4.4	LOS A	2.3	59.3	0.37	0.42	0.37	33.7
Approach			462	3.0	462	3.0	0.357	4.2	LOS A	2.3	59.3	0.37	0.42	0.37	32.6
All Vehicles			1545	3.0	1545	3.0	0.405	5.5	LOS A	2.9	73.7	0.49	0.50	0.49	31.2

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

LANE LEVEL OF SERVICE

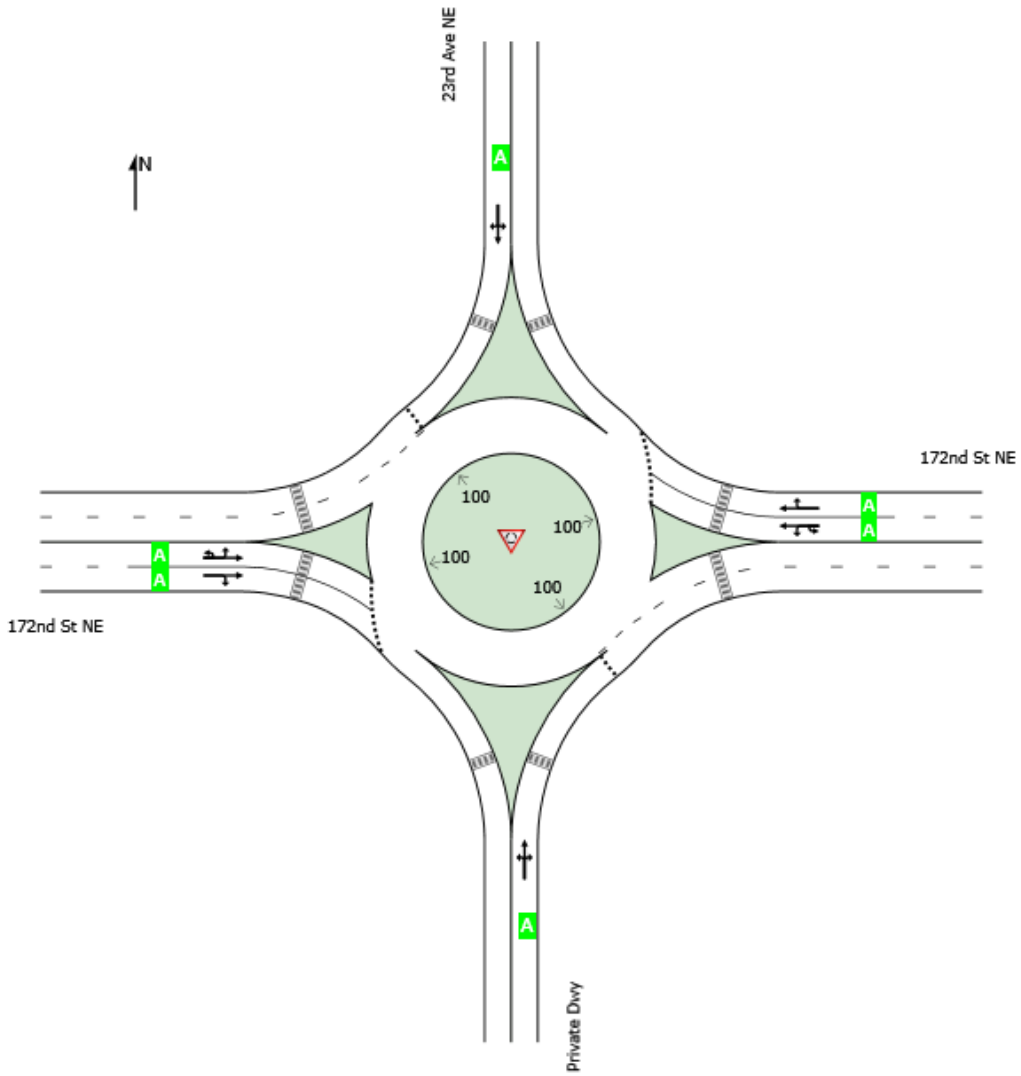
Lane Level of Service

Site: 4 [2032 With Project - PM Peak Hour (Site Folder: 23rd Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

23rd Ave NE / 172nd St NE
Site Category: 2032 With Project - PM Peak Hour
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	A	A



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 4 [2032 With Project - PM Peak Hour (Site Folder: 23rd Ave NE / 172nd St NE)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

23rd Ave NE / 172nd St NE
Site Category: 2032 With Project - PM Peak Hour
Roundabout

Vehicle Movement Performance

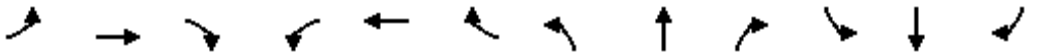
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Private Dwy															
3	L2	All MCs	67	0.0	67	0.0	0.169	9.7	LOS A	1.0	25.8	0.73	0.65	0.73	23.0
8	T1	All MCs	66	0.0	66	0.0	0.169	4.5	LOS A	1.0	25.8	0.73	0.65	0.73	23.2
18	R2	All MCs	5	0.0	5	0.0	0.169	5.4	LOS A	1.0	25.8	0.73	0.65	0.73	23.1
Approach			138	0.0	138	0.0	0.169	7.1	LOS A	1.0	25.8	0.73	0.65	0.73	23.1
East: 172nd St NE															
1u	U	All MCs	40	1.6	40	1.6	0.322	11.8	LOS B	2.1	52.1	0.44	0.44	0.44	31.1
1	L2	All MCs	1	1.6	1	1.6	0.322	9.6	LOS A	2.1	52.1	0.44	0.44	0.44	31.1
6	T1	All MCs	727	1.6	727	1.6	0.322	3.7	LOS A	2.1	54.3	0.42	0.42	0.42	31.8
16	R2	All MCs	140	1.6	140	1.6	0.322	4.0	LOS A	2.1	54.3	0.41	0.40	0.41	31.8
Approach			909	1.6	909	1.6	0.322	4.1	LOS A	2.1	54.3	0.42	0.42	0.42	31.8
North: 23rd Ave NE															
7	L2	All MCs	146	2.2	146	2.2	0.311	10.6	LOS B	2.0	51.3	0.79	0.71	0.79	22.7
4	T1	All MCs	47	2.2	47	2.2	0.311	5.5	LOS A	2.0	51.3	0.79	0.71	0.79	22.8
14	R2	All MCs	45	2.2	45	2.2	0.311	6.4	LOS A	2.0	51.3	0.79	0.71	0.79	22.8
Approach			237	2.2	237	2.2	0.311	8.8	LOS A	2.0	51.3	0.79	0.71	0.79	22.7
West: 172nd St NE															
5u	U	All MCs	3	2.5	3	2.5	0.245	11.9	LOS B	1.5	38.4	0.46	0.48	0.46	30.9
5	L2	All MCs	62	2.5	62	2.5	0.245	9.7	LOS A	1.5	38.4	0.46	0.48	0.46	31.0
2	T1	All MCs	549	2.5	549	2.5	0.245	3.8	LOS A	1.6	40.6	0.45	0.43	0.45	31.7
12	R2	All MCs	44	2.5	44	2.5	0.245	4.1	LOS A	1.6	40.6	0.44	0.40	0.44	31.7
Approach			657	2.5	657	2.5	0.245	4.4	LOS A	1.6	40.6	0.45	0.44	0.45	31.6
All Vehicles			1941	1.9	1941	1.9	0.322	5.0	LOS A	2.1	54.3	0.50	0.48	0.50	29.5

