

## Traffic Impact Analysis

# ARLINGTON BROWN BEAR

Prepared for:  
Brown Bear

July 2023

Prepared by:



12131 113th Avenue NE, Suite 203  
Kirkland, WA 98034  
Phone: 425-821-3665  
Fax: 425-825-8434  
[www.transpogroup.com](http://www.transpogroup.com)

1.22356.00

© 2023 Transpo Group

## Table of Contents

<b>Introduction .....</b>	<b>1</b>
Project Description .....	1
Study Scope .....	1
<b>Existing &amp; Future Without-Project Conditions .....</b>	<b>4</b>
Street System .....	4
Traffic Volumes .....	5
Traffic Operations .....	9
Traffic Safety .....	10
<b>Project Impacts .....</b>	<b>12</b>
Trip Generation .....	12
Trip Distribution & Assignment .....	13
Traffic Volume Impact .....	15
Traffic Operations .....	17
Site Access .....	17
<b>Mitigation .....</b>	<b>19</b>
Transportation Mitigation Fees .....	19
<b>Findings and Conclusions .....</b>	<b>20</b>

## Appendix

- Appendix A: Traffic Counts
- Appendix B: LOS Definitions
- Appendix C: LOS Worksheets
- Appendix D: Trip Generation Observations

## List of Figures

Figure 1.	Site Vicinity & Study Intersections .....	2
Figure 2.	Preliminary Site Plan .....	3
Figure 3.	Existing Weekday PM Peak Hour Traffic Volumes .....	7
Figure 4.	Future (2024) Without-Project Weekday PM Peak Hour Traffic Volumes .....	8
Figure 5.	Car Wash Seasonal Variation .....	13
Figure 6.	Weekday PM Peak Hour Project Trip Distribution & Assignment .....	14
Figure 7.	Future (2024) With-Project Weekday PM Peak Hour Traffic Volumes .....	16
Figure 8.	On-Site Queue Capacity .....	18

## List of Tables

Table 1.	Existing and Without-Project Weekday PM Peak Hour Intersection LOS Summary .....	9
Table 2.	Five-Year Collision Summary – 2018 to 2022 .....	10
Table 3.	Trip Generation Estimates .....	13
Table 4.	Future (2024) Weekday PM Peak Hour Traffic Volume Impacts at Study Intersections .....	15
Table 5.	Future (2024) Weekday PM Peak Hour Intersection LOS Summary .....	17

# Introduction

The purpose of this traffic impact analysis (TIA) is to identify potential transportation-related impacts to the surrounding street network associated with the development of the proposed Brown Bear development in Arlington, WA.

## Project Description

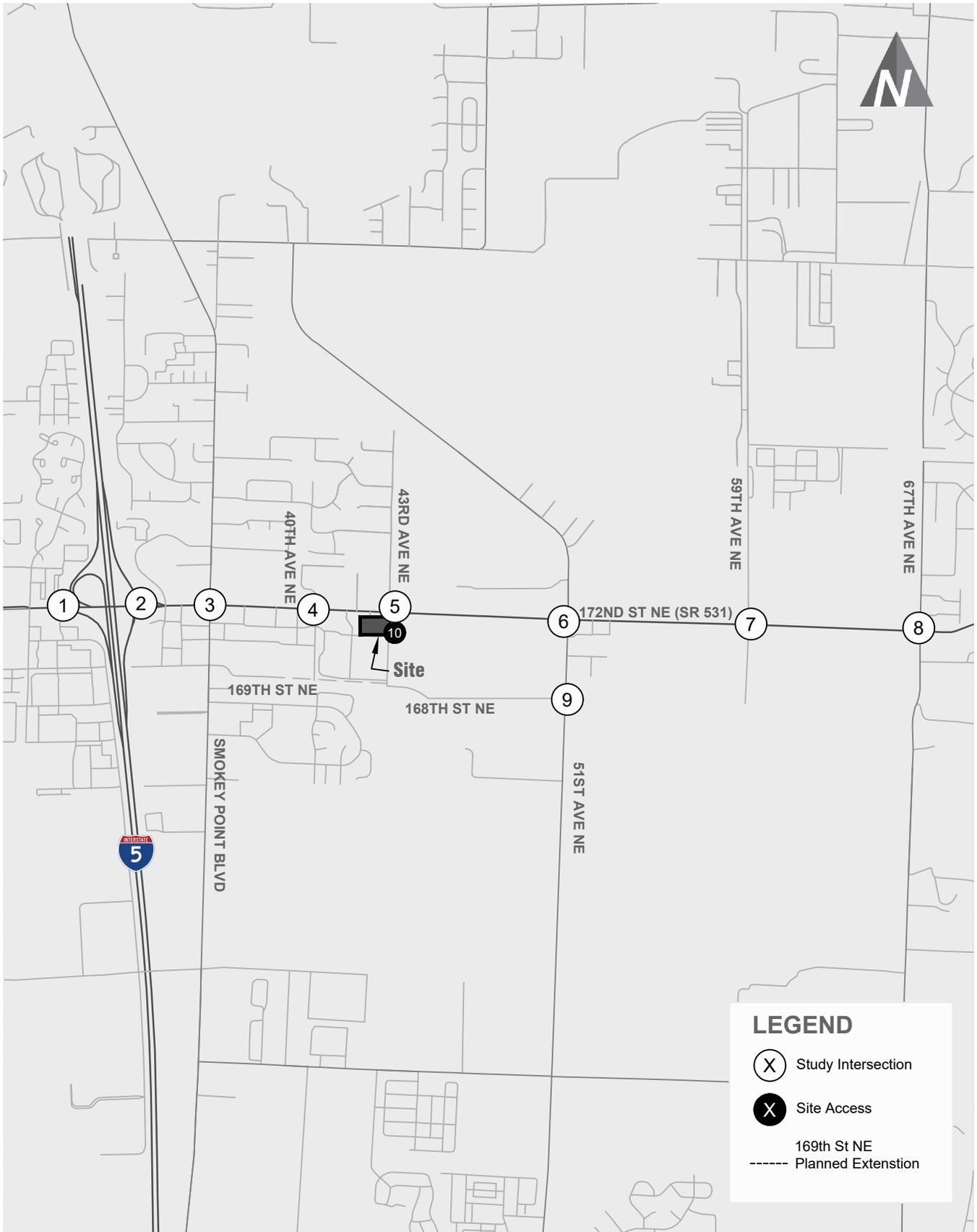
The project site is located west of 43rd Avenue NE, south of 172nd Street NE (State Route [SR] 531) in Arlington (see Figure 1). The proposed project would construct a single carwash tunnel (2,730 square feet) with 12 vacuum stations on an unoccupied lot. Access to the site is proposed via an existing driveway along 43rd Avenue NE. Additionally, there is internal connectivity along the west side of the site to existing commercial developments located north and south of the project site. Circulation for the carwash tunnel is proposed to be counterclockwise with the entrance located on the northeast corner of the site, west of 43rd Avenue NE. Figure 2 illustrates the preliminary site plan. It is anticipated that the development would be constructed and operating by the end of 2024.

## Study Scope

The scope of this analysis is based on coordination with City staff and consistent with the City of Arlington's *Traffic Analysis Procedures & Checklist (Revised 10/2013)*. Based on anticipated travel patterns for project-generated vehicle traffic, the following intersections were selected for study during the weekday PM peak hour:

1. I-5 SB Ramps/172nd Street NE (SR 531)
2. I-5 NB Ramps/172nd Street NE (SR 531)
3. Smokey Point Blvd/172nd Street NE (SR 531)
4. 40th Avenue NE/172nd Street NE (SR 531)
5. 43rd Avenue NE/172nd Street NE (SR 531)
6. 51st Avenue NE/172nd Street NE (SR 531)
7. 59th Avenue NE/172nd Street NE (SR 531)
8. 67th Avenue NE/172nd Street NE (SR 531)
9. 51st Avenue NE/168th Street NE

In addition to the off-site study intersections noted above, the prospect site access would be evaluated under future with-project conditions as well. The analysis includes a review of existing conditions in the vicinity of the project site, including the street network, non-motorized facilities, transit service, existing and future (2024) without-project peak hour traffic volumes, traffic operations, and traffic safety. Future (2024) with-project conditions are evaluated by adding site-generated traffic to future (2024) without-project volumes and were then compared to future (2024) without-project conditions to identify the relative impacts the proposed project has on the surrounding transportation system.

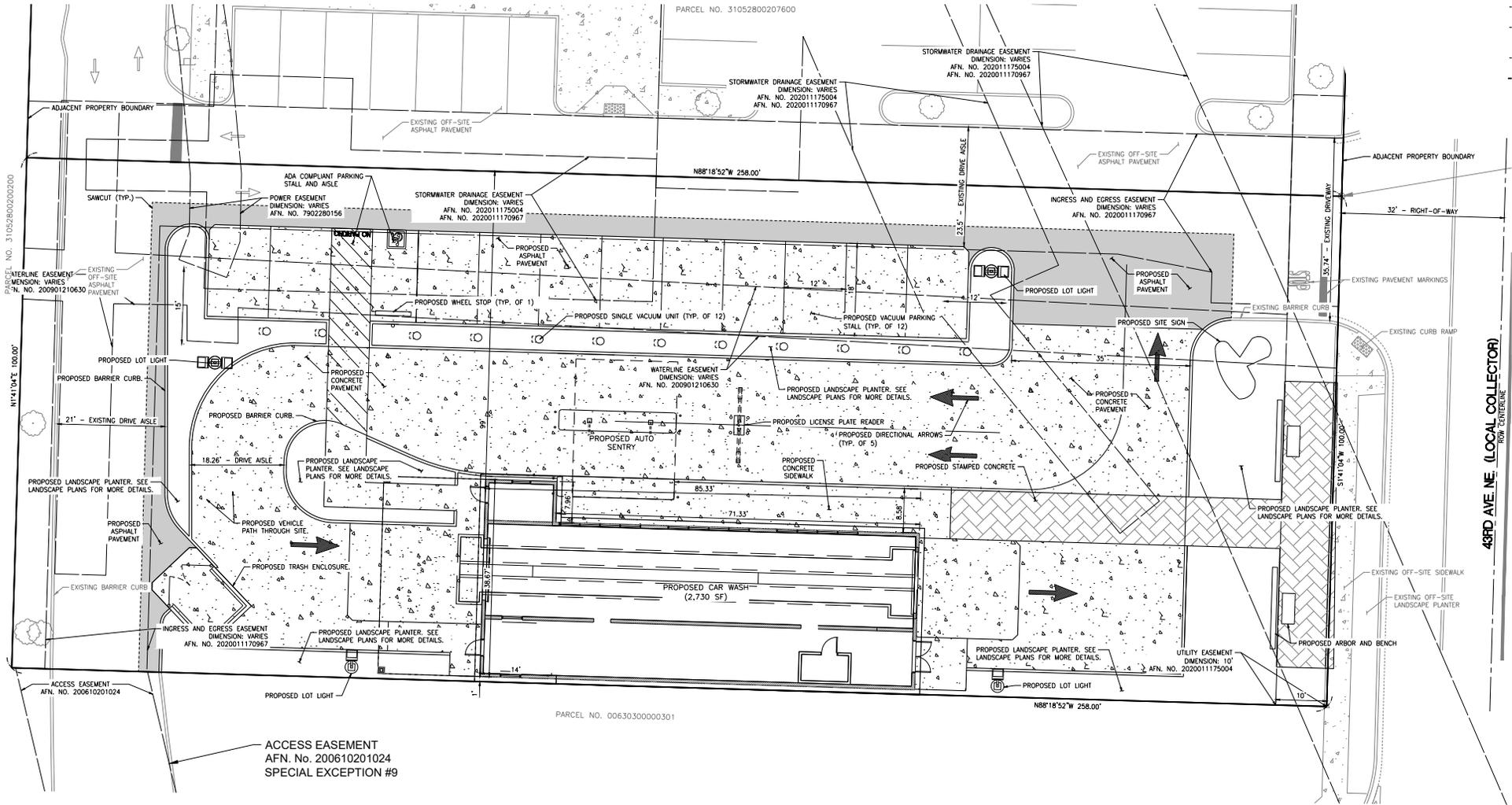


# Site Vicinity and Study Intersections

Arlington Brown Bear

FIGURE

1



# Site Plan

Arlington Brown Bear

FIGURE

2



## Existing & Future Without-Project Conditions

This section describes existing and future (2024) without-project conditions within the study area. Study area characteristics are provided for the existing street network, existing and future without-project peak hour traffic volumes, traffic operations, and traffic safety.

### Street System

The following describes the existing street network within the vicinity of the proposed project and any anticipated changes resulting from planned improvements.

#### *Existing Inventory*

Existing characteristics of 172nd Street NE and 43rd Avenue NE in close proximity to the project site are described below.

**172nd Street NE (SR 531)** is a highway of regional significance with a posted speed limit of 35 miles per hour. Current channelization along 172nd Street NE is predominantly 2 lanes east of 43rd Avenue NE. This is the primary east/west roadway connection near the project site. Sidewalks and bike lanes are available on both sides along 172nd Street NE west of 43rd Avenue NE. There is no on-street parking available along the roadway.

**43rd Avenue NE** is classified as a local street and access to the project site is proposed along 43rd Avenue NE via an existing driveway. Sidewalks are provided on both sides of the roadway. No parking or bike lanes are available.

The primary north/south connections in the project site include Smokey Point Boulevard and 51st Avenue NE located west and east of the site, respectively, as well as I-5 further west of the project site. Connections from the project site to these north-south roadways are currently via 172nd Street NE north of the site as well as via 168th Street NE south of the site to 51st Avenue NE only.

Transit service in the study area is provided by Community Transit and is primarily provided along 172nd Street NE (SR 531) and Smokey Point Boulevard. The nearest bus stop to the project is located on Smokey Point Boulevard and 172nd Street NE and is served by routes 201 and 202. Routes 201 and 202 provides service between the Smokey Point Transit Center in Arlington and the Lynnwood Transit Center. Transit service for routes 201 and 202 is provided 7 days a week with AM and PM peak hour headways of approximately 40 minutes on weekdays and 1 hour headways on weekends.

#### *Planned Improvements*

Based on a review of the *City of Arlington Comprehensive Plan's Six Year Transportation Improvement Plan* and Washington Department of Transportation (WSDOT) 2023-2026 Statewide Transportation Program (STIP), there are a number of planned roadway and or intersection improvements in the study area, which include:

- **169th Street Connection:** Completion of a missing segment of 169th Street between 37th Avenue NE and 43rd Avenue NE and connection of 169th Street NE to 40th Ave NE north of the segment. The project will install a two-lane roadway including low impact drainage, a 12-foot wide multi-use path, street lighting, and landscaping. Construction is planned for 2024. The connection of 169th Street is assumed in future analysis.
- **168th Street NE/51st Avenue NE Roundabout:** Installation of a roundabout at the 168th Street NE/51st Avenue NE intersection. The project is fully funded by the developer. The project would include ADA-complaint ramps, pedestrian facilities, and

lighting. Construction is scheduled to begin in 2023. The roundabout was assumed in the future (2024) analysis.

- **172nd Street NE (SR 531) Widening, Phase I:** Widening of 172nd Street NE (SR 531) from 43rd Avenue NE to 67th Avenue NE to a four-lane facility with two travel lanes in each direction. The improvement project would install roundabouts at the 51st Avenue NE, 59th Avenue NE, and 67th Avenue NE intersections along 172nd Street NE (SR 531). The project is completely funded by WSDOT with construction beginning in 2025 and completed in 2026. Given the timing of these projects, the future roundabouts and widening are not included in the future analysis.
- **172nd Street NE (SR 531) Widening, Phase II:** Widening of 172nd Street NE (SR 531) between 67th Avenue NE and SR-9 to a four-lane facility with two travel lanes in each direction. The timing of this widening project is anticipated following the project's 2024 horizon year, such that this improvement was not assumed in the future analysis.

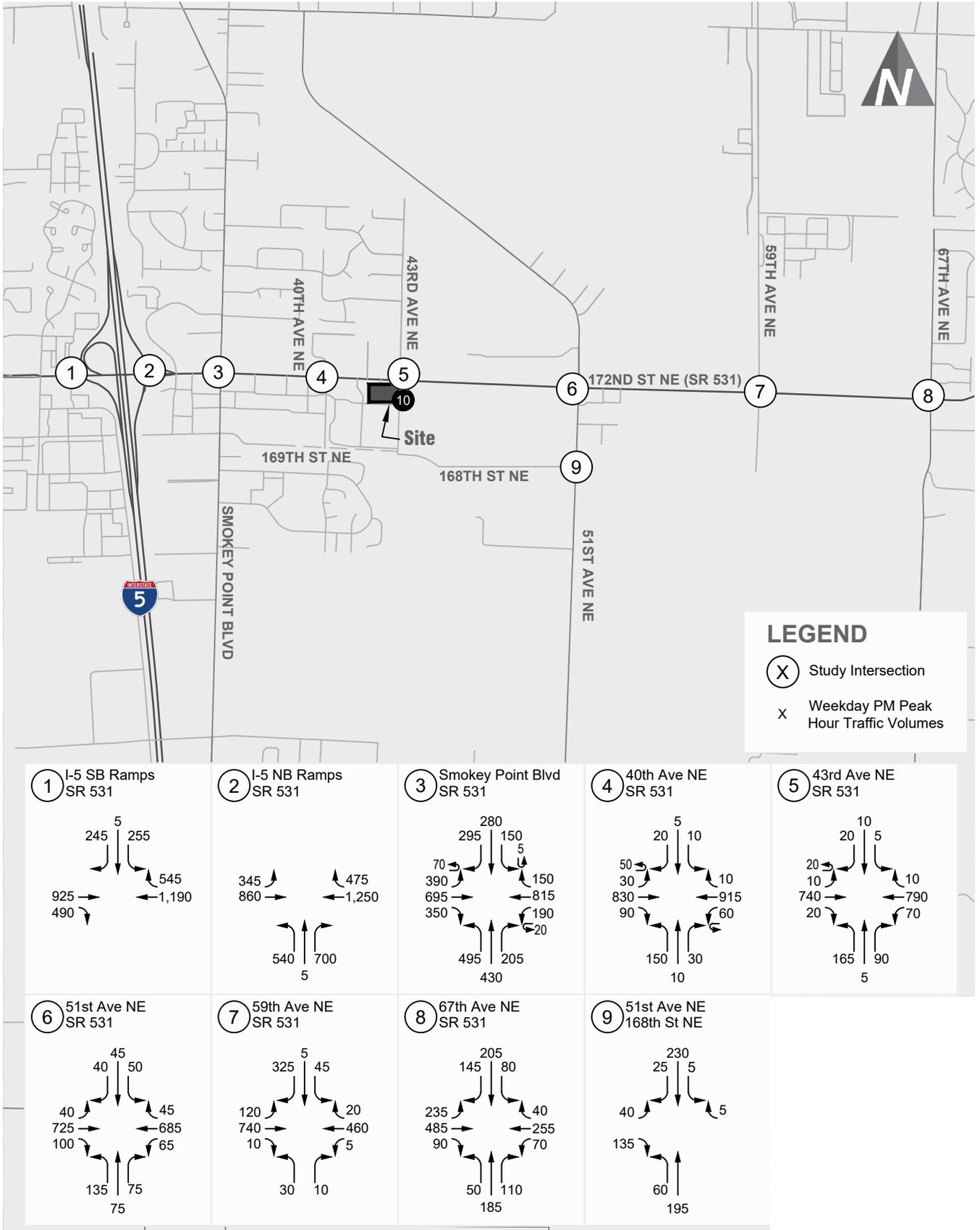
In addition to the planned improvements described above, there is a planned Swift Bus Rapid Transit (BRT) Gold Line that would be completed and operating by 2027 as identified in WSDOT's 2023-2026 STIP. The Gold Line would be Community Transit's 4th BRT line with service between Everett Station and Smokey Point Transit Center in Arlington with the nearest stop located west of the site at 172nd Street NE (SR 531) and Smokey Point Boulevard.

## Traffic Volumes

The following summarizes the traffic volumes for existing and future without-project conditions.

### *Existing Traffic Volumes*

Existing weekday PM peak period (4-6 p.m.) traffic counts were collected in November 2022 and July 2023. Traffic volumes data collected in 2022 were grown at an average annual growth rate of 3 percent to establish existing 2023 conditions. The annual growth rate of 3 percent was coordinated with City staff. Figure 3 illustrates the existing weekday peak hour traffic volumes at the study intersections. Volumes are rounded to the nearest 5 vehicles to account for the daily fluctuations in traffic volumes. Detailed traffic counts are provided in Appendix A.