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	471	85	726	653	333	130	120	627	427	132	38
Future Volume (vph)	39	471	85	726	653	333	130	120	627	427	132	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	425		200	125		0	150		150
Storage Lanes	1		0	2		1	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		394			613			444			470	
Travel Time (s)		7.7			11.9			12.1			12.8	
Confl. Peds. (#/hr)	1					1	2					2
Peak Hour 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
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases						6						
Detector Phase	5	2		1	6	6	3	8	8 1	7	4	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0	7.0	3.0	5.0		3.0	5.0	
Minimum Split (s)	9.0	38.0		9.0	38.0	38.0	9.0	11.0		9.0	46.0	
Total Split (s)	20.0	40.0		40.0	60.0	60.0	35.0	15.0		35.0	15.0	
Total Split (%)	15.4%	30.8%		30.8%	46.2%	46.2%	26.9%	11.5%		26.9%	11.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
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)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	Min		C-Min	C-Min	C-Min	None	None		Min	Min	

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 75 (58%), Referenced to phase 1:WBL and 6:WBT, Start of Red	
Natural Cycle: 125	
Control Type: Actuated-Coordinated	

Splits and Phases: 5: 27th Ave NE/Spring Ln Ave & 172nd St NE



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	471	85	726	653	333	130	120	627	427	132	38
Future Volume (veh/h)	39	471	85	726	653	333	130	120	627	427	132	38
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	39	471	85	726	653	333	130	120	627	427	132	38
Peak Hour 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
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	1	1	1
Cap, veh/h	50	1140	205	783	2061	918	157	131	469	497	175	50
Arrive On Green	0.03	0.38	0.38	0.38	0.96	0.96	0.09	0.07	0.07	0.14	0.12	0.12
Sat Flow, veh/h	1781	3009	540	3483	3582	1596	1795	1885	1584	3483	1405	405
Grp Volume(v), veh/h	39	277	279	726	653	333	130	120	627	427	0	170
Grp Sat Flow(s),veh/h/ln	1781	1777	1773	1742	1791	1596	1795	1885	1584	1742	0	1810
Q Serve(g_s), s	2.8	14.9	15.1	26.0	1.3	1.6	9.3	8.2	9.0	15.6	0.0	11.8
Cycle Q Clear(g_c), s	2.8	14.9	15.1	26.0	1.3	1.6	9.3	8.2	9.0	15.6	0.0	11.8
Prop In Lane	1.00		0.30	1.00		1.00	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	50	673	671	783	2061	918	157	131	469	497	0	225
V/C Ratio(X)	0.78	0.41	0.42	0.93	0.32	0.36	0.83	0.92	1.34	0.86	0.00	0.76
Avail Cap(c_a), veh/h	192	673	671	911	2061	918	401	131	469	777	0	225
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.69	0.69	0.69	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	62.8	29.7	29.8	39.6	1.1	1.1	58.3	60.1	21.8	54.5	0.0	55.0
Incr Delay (d2), s/veh	17.1	0.4	0.4	10.2	0.3	0.8	8.0	54.8	165.9	5.0	0.0	13.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	6.4	6.5	10.8	0.5	0.6	4.6	5.9	30.6	7.2	0.0	6.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.8	30.1	30.2	49.8	1.4	1.9	66.3	114.9	187.6	59.5	0.0	68.6
LnGrp LOS	E	C	C	D	A	A	E	F	F	E	A	E
Approach Vol, veh/h		595			1712			877			597	
Approach Delay, s/veh		33.4			22.0			159.7			62.1	
Approach LOS		C			C			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	35.2	55.2	17.4	22.2	9.7	80.8	24.5	15.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	34.0	34.0	29.0	9.0	14.0	54.0	29.0	9.0
Max Q Clear Time (g_c+I1), s	28.0	17.1	11.3	13.8	4.8	3.6	17.6	11.0
Green Ext Time (p_c), s	1.3	3.0	0.2	0.0	0.0	6.5	1.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	62.1
HCM 6th LOS	E

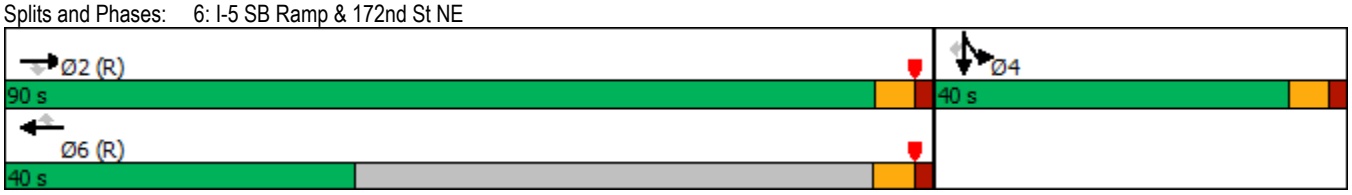
Notes

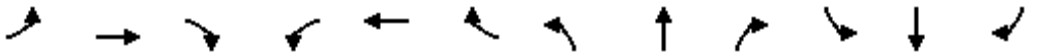
User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1375	254	0	1352	755	0	0	0	382	0	380
Future Volume (vph)	0	1375	254	0	1352	755	0	0	0	382	0	380
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-3%			0%			3%	
Storage Length (ft)	0		250	0		0	0		0	400		400
Storage Lanes	0		1	0		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		613			915			299			608	
Travel Time (s)		11.9			17.8			6.8			13.8	
Confl. Peds. (#/hr)	11					11	1					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
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)										50%		
Turn Type		NA	Perm		NA	Perm				Split	NA	Perm
Protected Phases		2			6					4	4	
Permitted Phases			2			6						4
Detector Phase		2	2		6	6				4	4	4
Switch Phase												
Minimum Initial (s)		7.0	7.0		7.0	7.0				5.0	5.0	5.0
Minimum Split (s)		24.8	24.8		34.1	34.1				33.8	33.8	33.8
Total Split (s)		90.0	90.0		40.0	40.0				40.0	40.0	40.0
Total Split (%)		69.2%	69.2%		30.8%	30.8%				30.8%	30.8%	30.8%
Yellow Time (s)		3.8	3.8		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
Lost Time Adjust (s)		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				5.8	5.8	5.8
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min	C-Min		C-Min	C-Min				None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Red	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	

Splits and Phases: 6: I-5 SB Ramp & 172nd St NE





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1375	254	0	1352	755	0	0	0	382	0	380
Future Volume (veh/h)	0	1375	254	0	1352	755	0	0	0	382	0	380
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1832	1832	0	1988	1988				1788	1788	1788
Adj Flow Rate, veh/h	0	1418	0	0	1394	0				394	0	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97				0.97	0.97	0.97
Percent Heavy Veh, %	0	1	1	0	2	2				4	4	4
Cap, veh/h	0	2651		0	2876					501	0	
Arrive On Green	0.00	1.00	0.00	0.00	1.00	0.00				0.15	0.00	0.00
Sat Flow, veh/h	0	3573	1553	0	3877	1685				3405	0	1515
Grp Volume(v), veh/h	0	1418	0	0	1394	0				394	0	0
Grp Sat Flow(s),veh/h/ln	0	1741	1553	0	1889	1685				1703	0	1515
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0				14.5	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0				14.5	0.0	0.0
Prop In Lane	0.00		1.00	0.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2651		0	2876					501	0	
V/C Ratio(X)	0.00	0.53		0.00	0.48					0.79	0.00	
Avail Cap(c_a), veh/h	0	2651		0	2876					896	0	
HCM Platoon Ratio	1.00	2.00	2.00	1.00	2.00	2.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.53	0.00	0.00	0.20	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0				53.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.4	0.0	0.0	0.1	0.0				4.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.2	0.0	0.0	0.0	0.0				6.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.4	0.0	0.0	0.1	0.0				58.2	0.0	0.0
LnGrp LOS	A	A		A	A					E	A	
Approach Vol, veh/h		1418			1394						394	
Approach Delay, s/veh		0.4			0.1						58.2	
Approach LOS		A			A						E	

Timer - Assigned Phs	2	4	6
Phs Duration (G+Y+Rc), s	105.1	24.9	105.1
Change Period (Y+Rc), s	* 6.1	* 5.8	6.1
Max Green Setting (Gmax), s	* 84	* 34	33.9
Max Q Clear Time (g_c+I1), s	2.0	16.5	2.0
Green Ext Time (p_c), s	26.7	2.4	17.8

Intersection Summary	
HCM 6th Ctrl Delay	7.4
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

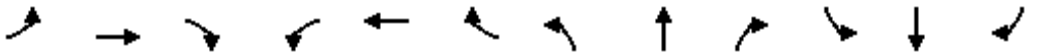
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	439	1287	0	0	1739	638	355	3	981	0	0	0
Future Volume (vph)	439	1287	0	0	1739	638	355	3	981	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			6%			5%			0%	
Storage Length (ft)	600		0	0		300	400		0	0		0
Storage Lanes	1		0	0		1	1		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		915			978			589			234	
Travel Time (s)		17.8			19.1			13.4			5.3	
Confl. Peds. (#/hr)	8		11	11		8			4	4		
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	0%	0%	0%
Shared Lane Traffic (%)							50%					
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Detector Phase	5	2			6	6	8	8	8			
Switch Phase												
Minimum Initial (s)	5.0	7.0			7.0	7.0	5.0	5.0	5.0			
Minimum Split (s)	10.6	24.1			23.8	23.8	40.8	40.8	40.8			
Total Split (s)	40.0	89.0			49.0	49.0	41.0	41.0	41.0			
Total Split (%)	30.8%	68.5%			37.7%	37.7%	31.5%	31.5%	31.5%			
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	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Min			C-Min	C-Min	None	None	None			

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Red	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	

Splits and Phases: 7: I-5 NB Ramps & 172nd St NE



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	439	1287	0	0	1739	638	355	3	981	0	0	0
Future Volume (veh/h)	439	1287	0	0	1739	638	355	3	981	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1658	1658	1723	1723	1723			
Adj Flow Rate, veh/h	448	1313	0	0	1774	0	364	0	0			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	469	2701	0	0	2334		488	0				
Arrive On Green	0.40	1.00	0.00	0.00	0.52	0.00	0.15	0.00	0.00			
Sat Flow, veh/h	1781	3647	0	0	4676	1405	3282	0	1460			
Grp Volume(v), veh/h	448	1313	0	0	1774	0	364	0	0			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1509	1405	1641	0	1460			
Q Serve(g_s), s	23.1	0.0	0.0	0.0	40.6	0.0	13.8	0.0	0.0			
Cycle Q Clear(g_c), s	23.1	0.0	0.0	0.0	40.6	0.0	13.8	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	469	2701	0	0	2334		488	0				
V/C Ratio(X)	0.96	0.49	0.00	0.00	0.76		0.75	0.00				
Avail Cap(c_a), veh/h	581	2701	0	0	2334		889	0				
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.77	0.77	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	24.9	0.0	0.0	0.0	25.1	0.0	53.0	0.0	0.0			
Incr Delay (d2), s/veh	20.3	0.5	0.0	0.0	2.4	0.0	3.9	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	12.5	0.2	0.0	0.0	14.5	0.0	6.0	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.2	0.5	0.0	0.0	27.5	0.0	56.9	0.0	0.0			
LnGrp LOS	D	A	A	A	C		E	A				
Approach Vol, veh/h		1761			1774			364				
Approach Delay, s/veh		11.9			27.5			56.9				
Approach LOS		B			C			E				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		104.9			31.8	73.1		25.1				
Change Period (Y+Rc), s		6.1			5.6	* 6.1		5.8				
Max Green Setting (Gmax), s		82.9			34.4	* 43		35.2				
Max Q Clear Time (g_c+I1), s		2.0			25.1	42.6		15.8				
Green Ext Time (p_c), s		22.9			1.0	0.6		2.3				