# Existing Weekday PM Peak Hour Traffic Volumes

Arlington Brown Bear



FIGURE

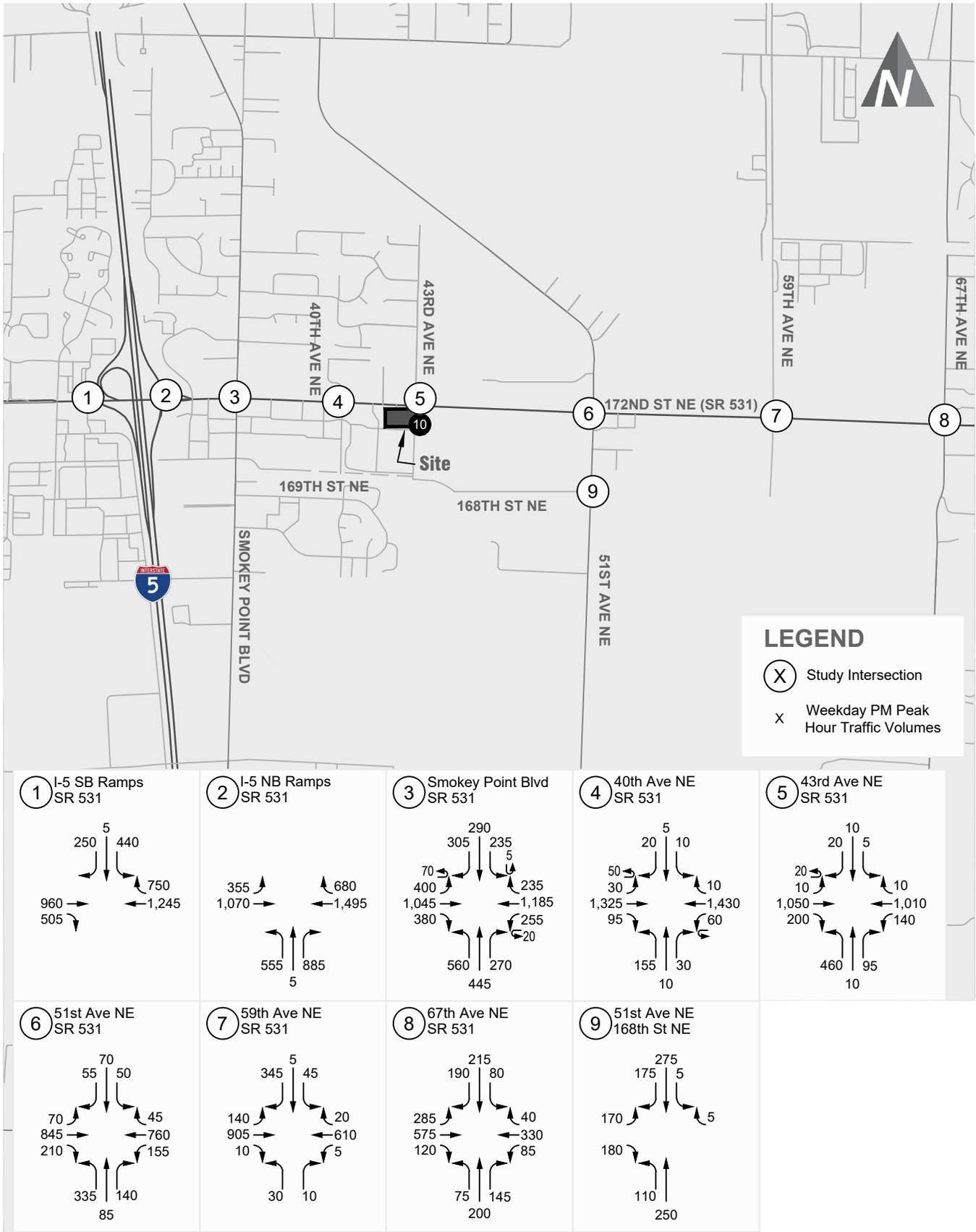
3

### *Future Without-Project Traffic Volumes*

Future (2024) without-project PM peak hour traffic volumes were forecasted by applying an annual growth rate to existing traffic volumes and adding traffic from “pipeline” development projects that would also contribute traffic to study intersections. An annual growth rate of 3 percent was applied to existing study intersection traffic volumes to estimate 2024 horizon year background traffic growth, as coordinated with City of Arlington staff and consistent with the growth rate applied to the existing 2022 counts. Two pipeline projects were identified by the City to be included in the analysis which include:

- **Project Roxy** would develop an approximately 2.82 million square foot fulfillment center warehouse located between 172nd Street NE (SR 531) and 169th Street NE, and 43rd Avenue NE and 51st Avenue NE in the City of Arlington.
- **The Outpost** would develop an approximately 500 unit multi-family residential development with 21,982 square feet of office space, 69,058 square feet of retail space and 16 live/work units. The project is located southwest of the 51st Street NE/168th Street NE intersection in Arlington.
- **The Cascade Commerce Center (CCC)** would develop approximately 4.15 million sf of a mix of industrial uses anticipated to include a combination of industrial park, high-cube warehouse, and high-cube fulfillment center. The CCC is located in south of 172nd Street NE (SR 531) and between 51st Avenue NE/59th Avenue NE and the railroad track to the east. The CCC is anticipated to be completed across 9 buildings which would be built and occupied separately. The full site is anticipated to be constructed by 2030; however, full buildout of the project has not been approved. Phase 1 of the project has been assumed which includes a 250,000 sf warehouse was assumed under future 2026 without-project conditions.
- **The PacTrust Project** would develop approximately 745,250 sf of Industrial Park. The development includes areas north and south of 156th Street NE within the City of Marysville. Access to the development is provided by proposed driveways along 47th Avenue NE and 156th Street NE.

The forecast future 2024 without-project weekday PM peak hour traffic volumes are shown in Figure 4.



Future (2024) Without-Project Weekday PM Peak Hour Traffic Volumes

FIGURE

## Traffic Operations

The operational characteristics of an intersection are determined by calculating the intersection level of service (LOS). At signalized and roundabout intersections, LOS is measured in average control delay per vehicle and is typically reported using the intersection delay. At unsignalized side-street, stop-controlled intersections, LOS is measured by the average delay on the worst-movement of the intersection. Traffic operations and average vehicle delay for an intersection can be described qualitatively with a range of levels of service (LOS A through LOS F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays. Appendix B contains a detailed explanation of LOS criteria and definitions.

For the operations analysis of existing conditions at the signalized study intersections, signal timing and phasing information was obtained from the WSDOT and City of Arlington. Future (2024) analysis parameters such as channelization was maintained with the exception of the planned roundabout installation at the 168th Street NE/51st Avenue NE intersection as noted above as well as signal timing optimization of splits (cycle lengths and offsets were maintained along corridors).

Weekday PM peak hour traffic operations for existing and future without-project conditions were evaluated at the study intersections based on the procedures identified in the *Highway Capacity Manual* 6th Edition, unless otherwise noted for signal timing constraints, and were evaluated using *Synchro 11*. *Synchro 11* is a software program that uses HCM methodology to evaluate intersection LOS and average vehicle delays. Roundabout controlled intersections were evaluated utilizing *Sidra 9* and the WSDOT methodology for analyzing roundabouts. Results for the existing and future without-project operations analyses are summarized in Table 1. Detailed LOS worksheets for each intersection analysis are included in Appendix C.

The City of Arlington and the WSDOT intersections have an LOS Standard of LOS D for the study area. For the roundabout controlled intersections, a volume to capacity (v/c) ratio  $\geq 0.90$  is also generally targeted.

**Table 1. Existing and Without-Project Weekday PM Peak Hour Intersection LOS Summary**

Intersection	Traffic Control	Existing			Future 2024 Without-Project		
		LOS <sup>1</sup>	Delay <sup>2</sup>	WM <sup>3</sup> or v/c	LOS	Delay	v/c <sup>4</sup>
1. I-5 SB Ramps/172nd St NE (SR 531)	Signal	A	8	-	B	12	-
2. I-5 NB Ramps/172nd St NE (SR 531)	Signal	C	33	-	C	35	-
3. Smokey Point Blvd/172nd St NE (SR 531) <sup>6</sup>	Signal	<b>E</b>	<b>73</b>	-	<b>F</b>	<b>87</b>	-
4. 40th Ave NE/172nd St NE (SR 531) <sup>6</sup>	Signal	C	31	-	D	37	-
5. 43rd Ave NE/172nd St NE (SR 531)	Roundabout	A	6	0.38	A	9	0.63
6. 51st Ave NE/172nd St NE (SR 531)	Signal	D	35	-	<b>F</b>	<b>82</b>	-
7. 59th Ave NE/172nd St NE (SR 531)	Signal	D	43	-	D	50	-
8. 67th Ave NE/172nd St NE (SR 531)	Signal	D	54	-	D	55	-
9. 51st Ave NE/168th St NE	TWSC /Roundabout <sup>5</sup>	B	13	EB	A	7	0.44

Note: TWSC = two-way stop-controlled. **Bold** indicates the intersection is operating below standard.

1. Level of Service (A – F) as defined by the *Highway Capacity Manual* (HCM) 6th Edition (TRB).

2. Average delay per vehicle in seconds.

3. Worst movement reported for two-way stop-controlled intersections. EB = eastbound movement.

4. Volume to capacity ratio reported for roundabouts.

5. Roundabout with planned improvements.

6. Intersections run utilizing HCM 2000 methodology due to signal timing constraints not allowed under HCM 6th Edition.

As shown in Table 1, under existing conditions, all intersections operate at LOS D or better during the PM peak hour, meeting the LOS standard, with the exception of the Smokey Point

Boulevard/172nd Street NE (SR 531) intersection, operating at LOS E. Under future (2024) without-project conditions, with the inclusion of area planned improvements, two intersections are forecast to not meet the applicable LOS standard which include:

- Smokey Point Boulevard/172nd Street NE (SR 531) – This intersection is forecast to degrade from LOS E under existing conditions to LOS F under future (2024) without-project conditions during the weekday PM peak hour. This location has been identified by the City as a priority location and is anticipated to have planned improvements identified in the City’s Comprehensive Plan update.
- 51st Avenue NE /172nd Street NE (SR 531) – This intersection is forecast to degrade from LOS D under existing conditions to LOS F under future (2024) without-project conditions during the weekday PM peak hour. There is a funded planned WSDOT improvement at this location that would install a roundabout in place of the existing traffic signal as well as the planned widening along the 172nd Street NE (SR 531) corridor that are anticipated to improve operations at the intersection.

## Traffic Safety

Recent collision records were reviewed within the study area to identify existing traffic safety issues at the study intersections. The most recent complete five-year summary of accident data from the WSDOT is for the period between January 1, 2018 and December 31, 2022. This information is summarized in Table 2.

**Table 2. Five-Year Collision Summary – 2018 to 2022**

Location	Number of Collisions					Total	Annual Average
	2018	2019	2020	2021	2022		
1. I-5 SB Ramps/172nd St NE (SR 531)	10	11	5	9	11	46	9.20
2. I-5 NB Ramps/172nd St NE (SR 531)	11	12	9	12	10	54	10.80
3. Smokey Point Blvd/172nd St NE (SR 531)	24	27	18	18	13	100	20.00
4. 40th Ave NE/172nd St NE (SR 531)	4	0	5	4	3	16	3.20
5. 43rd Ave NE/172nd St NE (SR 531)	6	3	4	5	7	25	5.00
6. 51st Ave NE/172nd St NE (SR 531)	9	8	2	14	9	42	8.40
7. 59th Ave NE/172nd St NE (SR 531)	3	5	2	1	2	13	2.60
8. 67th Ave NE/172nd St NE (SR 531)	5	7	5	7	2	26	5.20
9. 51st Ave NE/168th St NE	0	0	0	0	0	0	0.00

Source: WSDOT, 2023

*Under 23 U.S. Code § 409 and 23 U.S. Code § 148, safety data, reports, surveys, schedules, lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.*

As shown in Table 2, the study intersections along SR 531 had between 3 and 11 collisions reported per year on average during the review period with the exception of the Smokey Point Boulevard/172nd Street NE (SR 531) intersection which is discussed in greater detail below. The collisions along the remaining SR 531 study intersections primarily rear end collisions resulting in property damage only. No fatalities were reported in the study area during the review period and there was 1 collision or less per intersection over the 5 years period involving a pedestrian or bicyclist. Note that no collisions were reported at the 51st Avenue NE/168th Street intersection; however, this is a recent connection (since 2020).

As identified above, there are planned SR 531 corridor improvements that will provide widening east of 43rd Avenue NE as well as traffic control changes from traffic signals to roundabout at the intersections in the study area east of 43rd Avenue NE. These changes are anticipated to relieve congestion by adding capacity which is a common cause of rear-end collisions, the most

common collision type as identified above. Additionally, studies have shown that roundabouts result in reductions in the overall number of collisions, severity, and the number of collisions involving pedestrians relative to traditional signalized intersections. These reductions are achieved through lower travel speeds through roundabouts, yielding behavior of roundabouts, and one-way travel as such, it is anticipated that this collision rate would improve in the future.

As noted above, the highest number of reported collisions occurred at the Smokey Point Boulevard/172nd Street NE (SR 531) intersection with an average of 20 collisions per year associated with the intersection. This intersection also carries the highest traffic volumes in the study area. At the Smokey Point Boulevard/172nd Street (SR 531) the most frequent number of collisions reported were rear-end followed by angle collisions. The majority (approximately 78 percent) resulted in property damage only. Additional improvements along the 172nd Street NE (SR 531) corridor are being considered by the City of Arlington's as part of the transportation element of the City's updated comprehensive plan. This study identified additional capacity improvements at the Smokey Point Boulevard/172nd Street NE (SR 531) intersection. These improvements would reduce congestion and help mitigate for congestion related incidents. These improvements have been adopted formally by the City but are expected to be as part of the comprehensive plan update.

## Project Impacts

This section of the report documents the proposed project's impacts on the surrounding street network and study intersections. First, estimated traffic volumes generated by the proposed project are distributed and assigned to adjacent streets and intersections within the study area for the weekday PM peak hour study period. Next, project trips are added to future without-project traffic volumes and any potential impact to traffic operations. Site specific items are also discussed.

### Trip Generation

The trip generation for the proposed project was estimated based on observations conducted at two existing Brown Bear sites with similar features to the proposed project. The location and count details for each observed site are noted below:

- **Sammamish Brown Bear:** The Sammamish Brown Bear is located at 3050 228th Ave SE. The site includes a single car wash tunnel and detail express stalls (vacuuming stations) consistent with the proposed project and also located near a high volume intersection (greater than 2,000 total entering vehicles (TEV), consistent with the adjacent 43rd Avenue NE/SR 531 intersection). Observations were conducted in October 2019<sup>1</sup> on two mid-weekdays as well as one Saturday for the full day. The detailed observations are included in Appendix D.
- **Everett Brown Bear:** The Everett Brown Bear is located at 3523 Broadway. The site includes a single car wash tunnel and detail express stalls (vacuuming stations) consistent with the proposed project. This site was coordinated with City staff. Observations were conducted in July 2023 on two mid-weekdays as well as one Friday and one Saturday for the full day. The detailed observations are included in Appendix D.

It is recognized that pass-by trips are a component of the trip generation consistent with gas stations and other retail services. Pass-by trips reflect traffic already on streets in the vicinity of the project site that would visit the project while driving by the site on the way to its final destination. Although, specific car wash pass-by studies were not available, pass-by rates for similar "service" and retail uses were reviewed as available in ITE's *Trip Generation Manual* (11th Edition) for the weekday PM peak hour. ITE's retail and service uses (Land Use 821 and 900's) with studies available show PM peak hour pass-by rates ranging from 35 to 98 percent. Specifically, the Gasoline/Service Station (LU 944) land use description identifies that car washes may be included within the use and has a weekday PM peak hour pass-by rate of 57 percent and Shopping Center (LU 821) which includes a range of general retail land uses has a pass-by rate of 40 percent. Based on the review of available data, the pass-by rate was assumed to be 40 percent, consistent with general retail (LU 821). The shopping center pass-by rate was assumed because it is on the lower end of the range of identified pass-by rates, is less than the pass-by rate for the Gasoline/Service Station (LU 944) land use (providing a conservative estimate as this land use specifically identifies a car wash), and the project is located in the vicinity of other shopping center uses including a bank and Walmart.

Table 3 shows the observed daily and peak hour trips generated by the sites during both the weekday and Saturday. Given the sites are similar in services and capacity, the observed trips are anticipated to be representative of the gross trip generation for the proposed project and the table shows the anticipated pass-by for the project as well.

---

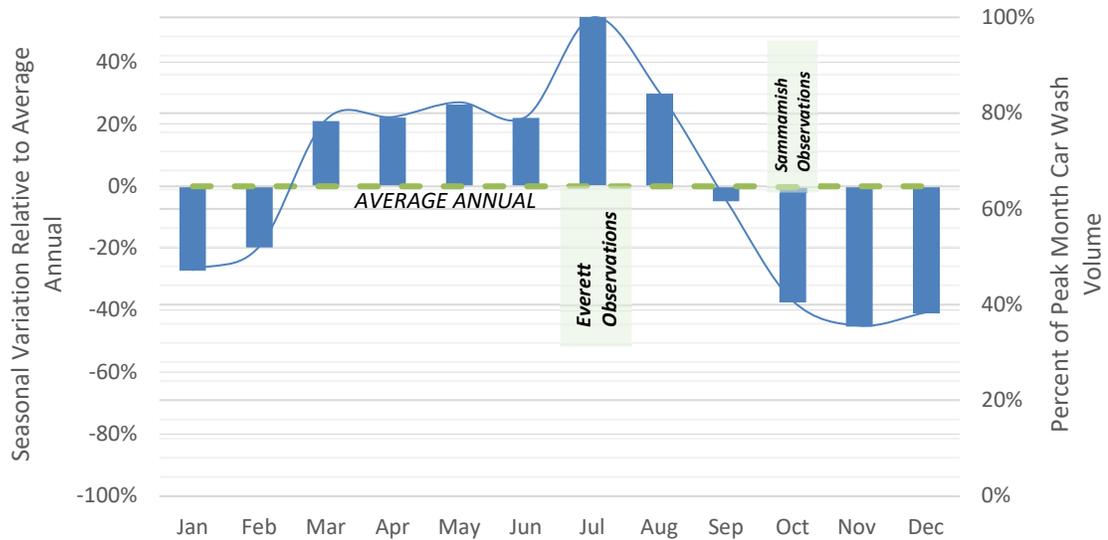
<sup>1</sup> Note that 2019 counts are still considered valid as growth is not applied to trip generation and the observations were conducted pre-COVID under typical conditions.

**Table 3. Trip Generation Estimates**

Local Observations <sup>1</sup>	Weekday				Saturday			
	Daily	PM Peak Hour			Daily	Peak Hour		
		In	Out	Total		In	Out	Total
<b>Sammamish</b> (Observed in October)	768	56	55	111	526	57	55	112
<b>Everett</b> (Observed in July)	1,978	100	91	191	2,017	120	126	246
<b>Average Total</b>	1,329	70	67	137	1,272	89	91	179
<i>Pass-by (40%)</i>	532	27	27	54				
<b>New Trips</b>	<b>797</b>	<b>43</b>	<b>40</b>	<b>83</b>				

1. Local observations as completed at the Brown Bear facility in Sammamish in October 2019 by TENW on two mid-weekdays and in Everett in July 2023.
2. Pass-by rate based on ITE Trip Generation Manual (11th Edition, 2021). Note that the Car Wash pass-by rate is assumed to be consistent with ITE's Shopping Center (LU 821) land use.

The table shows the observations varied between 111 and 191 during the weekday PM peak hour at the Sammamish and Everett locations. This difference is anticipated to primarily associated with the seasonal variation that occurs with car washes. Transaction data at existing Brown Bear Car Wash locations in the area for 2021 was provided and the resulting seasonal variation is summarized in Figure 2.

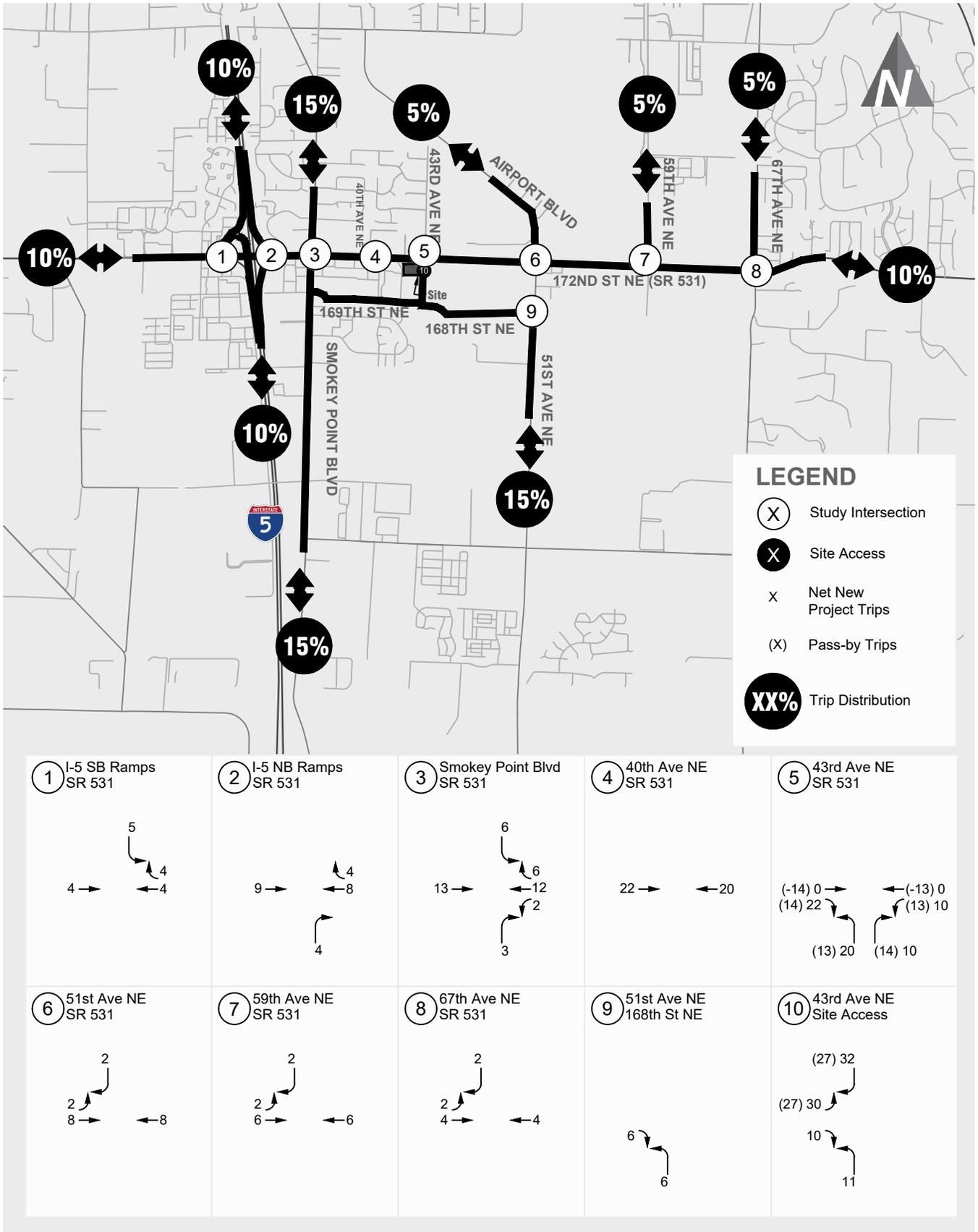


**Figure 5. Car Wash Seasonal Variation**

As shown in Figure 5, the peak transaction month for car washes occurs in July (approximately 50 percent above average) when the Everett observations took place and the lowest months being October through December (approximately 40 percent below average) when the Sammamish observations took place. Therefore the observations captured the range of transactions anticipated for a car wash and the average provides an appropriate average condition. Table 3 shows the average PM peak hour has 137 gross trips and the proposed project is anticipated to generate 83 weekday PM peak hour primary project trips.

## Trip Distribution & Assignment

Trip distribution patterns developed for the project were based on existing travel patterns and similar to previously approved commercial development trip distribution patterns in the vicinity. Note that the planned improvement extending 169th Street NE is included in the project's distribution pattern. Figure 6 illustrates the future (2025) vehicle trip distribution and assignment for the proposed project.