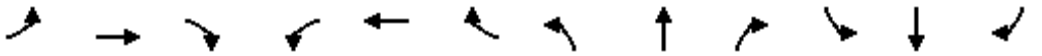
Intersection Summary	
HCM 6th Ctrl Delay	23.2
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	84	35	6	34	121	63	39	35	52	20
Future Volume (vph)	15	4	84	35	6	34	121	63	39	35	52	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	50		0	50		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		94			694			670			298	
Travel Time (s)		2.6			18.9			13.1			5.8	
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	0%	0%	0%	0%	3%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	4	84	35	6	34	121	63	39	35	52	20
Future Vol, veh/h	15	4	84	35	6	34	121	63	39	35	52	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	1	1	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	3	3	3	3	3	3	3	0	0	0	0	3
Mvmt Flow	18	5	100	42	7	40	144	75	46	42	62	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	568	568	74	598	557	99	86	0	0	122	0	0
Stage 1	158	158	-	387	387	-	-	-	-	-	-	-
Stage 2	410	410	-	211	170	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	432	431	985	413	437	954	1504	-	-	1478	-	-
Stage 1	842	765	-	635	608	-	-	-	-	-	-	-
Stage 2	617	594	-	789	756	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	371	378	985	333	384	953	1504	-	-	1477	-	-
Mov Cap-2 Maneuver	419	425	-	405	434	-	-	-	-	-	-	-
Stage 1	761	744	-	573	549	-	-	-	-	-	-	-
Stage 2	527	536	-	684	735	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	12.8	4.1	2.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1504	-	-	789	552	1477	-	-
HCM Lane V/C Ratio	0.096	-	-	0.155	0.162	0.028	-	-
HCM Control Delay (s)	7.6	-	-	10.4	12.8	7.5	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.5	0.6	0.1	-	-

Appendix D

Trip Generation Calculations

English Crossing (Marysville)
Weekday Trip Generation Summary

Land Use	Units [1]	ITE LUC [2]	Trip Rate or Equation [2]	Directional Distribution		Trips Generated		
				In	Out	In	Out	Total
DAILY								
Proposed Use:								
Single-Family Attached Housing	250 DU	215	7.20	50%	50%	900	900	1,800
					New Daily Trips =	**900**	**900**	**1,800**
AM PEAK HOUR								
Proposed Use:								
Single-Family Attached Housing	250 DU	215	0.48	25%	75%	30	90	120
					New AM Peak Hour Trips =	**30**	**90**	**120**
PM PEAK HOUR								
Proposed Use:								
Single-Family Attached Housing	250 DU	215	1.00	59%	41%	147	103	250
					New PM Peak Hour Trips =	**147**	**103**	**250**

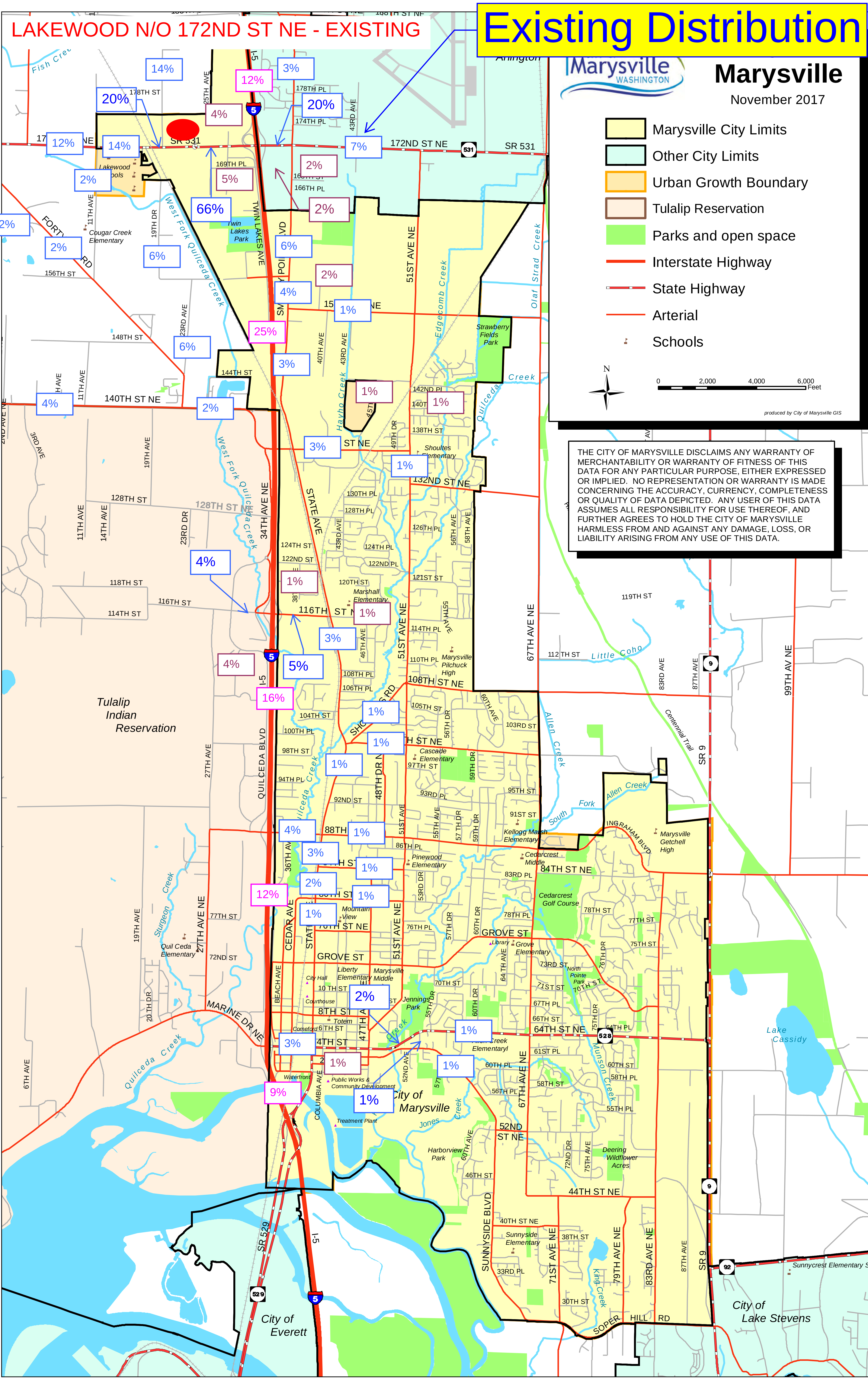
Notes:

[1] DU = Dwelling Units.

[2] Average rates used per City of Marysville TIA guidelines. Daily and AM peak hour rates based on Institute of Transportation Engineers (ITE) *Trip Generation* Manual, 11th Edition, 2021; PM peak hour rate based on City of Marysville TIA guidelines.

Appendix E

City of Marysville Model Distribution


LAKEWOOD N/O 172ND ST NE - EXISTING
Existing Distribution
Marysville WASHINGTON
Marysville
November 2017
Marysville City Limits
Other City Limits
Urban Growth Boundary
Tulalip Reservation
Parks and open space
Interstate Highway
State Highway
Arterial
Schools
N
0
2,000
4,000
6,000
Feet
produced by City of Marysville GIS
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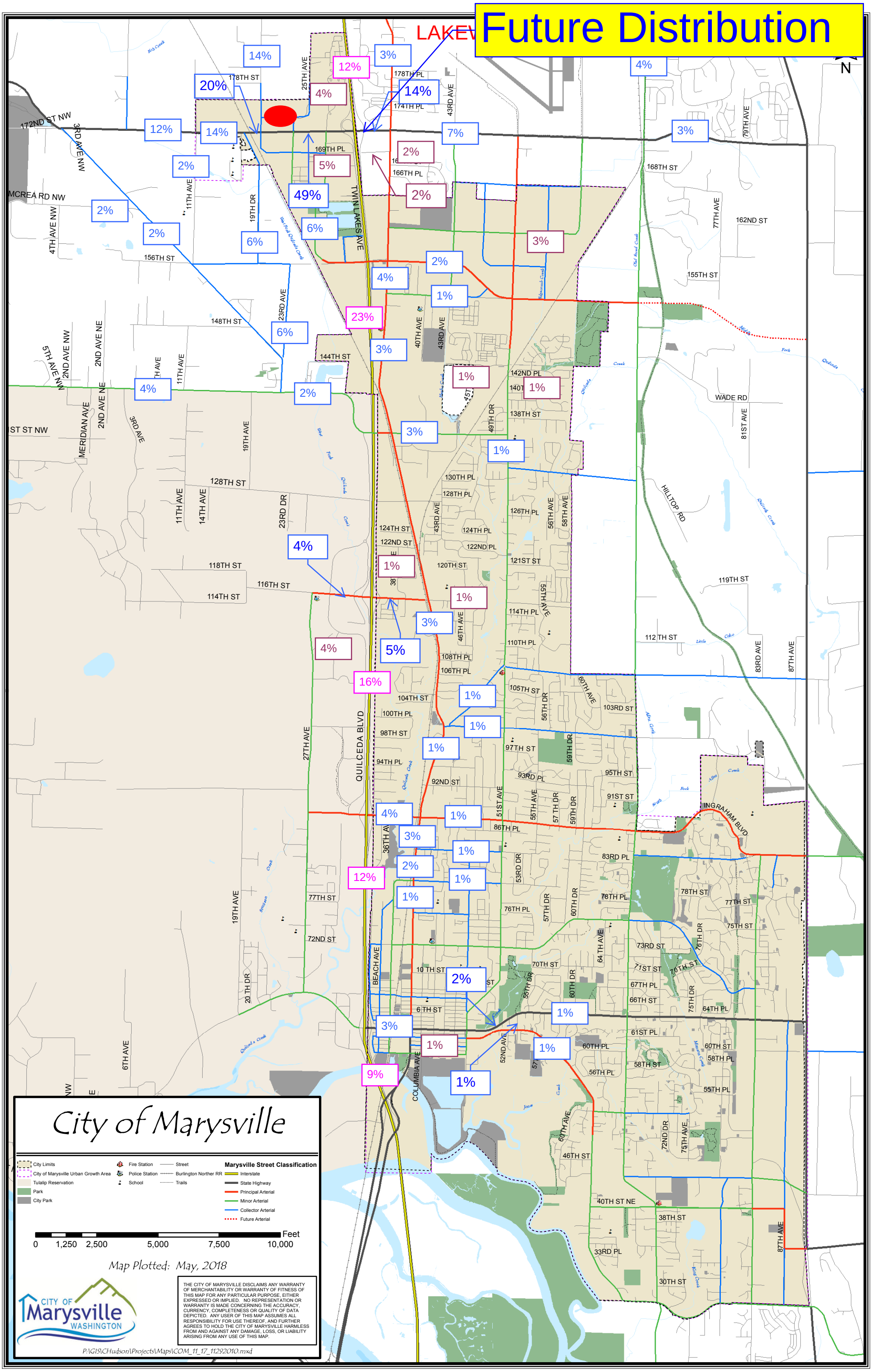
1%
1%
9%
1%
172ND ST NE
SR 531
178TH ST
178TH PL
174TH PL
169TH PL
166TH PL
156TH ST
148TH ST
144TH ST
140TH ST NE
128TH ST
118TH ST
116TH ST
114TH ST
132ND ST NE
108TH ST NE
88TH ST
84TH ST NE
GROVE ST
64TH ST NE
52ND ST NE
44TH ST NE
40TH ST NE
SOPER HILL RD
51ST AVE NE
67TH AVE NE
STATE AVE
34TH AVE NE
QUILCEDA BLVD
CEDAR AVE
SUNNYSIDE BLVD
71ST AVE NE
79TH AVE NE
83RD AVE NE
99TH AV NE
MARINE DR NE
SR 9
SR 529
I-5
Tulalip Indian Reservation
City of Marysville
City of Everett
City of Lake Stevens
Lake Cassidy
Cedarcrest Golf Course
Centennial Trail
Allen Creek
Quilceda Creek
West Fork Quilceda Creek
Munson Creek
King Creek
Little Coho
Olaf Strad Creek
Edgecomb Creek
Hayho Creek
Sturgeon Creek
Jones Creek
Marysville Pilchuck High
Marysville Getchell High
Cedarcrest Middle
Marysville Middle
Strawberry Fields Park
Twin Lakes Park
Jennings Park
Harborview Park
North Pointe Park
Deering Wildflower Acres
Cougar Creek Elementary
Shoultes Elementary
Marshall Elementary
Cascade Elementary
Kellogg Marsh Elementary
Pinewood Elementary
Mountain View
Liberty Elementary
Grove Elementary
Allen Creek Elementary
Sunnyside Elementary
Quil Ceda Elementary
Sunnycrest Elementary School
City Hall
Courthouse
Library
Public Works & Community Development
Treatment Plant
Waterfront
Totem
Comeford