Weekday PM Peak Hour Project Trip Distribution and Assignment

FIGURE

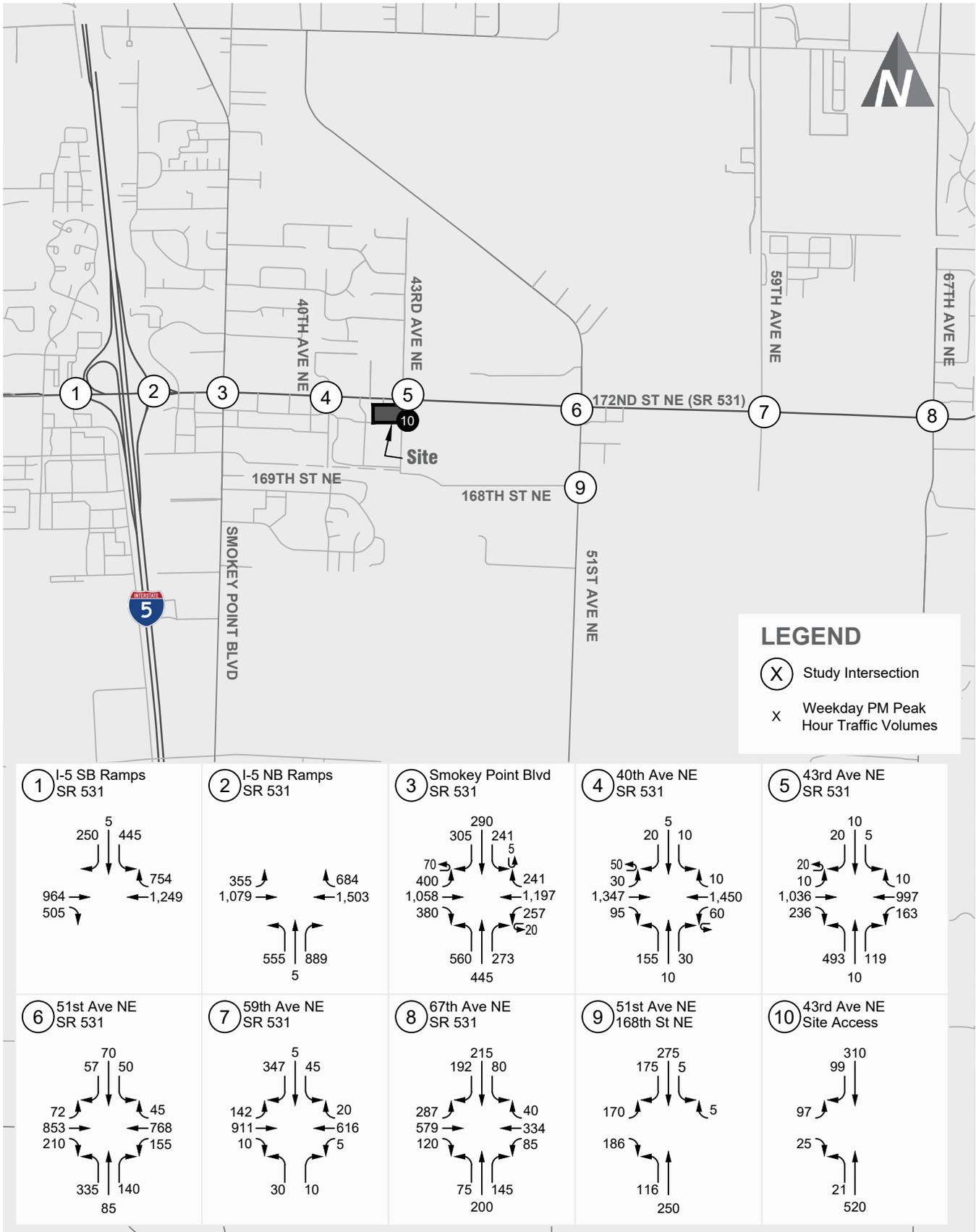
## Traffic Volume Impact

The assigned project generated traffic was added to the future without-project weekday PM peak hour traffic volumes at the study intersections under future 2024 conditions. The future (2024) with-project weekday PM peak hour traffic volumes are shown in Figure 7. Table 4 summarizes the project share of traffic volumes at the study intersections during the weekday PM peak hour under the future 2024 conditions.

**Table 4. Future (2024) Weekday PM Peak Hour Traffic Volume Impacts at Study Intersections**

Intersection	PM Peak Hour Total Entering Vehicles			Project Share
	2024 Without-Project	Project Trips	2024 With-Project	
1. I-5 SB Ramps/172nd St NE (SR 531)	4,155	17	4,172	0.4%
2. I-5 NB Ramps/172nd St NE (SR 531)	5,045	25	5,070	0.5%
3. Smokey Point Blvd/172nd St NE (SR 531)	5,700	42	5,742	0.7%
4. 40th Ave NE/172nd St NE (SR 531)	3,235	42	3,277	1.3%
5. 43rd Ave NE/172nd St NE (SR 531)	3,040	89	3,129	2.8%
6. 51st Ave NE/172nd St NE (SR 531)	2,820	20	2,840	0.7%
7. 59th Ave NE/172nd St NE (SR 531)	2,125	16	2,141	0.7%
8. 67th Ave NE/172nd St NE (SR 531)	2,340	12	2,352	0.5%
9. 51st Ave NE/168th St NE	1,170	12	1,182	1.0%

As shown in Table 4, the proposed project is estimated to account for less than 3 percent of the total weekday PM peak hour traffic at the majority of study intersections. Traffic volumes fluctuate day-to-day and the anticipated traffic increase at study intersections are within the range of typical daily traffic fluctuations.



Future (2024) With-Project Weekday PM Peak Hour Traffic Volumes

FIGURE

## Traffic Operations

The following section summarizes the future with-project LOS at the study intersections relative to the without-project conditions to identify project-related impacts. Intersection parameters such as channelization and intersection control applied to the future with-project analyses were consistent with those used in the evaluation of future without-project conditions. A comparison of the future (2024) without-project and with-project weekday PM peak hour traffic operations are summarized in Table 5. Detailed LOS worksheets are provided in Appendix C.

**Table 5. Future (2024) Weekday PM Peak Hour Intersection LOS Summary**

Intersection	Traffic Control	Future 2024 Without-Project			Future 2024 With-Project		
		LOS <sup>1</sup>	Delay <sup>2</sup>	v/c <sup>4</sup>	LOS	Delay	WM <sup>3</sup> or v/c
1. I-5 SB Ramps/172nd St NE (SR 531)	Signal	B	12	-	B	12	-
2. I-5 NB Ramps/172nd St NE (SR 531)	Signal	C	35	-	C	35	-
3. Smokey Point Blvd/172nd St NE (SR 531) <sup>5</sup>	Signal	<b>F</b>	<b>87</b>	-	<b>F</b>	<b>88</b>	-
4. 40th Ave NE/172nd St NE (SR 531) <sup>5</sup>	Signal	D	37	-	D	37	-
5. 43rd Ave NE/172nd St NE (SR 531)	Roundabout	A	9	0.63	A	9	0.66
6. 51st Ave NE/172nd St NE (SR 531)	Signal	<b>F</b>	<b>82</b>	-	<b>F</b>	<b>82</b>	-
7. 59th Ave NE/172nd St NE (SR 531)	Signal	D	50	-	D	52	-
8. 67th Ave NE/172nd St NE (SR 531)	Signal	D	55	-	D	55	-
9. 51st Ave NE/168th St NE	Roundabout	A	7	0.44	A	7	0.44
A. 43rd Ave NE/Site Access	TWSC	Evaluated under With-Project			C	17	EB

Note: TWSC = two-way stop-controlled. **Bold** indicates the intersection is operating below standard.

1. Level of Service (A – F) as defined by the *Highway Capacity Manual* (HCM) 6th Edition (TRB)

2. Average delay per vehicle in seconds.

3. Worst movement reported for two-way stop-controlled intersections. EB = eastbound movement.

4. Volume to capacity ratio reported for roundabouts.

5. Intersections run utilizing HCM 2000 methodology due to signal timing constraints not allowed under HCM 6th Edition.

As shown in Table 5, all study intersections remain at the same LOS under with-project conditions with increases in delay of 1 second or less. The Smokey Point Boulevard and 51st Avenue NE intersections are both forecast to operate below the LOS D standard with 1 second of added delay and with less than a 1 percent traffic volume impact with the addition of the project. Both locations have been identified for future planned improvements as described above. All remaining study intersections meet the LOS D standard.

## Site Access

Access to the site is proposed via the existing full access two-way stop controlled driveway located approximately 125 feet south of the 43rd Ave NE/172nd St NE (SR 531) roundabout. There is a two-way left turn lane along 43rd Ave NE to facilitate movement to/from the existing/proposed driveway. The future (2024) with-project weekday PM peak hour traffic volumes at the site access are shown in Figure 7 which are assumed for the analysis. Note that there is internal connectivity to the Walmart to the south; however, all trips are assigned to/from the primary driveway for purposes of the operational analysis. The traffic operations at the proposed project's site access along 43rd Avenue NE is summarized below along with the on-site queueing associated with the car wash.

### Traffic Operations

As noted above, the site access is assumed and evaluated as a full access driveway. The operations as summarized in Table 5 above show the driveway is forecast to operate at LOS C with minimal queueing (95th percentile of 1 vehicle eastbound from the driveway). Additionally, queueing associated with the 43rd Ave NE/172nd St NE (SR 531) roundabout was reviewed

and showed a northbound 95th percentile queue of 115 feet, such that the queue does not extend past the driveway.

### *On-Site Queueing*

Queueing is related to the density of arrivals, that is, the more vehicles that arrival in a brief period of time, the higher probability of queueing, projected traffic volumes, and capacity of the service tunnel. The observations at the Sammamish and Everett Brown Bear facilities as described above also captured and recorded the peak queues that occurred on-site each day. The observations of both sites showed the greatest queues occurring on Saturdays (outside of the weekday PM peak period when volumes are greatest). On the Saturday, the Sammamish October observation showed a maximum queue of 7 vehicles and the Everett July observations showed up to 13 vehicles also on the Saturday. During the weekday PM peak hours, the queues were lower with up to 4 vehicles queued during the Sammamish October observations and 7 vehicles queued during the Everett July observations.

Figure 8 illustrates the proposed site configuration can accommodate more than the maximum 13 vehicles observed queued during the summer peak condition at a similar existing Brown Bear site such that no off-site impacts are anticipated.

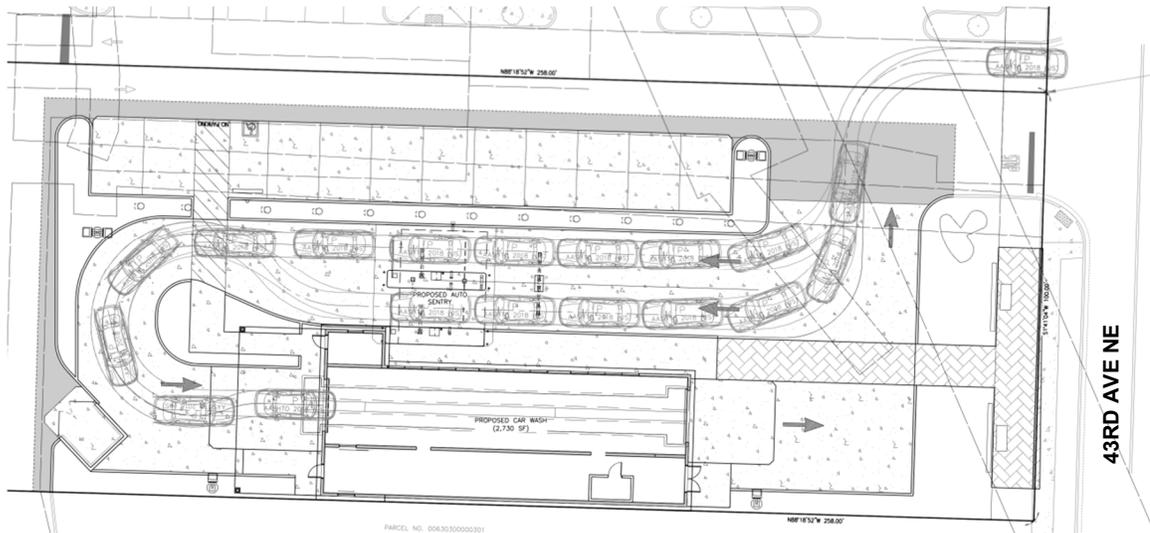


Figure 8. On-Site Queue Capacity

## Mitigation

The project impacts to the surrounding transportation system would be mitigated through the City of Arlington, Snohomish County and WSDOT impact fee programs.

### Transportation Mitigation Fees

To mitigate impacts of the proposal on the surrounding transportation system, the developer would be required to pay impact fees to three jurisdictions: the City of Arlington, Snohomish County, and WSDOT based on current interlocal agreements that have been established between these entities. The following provides an estimate only, the final fees will be calculated at time of permit issuance.

#### *City of Arlington*

The City of Arlington traffic mitigation fees are currently \$3,355 per PM peak hour trip. Based on the anticipated trip generation of 83 primary trips the resulting City of Arlington impact fee would be **\$278,465** (\$3,355/trip x 83 trips). The fee rate is subject to annual increases and will be based on the adopted rates at the time of building permit issuance.

#### *Snohomish County*

Snohomish County has an interlocal agreement with the City of Arlington. Per the Snohomish County Traffic Mitigation Worksheet for City Developments Impacting County Streets, the percentage of trips impacting County Streets was determined to be 70 percent. Per SCC 30.66B.330 the fee for commercial uses within the urban growth area of TSA is \$157 per average daily trip (ADT). The resulting fee was estimated to be approximately **\$87,590.30** (70% x 797 ADT x \$157 per ADT). The fee rate is subject to annual increases and will be based on the adopted rates at the time of building permit issuance.

#### *WSDOT*

Per the interlocal agreement with WSDOT, project-related impacts can be mitigated through the payment of a flat fee of \$36 per ADT or a proportional share based on the WSDOT projects currently planned. Based on the project distribution, the project would impact the WSDOT projects on 172nd Street NE (SR 531); however, those projects have been identified as funded. As such no impact fees would be paid to WSDOT.

## Findings and Conclusions

This transportation impact analysis summarizes the transportation impacts associated with the proposed Brown Bear development in Arlington, WA.

- The proposed single carwash tunnel (2,730 square feet) with 12 vacuum stations is estimated to generate 87 primary weekday PM peak hour trips.
- Under forecast (2024) with-project PM peak hour conditions, all study intersections remain at the same LOS with increases in delay of 1 second or less. The Smokey Point Boulevard and 51st Avenue NE intersections are both forecast to operate below the LOS D standard with 1 second or less of added delay and with less than a 1 percent traffic volume impact with the addition of the project. Both locations have been identified for future planned improvements as described above. All remaining study intersections meet the LOS D standard.
- Access to the proposed development would be provided via the existing driveway along 43rd Avenue NE, south of 172nd Street NE (SR 531). The driveway is forecast to operate at LOS C with the project with limited queuing outbound from the driveway. Additionally, the site is anticipated to accommodate the peak queueing for the project.
- The developer would be required to pay transportation mitigation fees. The mitigation fees are estimated to total \$366,055.30 (including both Arlington and Snohomish County). The final fees are calculated at the time of building permit issuance.

## Appendix A: Traffic Counts



<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	SR 531				SR 531				I-5 SB Ramps				I-5 SB Ramps				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	2	1	0	0	9	6	0	0	0	0	0	8	0	2	28	0
4:15 PM	0	0	3	2	0	0	4	6	0	0	0	0	0	5	0	1	21	0
4:30 PM	0	0	1	2	0	0	3	4	0	0	0	0	0	3	0	1	14	0
4:45 PM	0	0	1	1	0	0	3	6	0	0	0	0	0	3	0	2	16	79
5:00 PM	0	0	5	2	0	0	1	3	0	0	0	0	0	6	0	1	18	69
5:15 PM	0	0	1	1	0	0	4	3	0	0	0	0	0	1	0	2	12	60
5:30 PM	0	0	1	0	0	0	5	0	0	0	0	0	0	2	0	0	8	54
5:45 PM	0	0	3	1	0	0	0	3	0	0	0	0	0	7	0	0	14	52
Count Total	0	0	17	10	0	0	29	31	0	0	0	0	0	35	0	9	131	0
Peak Hour	0	0	7	6	0	0	19	22	0	0	0	0	0	19	0	6	79	0

<b>Two-Hour Count Summaries - Bikes</b>																
Interval Start	SR 531			SR 531			I-5 SB Ramps			I-5 SB Ramps			15-min Total	Rolling One Hour		
	Eastbound			Westbound			Northbound			Southbound						
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT				
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	0		
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	1	1		
Count Total	0	1	0	0	0	0	0	0	0	0	0	1	2	0		
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	1	1	0		

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	SR 531				SR 531				I-5 NB Ramps				I-5 NB Ramps				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	1	6	0	0	0	12	4	0	3	0	9	0	0	0	0	35	0
4:15 PM	0	4	10	0	0	0	7	3	0	4	0	7	0	0	0	0	35	0
4:30 PM	0	2	7	0	0	0	7	3	0	2	0	8	0	0	0	0	29	0
4:45 PM	0	3	4	0	0	0	2	3	0	2	0	11	0	0	0	0	25	124
5:00 PM	0	0	5	0	0	0	4	2	0	2	0	12	0	0	0	0	25	114
5:15 PM	0	0	3	0	0	0	5	1	0	0	0	12	0	0	0	0	21	100
5:30 PM	0	0	5	0	0	0	4	1	0	3	0	10	0	0	0	0	23	94
5:45 PM	0	2	9	0	0	0	4	2	0	2	0	15	0	0	0	0	34	103
Count Total	0	12	49	0	0	0	45	19	0	18	0	84	0	0	0	0	227	0
Peak Hour	0	10	27	0	0	0	28	13	0	11	0	35	0	0	0	0	124	0

<b>Two-Hour Count Summaries - Bikes</b>																
Interval Start	SR 531			SR 531			I-5 NB Ramps			I-5 NB Ramps			15-min Total	Rolling One Hour		
	Eastbound			Westbound			Northbound			Southbound						
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT				
4:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Count Total	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Peak Hour	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0

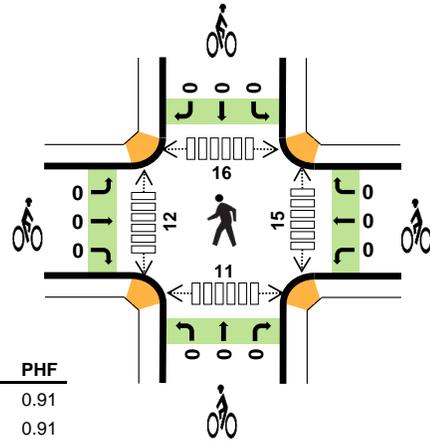
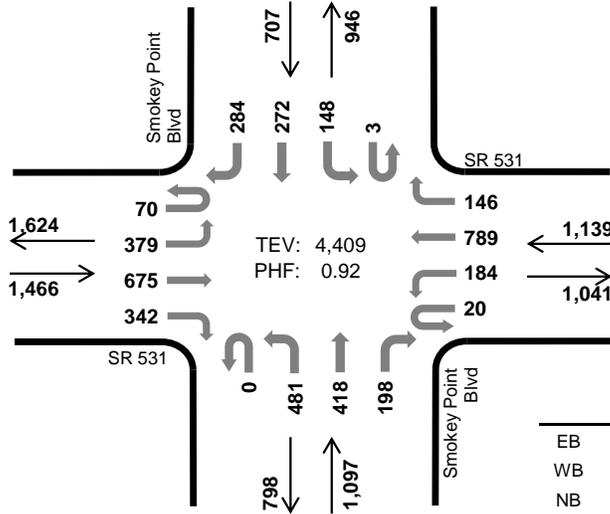
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

## Smokey Point Blvd SR 531



Peak Hour

Date: 11/01/2022  
Count Period: 4:00 PM to 6:00 PM  
Peak Hour: 4:00 PM to 5:00 PM



	HV %:	PHF
EB	4.4%	0.91
WB	1.5%	0.91
NB	2.6%	0.87
SB	2.4%	0.96
TOTAL	2.9%	0.92

### Two-Hour Count Summaries

Interval Start	SR 531 Eastbound				SR 531 Westbound				Smokey Point Blvd Northbound				Smokey Point Blvd Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	16	100	194	92	5	39	194	74	0	139	103	58	1	40	77	67	1,199	0	
4:15 PM	18	101	170	77	3	52	191	24	0	103	96	44	1	30	73	67	1,050	0	
4:30 PM	12	87	140	89	2	36	206	26	0	149	117	50	1	41	58	81	1,095	0	
4:45 PM	24	91	171	84	10	57	198	22	0	90	102	46	0	37	64	69	1,065	4,409	
5:00 PM	15	101	183	79	1	37	206	20	0	121	123	41	4	29	52	71	1,083	4,293	
5:15 PM	11	100	167	77	4	47	209	19	0	137	79	41	0	28	72	73	1,064	4,307	
5:30 PM	14	107	184	73	8	33	155	22	0	137	89	42	0	40	56	51	1,011	4,223	
5:45 PM	19	91	173	71	6	49	150	11	0	94	57	43	1	33	36	38	872	4,030	
Count Total	129	778	1,382	642	39	350	1,509	218	0	970	766	365	8	278	488	517	8,439	0	
Peak Hour	All	70	379	675	342	20	184	789	146	0	481	418	198	3	148	272	284	4,409	0
	HV	1	15	33	15	0	4	11	2	0	16	11	1	0	0	7	10	126	0
	HV%	1%	4%	5%	4%	0%	2%	1%	1%	-	3%	3%	1%	0%	0%	3%	4%	3%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

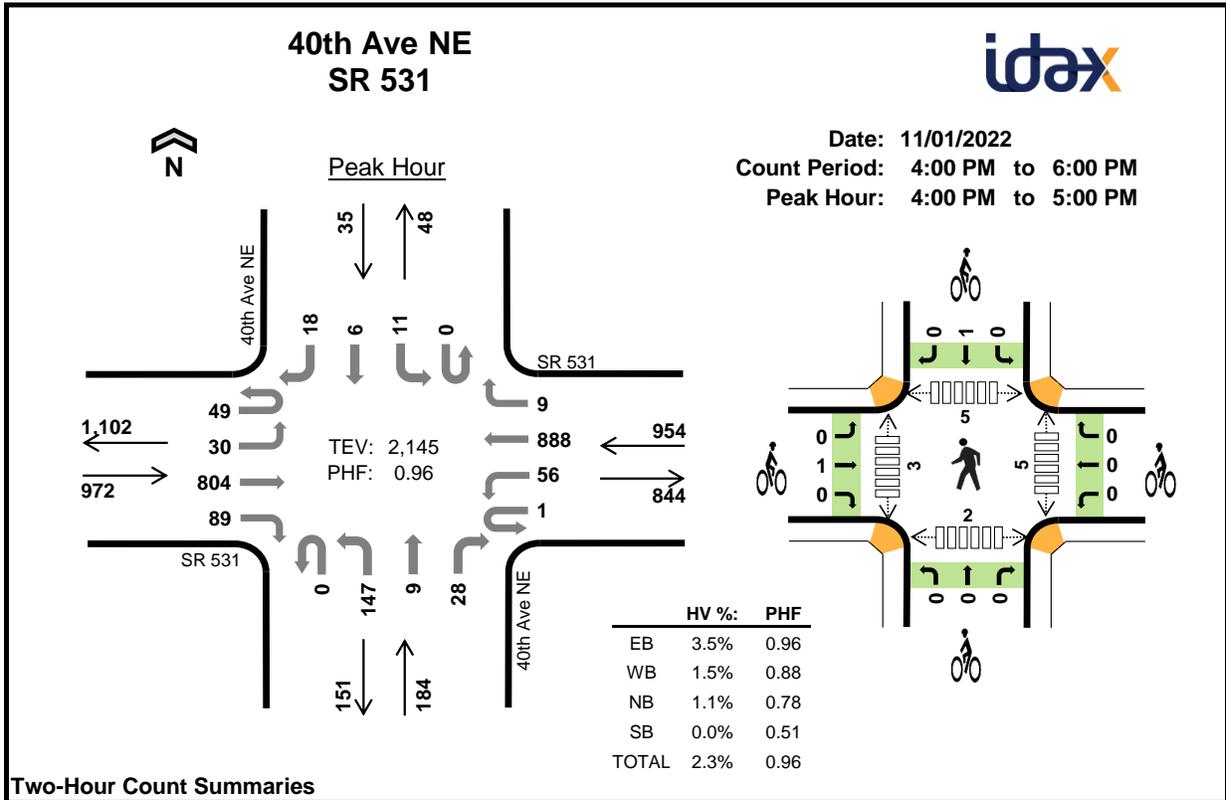
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	19	8	7	6	40	0	0	0	0	0	4	3	2	2	11
4:15 PM	14	3	8	5	30	0	0	0	0	0	5	4	9	3	21
4:30 PM	12	3	5	4	24	0	0	0	0	0	4	3	2	1	10
4:45 PM	19	3	8	2	32	0	0	0	0	0	2	2	3	5	12
5:00 PM	16	1	6	4	27	0	0	0	0	0	1	3	2	2	8
5:15 PM	15	3	4	6	28	0	0	0	0	0	2	1	9	1	13
5:30 PM	15	1	5	3	24	0	0	0	0	0	6	3	4	1	14
5:45 PM	21	2	4	3	30	0	0	0	0	0	3	1	3	1	8
Count Total	131	24	47	33	235	0	0	0	0	0	27	20	34	16	97
Peak Hour	64	17	28	17	126	0	0	0	0	0	15	12	16	11	54