Future Distribution



City of Marysville

City Limits
City of Marysville Urban Growth Area
Tulalip Reservation
Park
City Park

Fire Station
Police Station
School
Street
Burlington Norther RR
Trails

Marysville Street Classification
Interstate
State Highway
Principal Arterial
Minor Arterial
Collector Arterial
Future Arterial

0 1,250 2,500 5,000 7,500 10,000 Feet

Map Plotted: May, 2018

CITY OF Marysville WASHINGTON

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Appendix F

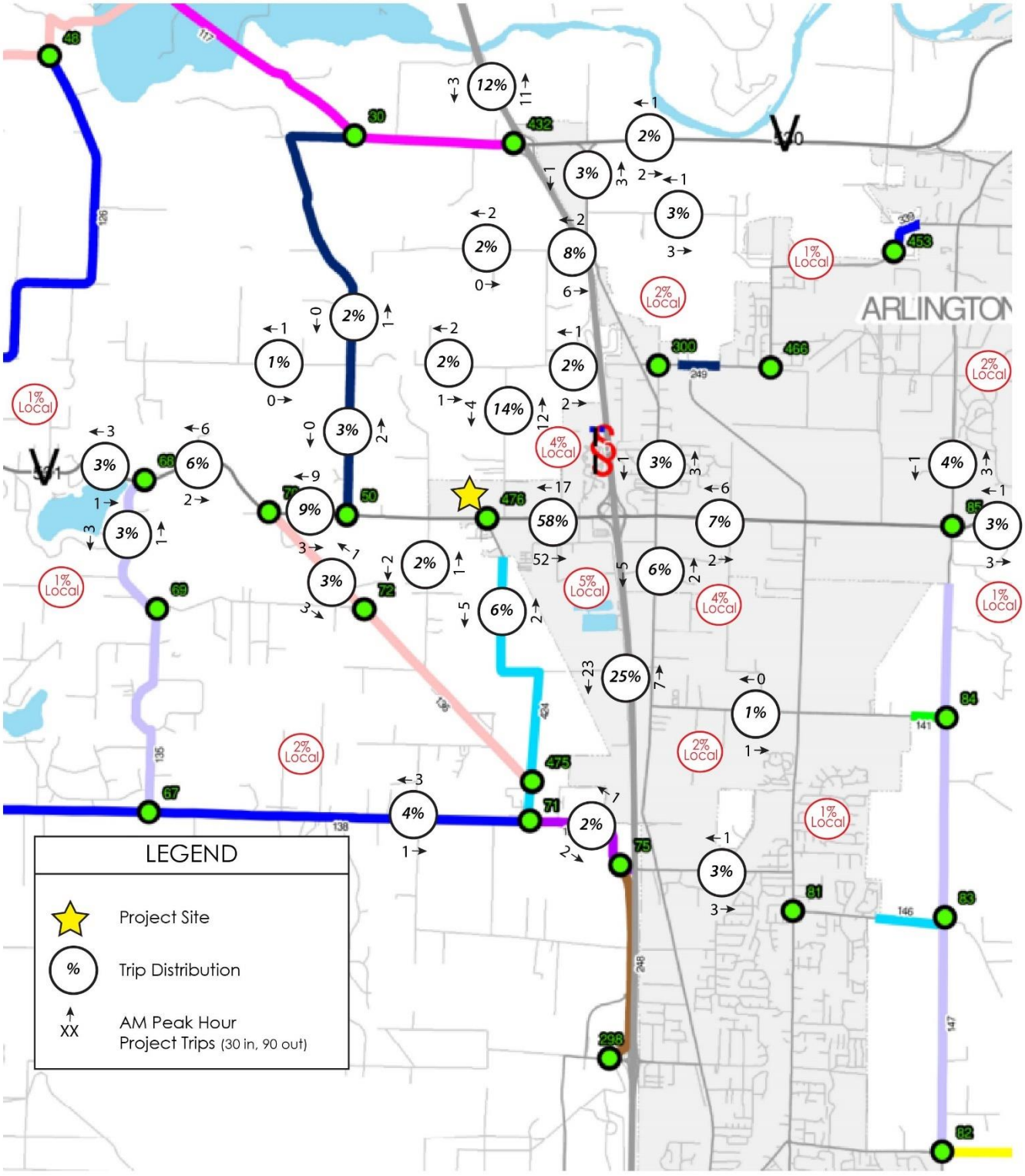
Snohomish County Key Intersection Impacts