<b>Two-Hour Count Summaries - Heavy Vehicles</b>														15-min Total	Rolling One Hour			
Interval Start	SR 531				SR 531				Smokey Point Blvd				Smokey Point Blvd					
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	5	8	6	0	1	5	2	0	5	2	0	0	0	1	5	40	0
4:15 PM	0	4	6	4	0	1	2	0	0	4	4	0	0	0	2	3	30	0
4:30 PM	1	0	10	1	0	0	3	0	0	3	2	0	0	0	2	2	24	0
4:45 PM	0	6	9	4	0	2	1	0	0	4	3	1	0	0	2	0	32	126
5:00 PM	0	3	10	3	0	0	1	0	0	3	3	0	0	0	2	2	27	113
5:15 PM	0	5	5	5	0	1	2	0	0	2	1	1	0	0	2	4	28	111
5:30 PM	0	2	8	5	0	0	1	0	0	2	2	1	0	0	2	1	24	111
5:45 PM	0	4	11	6	0	0	2	0	0	3	1	0	0	1	1	1	30	109
Count Total	1	29	67	34	0	5	17	2	0	26	18	3	0	1	14	18	235	0
Peak Hour	1	15	33	15	0	4	11	2	0	16	11	1	0	0	7	10	126	0

<b>Two-Hour Count Summaries - Bikes</b>														15-min Total	Rolling One Hour			
Interval Start	SR 531			SR 531			Smokey Point Blvd			Smokey Point Blvd								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



**Two-Hour Count Summaries**

Interval Start	SR 531 Eastbound				SR 531 Westbound				40th Ave NE Northbound				40th Ave NE Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	14	10	195	31	1	13	233	3	0	31	3	5	0	7	4	6	556	0	
4:15 PM	15	4	203	22	0	15	198	3	0	32	2	10	0	3	0	4	511	0	
4:30 PM	9	5	190	20	0	11	258	2	0	47	3	9	0	0	0	2	556	0	
4:45 PM	11	11	216	16	0	17	199	1	0	37	1	4	0	1	2	6	522	2,145	
5:00 PM	13	4	177	22	0	17	186	2	0	56	3	11	0	1	2	5	499	2,088	
5:15 PM	16	8	229	16	0	11	199	4	0	25	4	12	0	3	0	4	531	2,108	
5:30 PM	6	2	216	18	1	15	177	4	0	29	3	12	0	5	1	7	496	2,048	
5:45 PM	9	4	197	24	0	14	158	0	0	31	1	13	0	1	3	1	456	1,982	
Count Total	93	48	1,623	169	2	113	1,608	19	0	288	20	76	0	21	12	35	4,127	0	
Peak Hour	All	49	30	804	89	1	56	888	9	0	147	9	28	0	11	6	18	2,145	0
	HV	0	1	33	0	0	0	14	0	0	1	0	1	0	0	0	0	50	0
	HV%	0%	3%	4%	0%	0%	0%	2%	0%	-	1%	0%	4%	-	0%	0%	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	8	5	1	0	14	0	0	0	0	0	0	1	1	0	2
4:15 PM	6	4	0	0	10	1	0	0	0	1	3	0	1	2	6
4:30 PM	10	3	0	0	13	0	0	0	1	1	1	1	2	0	4
4:45 PM	10	2	1	0	13	0	0	0	0	0	1	1	1	0	3
5:00 PM	9	2	0	0	11	1	0	0	0	1	1	1	4	0	6
5:15 PM	6	2	0	0	8	0	0	0	0	0	0	0	2	2	4
5:30 PM	8	2	1	1	12	0	0	0	0	0	0	2	1	1	4
5:45 PM	12	2	0	0	14	0	0	0	0	0	0	1	0	0	1
Count Total	69	22	3	1	95	2	0	0	1	3	6	7	12	5	30
Peak Hour	34	14	2	0	50	1	0	0	1	2	5	3	5	2	15

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	SR 531				SR 531				40th Ave NE				40th Ave NE				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	8	0	0	0	5	0	0	1	0	0	0	0	0	0	14	0
4:15 PM	0	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	10	0
4:30 PM	0	0	10	0	0	0	3	0	0	0	0	0	0	0	0	0	13	0
4:45 PM	0	1	9	0	0	0	2	0	0	0	0	1	0	0	0	0	13	50
5:00 PM	0	0	8	1	0	1	1	0	0	0	0	0	0	0	0	0	11	47
5:15 PM	0	0	6	0	0	0	2	0	0	0	0	0	0	0	0	0	8	45
5:30 PM	0	0	8	0	0	1	1	0	0	0	1	0	0	0	0	1	12	44
5:45 PM	0	0	12	0	0	0	2	0	0	0	0	0	0	0	0	0	14	45
Count Total	0	1	67	1	0	2	20	0	0	1	1	1	0	0	0	1	95	0
Peak Hour	0	1	33	0	0	0	14	0	0	1	0	1	0	0	0	0	50	0

<b>Two-Hour Count Summaries - Bikes</b>																
Interval Start	SR 531			SR 531			40th Ave NE			40th Ave NE			15-min Total	Rolling One Hour		
	Eastbound			Westbound			Northbound			Southbound						
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT				
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	1	0		
4:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	0		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2		
5:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	1	3		
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2		
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
Count Total	0	2	0	0	0	0	0	0	0	0	1	0	3	0		
Peak Hour	0	1	0	0	0	0	0	0	0	0	1	0	2	0		

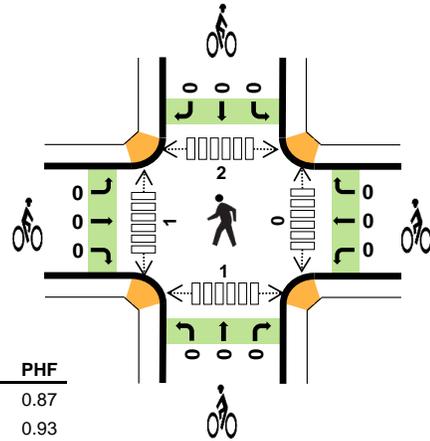
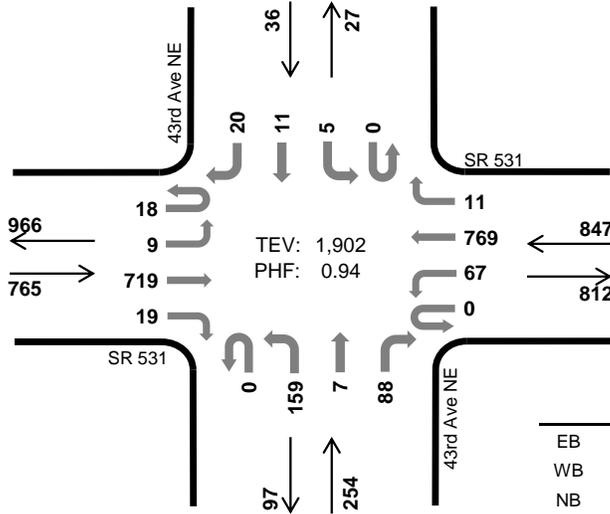
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

### 43rd Ave NE SR 531



Peak Hour

Date: 11/01/2022  
Count Period: 4:00 PM to 6:00 PM  
Peak Hour: 4:00 PM to 5:00 PM



	HV %:	PHF
EB	4.4%	0.87
WB	1.4%	0.93
NB	0.4%	0.67
SB	0.0%	0.75
TOTAL	2.5%	0.94

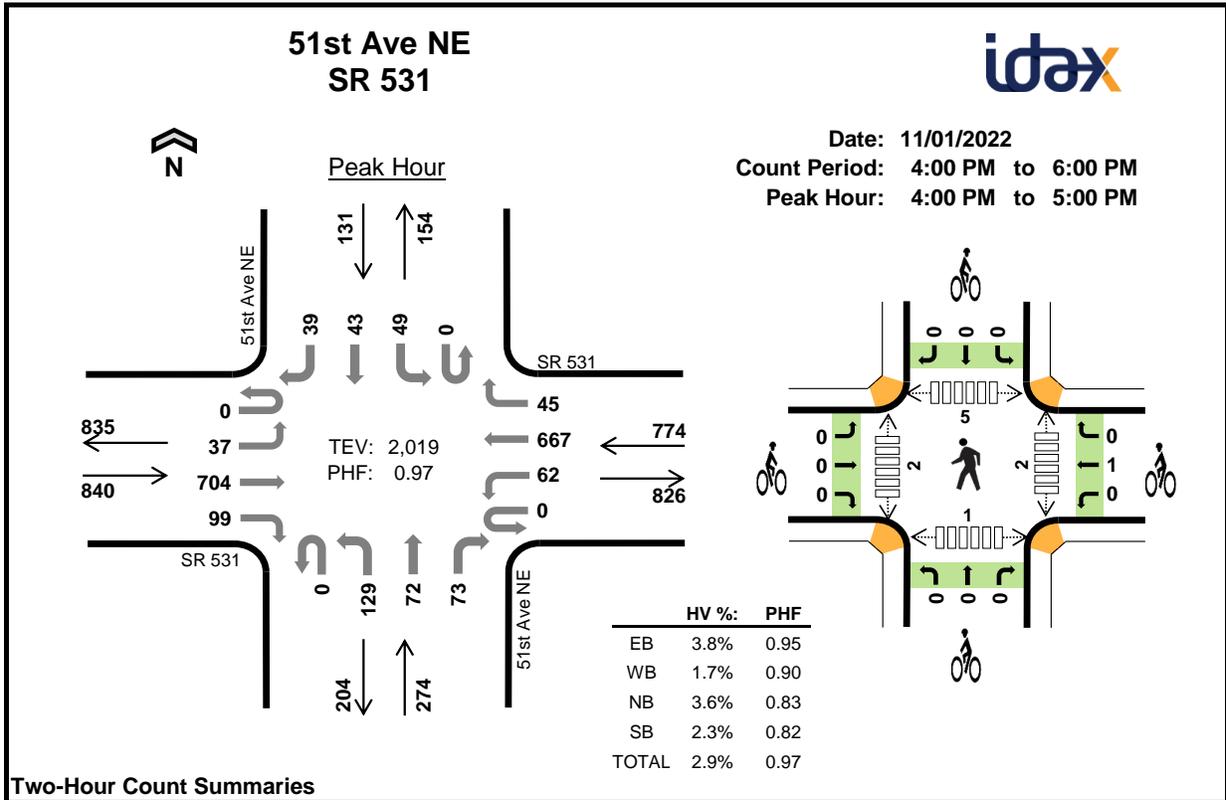
#### Two-Hour Count Summaries

Interval Start	SR 531 Eastbound				SR 531 Westbound				43rd Ave NE Northbound				43rd Ave NE Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	3	0	168	8	0	16	200	3	0	37	1	29	0	2	4	6	477	0	
4:15 PM	6	3	203	7	0	18	188	3	0	24	1	17	0	1	2	3	476	0	
4:30 PM	4	4	162	2	0	13	211	3	0	68	2	25	0	2	2	6	504	0	
4:45 PM	5	2	186	2	0	20	170	2	0	30	3	17	0	0	3	5	445	1,902	
5:00 PM	2	2	186	6	0	20	190	2	0	18	2	29	0	4	5	3	469	1,894	
5:15 PM	8	4	194	2	0	19	185	0	0	29	4	29	0	1	2	3	480	1,898	
5:30 PM	6	1	188	2	0	17	161	2	0	20	7	14	0	1	3	2	424	1,818	
5:45 PM	7	3	188	8	1	23	129	2	0	31	1	24	0	2	2	2	423	1,796	
Count Total	41	19	1,475	37	1	146	1,434	17	0	257	21	184	0	13	23	30	3,698	0	
Peak Hour	All	18	9	719	19	0	67	769	11	0	159	7	88	0	5	11	20	1,902	0
	HV	1	0	33	0	0	0	12	0	0	1	0	0	0	0	0	0	47	0
	HV%	6%	0%	5%	0%	-	0%	2%	0%	-	1%	0%	0%	-	0%	0%	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	6	4	0	0	10	0	0	0	0	0	0	1	1	0	2
4:15 PM	9	5	0	0	14	0	0	0	0	0	0	0	1	1	2
4:30 PM	10	3	1	0	14	0	0	0	0	0	0	0	0	0	0
4:45 PM	9	0	0	0	9	0	0	0	0	0	0	0	0	0	0
5:00 PM	9	4	0	1	14	0	0	0	0	0	0	0	0	0	0
5:15 PM	6	4	0	0	10	0	0	0	0	0	0	0	1	1	2
5:30 PM	7	1	0	0	8	0	0	0	0	0	0	1	0	0	1
5:45 PM	13	2	0	0	15	0	0	0	0	0	0	0	0	0	0
Count Total	69	23	1	1	94	0	0	0	0	0	0	2	3	2	7
Peak Hour	34	12	1	0	47	0	0	0	0	0	0	1	2	1	4

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	SR 531				SR 531				43rd Ave NE				43rd Ave NE				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	6	0	0	0	4	0	0	0	0	0	0	0	0	10	0	
4:15 PM	0	0	9	0	0	0	5	0	0	0	0	0	0	0	0	14	0	
4:30 PM	0	0	10	0	0	0	3	0	0	1	0	0	0	0	0	14	0	
4:45 PM	1	0	8	0	0	0	0	0	0	0	0	0	0	0	0	9	47	
5:00 PM	0	0	9	0	0	0	4	0	0	0	0	0	0	1	14	51		
5:15 PM	0	0	6	0	0	1	3	0	0	0	0	0	0	0	10	47		
5:30 PM	0	0	7	0	0	0	1	0	0	0	0	0	0	0	8	41		
5:45 PM	0	0	11	2	0	0	2	0	0	0	0	0	0	0	15	47		
Count Total	1	0	66	2	0	1	22	0	0	1	0	0	0	1	94	0		
Peak Hour	1	0	33	0	0	0	12	0	0	1	0	0	0	0	47	0		
<b>Two-Hour Count Summaries - Bikes</b>																		
Interval Start	SR 531			SR 531			43rd Ave NE			43rd Ave NE			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
<i>Note: U-Turn volumes for bikes are included in Left-Turn, if any.</i>																		



**Two-Hour Count Summaries**

Interval Start	SR 531 Eastbound				SR 531 Westbound				51st Ave NE Northbound				51st Ave NE Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	10	181	29	0	17	162	11	0	36	22	25	0	12	8	8	521	0	
4:15 PM	0	14	180	19	0	17	167	12	0	33	12	10	0	13	10	4	491	0	
4:30 PM	0	5	169	25	0	14	190	11	0	21	17	20	0	10	12	18	512	0	
4:45 PM	0	8	174	26	0	14	148	11	0	39	21	18	0	14	13	9	495	2,019	
5:00 PM	0	4	160	26	0	10	161	12	0	33	19	24	0	16	8	12	485	1,983	
5:15 PM	0	11	184	35	0	13	154	7	0	35	16	21	0	12	9	13	510	2,002	
5:30 PM	0	9	195	23	0	13	137	5	0	39	20	13	1	15	9	10	489	1,979	
5:45 PM	0	6	183	23	0	10	140	4	0	26	9	15	0	11	12	11	450	1,934	
Count Total	0	67	1,426	206	0	108	1,259	73	0	262	136	146	1	103	81	85	3,953	0	
Peak Hour	All	0	37	704	99	0	62	667	45	0	129	72	73	0	49	43	39	2,019	0
	HV	0	1	30	1	0	5	6	2	0	4	3	3	0	1	2	0	58	0
	HV%	-	3%	4%	1%	-	8%	1%	4%	-	3%	4%	4%	-	2%	5%	0%	3%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	8	2	5	2	17	0	0	0	0	0	0	0	2	1	3
4:15 PM	6	5	2	0	13	0	0	0	0	0	0	1	1	0	2
4:30 PM	10	3	1	0	14	0	1	0	0	1	0	0	2	0	2
4:45 PM	8	3	2	1	14	0	0	0	0	0	2	1	0	0	3
5:00 PM	9	4	4	0	17	0	0	0	0	0	0	1	0	2	3
5:15 PM	6	5	0	1	12	0	0	0	0	0	0	0	0	0	0
5:30 PM	6	3	0	0	9	0	0	0	0	0	0	0	0	0	0
5:45 PM	11	3	1	1	16	0	0	0	0	0	0	0	0	1	1
Count Total	64	28	15	5	112	0	1	0	0	1	2	3	5	4	14
Peak Hour	32	13	10	3	58	0	1	0	0	1	2	2	5	1	10

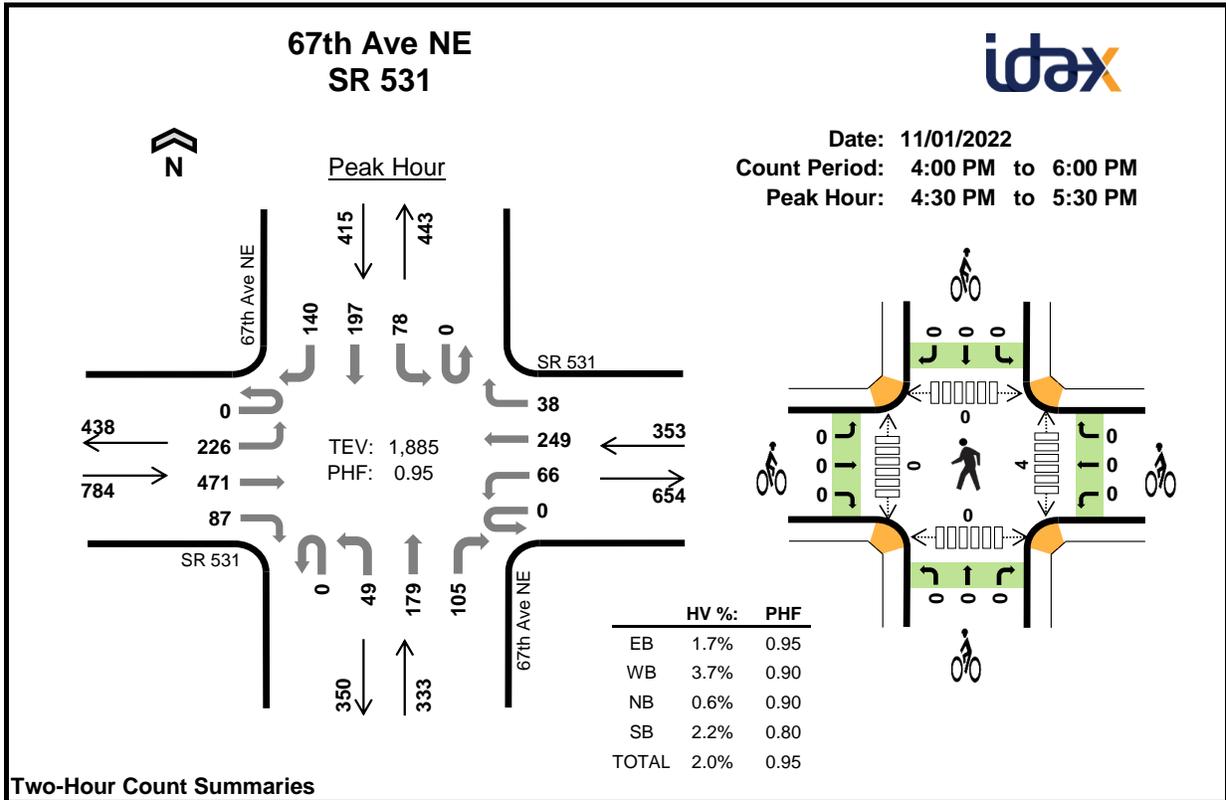
<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	SR 531				SR 531				51st Ave NE				51st Ave NE				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	1	7	0	0	0	1	1	0	3	1	1	0	1	1	0	17	0
4:15 PM	0	0	5	1	0	2	3	0	0	1	1	0	0	0	0	0	13	0
4:30 PM	0	0	10	0	0	1	2	0	0	0	0	1	0	0	0	0	14	0
4:45 PM	0	0	8	0	0	2	0	1	0	0	1	1	0	0	1	0	14	58
5:00 PM	0	0	9	0	0	0	3	1	0	1	2	1	0	0	0	0	17	58
5:15 PM	0	0	6	0	0	2	3	0	0	0	0	0	0	0	1	0	12	57
5:30 PM	0	0	6	0	0	1	2	0	0	0	0	0	0	0	0	0	9	52
5:45 PM	0	1	9	1	0	0	2	1	0	0	0	1	0	1	0	0	16	54
Count Total	0	2	60	2	0	8	16	4	0	5	5	5	0	2	3	0	112	0
Peak Hour	0	1	30	1	0	5	6	2	0	4	3	3	0	1	2	0	58	0

<b>Two-Hour Count Summaries - Bikes</b>																		
Interval Start	SR 531			SR 531			51st Ave NE			51st Ave NE			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Peak Hour	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	SR 531				SR 531				59th Ave NE				59th Ave NE				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	3	3	0	0	0	1	0	0	0	0	0	0	0	0	4	11	0
4:15 PM	0	2	4	0	0	0	3	1	0	0	0	0	0	0	0	1	11	0
4:30 PM	0	6	3	1	0	0	1	1	0	1	0	0	0	0	0	0	13	0
4:45 PM	0	1	4	4	0	0	1	0	0	0	0	0	0	0	0	2	12	47
5:00 PM	0	3	3	1	0	2	1	1	0	0	0	0	0	0	0	1	12	48
5:15 PM	0	1	7	1	0	1	4	0	0	1	0	0	0	0	0	0	15	52
5:30 PM	0	2	4	0	0	0	1	0	0	0	0	0	0	0	0	0	7	46
5:45 PM	0	2	2	6	0	0	4	0	0	0	0	0	0	0	0	0	14	48
Count Total	0	20	30	13	0	3	16	3	0	2	0	0	0	0	0	8	95	0
Peak Hour	0	12	14	5	0	0	6	2	0	1	0	0	0	0	0	7	47	0
<b>Two-Hour Count Summaries - Bikes</b>																		
Interval Start	SR 531			SR 531			59th Ave NE			59th Ave NE			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Note: U-Turn volumes for bikes are included in Left-Turn, if any.</i>																		



**Two-Hour Count Summaries**

Interval Start	SR 531				SR 531				67th Ave NE				67th Ave NE				15-min Total	Rolling One Hour	
	Eastbound		Westbound		Northbound		Southbound		Northbound		Southbound		Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	74	100	23	0	16	55	7	0	11	53	11	0	20	44	44	458	0	
4:15 PM	0	50	132	21	0	7	61	9	0	8	37	13	0	12	43	31	424	0	
<b>4:30 PM</b>	<b>0</b>	<b>53</b>	<b>102</b>	<b>30</b>	<b>0</b>	<b>22</b>	<b>53</b>	<b>13</b>	<b>0</b>	<b>16</b>	<b>53</b>	<b>23</b>	<b>0</b>	<b>27</b>	<b>60</b>	<b>43</b>	<b>495</b>	<b>0</b>	
4:45 PM	0	51	127	18	0	17	63	6	0	14	48	25	0	20	51	29	469	1,846	
5:00 PM	0	60	115	22	0	16	55	10	0	8	36	30	0	18	47	41	458	1,846	
5:15 PM	0	62	127	17	0	11	78	9	0	11	42	27	0	13	39	27	463	1,885	
5:30 PM	0	58	115	18	0	13	71	6	0	9	39	26	0	11	43	32	441	1,831	
5:45 PM	0	44	125	22	0	12	76	4	0	13	49	18	0	10	38	33	444	1,806	
Count Total	0	452	943	171	0	114	512	64	0	90	357	173	0	131	365	280	3,652	0	
Peak Hour	All	0	226	471	87	0	66	249	38	0	49	179	105	0	78	197	140	1,885	0
	HV	0	7	5	1	0	3	7	3	0	1	0	1	0	0	4	5	37	0
	HV%	-	3%	1%	1%	-	5%	3%	8%	-	2%	0%	1%	-	0%	2%	4%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

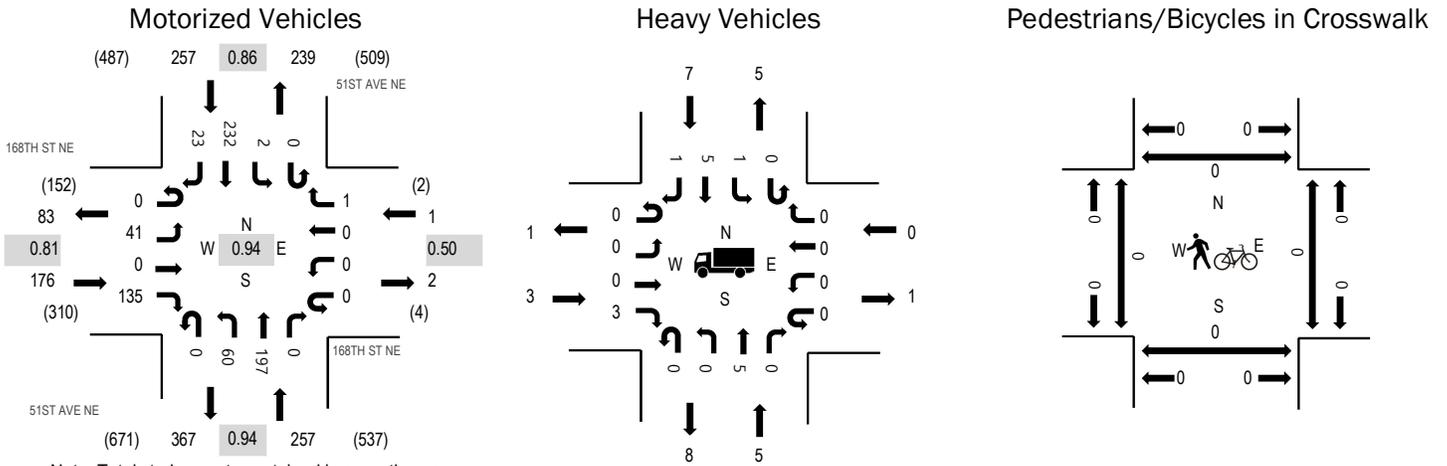
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	4	4	1	1	10	0	0	0	0	0	2	0	0	0	2
4:15 PM	5	0	0	3	8	0	0	0	0	0	0	0	0	0	0
<b>4:30 PM</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
4:45 PM	3	2	0	3	8	0	0	0	0	0	2	0	0	0	2
5:00 PM	3	5	0	1	9	0	0	0	0	0	0	0	0	0	0
5:15 PM	5	3	2	2	12	0	0	0	0	0	1	0	0	0	1
5:30 PM	1	1	1	2	5	0	0	0	0	0	1	0	0	0	1
5:45 PM	1	2	0	3	6	0	0	0	0	0	0	0	0	0	0
Count Total	24	20	4	18	66	0	0	0	0	0	7	0	0	0	7
Peak Hour	13	13	2	9	37	0	0	0	0	0	4	0	0	0	4

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	SR 531				SR 531				67th Ave NE				67th Ave NE				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	3	1	0	0	2	2	0	0	1	0	0	0	0	1	10	0
4:15 PM	0	2	1	2	0	0	0	0	0	0	0	0	0	0	0	3	8	0
<b>4:30 PM</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>8</b>	<b>0</b>
4:45 PM	0	0	3	0	0	1	1	0	0	0	0	0	0	0	0	3	8	34
5:00 PM	0	2	1	0	0	1	2	2	0	0	0	0	0	0	1	0	9	33
5:15 PM	0	4	0	1	0	1	2	0	0	1	0	1	0	0	0	2	12	37
5:30 PM	0	1	0	0	0	0	1	0	0	0	0	1	0	0	1	1	5	34
5:45 PM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	1	2	6	32
Count Total	0	10	10	4	0	3	12	5	0	1	1	2	0	0	6	12	66	0
Peak Hour	0	7	5	1	0	3	7	3	0	1	0	1	0	0	4	5	37	0

<b>Two-Hour Count Summaries - Bikes</b>																	
Interval Start	SR 531			SR 531			67th Ave NE			67th Ave NE			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>4:30 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

### Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	1.7%	0.81
WB	0.0%	0.50
NB	1.9%	0.94
SB	2.7%	0.86
All	2.2%	0.94

### Traffic Counts - Motorized Vehicles

Interval Start Time	168TH ST NE Eastbound				168TH ST NE Westbound				51ST AVE NE Northbound			51ST 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	10	0	28	0	0	0	1	0	15	52	1	0	1	69	5	182	688
4:15 PM	0	5	0	28	0	0	0	0	0	12	61	0	0	0	52	5	163	690
4:30 PM	0	7	0	28	0	0	0	0	0	19	48	0	0	1	68	8	179	691
4:45 PM	0	12	0	29	0	0	0	1	0	13	53	0	0	0	49	7	164	668
5:00 PM	0	14	0	40	0	0	0	0	0	15	50	0	0	0	57	8	184	648
5:15 PM	0	8	0	38	0	0	0	0	0	13	46	0	0	1	58	0	164	
5:30 PM	0	10	0	18	0	0	0	0	0	13	61	0	0	0	47	7	156	
5:45 PM	0	11	0	24	0	0	0	0	0	6	59	0	0	0	38	6	144	
Count Total	0	77	0	233	0	0	0	2	0	106	430	1	0	3	438	46	1,336	
Peak Hour	0	41	0	135	0	0	0	1	0	60	197	0	0	2	232	23	691	

### 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	0	5	0	2	7	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:15 PM	1	1	0	3	5	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:30 PM	2	4	0	2	8	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0
4:45 PM	1	1	0	1	3	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	1	1	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	3	3	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:30 PM	0	1	0	0	1	5:30 PM	0	0	0	0	0	5:30 PM	0	0	1	0	1
5:45 PM	0	1	0	0	1	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
Count Total	4	13	0	12	29	Count Total	0	0	0	0	0	Count Total	0	0	1	0	1
Peak Hour	3	5	0	7	15	Peak Hour	0	0	0	0	0	Peak Hour	0	0	0	0	0

## Appendix B: LOS Definitions

## Highway Capacity Manual 2010/6th Edition

**Signalized intersection** level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* and 6th Edition (Transportation Research Board, 2010 and 2016, respectively).

**Table 1. Level of Service Criteria for Signalized Intersections**

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F <sup>1</sup>	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010 and 6th Edition*, Transportation Research Board, 2010 and 2016, respectively.

1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

**Unsignalized intersection** LOS criteria can be further reduced into two intersection types: all-way stop and two-way stop control. All-way stop control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

**Table 2. Level of Service Criteria for Unsignalized Intersections**

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F <sup>1</sup>	>50

Source: *Highway Capacity Manual 2010 and 6th Edition*, Transportation Research Board, 2010 and 2016, respectively.

1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

## Highway Capacity Manual, 2000

**Signalized intersection** level of service (LOS) is defined in terms of the average total vehicle delay of all movements through an intersection. Vehicle delay is a method of quantifying several intangible factors, including driver discomfort, frustration, and lost travel time. Specifically, LOS criteria are stated in terms of average delay per vehicle during a specified time period (for example, the PM peak hour). Vehicle delay is a complex measure based on many variables, including signal phasing (i.e., progression of movements through the intersection), signal cycle length, and traffic volumes with respect to intersection capacity. Table 1 shows LOS criteria for signalized intersections, as described in the *Highway Capacity Manual* (Transportation Research Board, Special Report 209, 2000).

**Table 1. Level of Service Criteria for Signalized Intersections**

Level of Service	Average Control Delay (sec/veh)	General Description (Signalized Intersections)
A	≤10	Free Flow
B	>10 - 20	Stable Flow (slight delays)
C	>20 - 35	Stable flow (acceptable delays)
D	>35 - 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 - 80	Unstable flow (intolerable delay)
F	>80	Forced flow (jammed)

Source: *Highway Capacity Manual*, Transportation Research Board, Special Report 209, 2000.

**Unsignalized intersection** LOS criteria can be further reduced into two intersection types: all-way stop-controlled and two-way stop-controlled. All-way, stop-controlled intersection LOS is expressed in terms of the average vehicle delay of all of the movements, much like that of a signalized intersection. Two-way, stop-controlled intersection LOS is defined in terms of the average vehicle delay of an individual movement(s). This is because the performance of a two-way, stop-controlled intersection is more closely reflected in terms of its individual movements, rather than its performance overall. For this reason, LOS for a two-way, stop-controlled intersection is defined in terms of its individual movements. With this in mind, total average vehicle delay (i.e., average delay of all movements) for a two-way, stop-controlled intersection should be viewed with discretion. Table 2 shows LOS criteria for unsignalized intersections (both all-way and two-way, stop-controlled).

**Table 2. Level of Service Criteria for Unsignalized Intersections**

Level of Service	Average Control Delay (sec/veh)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

Source: *Highway Capacity Manual*, Transportation Research Board, Special Report 209, 2000.

## Appendix C: LOS Worksheets

HCM 6th Signalized Intersection Summary  
 1: I-5 SB On Ramp/I-5 SB Ramps & SR 531 (172nd St)

Arlington Brown Bear  
 Existing PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑	↗				↘	↖	↗
Traffic Volume (veh/h)	0	925	490	0	1190	545	0	0	0	255	5	245
Future Volume (veh/h)	0	925	490	0	1190	545	0	0	0	255	5	245
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	1687	1687	0	1575	1575				1826	1826	1826
Adj Flow Rate, veh/h	0	934	0	0	1202	0				262	0	0
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99				0.99	0.99	0.99
Percent Heavy Veh, %	0	1	1	0	2	2				5	5	5
Cap, veh/h	0	2581		0	2364					358	0	
Arrive On Green	0.00	0.81	0.00	0.00	1.00	0.00				0.10	0.00	0.00
Sat Flow, veh/h	0	3289	1429	0	3071	1335				3478	0	1547
Grp Volume(v), veh/h	0	934	0	0	1202	0				262	0	0
Grp Sat Flow(s),veh/h/ln	0	1602	1429	0	1496	1335				1739	0	1547
Q Serve(g_s), s	0.0	10.4	0.0	0.0	0.0	0.0				9.5	0.0	0.0
Cycle Q Clear(g_c), s	0.0	10.4	0.0	0.0	0.0	0.0				9.5	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	2581		0	2364					358	0	
V/C Ratio(X)	0.00	0.36		0.00	0.51					0.73	0.00	
Avail Cap(c_a), veh/h	0	2581		0	2364					915	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	2.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.00	0.51	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	3.5	0.0	0.0	0.0	0.0				56.6	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.4	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	2.7	0.0	0.0	0.1	0.0				4.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	3.9	0.0	0.0	0.4	0.0				61.4	0.0	0.0
LnGrp LOS	A	A		A	A					E	A	
Approach Vol, veh/h		934			1202						262	
Approach Delay, s/veh		3.9			0.4						61.4	
Approach LOS		A			A						E	
Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		110.8		19.2		110.8						
Change Period (Y+Rc), s		* 6.1		* 5.8		6.1						
Max Green Setting (Gmax), s		* 84		* 34		83.9						
Max Q Clear Time (g_c+I1), s		12.4		11.5		2.0						
Green Ext Time (p_c), s		12.5		1.6		19.5						

Intersection Summary

HCM 6th Ctrl Delay	8.4
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.

HCM 6th Signalized Intersection Summary  
 2: I-5 NB Off Ramp/I-5 NB On Ramp & SR 531 (172nd St)

Arlington Brown Bear  
 Existing PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑			↑↑↑	↗	↘	↗	↗			
Traffic Volume (veh/h)	345	860	0	0	1250	475	540	5	700	0	0	0
Future Volume (veh/h)	345	860	0	0	1250	475	540	5	700	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	1660	1660	0	0	1575	1575	1841	1841	1841			
Adj Flow Rate, veh/h	356	887	0	0	1289	0	561	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, %	3	3	0	0	2	2	4	4	4			
Cap, veh/h	366	2215	0	0	1774		696	0				
Arrive On Green	0.46	1.00	0.00	0.00	0.41	0.00	0.20	0.00	0.00			
Sat Flow, veh/h	1581	3237	0	0	4442	1335	3506	0	1560			
Grp Volume(v), veh/h	356	887	0	0	1289	0	561	0	0			
Grp Sat Flow(s),veh/h/ln	1581	1577	0	0	1433	1335	1753	0	1560			
Q Serve(g_s), s	28.6	0.0	0.0	0.0	32.7	0.0	19.8	0.0	0.0			
Cycle Q Clear(g_c), s	28.6	0.0	0.0	0.0	32.7	0.0	19.8	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	366	2215	0	0	1774		696	0				
V/C Ratio(X)	0.97	0.40	0.00	0.00	0.73		0.81	0.00				
Avail Cap(c_a), veh/h	406	2215	0	0	1774		949	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)	0.92	0.92	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	34.6	0.0	0.0	0.0	32.0	0.0	49.7	0.0	0.0			
Incr Delay (d2), s/veh	34.6	0.5	0.0	0.0	2.6	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	12.0	0.2	0.0	0.0	11.5	0.0	8.9	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.1	0.5	0.0	0.0	34.7	0.0	54.6	0.0	0.0			
LnGrp LOS	E	A	A	A	C		D	A				
Approach Vol, veh/h		1243			1289			561				
Approach Delay, s/veh		20.2			34.7			54.6				
Approach LOS		C			C			D				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		98.4			36.7	61.7		31.6				
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			30.6	34.7		21.8				
Green Ext Time (p_c), s		11.7			0.4	6.1		3.1				

Intersection Summary

HCM 6th Ctrl Delay	32.5
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.

HCM Signalized Intersection Capacity Analysis  
3: Smokey Pt Blvd & SR 531 (172nd St)

Arlington Brown Bear  
Existing PM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations		↖	↗	↘		↖	↗	↘	↖	↗	↘	
Traffic Volume (vph)	70	390	695	350	20	190	815	150	495	430	205	5
Future Volume (vph)	70	390	695	350	20	190	815	150	495	430	205	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	6.5	6.5		8.5	9.5	9.5	5.5	5.9	5.9	
Lane Util. Factor		1.00	0.95	1.00		1.00	0.91	1.00	0.97	0.95	1.00	
Frbp, ped/bikes		1.00	1.00	0.97		1.00	1.00	0.97	1.00	1.00	0.97	
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Frt		1.00	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected		0.95	1.00	1.00		0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1736	3471	1514		1770	5085	1537	3400	3505	1524	
Flt Permitted		0.95	1.00	1.00		0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)		1736	3471	1514		1770	5085	1537	3400	3505	1524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	424	755	380	22	207	886	163	538	467	223	5
RTOR Reduction (vph)	0	0	0	212	0	0	0	127	0	0	157	0
Lane Group Flow (vph)	0	500	755	168	0	229	886	36	538	467	66	0
Confl. Peds. (#/hr)		16		11		11		16	12		15	
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%	2%	2%	3%	3%	3%	2%
Turn Type	Prot	Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	NA	Perm	Prot
Protected Phases	5 15	5 15	2		1	1	6		3	8		7
Permitted Phases				2			6				8	
Actuated Green, G (s)		37.0	53.7	53.7		23.3	35.5	35.5	19.8	29.2	29.2	
Effective Green, g (s)		37.0	53.7	53.7		20.3	32.5	32.5	19.8	29.2	29.2	
Actuated g/C Ratio		0.25	0.37	0.37		0.14	0.22	0.22	0.14	0.20	0.20	
Clearance Time (s)			6.5	6.5		5.5	6.5	6.5	5.5	5.9	5.9	
Vehicle Extension (s)			3.0	3.0		2.5	3.0	3.0	2.5	3.0	3.0	
Lane Grp Cap (vph)		439	1274	556		245	1130	341	460	700	304	
v/s Ratio Prot		c0.29	0.22			0.13	c0.17		c0.16	c0.13		
v/s Ratio Perm				0.11				0.02			0.04	
v/c Ratio		1.14	0.59	0.30		0.93	0.78	0.11	1.17	0.67	0.22	
Uniform Delay, d1		54.6	37.4	32.9		62.3	53.5	45.3	63.2	54.0	48.9	
Progression Factor		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		86.8	0.7	0.3		39.7	3.6	0.1	97.4	2.4	0.4	
Delay (s)		141.4	38.1	33.2		102.0	57.2	45.4	160.6	56.4	49.3	
Level of Service		F	D	C		F	E	D	F	E	D	
Approach Delay (s)			68.6				63.7			100.8		
Approach LOS			E				E			F		
<b>Intersection Summary</b>												
HCM 2000 Control Delay			72.7				HCM 2000 Level of Service				E	
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			146.2				Sum of lost time (s)				30.9	
Intersection Capacity Utilization			108.4%				ICU Level of Service				G	
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 3: Smokey Pt Blvd & SR 531 (172nd St)

Arlington Brown Bear  
 Existing PM Peak Hour



Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (vph)	150	280	295
Future Volume (vph)	150	280	295
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	5.5	5.9	5.9
Lane Util. Factor	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00
Frt	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1543
Flt Permitted	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1543
Peak-hour factor, PHF	0.92	0.92	0.92
Adj. Flow (vph)	163	304	321
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	168	304	321
Confl. Peds. (#/hr)	15		12
Heavy Vehicles (%)	2%	2%	2%
Turn Type	Prot	NA	custom
Protected Phases	7	4	
Permitted Phases			4 6
Actuated Green, G (s)	16.6	26.0	61.5
Effective Green, g (s)	16.6	26.0	61.5
Actuated g/C Ratio	0.11	0.18	0.42
Clearance Time (s)	5.5	5.9	
Vehicle Extension (s)	2.5	3.0	
Lane Grp Cap (vph)	200	629	649
v/s Ratio Prot	0.09	0.09	
v/s Ratio Perm			0.21
v/c Ratio	0.84	0.48	0.49
Uniform Delay, d1	63.5	54.1	31.0
Progression Factor	1.00	1.00	1.00
Incremental Delay, d2	25.0	0.6	0.6
Delay (s)	88.5	54.6	31.6
Level of Service	F	D	C
Approach Delay (s)		52.5	
Approach LOS		D	
<b>Intersection Summary</b>			

HCM Signalized Intersection Capacity Analysis  
4: 40th Ave NE & SR 531 (172nd St)

Arlington Brown Bear  
Existing PM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations		↔	↕			↔	↕		↔	↕	↔	↕
Traffic Volume (vph)	50	30	830	90	5	60	915	10	150	10	30	10
Future Volume (vph)	50	30	830	90	5	60	915	10	150	10	30	10
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		4.5	4.0			4.5	4.0		4.5	4.0	4.0	4.5
Lane Util. Factor		1.00	0.95			1.00	0.95		1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	1.00			1.00	1.00		1.00	1.00	0.97	1.00
Flpb, ped/bikes		1.00	1.00			1.00	1.00		1.00	1.00	1.00	0.99
Frt		1.00	0.99			1.00	1.00		1.00	1.00	0.85	1.00
Flt Protected		0.95	1.00			0.95	1.00		0.95	1.00	1.00	0.95
Satd. Flow (prot)		1553	3049			1583	3160		1593	1683	1395	1592
Flt Permitted		0.13	1.00			0.15	1.00		0.48	1.00	1.00	0.75
Satd. Flow (perm)		214	3049			242	3160		802	1683	1395	1259
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	52	31	865	94	5	62	953	10	156	10	31	10
RTOR Reduction (vph)	0	0	7	0	0	0	1	0	0	0	19	0
Lane Group Flow (vph)	0	83	952	0	0	68	962	0	156	10	12	10
Confl. Peds. (#/hr)		8		5		7		10	5		7	10
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%	2%	2%	1%	1%	1%	0%
Turn Type	custom	pm+pt	NA		custom	pm+pt	NA		pm+pt	NA	Perm	pm+pt
Protected Phases		7	4			3	8		5	2		1
Permitted Phases	7	4			3	8			2		2	6
Actuated Green, G (s)		46.6	39.6			44.8	38.7		44.9	39.4	39.4	9.2
Effective Green, g (s)		46.6	39.6			44.8	38.7		44.9	39.4	39.4	9.2
Actuated g/C Ratio		0.45	0.38			0.43	0.38		0.44	0.38	0.38	0.09
Clearance Time (s)		4.5	4.0			4.5	4.0		4.5	4.0	4.0	4.5
Vehicle Extension (s)		3.0	3.0			3.0	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		187	1171			184	1186		596	643	533	115
v/s Ratio Prot		c0.03	c0.31			0.02	0.30		c0.08	0.01		0.00
v/s Ratio Perm		0.17				0.14			c0.03		0.01	0.01
v/c Ratio		0.44	0.81			0.37	0.81		0.26	0.02	0.02	0.09
Uniform Delay, d1		19.2	28.4			19.4	28.9		18.3	19.8	19.8	43.0
Progression Factor		1.00	1.00			1.00	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		1.7	4.4			1.3	4.3		0.2	0.0	0.1	0.3
Delay (s)		20.9	32.9			20.7	33.2		18.6	19.8	19.9	43.4
Level of Service		C	C			C	C		B	B	B	D
Approach Delay (s)			31.9				32.4			18.8		
Approach LOS			C				C			B		
<b>Intersection Summary</b>												
HCM 2000 Control Delay			31.2			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			103.1			Sum of lost time (s)			17.0			
Intersection Capacity Utilization			64.7%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
 4: 40th Ave NE & SR 531 (172nd St)