Table F1
AM Peak Hour Trip Assignment at Key Intersections

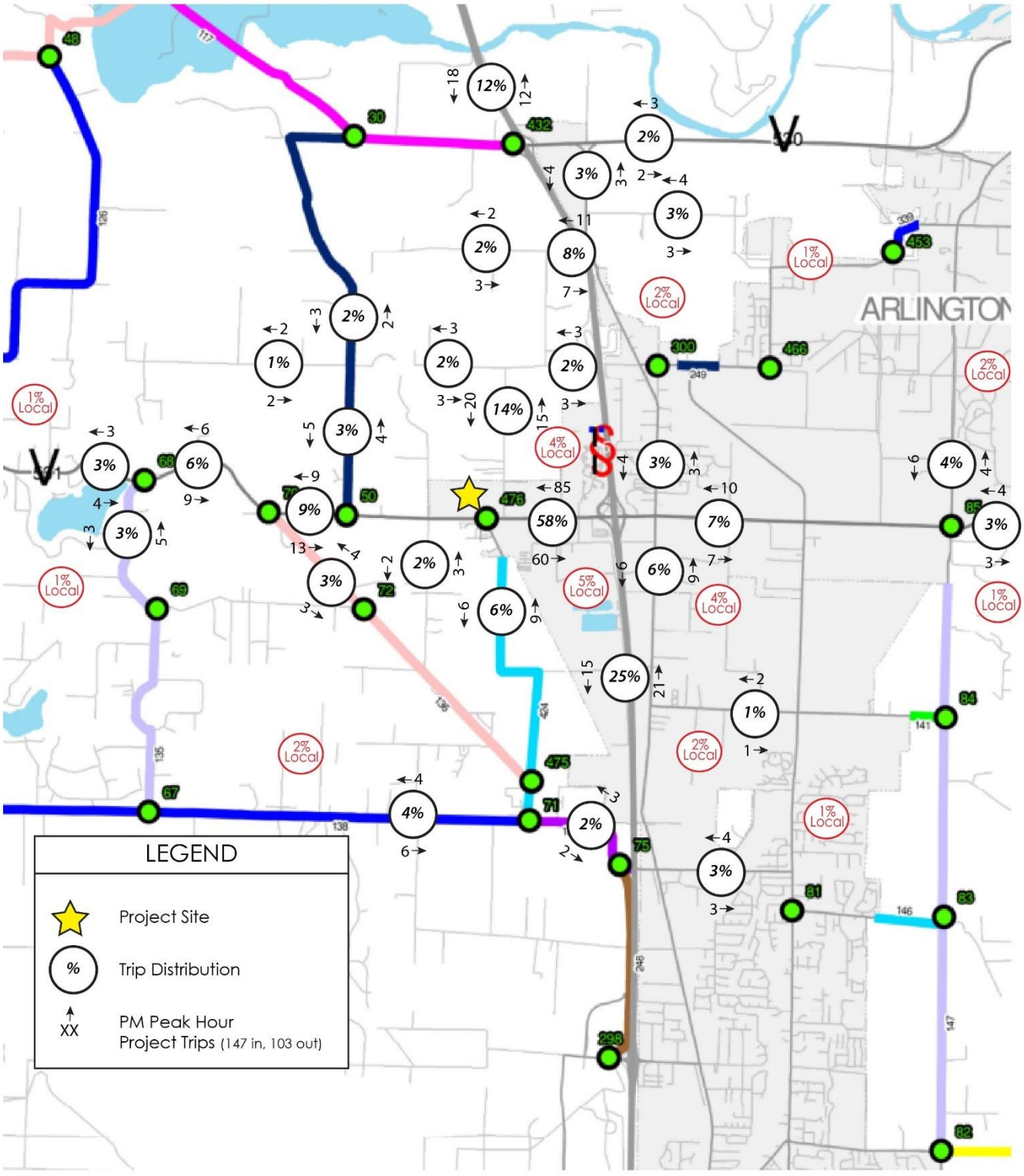
Key Intersection ID#	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
476	0	4	0	5	13	0	0	0	2	0	0	0
50	0	3	0	0	9	3	0	0	0	1	0	0
70	0	0	0	3	0	6	0	0	1	2	0	0
68	0	1	0	3	3	0	0	0	1	0	0	0
85	3	3	0	0	1	0	0	0	0	0	0	1
475	0	0	0	0	0	0	0	2	0	0	5	0
71	1	0	0	0	0	1	0	0	0	2	0	3
72	1	0	0	0	0	0	0	0	0	0	1	2

Table F2
PM Peak Hour Trip Assignment at Key Intersections

Key Intersection ID#	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
476	0	21	0	6	15	0	0	0	9	0	0	0
50	0	13	0	0	9	4	0	0	0	5	0	0
70	0	0	0	3	0	6	0	0	4	9	0	0
68	0	4	0	3	3	0	0	0	5	0	0	0
85	4	3	0	0	4	0	0	0	0	0	0	6
475	0	0	0	0	0	0	0	9	0	0	6	0
71	6	0	0	0	0	3	0	0	0	2	0	4
72	3	0	0	0	0	0	0	1	0	0	1	2