Arlington Brown Bear  
 Existing PM Peak Hour



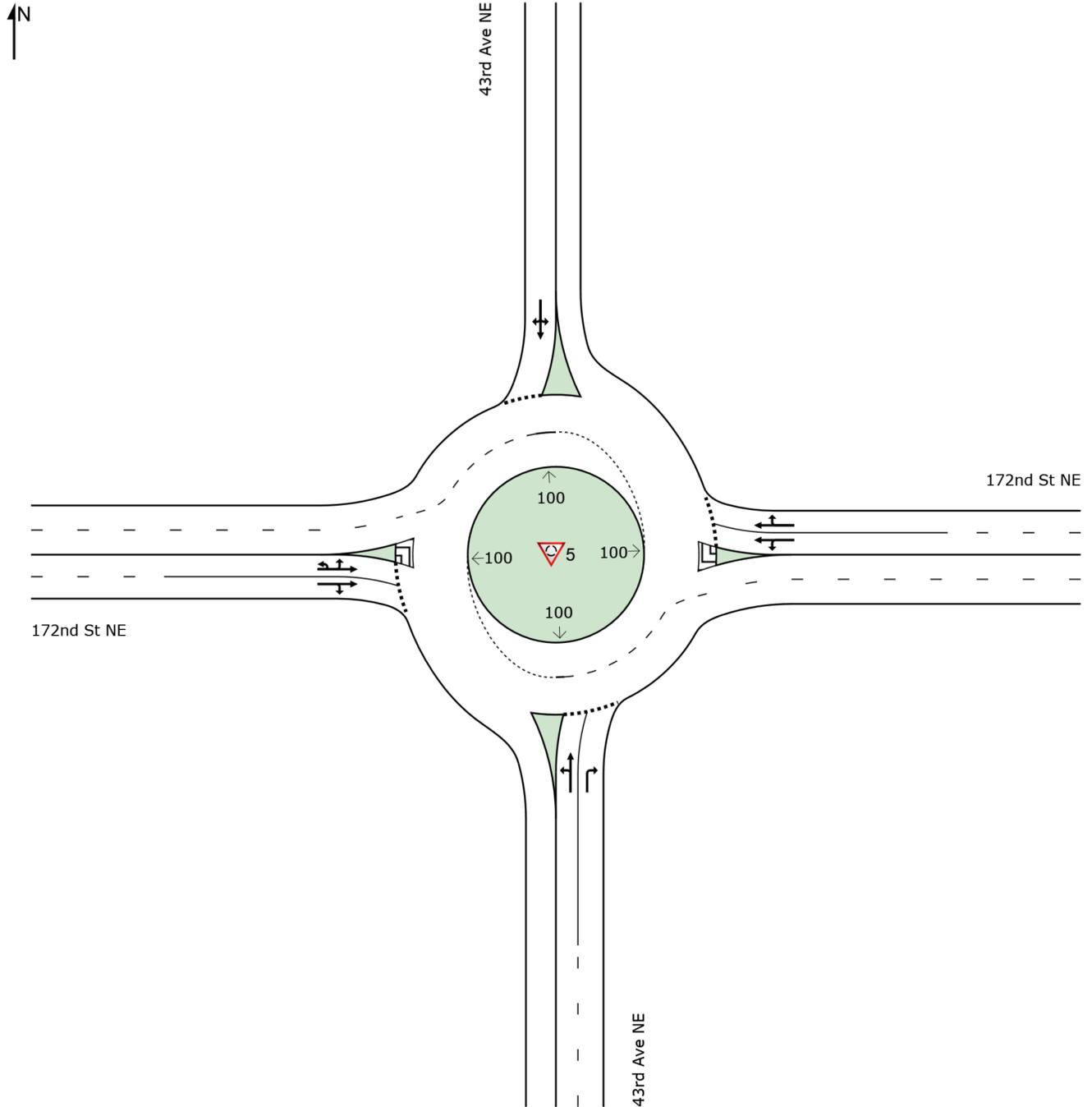
Movement	SBT	SBR
Lane Configurations	P	
Traffic Volume (vph)	5	20
Future Volume (vph)	5	20
Ideal Flow (vphpl)	1700	1700
Total Lost time (s)	4.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	0.98	
Flpb, ped/bikes	1.00	
Frt	0.88	
Flt Protected	1.00	
Satd. Flow (prot)	1458	
Flt Permitted	1.00	
Satd. Flow (perm)	1458	
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	5	21
RTOR Reduction (vph)	19	0
Lane Group Flow (vph)	7	0
Confl. Peds. (#/hr)	8	
Confl. Bikes (#/hr)	1	
Heavy Vehicles (%)	0%	0%
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	8.2	
Effective Green, g (s)	8.2	
Actuated g/C Ratio	0.08	
Clearance Time (s)	4.0	
Vehicle Extension (s)	3.0	
Lane Grp Cap (vph)	115	
v/s Ratio Prot	0.00	
v/s Ratio Perm		
v/c Ratio	0.06	
Uniform Delay, d1	43.9	
Progression Factor	1.00	
Incremental Delay, d2	0.2	
Delay (s)	44.1	
Level of Service	D	
Approach Delay (s)	43.9	
Approach LOS	D	
<b>Intersection Summary</b>		

# SITE LAYOUT

Site: 5 [5. 172nd Street NE/43rd Avenue NE (Site Folder: Existing 2023)]

Existing PM Peak Hour  
Site Category: (None)  
Roundabout

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



# MOVEMENT SUMMARY

**Site: 5 [5. 172nd Street NE/43rd Avenue NE (Site Folder: Existing 2023)]**

Existing PM Peak Hour  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist ] ft				
South: 43rd Ave NE														
3	L2	165	0.0	176	0.0	0.191	11.9	LOS B	0.8	19.5	0.55	0.81	0.55	33.9
8	T1	5	0.0	5	0.0	0.191	6.0	LOS A	0.8	19.5	0.55	0.81	0.55	33.7
18	R2	90	0.0	96	0.0	0.131	6.8	LOS A	0.5	12.3	0.56	0.74	0.56	35.3
Approach		260	0.0	277	0.0	0.191	10.0	LOS B	0.8	19.5	0.56	0.79	0.56	34.4
East: 172nd St NE														
1	L2	70	1.0	74	1.0	0.381	11.2	LOS B	2.7	68.6	0.52	0.55	0.52	35.9
6	T1	790	1.0	840	1.0	0.381	5.3	LOS A	2.8	70.2	0.51	0.52	0.51	36.1
16	R2	10	1.0	11	1.0	0.381	5.2	LOS A	2.8	70.2	0.50	0.50	0.50	35.0
Approach		870	1.0	926	1.0	0.381	5.8	LOS A	2.8	70.2	0.51	0.52	0.51	36.1
North: 43rd Ave NE														
7	L2	5	0.0	5	0.0	0.052	12.2	LOS B	0.2	4.6	0.56	0.70	0.56	36.2
4	T1	10	0.0	11	0.0	0.052	6.3	LOS A	0.2	4.6	0.56	0.70	0.56	36.0
14	R2	20	0.0	21	0.0	0.052	6.3	LOS A	0.2	4.6	0.56	0.70	0.56	35.0
Approach		35	0.0	37	0.0	0.052	7.2	LOS A	0.2	4.6	0.56	0.70	0.56	35.4
West: 172nd St NE														
5u	U	20	4.0	21	4.0	0.320	12.9	LOS B	2.2	57.2	0.33	0.44	0.33	37.6
5	L2	10	4.0	11	4.0	0.320	10.4	LOS B	2.2	57.2	0.33	0.44	0.33	36.6
2	T1	740	4.0	787	4.0	0.320	4.5	LOS A	2.2	57.8	0.32	0.43	0.32	36.8
12	R2	20	4.0	21	4.0	0.320	4.6	LOS A	2.2	57.8	0.32	0.41	0.32	35.6
Approach		790	4.0	840	4.0	0.320	4.8	LOS A	2.2	57.8	0.32	0.43	0.32	36.8
All Vehicles		1955	2.1	2080	2.1	0.381	6.0	LOS A	2.8	70.2	0.44	0.52	0.44	36.1

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: HCM Queue Formula.

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

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

HCM 6th Signalized Intersection Summary  
6: 51st Ave NE & SR 531

Arlington Brown Bear  
Existing PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	725	100	65	685	45	135	75	75	50	45	40
Future Volume (veh/h)	40	725	100	65	685	45	135	75	75	50	45	40
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		0.98	1.00		1.00	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	1453	1453	1453	1575	1575	1575	1647	1647	1647	1673	1673	1673
Adj Flow Rate, veh/h	41	747	103	67	706	46	139	77	77	52	46	41
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
Percent Heavy Veh, %	4	4	4	2	2	2	4	4	4	2	2	2
Cap, veh/h	282	838	116	172	978	64	203	284	240	207	140	125
Arrive On Green	0.01	0.67	0.67	0.01	0.67	0.69	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1384	1249	172	1500	1460	95	1284	1647	1391	1230	813	725
Grp Volume(v), veh/h	41	0	850	67	0	752	139	77	77	52	0	87
Grp Sat Flow(s),veh/h/ln	1384	0	1421	1500	0	1555	1284	1647	1391	1230	0	1538
Q Serve(g_s), s	1.2	0.0	78.3	1.7	0.0	49.4	17.0	6.5	7.8	6.1	0.0	7.9
Cycle Q Clear(g_c), s	1.2	0.0	78.3	1.7	0.0	49.4	25.0	6.5	7.8	12.6	0.0	7.9
Prop In Lane	1.00		0.12	1.00		0.06	1.00		1.00	1.00		0.47
Lane Grp Cap(c), veh/h	282	0	954	172	0	1041	203	284	240	207	0	265
V/C Ratio(X)	0.15	0.00	0.89	0.39	0.00	0.72	0.69	0.27	0.32	0.25	0.00	0.33
Avail Cap(c_a), veh/h	416	0	954	320	0	1041	254	350	296	250	0	318
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.87	0.00	0.87	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.6	0.0	21.5	37.5	0.0	16.8	69.0	57.5	58.0	63.0	0.0	58.1
Incr Delay (d2), s/veh	0.2	0.0	12.3	0.9	0.0	3.8	5.4	0.5	0.8	0.6	0.0	0.7
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	0.6	0.0	28.1	1.7	0.0	18.2	5.9	2.7	2.8	2.0	0.0	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.7	0.0	33.9	38.4	0.0	20.6	74.4	58.0	58.8	63.6	0.0	58.8
LnGrp LOS	C	A	C	D	A	C	E	E	E	E	A	E
Approach Vol, veh/h		891			819			293				139
Approach Delay, s/veh		33.3			22.1			66.0				60.6
Approach LOS		C			C			E				E
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.2	116.3		33.5	10.5	116.0		33.5				
Change Period (Y+Rc), s	5.5	5.9		* 5.9	6.3	* 5.9		5.9				
Max Green Setting (Gmax), s	20.5	89.1		* 34	19.7	* 90		33.1				
Max Q Clear Time (g_c+I1), s	4.7	81.3		27.0	4.2	51.4		14.6				
Green Ext Time (p_c), s	0.1	4.6		0.6	0.0	9.7		0.5				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				35.2								
HCM 6th LOS				D								
<b>Notes</b>												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

HCM 6th Signalized Intersection Summary  
7: 59th Ave NE & SR 531/SR 531 (172nd St)

Arlington Brown Bear  
Existing PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (veh/h)	120	740	10	5	460	20	30	0	10	45	5	325
Future Volume (veh/h)	120	740	10	5	460	20	30	0	10	45	5	325
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		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	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1550	1550	1550	1624	1624	1624	1673	1673	1673	1673	1673	1673
Adj Flow Rate, veh/h	122	755	10	5	469	20	31	0	10	46	5	332
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
Percent Heavy Veh, %	4	4	4	2	2	2	2	2	2	2	2	2
Cap, veh/h	131	903	12	6	783	33	38	0	312	57	5	325
Arrive On Green	0.18	1.00	1.00	0.00	0.51	0.51	0.02	0.00	0.22	0.04	0.23	0.23
Sat Flow, veh/h	1476	1526	20	1547	1546	66	1594	0	1418	1594	21	1400
Grp Volume(v), veh/h	122	0	765	5	0	489	31	0	10	46	0	337
Grp Sat Flow(s),veh/h/ln	1476	0	1546	1547	0	1612	1594	0	1418	1594	0	1421
Q Serve(g_s), s	13.0	0.0	0.0	0.5	0.0	34.4	3.1	0.0	0.9	4.6	0.0	37.1
Cycle Q Clear(g_c), s	13.0	0.0	0.0	0.5	0.0	34.4	3.1	0.0	0.9	4.6	0.0	37.1
Prop In Lane	1.00		0.01	1.00		0.04	1.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	131	0	915	6	0	817	38	0	312	57	0	330
V/C Ratio(X)	0.93	0.00	0.84	0.87	0.00	0.60	0.81	0.00	0.03	0.80	0.00	1.02
Avail Cap(c_a), veh/h	309	0	915	140	0	817	95	0	329	95	0	330
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.49	0.00	0.49	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	65.3	0.0	0.0	79.7	0.0	28.0	77.7	0.0	49.0	76.6	0.0	61.5
Incr Delay (d2), s/veh	13.4	0.0	4.6	134.3	0.0	3.2	32.3	0.0	0.1	22.2	0.0	55.4
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	4.9	0.0	1.2	0.4	0.0	13.9	1.6	0.0	0.3	2.2	0.0	18.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	78.7	0.0	4.6	214.0	0.0	31.2	110.1	0.0	49.1	98.8	0.0	116.9
LnGrp LOS	E	A	A	F	A	C	F	A	D	F	A	F
Approach Vol, veh/h		887			494			41				383
Approach Delay, s/veh		14.8			33.0			95.2				114.7
Approach LOS		B			C			F				F
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.1	101.6	9.3	43.0	20.7	86.9	11.2	41.1				
Change Period (Y+Rc), s	5.5	5.9	5.5	5.9	5.5	5.9	5.5	5.9				
Max Green Setting (Gmax), s	14.5	76.1	9.5	37.1	34.5	56.1	9.5	37.1				
Max Q Clear Time (g_c+I1), s	2.5	2.0	5.1	39.1	15.0	36.4	6.6	2.9				
Green Ext Time (p_c), s	0.0	10.4	0.0	0.0	0.3	4.1	0.0	0.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				42.8								
HCM 6th LOS				D								

HCM 6th Signalized Intersection Summary  
 8: 67th Ave NE & SR 531 (172nd St)

Arlington Brown Bear  
 Existing PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	235	485	90	70	255	40	50	185	110	80	205	145
Future Volume (veh/h)	235	485	90	70	255	40	50	185	110	80	205	145
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	1673	1673	1673	1647	1647	1647	1687	1687	1687	1673	1673	1673
Adj Flow Rate, veh/h	247	511	95	74	268	42	53	195	116	84	216	153
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	4	4	4	1	1	1	2	2	2
Cap, veh/h	611	950	805	402	716	112	101	206	123	144	206	146
Arrive On Green	0.09	0.57	0.57	0.03	0.51	0.51	0.04	0.21	0.21	0.05	0.23	0.23
Sat Flow, veh/h	1594	1673	1418	1569	1390	218	1606	987	587	1594	908	643
Grp Volume(v), veh/h	247	511	95	74	0	310	53	0	311	84	0	369
Grp Sat Flow(s),veh/h/ln	1594	1673	1418	1569	0	1608	1606	0	1574	1594	0	1551
Q Serve(g_s), s	11.3	30.4	5.0	3.6	0.0	18.5	4.1	0.0	31.2	6.6	0.0	36.3
Cycle Q Clear(g_c), s	11.3	30.4	5.0	3.6	0.0	18.5	4.1	0.0	31.2	6.6	0.0	36.3
Prop In Lane	1.00		1.00	1.00		0.14	1.00		0.37	1.00		0.41
Lane Grp Cap(c), veh/h	611	950	805	402	0	828	101	0	329	144	0	352
V/C Ratio(X)	0.40	0.54	0.12	0.18	0.00	0.37	0.52	0.00	0.95	0.58	0.00	1.05
Avail Cap(c_a), veh/h	771	950	805	642	0	828	246	0	336	259	0	352
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.8	21.5	16.0	18.7	0.0	23.3	50.8	0.0	62.4	49.3	0.0	61.9
Incr Delay (d2), s/veh	0.4	2.2	0.3	0.2	0.0	1.3	4.1	0.0	35.3	3.7	0.0	61.6
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	4.2	12.4	1.7	1.3	0.0	7.4	1.8	0.0	15.7	2.8	0.0	20.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.2	23.7	16.3	18.9	0.0	24.6	54.9	0.0	97.8	53.0	0.0	123.5
LnGrp LOS	B	C	B	B	A	C	D	A	F	D	A	F
Approach Vol, veh/h		853			384			364				453
Approach Delay, s/veh		20.7			23.5			91.5				110.4
Approach LOS		C			C			F				F
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.5	96.7	10.6	42.2	18.9	88.3	13.5	39.3				
Change Period (Y+Rc), s	5.0	5.9	5.0	5.9	5.0	5.9	5.0	5.9				
Max Green Setting (Gmax), s	30.0	54.1	20.0	34.1	30.0	54.1	20.0	34.1				
Max Q Clear Time (g_c+I1), s	5.6	32.4	6.1	38.3	13.3	20.5	8.6	33.2				
Green Ext Time (p_c), s	0.2	5.1	0.1	0.0	0.6	2.8	0.1	0.2				

Intersection Summary												
HCM 6th Ctrl Delay				53.6								
HCM 6th LOS				D								

Intersection												
Int Delay, s/veh	4.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	40	0	135	0	0	5	60	195	0	5	230	25
Future Vol, veh/h	40	0	135	0	0	5	60	195	0	5	230	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	0	0	0	2	2	2	3	3	3
Mvmt Flow	43	0	144	0	0	5	64	207	0	5	245	27

Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	607	604	259	676	617	207	272	0	0	207	0	0
Stage 1	269	269	-	335	335	-	-	-	-	-	-	-
Stage 2	338	335	-	341	282	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.1	6.5	6.2	4.12	-	-	4.13	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.5	4	3.3	2.218	-	-	2.227	-	-
Pot Cap-1 Maneuver	408	412	780	370	408	839	1291	-	-	1358	-	-
Stage 1	737	687	-	683	646	-	-	-	-	-	-	-
Stage 2	676	643	-	678	681	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	387	387	780	288	384	839	1291	-	-	1358	-	-
Mov Cap-2 Maneuver	387	387	-	288	384	-	-	-	-	-	-	-
Stage 1	696	684	-	645	610	-	-	-	-	-	-	-
Stage 2	634	607	-	551	678	-	-	-	-	-	-	-

Approach	EB		WB			NB			SB		
HCM Control Delay, s	13		9.3			1.9			0.1		
HCM LOS	B		A								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1291	-	-	633	839	1358	-	-
HCM Lane V/C Ratio	0.049	-	-	0.294	0.006	0.004	-	-
HCM Control Delay (s)	7.9	0	-	13	9.3	7.7	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.2	0	0	-	-

HCM 6th Signalized Intersection Summary  
 1: I-5 SB On Ramp/I-5 SB Ramps & SR 531 (172nd St)

Arlington Brown Bear  
 Future (2024) Without-Project PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑	↗				↘	↖	↗
Traffic Volume (veh/h)	0	960	505	0	1245	750	0	0	0	440	5	250
Future Volume (veh/h)	0	960	505	0	1245	750	0	0	0	440	5	250
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	1687	1687	0	1575	1575				1826	1826	1826
Adj Flow Rate, veh/h	0	970	0	0	1258	0				448	0	0
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99				0.99	0.99	0.99
Percent Heavy Veh, %	0	1	1	0	2	2				5	5	5
Cap, veh/h	0	2396		0	2192					559	0	
Arrive On Green	0.00	0.75	0.00	0.00	1.00	0.00				0.16	0.00	0.00
Sat Flow, veh/h	0	3289	1429	0	3071	1335				3478	0	1547
Grp Volume(v), veh/h	0	970	0	0	1258	0				448	0	0
Grp Sat Flow(s),veh/h/ln	0	1602	1429	0	1496	1335				1739	0	1547
Q Serve(g_s), s	0.0	14.2	0.0	0.0	0.0	0.0				16.1	0.0	0.0
Cycle Q Clear(g_c), s	0.0	14.2	0.0	0.0	0.0	0.0				16.1	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	2396		0	2192					559	0	
V/C Ratio(X)	0.00	0.40		0.00	0.57					0.80	0.00	
Avail Cap(c_a), veh/h	0	2396		0	2192					915	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	2.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.00	0.20	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.9	0.0	0.0	0.0	0.0				52.6	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.0	0.2	0.0				4.6	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	4.3	0.0	0.0	0.1	0.0				7.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	6.4	0.0	0.0	0.2	0.0				57.1	0.0	0.0
LnGrp LOS	A	A		A	A					E	A	
Approach Vol, veh/h		970			1258						448	
Approach Delay, s/veh		6.4			0.2						57.1	
Approach LOS		A			A						E	
Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		103.3		26.7		103.3						
Change Period (Y+Rc), s		* 6.1		* 5.8		6.1						
Max Green Setting (Gmax), s		* 84		* 34		83.9						
Max Q Clear Time (g_c+I1), s		16.2		18.1		2.0						
Green Ext Time (p_c), s		13.3		2.6		21.2						

Intersection Summary

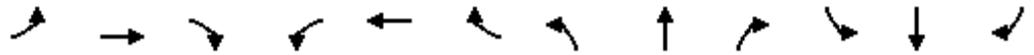
HCM 6th Ctrl Delay	12.0
HCM 6th LOS	B

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.