Attachment F1: Weekday AM Peak Hour Project Trip Distribution & Assignment



Attachment F2: Weekday PM Peak Hour Project Trip Distribution & Assignment

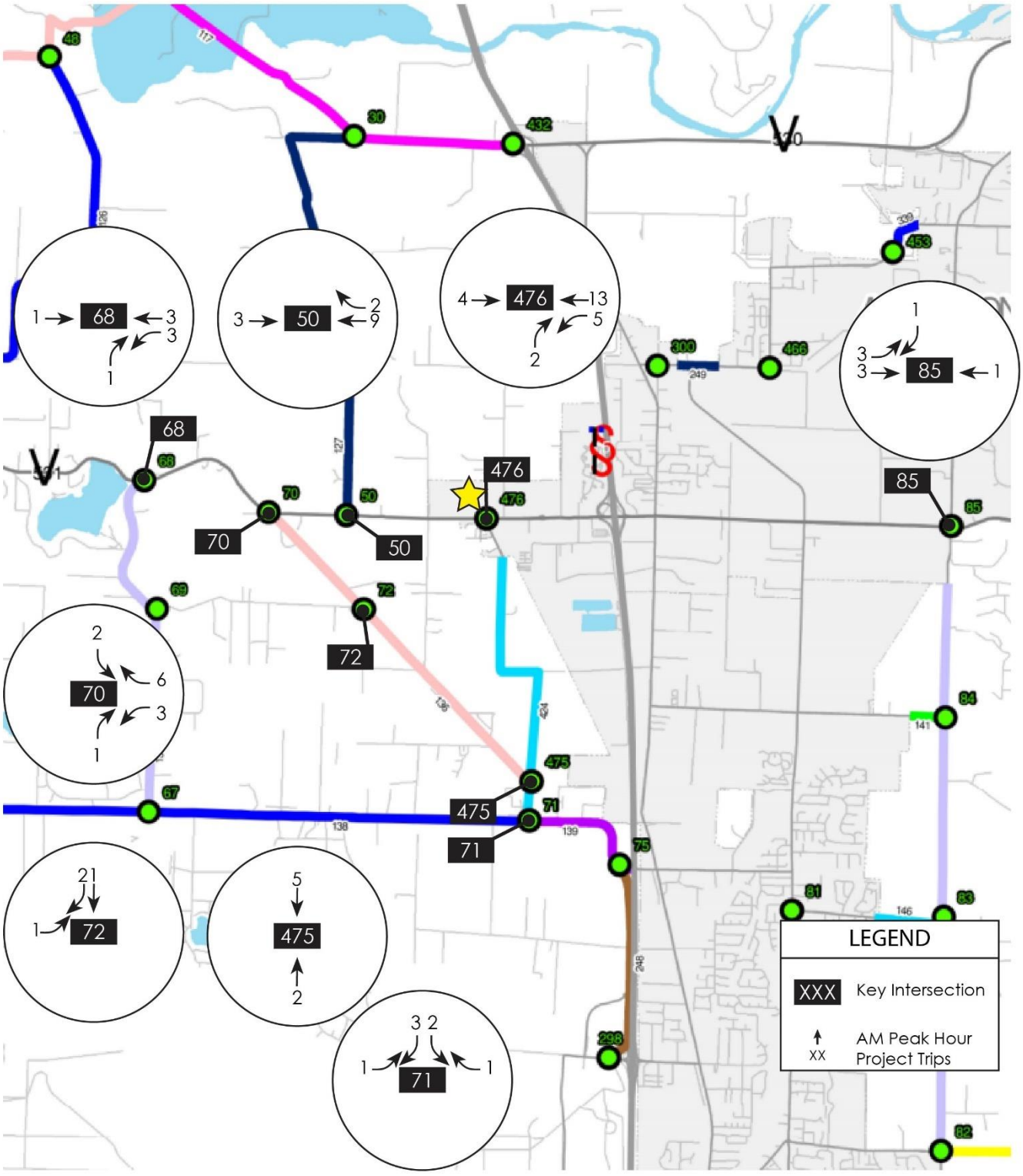


Figure F3: Weekday AM Peak Hour Project Trip Assignment at Key Intersections

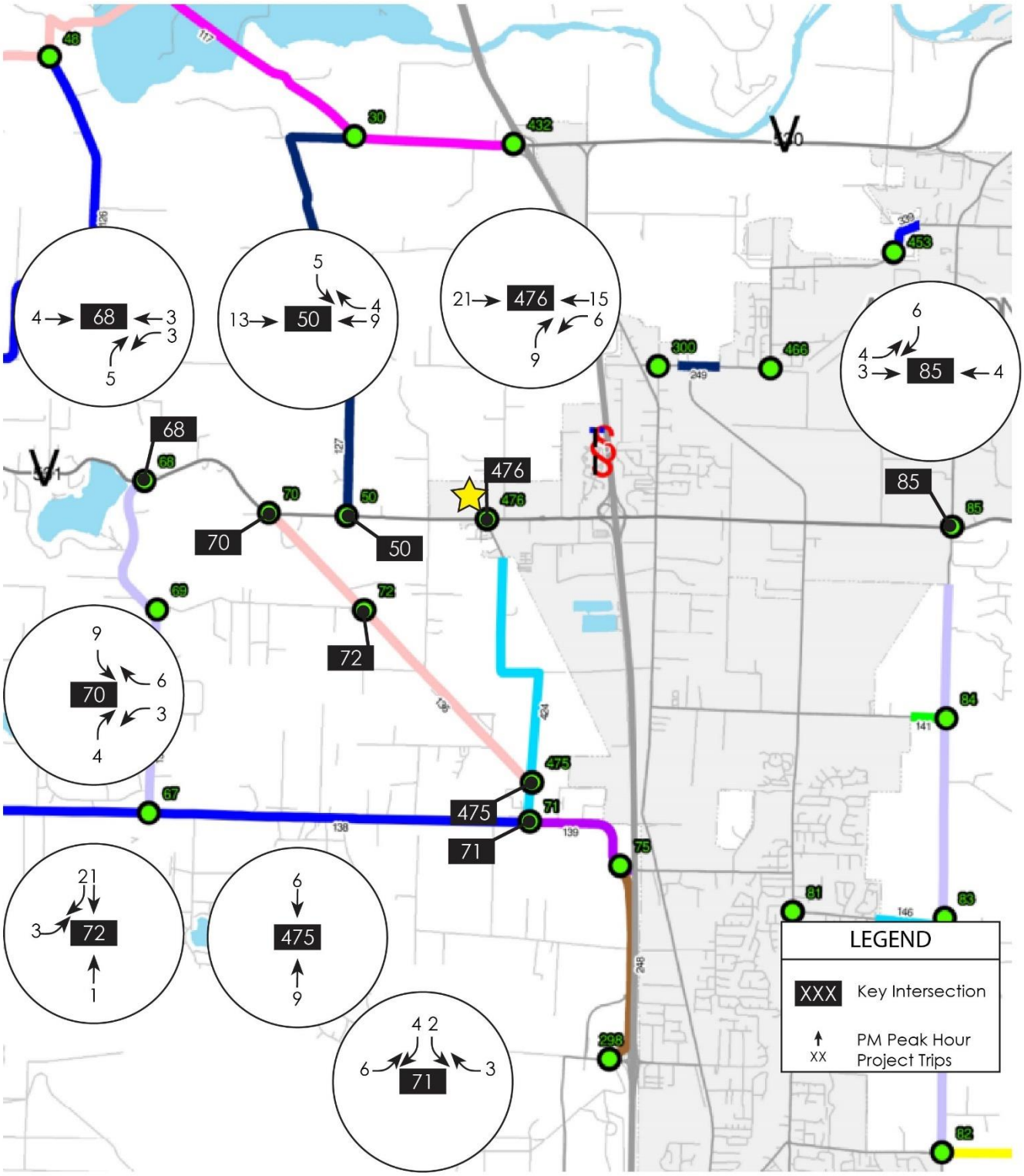


Figure F4: Weekday PM Peak Hour Project Trip Assignment at Key Intersections