HCM 6th Signalized Intersection Summary  
 2: I-5 NB Off Ramp/I-5 NB On Ramp & SR 531 (172nd St)

Arlington Brown Bear  
 Future (2024) Without-Project PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑			↑↑↑	↗	↘	↗	↗			
Traffic Volume (veh/h)	355	1070	0	0	1495	680	555	5	885	0	0	0
Future Volume (veh/h)	355	1070	0	0	1495	680	555	5	885	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	1660	1660	0	0	1575	1575	1841	1841	1841			
Adj Flow Rate, veh/h	366	1103	0	0	1541	0	576	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, %	3	3	0	0	2	2	4	4	4			
Cap, veh/h	375	2203	0	0	1732		710	0				
Arrive On Green	0.47	1.00	0.00	0.00	0.40	0.00	0.20	0.00	0.00			
Sat Flow, veh/h	1581	3237	0	0	4442	1335	3506	0	1560			
Grp Volume(v), veh/h	366	1103	0	0	1541	0	576	0	0			
Grp Sat Flow(s),veh/h/ln	1581	1577	0	0	1433	1335	1753	0	1560			
Q Serve(g_s), s	29.5	0.0	0.0	0.0	43.4	0.0	20.4	0.0	0.0			
Cycle Q Clear(g_c), s	29.5	0.0	0.0	0.0	43.4	0.0	20.4	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	375	2203	0	0	1732		710	0				
V/C Ratio(X)	0.98	0.50	0.00	0.00	0.89		0.81	0.00				
Avail Cap(c_a), veh/h	406	2203	0	0	1732		949	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)	0.88	0.88	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	33.8	0.0	0.0	0.0	36.1	0.0	49.5	0.0	0.0			
Incr Delay (d2), s/veh	34.6	0.7	0.0	0.0	7.3	0.0	5.2	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	12.3	0.2	0.0	0.0	16.0	0.0	9.1	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.5	0.7	0.0	0.0	43.5	0.0	54.6	0.0	0.0			
LnGrp LOS	E	A	A	A	D		D	A				
Approach Vol, veh/h		1469			1541			576				
Approach Delay, s/veh		17.6			43.5			54.6				
Approach LOS		B			D			D				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		97.9			37.4	60.4		32.1				
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			31.5	45.4		22.4				
Green Ext Time (p_c), s		16.7			0.4	0.0		3.1				

Intersection Summary

HCM 6th Ctrl Delay	34.7
HCM 6th LOS	C

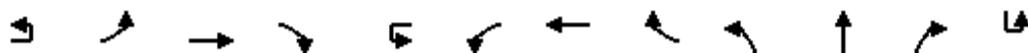
Notes

- 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.

# HCM Signalized Intersection Capacity Analysis

## 3: Smokey Pt Blvd & SR 531 (172nd St)

Arlington Brown Bear  
Future (2024) Without-Project PM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations		↘	↕	↗		↘	↕	↗	↘	↕	↗	
Traffic Volume (vph)	70	400	1045	380	20	255	1185	235	560	445	270	5
Future Volume (vph)	70	400	1045	380	20	255	1185	235	560	445	270	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	6.5	6.5		8.5	9.5	9.5	5.5	5.9	5.9	
Lane Util. Factor		1.00	0.95	1.00		1.00	0.91	1.00	0.97	0.95	1.00	
Frbp, ped/bikes		1.00	1.00	0.97		1.00	1.00	0.97	1.00	1.00	0.97	
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Frt		1.00	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected		0.95	1.00	1.00		0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1736	3471	1513		1770	5085	1535	3400	3505	1522	
Flt Permitted		0.95	1.00	1.00		0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)		1736	3471	1513		1770	5085	1535	3400	3505	1522	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	435	1136	413	22	277	1288	255	609	484	293	5
RTOR Reduction (vph)	0	0	0	161	0	0	0	134	0	0	197	0
Lane Group Flow (vph)	0	511	1136	252	0	299	1288	121	609	484	96	0
Confl. Peds. (#/hr)		16		11		11		16	12		15	
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%	2%	2%	3%	3%	3%	2%
Turn Type	Prot	Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	NA	Perm	Prot
Protected Phases	5 15	5 15	2		1	1	6		3	8		7
Permitted Phases				2				6			8	
Actuated Green, G (s)		40.6	54.0	54.0		28.8	43.2	43.2	23.6	30.3	30.3	
Effective Green, g (s)		40.6	54.0	54.0		25.8	40.2	40.2	23.6	30.3	30.3	
Actuated g/C Ratio		0.26	0.35	0.35		0.17	0.26	0.26	0.15	0.19	0.19	
Clearance Time (s)			6.5	6.5		5.5	6.5	6.5	5.5	5.9	5.9	
Vehicle Extension (s)			3.0	3.0		2.5	3.0	3.0	2.5	3.0	3.0	
Lane Grp Cap (vph)		453	1205	525		293	1314	396	516	682	296	
v/s Ratio Prot		c0.29	c0.33			0.17	c0.25		c0.18	c0.14		
v/s Ratio Perm				0.17				0.08			0.06	
v/c Ratio		1.13	0.94	0.48		1.02	0.98	0.31	1.18	0.71	0.32	
Uniform Delay, d1		57.5	49.2	39.8		64.8	57.3	46.4	66.0	58.5	53.8	
Progression Factor		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		82.2	14.3	0.7		57.9	20.1	0.4	99.7	3.4	0.6	
Delay (s)		139.6	63.5	40.5		122.8	77.4	46.8	165.6	61.9	54.4	
Level of Service		F	E	D		F	E	D	F	E	D	
Approach Delay (s)			77.8				80.5			105.9		
Approach LOS			E				F			F		
<b>Intersection Summary</b>												
HCM 2000 Control Delay			86.5				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			1.15									
Actuated Cycle Length (s)			155.5				Sum of lost time (s)			30.9		
Intersection Capacity Utilization			115.4%				ICU Level of Service			H		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 3: Smokey Pt Blvd & SR 531 (172nd St)

Arlington Brown Bear  
 Future (2024) Without-Project PM Peak Hour



Movement	SBL	SBT	SBR
Lane Configurations	↵	↑↑	↵
Traffic Volume (vph)	235	290	305
Future Volume (vph)	235	290	305
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	5.5	5.9	5.9
Lane Util. Factor	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00
Frt	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1542
Flt Permitted	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1542
Peak-hour factor, PHF	0.92	0.92	0.92
Adj. Flow (vph)	255	315	332
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	260	315	332
Confl. Peds. (#/hr)	15		12
Heavy Vehicles (%)	2%	2%	2%
Turn Type	Prot	NA	custom
Protected Phases	7	4	
Permitted Phases			4 6
Actuated Green, G (s)	19.0	25.7	68.9
Effective Green, g (s)	19.0	25.7	68.9
Actuated g/C Ratio	0.12	0.17	0.44
Clearance Time (s)	5.5	5.9	
Vehicle Extension (s)	2.5	3.0	
Lane Grp Cap (vph)	216	584	683
v/s Ratio Prot	c0.15	0.09	
v/s Ratio Perm			0.22
v/c Ratio	1.20	0.54	0.49
Uniform Delay, d1	68.2	59.5	30.7
Progression Factor	1.00	1.00	1.00
Incremental Delay, d2	127.2	1.0	0.5
Delay (s)	195.4	60.4	31.3
Level of Service	F	E	C
Approach Delay (s)		88.5	
Approach LOS		F	
<b>Intersection Summary</b>			

HCM Signalized Intersection Capacity Analysis  
4: 40th Ave NE & SR 531 (172nd St)

Arlington Brown Bear  
Future (2024) Without-Project PM Peak Hour

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	50	30	1325	95	5	60	1430	10	155	10	30	10
Future Volume (vph)	50	30	1325	95	5	60	1430	10	155	10	30	10
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		4.5	4.0			4.5	4.0		4.5	4.0	4.0	4.5
Lane Util. Factor		1.00	0.95			1.00	0.95		1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	1.00			1.00	1.00		1.00	1.00	0.97	1.00
Flpb, ped/bikes		1.00	1.00			1.00	1.00		0.99	1.00	1.00	0.98
Frt		1.00	0.99			1.00	1.00		1.00	1.00	0.85	1.00
Flt Protected		0.95	1.00			0.95	1.00		0.95	1.00	1.00	0.95
Satd. Flow (prot)		1553	3066			1583	3162		1590	1683	1388	1584
Flt Permitted		0.05	1.00			0.07	1.00		0.55	1.00	1.00	0.75
Satd. Flow (perm)		89	3066			124	3162		920	1683	1388	1253
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	52	31	1380	99	5	62	1490	10	161	10	31	10
RTOR Reduction (vph)	0	0	3	0	0	0	0	0	0	0	22	0
Lane Group Flow (vph)	0	83	1476	0	0	68	1500	0	161	10	9	10
Confl. Peds. (#/hr)		8		5		7		10	5		7	10
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%	2%	2%	1%	1%	1%	0%
Turn Type	custom	pm+pt	NA		custom	pm+pt	NA		pm+pt	NA	Perm	pm+pt
Protected Phases		7	4			3	8		5	2		1
Permitted Phases	7	4			3	8			2		2	6
Actuated Green, G (s)		84.8	75.2			78.6	72.1		45.2	38.3	38.3	15.4
Effective Green, g (s)		84.8	75.2			78.6	72.1		45.2	38.3	38.3	15.4
Actuated g/C Ratio		0.61	0.54			0.56	0.52		0.32	0.27	0.27	0.11
Clearance Time (s)		4.5	4.0			4.5	4.0		4.5	4.0	4.0	4.5
Vehicle Extension (s)		3.0	3.0			3.0	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		154	1653			137	1635		431	462	381	144
v/s Ratio Prot		c0.04	c0.48			0.02	0.47		c0.07	0.01		0.00
v/s Ratio Perm		0.29				0.25			c0.05		0.01	0.01
v/c Ratio		0.54	0.89			0.50	0.92		0.37	0.02	0.02	0.07
Uniform Delay, d1		24.8	28.5			22.0	30.9		35.5	36.9	36.9	55.5
Progression Factor		1.00	1.00			1.00	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		3.6	6.6			2.8	8.5		0.5	0.1	0.1	0.2
Delay (s)		28.4	35.1			24.8	39.4		36.0	37.0	37.0	55.7
Level of Service		C	D			C	D		D	D	D	E
Approach Delay (s)			34.7				38.8			36.2		
Approach LOS			C				D			D		
<b>Intersection Summary</b>												
HCM 2000 Control Delay			36.9			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			139.4			Sum of lost time (s)			17.0			
Intersection Capacity Utilization			80.2%			ICU Level of Service				D		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis  
 4: 40th Ave NE & SR 531 (172nd St)

Arlington Brown Bear  
 Future (2024) Without-Project PM Peak Hour



Movement	SBT	SBR
Lane Configurations	P	
Traffic Volume (vph)	5	20
Future Volume (vph)	5	20
Ideal Flow (vphpl)	1700	1700
Total Lost time (s)	4.0	
Lane Util. Factor	1.00	
Frbp, ped/bikes	0.97	
Flpb, ped/bikes	1.00	
Frt	0.88	
Flt Protected	1.00	
Satd. Flow (prot)	1452	
Flt Permitted	1.00	
Satd. Flow (perm)	1452	
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	5	21
RTOR Reduction (vph)	19	0
Lane Group Flow (vph)	7	0
Confl. Peds. (#/hr)		8
Confl. Bikes (#/hr)		1
Heavy Vehicles (%)	0%	0%
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	13.0	
Effective Green, g (s)	13.0	
Actuated g/C Ratio	0.09	
Clearance Time (s)	4.0	
Vehicle Extension (s)	3.0	
Lane Grp Cap (vph)	135	
v/s Ratio Prot	0.00	
v/s Ratio Perm		
v/c Ratio	0.05	
Uniform Delay, d1	57.6	
Progression Factor	1.00	
Incremental Delay, d2	0.2	
Delay (s)	57.7	
Level of Service	E	
Approach Delay (s)	57.2	
Approach LOS	E	
<b>Intersection Summary</b>		

# MOVEMENT SUMMARY

**Site: 5 [5. 172nd Street NE/43rd Avenue NE (Site Folder: Baseline 2024)]**

Future (2024) Without-Project PM Peak Hour  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist ft				
South: 43rd Ave NE														
3	L2	460	0.0	489	0.0	0.554	14.0	LOS B	3.7	93.0	0.80	0.99	0.98	33.1
8	T1	5	0.0	5	0.0	0.554	8.1	LOS A	3.7	93.0	0.80	0.99	0.98	33.0
18	R2	95	0.0	101	0.0	0.172	7.8	LOS A	0.7	18.3	0.68	0.83	0.68	34.8
Approach		560	0.0	596	0.0	0.554	12.9	LOS B	3.7	93.0	0.78	0.97	0.93	33.4
East: 172nd St NE														
1	L2	140	1.0	149	1.0	0.629	16.1	LOS B	6.8	170.8	0.91	0.94	1.10	33.8
6	T1	1010	1.0	1074	1.0	0.629	9.3	LOS A	7.2	181.7	0.90	0.89	1.06	34.4
16	R2	10	1.0	11	1.0	0.629	8.8	LOS A	7.2	181.7	0.90	0.86	1.04	33.7
Approach		1160	1.0	1234	1.0	0.629	10.1	LOS B	7.2	181.7	0.91	0.90	1.07	34.4
North: 43rd Ave NE														
7	L2	5	0.0	5	0.0	0.073	14.4	LOS B	0.4	8.8	0.78	0.85	0.78	35.2
4	T1	10	0.0	11	0.0	0.073	8.6	LOS A	0.4	8.8	0.78	0.85	0.78	35.0
14	R2	20	0.0	21	0.0	0.073	8.5	LOS A	0.4	8.8	0.78	0.85	0.78	34.0
Approach		35	0.0	37	0.0	0.073	9.4	LOS A	0.4	8.8	0.78	0.85	0.78	34.4
West: 172nd St NE														
5u	U	20	4.0	21	4.0	0.520	13.6	LOS B	4.8	122.8	0.58	0.52	0.58	36.8
5	L2	10	4.0	11	4.0	0.520	11.1	LOS B	4.8	122.8	0.58	0.52	0.58	35.8
2	T1	1050	4.0	1117	4.0	0.520	5.2	LOS A	4.9	127.5	0.57	0.51	0.57	36.0
12	R2	200	4.0	213	4.0	0.520	5.1	LOS A	4.9	127.5	0.55	0.50	0.55	34.9
Approach		1280	4.0	1362	4.0	0.520	5.3	LOS A	4.9	127.5	0.56	0.51	0.56	35.8
All Vehicles		3035	2.1	3229	2.1	0.629	8.6	LOS A	7.2	181.7	0.74	0.74	0.83	34.8

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: HCM Queue Formula.

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

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

HCM 6th Signalized Intersection Summary  
6: 51st Ave NE & SR 531

Arlington Brown Bear  
Future (2024) Without-Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	845	210	155	760	45	335	85	140	50	70	55
Future Volume (veh/h)	70	845	210	155	760	45	335	85	140	50	70	55
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		0.98	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	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1453	1453	1453	1575	1575	1575	1647	1647	1647	1673	1673	1673
Adj Flow Rate, veh/h	72	871	216	160	784	46	345	88	144	52	72	57
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
Percent Heavy Veh, %	4	4	4	2	2	2	4	4	4	2	2	2
Cap, veh/h	485	911	226	114	810	48	279	422	357	291	221	175
Arrive On Green	0.31	0.81	0.81	0.02	0.18	0.19	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	1384	1123	279	1500	1471	86	1239	1647	1392	1147	864	684
Grp Volume(v), veh/h	72	0	1087	160	0	830	345	88	144	52	0	129
Grp Sat Flow(s),veh/h/ln	1384	0	1402	1500	0	1557	1239	1647	1392	1147	0	1547
Q Serve(g_s), s	0.0	0.0	104.2	7.4	0.0	84.7	30.2	6.7	13.7	6.0	0.0	10.8
Cycle Q Clear(g_c), s	0.0	0.0	104.2	7.4	0.0	84.7	41.0	6.7	13.7	12.7	0.0	10.8
Prop In Lane	1.00		0.20	1.00		0.06	1.00		1.00	1.00		0.44
Lane Grp Cap(c), veh/h	485	0	1137	114	0	858	279	422	357	291	0	396
V/C Ratio(X)	0.15	0.00	0.96	1.40	0.00	0.97	1.24	0.21	0.40	0.18	0.00	0.33
Avail Cap(c_a), veh/h	485	0	1137	115	0	890	279	422	357	291	0	396
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.73	0.00	0.73	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.0	0.0	12.7	46.9	0.0	64.0	67.3	46.8	49.4	51.7	0.0	48.3
Incr Delay (d2), s/veh	0.1	0.0	18.0	214.0	0.0	19.5	133.9	0.2	0.7	0.3	0.0	0.5
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	2.0	0.0	32.3	11.7	0.0	40.3	21.8	2.8	4.9	1.8	0.0	4.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.1	0.0	30.6	260.8	0.0	83.5	201.3	47.0	50.1	52.0	0.0	48.8
LnGrp LOS	D	A	C	F	A	F	F	D	D	D	A	D
Approach Vol, veh/h		1159			990			577				181
Approach Delay, s/veh		31.1			112.2			140.0				49.7
Approach LOS		C			F			F				D
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.9	140.3		46.9	59.5	96.7		46.9				
Change Period (Y+Rc), s	5.5	* 6.3		* 5.9	6.3	5.5		5.9				
Max Green Setting (Gmax), s	10.5	* 92		* 41	7.7	94.5		40.1				
Max Q Clear Time (g_c+I1), s	10.4	107.2		43.0	3.0	86.7		14.7				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	4.5		0.9				

Intersection Summary

HCM 6th Ctrl Delay	81.5
HCM 6th LOS	F

Notes

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

HCM 6th Signalized Intersection Summary  
7: 59th Ave NE & SR 531/SR 531 (172nd St)

Arlington Brown Bear  
Future (2024) Without-Project PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	905	10	5	610	20	30	0	10	45	5	345
Future Volume (veh/h)	140	905	10	5	610	20	30	0	10	45	5	345
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		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	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1550	1550	1550	1624	1624	1624	1673	1673	1673	1673	1673	1673
Adj Flow Rate, veh/h	143	923	10	5	622	20	31	0	10	46	5	352
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
Percent Heavy Veh, %	4	4	4	2	2	2	2	2	2	2	2	2
Cap, veh/h	153	906	10	6	770	25	38	0	312	57	5	325
Arrive On Green	0.21	1.00	1.00	0.00	0.49	0.49	0.02	0.00	0.22	0.04	0.23	0.23
Sat Flow, veh/h	1476	1531	17	1547	1565	50	1594	0	1418	1594	20	1401
Grp Volume(v), veh/h	143	0	933	5	0	642	31	0	10	46	0	357
Grp Sat Flow(s),veh/h/ln	1476	0	1547	1547	0	1615	1594	0	1418	1594	0	1421
Q Serve(g_s), s	15.2	0.0	94.7	0.5	0.0	53.6	3.1	0.0	0.9	4.6	0.0	37.1
Cycle Q Clear(g_c), s	15.2	0.0	94.7	0.5	0.0	53.6	3.1	0.0	0.9	4.6	0.0	37.1
Prop In Lane	1.00		0.01	1.00		0.03	1.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	153	0	916	6	0	795	38	0	312	57	0	330
V/C Ratio(X)	0.94	0.00	1.02	0.87	0.00	0.81	0.81	0.00	0.03	0.80	0.00	1.08
Avail Cap(c_a), veh/h	309	0	916	140	0	795	95	0	329	95	0	330
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.09	0.00	0.09	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	62.9	0.0	0.0	79.7	0.0	34.2	77.7	0.0	49.0	76.6	0.0	61.5
Incr Delay (d2), s/veh	3.1	0.0	14.3	134.3	0.0	8.6	32.3	0.0	0.1	22.2	0.0	73.6
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	5.3	0.0	3.6	0.4	0.0	22.6	1.6	0.0	0.3	2.2	0.0	20.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.0	0.0	14.3	214.0	0.0	42.9	110.1	0.0	49.1	98.8	0.0	135.1
LnGrp LOS	E	A	F	F	A	D	F	A	D	F	A	F
Approach Vol, veh/h		1076			647			41			403	
Approach Delay, s/veh		21.2			44.2			95.2			130.9	
Approach LOS		C			D			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.1	101.6	9.3	43.0	23.0	84.6	11.2	41.1				
Change Period (Y+Rc), s	5.5	5.9	5.5	5.9	5.5	5.9	5.5	5.9				
Max Green Setting (Gmax), s	14.5	76.1	9.5	37.1	34.5	56.1	9.5	37.1				
Max Q Clear Time (g_c+I1), s	2.5	96.7	5.1	39.1	17.2	55.6	6.6	2.9				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				49.9								
HCM 6th LOS				D								

HCM 6th Signalized Intersection Summary  
8: 67th Ave NE & SR 531 (172nd St)

Arlington Brown Bear  
Future (2024) Without-Project PM Peak Hour



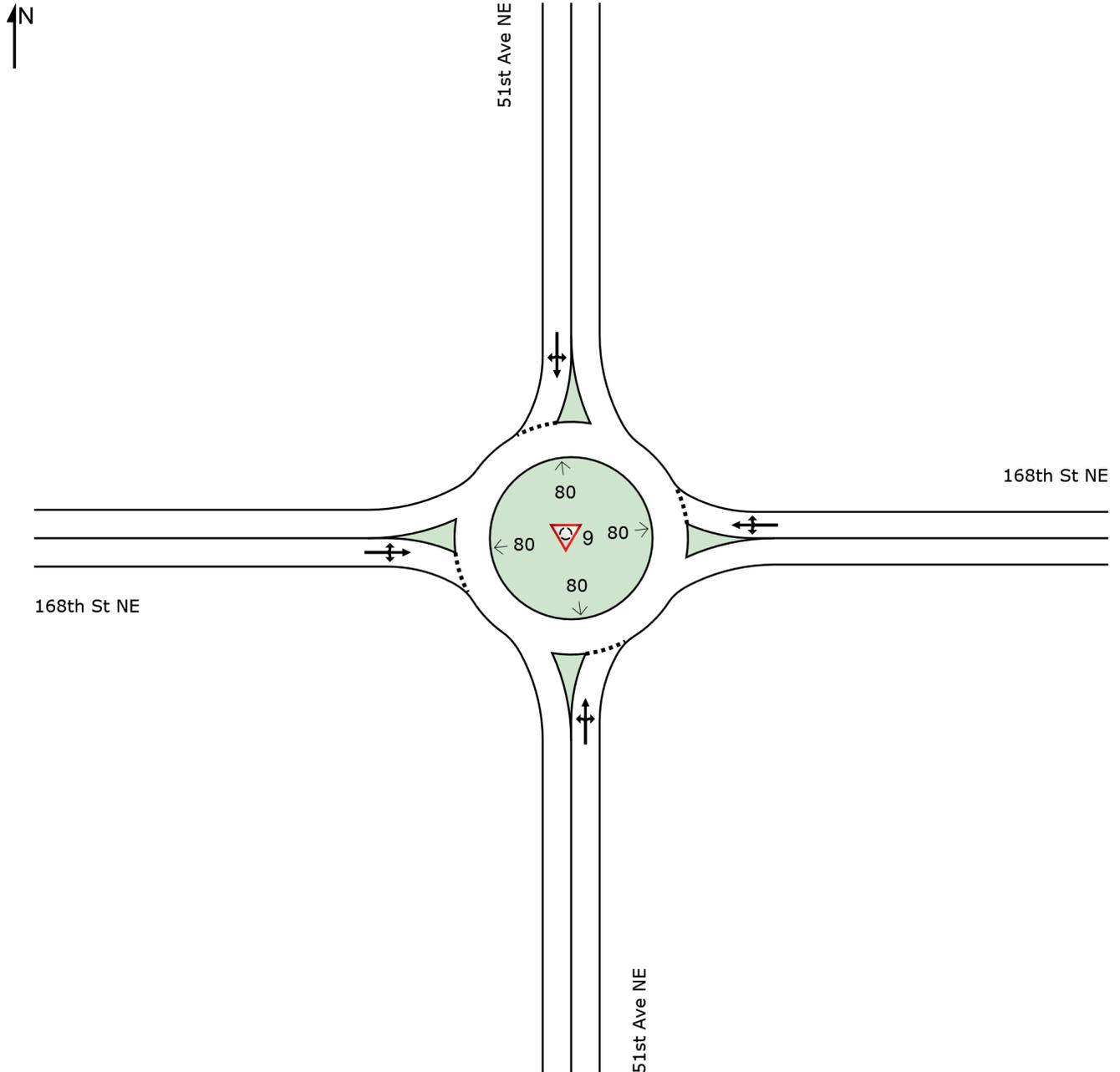
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	285	575	120	85	330	40	75	200	145	80	215	190
Future Volume (veh/h)	285	575	120	85	330	40	75	200	145	80	215	190
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1673	1673	1673	1647	1647	1647	1687	1687	1687	1673	1673	1673
Adj Flow Rate, veh/h	300	605	126	89	347	42	79	211	153	84	226	200
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	4	4	4	1	1	1	2	2	2
Cap, veh/h	487	852	722	279	630	76	121	236	171	162	215	190
Arrive On Green	0.12	0.51	0.51	0.04	0.44	0.44	0.05	0.26	0.26	0.05	0.26	0.26
Sat Flow, veh/h	1594	1673	1418	1569	1441	174	1606	906	657	1594	815	722
Grp Volume(v), veh/h	300	605	126	89	0	389	79	0	364	84	0	426
Grp Sat Flow(s),veh/h/ln	1594	1673	1418	1569	0	1616	1606	0	1563	1594	0	1537
Q Serve(g_s), s	16.1	44.5	7.7	5.0	0.0	28.6	5.7	0.0	35.9	6.1	0.0	42.1
Cycle Q Clear(g_c), s	16.1	44.5	7.7	5.0	0.0	28.6	5.7	0.0	35.9	6.1	0.0	42.1
Prop In Lane	1.00		1.00	1.00		0.11	1.00		0.42	1.00		0.47
Lane Grp Cap(c), veh/h	487	852	722	279	0	707	121	0	407	162	0	404
V/C Ratio(X)	0.62	0.71	0.17	0.32	0.00	0.55	0.65	0.00	0.89	0.52	0.00	1.05
Avail Cap(c_a), veh/h	532	852	722	435	0	707	246	0	460	231	0	404
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.8	30.2	21.2	26.7	0.0	33.4	45.7	0.0	57.0	44.5	0.0	59.0
Incr Delay (d2), s/veh	1.9	5.0	0.5	0.7	0.0	3.1	5.8	0.0	19.0	2.6	0.0	59.5
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	6.2	18.9	2.7	1.9	0.0	11.8	2.5	0.0	16.3	2.6	0.0	22.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.6	35.2	21.7	27.4	0.0	36.4	51.5	0.0	76.0	47.1	0.0	118.4
LnGrp LOS	C	D	C	C	A	D	D	A	E	D	A	F
Approach Vol, veh/h		1031			478			443				510
Approach Delay, s/veh		30.5			34.7			71.6				106.7
Approach LOS		C			C			E				F
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.0	87.4	12.6	48.0	23.5	75.9	13.0	47.6				
Change Period (Y+Rc), s	5.0	5.9	5.0	5.9	5.0	5.9	5.0	5.9				
Max Green Setting (Gmax), s	23.0	53.1	20.0	42.1	23.0	53.1	15.0	47.1				
Max Q Clear Time (g_c+I1), s	7.0	46.5	7.7	44.1	18.1	30.6	8.1	37.9				
Green Ext Time (p_c), s	0.2	3.1	0.1	0.0	0.4	3.3	0.1	2.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			54.5									
HCM 6th LOS			D									

# SITE LAYOUT

 Site: 9 [9. 168th Street NE/51st Avenue NE (Site Folder: With-Project 2024)]

Future (2024) With-Project PM Peak Hour  
Site Category: (None)  
Roundabout

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



# MOVEMENT SUMMARY

Site: 9 [9. 168th Street NE/51st Avenue NE (Site Folder: Baseline 2024)]

Future (2024) Without-Project PM Peak Hour  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: 51st Ave NE														
3	L2	110	2.0	117	2.0	0.366	10.8	LOS B	2.4	61.1	0.48	0.59	0.48	35.2
8	T1	250	2.0	266	2.0	0.366	5.5	LOS A	2.4	61.1	0.48	0.59	0.48	35.3
18	R2	1	2.0	1	2.0	0.366	5.4	LOS A	2.4	61.1	0.48	0.59	0.48	34.4
Approach		361	2.0	384	2.0	0.366	7.1	LOS A	2.4	61.1	0.48	0.59	0.48	35.2
East: 168th St NE														
1	L2	1	0.0	1	0.0	0.010	12.6	LOS B	0.1	1.3	0.61	0.59	0.61	35.3
6	T1	1	0.0	1	0.0	0.010	7.3	LOS A	0.1	1.3	0.61	0.59	0.61	35.3
16	R2	5	0.0	5	0.0	0.010	7.2	LOS A	0.1	1.3	0.61	0.59	0.61	34.4
Approach		7	0.0	7	0.0	0.010	8.0	LOS A	0.1	1.3	0.61	0.59	0.61	34.6
North: 51st Ave NE														
7	L2	5	3.0	5	3.0	0.436	10.4	LOS B	3.1	80.3	0.42	0.51	0.42	36.1
4	T1	275	3.0	293	3.0	0.436	5.1	LOS A	3.1	80.3	0.42	0.51	0.42	36.2
14	R2	175	3.0	186	3.0	0.436	5.1	LOS A	3.1	80.3	0.42	0.51	0.42	35.2
Approach		455	3.0	484	3.0	0.436	5.2	LOS A	3.1	80.3	0.42	0.51	0.42	35.8
West: 168th St NE														
5	L2	170	2.0	181	2.0	0.390	11.6	LOS B	2.5	63.1	0.58	0.71	0.58	34.7
2	T1	1	2.0	1	2.0	0.390	6.3	LOS A	2.5	63.1	0.58	0.71	0.58	34.8
12	R2	180	2.0	191	2.0	0.390	6.3	LOS A	2.5	63.1	0.58	0.71	0.58	33.9
Approach		351	2.0	373	2.0	0.390	8.8	LOS A	2.5	63.1	0.58	0.71	0.58	34.3
All Vehicles		1174	2.4	1249	2.4	0.436	6.9	LOS A	3.1	80.3	0.49	0.59	0.49	35.2

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

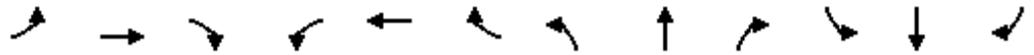
Queue Model: HCM Queue Formula.

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

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

HCM 6th Signalized Intersection Summary  
 1: I-5 SB On Ramp/I-5 SB Ramps & SR 531 (172nd St)

Arlington Brown Bear  
 Future (2024) With-Project PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑	↗				↘	↖	↗
Traffic Volume (veh/h)	0	964	505	0	1249	754	0	0	0	445	5	250
Future Volume (veh/h)	0	964	505	0	1249	754	0	0	0	445	5	250
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	1687	1687	0	1575	1575				1826	1826	1826
Adj Flow Rate, veh/h	0	974	0	0	1262	0				453	0	0
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99				0.99	0.99	0.99
Percent Heavy Veh, %	0	1	1	0	2	2				5	5	5
Cap, veh/h	0	2391		0	2187					564	0	
Arrive On Green	0.00	0.75	0.00	0.00	1.00	0.00				0.16	0.00	0.00
Sat Flow, veh/h	0	3289	1429	0	3071	1335				3478	0	1547
Grp Volume(v), veh/h	0	974	0	0	1262	0				453	0	0
Grp Sat Flow(s),veh/h/ln	0	1602	1429	0	1496	1335				1739	0	1547
Q Serve(g_s), s	0.0	14.4	0.0	0.0	0.0	0.0				16.3	0.0	0.0
Cycle Q Clear(g_c), s	0.0	14.4	0.0	0.0	0.0	0.0				16.3	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	2391		0	2187					564	0	
V/C Ratio(X)	0.00	0.41		0.00	0.58					0.80	0.00	
Avail Cap(c_a), veh/h	0	2391		0	2187					915	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	2.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.00	0.19	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	6.0	0.0	0.0	0.0	0.0				52.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.0	0.2	0.0				4.6	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	4.4	0.0	0.0	0.1	0.0				7.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	6.5	0.0	0.0	0.2	0.0				57.0	0.0	0.0
LnGrp LOS	A	A		A	A					E	A	
Approach Vol, veh/h		974			1262						453	
Approach Delay, s/veh		6.5			0.2						57.0	
Approach LOS		A			A						E	
Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		103.1		26.9		103.1						
Change Period (Y+Rc), s		* 6.1		* 5.8		6.1						
Max Green Setting (Gmax), s		* 84		* 34		83.9						
Max Q Clear Time (g_c+I1), s		16.4		18.3		2.0						
Green Ext Time (p_c), s		13.3		2.7		21.3						

Intersection Summary

HCM 6th Ctrl Delay	12.1
HCM 6th LOS	B

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.

HCM 6th Signalized Intersection Summary  
 2: I-5 NB Off Ramp/I-5 NB On Ramp & SR 531 (172nd St)

Arlington Brown Bear  
 Future (2024) With-Project PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑			↑↑↑	↗	↘	↗	↗			
Traffic Volume (veh/h)	355	1079	0	0	1503	684	555	5	889	0	0	0
Future Volume (veh/h)	355	1079	0	0	1503	684	555	5	889	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	1660	1660	0	0	1575	1575	1841	1841	1841			
Adj Flow Rate, veh/h	366	1112	0	0	1549	0	576	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, %	3	3	0	0	2	2	4	4	4			
Cap, veh/h	375	2203	0	0	1732		710	0				
Arrive On Green	0.47	1.00	0.00	0.00	0.40	0.00	0.20	0.00	0.00			
Sat Flow, veh/h	1581	3237	0	0	4442	1335	3506	0	1560			
Grp Volume(v), veh/h	366	1112	0	0	1549	0	576	0	0			
Grp Sat Flow(s),veh/h/ln	1581	1577	0	0	1433	1335	1753	0	1560			
Q Serve(g_s), s	29.5	0.0	0.0	0.0	43.7	0.0	20.4	0.0	0.0			
Cycle Q Clear(g_c), s	29.5	0.0	0.0	0.0	43.7	0.0	20.4	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	375	2203	0	0	1732		710	0				
V/C Ratio(X)	0.98	0.50	0.00	0.00	0.89		0.81	0.00				
Avail Cap(c_a), veh/h	406	2203	0	0	1732		949	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	33.8	0.0	0.0	0.0	36.2	0.0	49.5	0.0	0.0			
Incr Delay (d2), s/veh	34.4	0.7	0.0	0.0	7.6	0.0	5.2	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	12.3	0.2	0.0	0.0	16.1	0.0	9.1	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.2	0.7	0.0	0.0	43.9	0.0	54.6	0.0	0.0			
LnGrp LOS	E	A	A	A	D		D	A				
Approach Vol, veh/h		1478			1549			576				
Approach Delay, s/veh		17.4			43.9			54.6				
Approach LOS		B			D			D				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		97.9			37.4	60.4		32.1				
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			31.5	45.7		22.4				
Green Ext Time (p_c), s		16.9			0.4	0.0		3.1				

Intersection Summary

HCM 6th Ctrl Delay	34.7
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

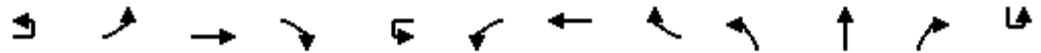
\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

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

# HCM Signalized Intersection Capacity Analysis

## 3: Smokey Pt Blvd & SR 531 (172nd St)

Arlington Brown Bear  
Future (2024) With-Project PM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations		↘	↕	↗		↘	↕	↗	↘	↕	↗	
Traffic Volume (vph)	70	400	1058	380	20	257	1197	241	560	445	273	5
Future Volume (vph)	70	400	1058	380	20	257	1197	241	560	445	273	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	6.5	6.5		8.5	9.5	9.5	5.5	5.9	5.9	
Lane Util. Factor		1.00	0.95	1.00		1.00	0.91	1.00	0.97	0.95	1.00	
Frbp, ped/bikes		1.00	1.00	0.97		1.00	1.00	0.97	1.00	1.00	0.97	
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Frt		1.00	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected		0.95	1.00	1.00		0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1736	3471	1513		1770	5085	1535	3400	3505	1522	
Flt Permitted		0.95	1.00	1.00		0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)		1736	3471	1513		1770	5085	1535	3400	3505	1522	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	435	1150	413	22	279	1301	262	609	484	297	5
RTOR Reduction (vph)	0	0	0	159	0	0	0	136	0	0	200	0
Lane Group Flow (vph)	0	511	1150	254	0	301	1301	126	609	484	97	0
Confl. Peds. (#/hr)		16		11		11		16	12		15	
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%	2%	2%	3%	3%	3%	2%
Turn Type	Prot	Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	NA	Perm	Prot
Protected Phases	5 15	5 15	2		1	1	6		3	8		7
Permitted Phases				2				6			8	
Actuated Green, G (s)		40.6	54.0	54.0		28.8	43.2	43.2	23.6	30.3	30.3	
Effective Green, g (s)		40.6	54.0	54.0		25.8	40.2	40.2	23.6	30.3	30.3	
Actuated g/C Ratio		0.26	0.35	0.35		0.17	0.26	0.26	0.15	0.19	0.19	
Clearance Time (s)			6.5	6.5		5.5	6.5	6.5	5.5	5.9	5.9	
Vehicle Extension (s)			3.0	3.0		2.5	3.0	3.0	2.5	3.0	3.0	
Lane Grp Cap (vph)		453	1205	525		293	1314	396	516	682	296	
v/s Ratio Prot		c0.29	c0.33			0.17	c0.26		c0.18	c0.14		
v/s Ratio Perm				0.17				0.08			0.06	
v/c Ratio		1.13	0.95	0.48		1.03	0.99	0.32	1.18	0.71	0.33	
Uniform Delay, d1		57.5	49.5	39.8		64.8	57.5	46.6	66.0	58.5	53.9	
Progression Factor		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		82.2	16.1	0.7		59.8	22.4	0.5	99.7	3.4	0.7	
Delay (s)		139.6	65.7	40.5		124.6	79.8	47.0	165.6	61.9	54.5	
Level of Service		F	E	D		F	E	D	F	E	D	
Approach Delay (s)			78.9				82.5			105.8		
Approach LOS			E				F			F		
<b>Intersection Summary</b>												
HCM 2000 Control Delay			88.0				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			1.16									
Actuated Cycle Length (s)			155.5				Sum of lost time (s)			30.9		
Intersection Capacity Utilization			115.6%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
 3: Smokey Pt Blvd & SR 531 (172nd St)

Arlington Brown Bear  
 Future (2024) With-Project PM Peak Hour



Movement	SBL	SBT	SBR
Lane Configurations	↵	↑↑	↵
Traffic Volume (vph)	241	290	305
Future Volume (vph)	241	290	305
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	5.5	5.9	5.9
Lane Util. Factor	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00
Frt	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1542
Flt Permitted	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1542
Peak-hour factor, PHF	0.92	0.92	0.92
Adj. Flow (vph)	262	315	332
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	267	315	332
Confl. Peds. (#/hr)	15		12
Heavy Vehicles (%)	2%	2%	2%
Turn Type	Prot	NA	custom
Protected Phases	7	4	
Permitted Phases			4 6
Actuated Green, G (s)	19.0	25.7	68.9
Effective Green, g (s)	19.0	25.7	68.9
Actuated g/C Ratio	0.12	0.17	0.44
Clearance Time (s)	5.5	5.9	
Vehicle Extension (s)	2.5	3.0	
Lane Grp Cap (vph)	216	584	683
v/s Ratio Prot	c0.15	0.09	
v/s Ratio Perm			0.22
v/c Ratio	1.24	0.54	0.49
Uniform Delay, d1	68.2	59.5	30.7
Progression Factor	1.00	1.00	1.00
Incremental Delay, d2	139.5	1.0	0.5
Delay (s)	207.7	60.4	31.3
Level of Service	F	E	C
Approach Delay (s)		92.9	
Approach LOS		F	
<b>Intersection Summary</b>			

HCM Signalized Intersection Capacity Analysis  
4: 40th Ave NE & SR 531 (172nd St)

Arlington Brown Bear  
Future (2024) With-Project PM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	50	30	1347	95	5	60	1450	10	155	10	30	10
Future Volume (vph)	50	30	1347	95	5	60	1450	10	155	10	30	10
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		4.5	4.0			4.5	4.0		4.5	4.0	4.0	4.5
Lane Util. Factor		1.00	0.95			1.00	0.95		1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	1.00			1.00	1.00		1.00	1.00	0.97	1.00
Flpb, ped/bikes		1.00	1.00			1.00	1.00		0.99	1.00	1.00	0.98
Frt		1.00	0.99			1.00	1.00		1.00	1.00	0.85	1.00
Flt Protected		0.95	1.00			0.95	1.00		0.95	1.00	1.00	0.95
Satd. Flow (prot)		1553	3066			1583	3162		1590	1683	1388	1584
Flt Permitted		0.05	1.00			0.07	1.00		0.55	1.00	1.00	0.75
Satd. Flow (perm)		87	3066			120	3162		922	1683	1388	1252
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	52	31	1403	99	5	62	1510	10	161	10	31	10
RTOR Reduction (vph)	0	0	3	0	0	0	0	0	0	0	23	0
Lane Group Flow (vph)	0	83	1499	0	0	68	1520	0	161	10	8	10
Confl. Peds. (#/hr)		8		5		7		10	5		7	10
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%	2%	2%	1%	1%	1%	0%
Turn Type	custom	pm+pt	NA		custom	pm+pt	NA		pm+pt	NA	Perm	pm+pt
Protected Phases		7	4			3	8		5	2		1
Permitted Phases	7	4			3	8			2		2	6
Actuated Green, G (s)		86.5	76.9			80.3	73.8		45.2	38.3	38.3	15.5
Effective Green, g (s)		86.5	76.9			80.3	73.8		45.2	38.3	38.3	15.5
Actuated g/C Ratio		0.61	0.55			0.57	0.52		0.32	0.27	0.27	0.11
Clearance Time (s)		4.5	4.0			4.5	4.0		4.5	4.0	4.0	4.5
Vehicle Extension (s)		3.0	3.0			3.0	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		153	1670			135	1653		426	456	376	143
v/s Ratio Prot		c0.04	c0.49			0.02	0.48		c0.07	0.01		0.00
v/s Ratio Perm		0.30				0.26			c0.05		0.01	0.01
v/c Ratio		0.54	0.90			0.50	0.92		0.38	0.02	0.02	0.07
Uniform Delay, d1		25.3	28.6			22.3	30.9		36.3	37.7	37.7	56.3
Progression Factor		1.00	1.00			1.00	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		3.9	6.8			2.9	8.6		0.6	0.1	0.1	0.2
Delay (s)		29.2	35.4			25.3	39.5		36.9	37.8	37.8	56.5
Level of Service		C	D			C	D		D	D	D	E
Approach Delay (s)			35.0				38.9			37.1		
Approach LOS			D				D			D		
<b>Intersection Summary</b>												
HCM 2000 Control Delay			37.2				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			141.1				Sum of lost time (s)		17.0			
Intersection Capacity Utilization			80.9%				ICU Level of Service			D		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis  
 4: 40th Ave NE & SR 531 (172nd St)

Arlington Brown Bear  
 Future (2024) With-Project PM Peak Hour



Movement	SBT	SBR
Lane Configurations	↱	
Traffic Volume (vph)	5	20
Future Volume (vph)	5	20
Ideal Flow (vphpl)	1700	1700
Total Lost time (s)	4.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	0.97	
Flpb, ped/bikes	1.00	
Frt	0.88	
Flt Protected	1.00	
Satd. Flow (prot)	1452	
Flt Permitted	1.00	
Satd. Flow (perm)	1452	
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	5	21
RTOR Reduction (vph)	19	0
Lane Group Flow (vph)	7	0
Confl. Peds. (#/hr)		8
Confl. Bikes (#/hr)		1
Heavy Vehicles (%)	0%	0%
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	13.1	
Effective Green, g (s)	13.1	
Actuated g/C Ratio	0.09	
Clearance Time (s)	4.0	
Vehicle Extension (s)	3.0	
Lane Grp Cap (vph)	134	
v/s Ratio Prot	0.00	
v/s Ratio Perm		
v/c Ratio	0.05	
Uniform Delay, d1	58.3	
Progression Factor	1.00	
Incremental Delay, d2	0.2	
Delay (s)	58.5	
Level of Service	E	
Approach Delay (s)	57.9	
Approach LOS	E	
<b>Intersection Summary</b>		

# MOVEMENT SUMMARY

**Site: 5 [5. 172nd Street NE/43rd Avenue NE (Site Folder: With-Project 2024)]**

Future (2024) With-Project PM Peak Hour  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist ] ft				
South: 43rd Ave NE														
3	L2	493	0.0	524	0.0	0.616	14.7	LOS B	4.5	113.3	0.84	1.03	1.08	32.8
8	T1	5	0.0	5	0.0	0.616	8.8	LOS A	4.5	113.3	0.84	1.03	1.08	32.6
18	R2	119	0.0	127	0.0	0.223	8.0	LOS A	1.0	24.8	0.71	0.85	0.71	34.7
Approach		617	0.0	656	0.0	0.616	13.4	LOS B	4.5	113.3	0.82	0.99	1.01	33.1
East: 172nd St NE														
1	L2	163	1.0	173	1.0	0.662	17.4	LOS B	7.6	192.2	0.95	1.01	1.21	33.1
6	T1	997	1.0	1061	1.0	0.662	10.4	LOS B	8.2	207.5	0.95	0.95	1.17	34.1
16	R2	10	1.0	11	1.0	0.662	9.8	LOS A	8.2	207.5	0.95	0.93	1.15	33.5
Approach		1170	1.0	1245	1.0	0.662	11.4	LOS B	8.2	207.5	0.95	0.96	1.17	33.9
North: 43rd Ave NE														
7	L2	5	0.0	5	0.0	0.076	14.8	LOS B	0.4	9.4	0.80	0.87	0.80	35.0
4	T1	10	0.0	11	0.0	0.076	8.9	LOS A	0.4	9.4	0.80	0.87	0.80	34.8
14	R2	20	0.0	21	0.0	0.076	8.9	LOS A	0.4	9.4	0.80	0.87	0.80	33.9
Approach		35	0.0	37	0.0	0.076	9.7	LOS A	0.4	9.4	0.80	0.87	0.80	34.3
West: 172nd St NE														
5u	U	20	4.0	21	4.0	0.555	13.9	LOS B	5.2	135.4	0.64	0.54	0.64	36.6
5	L2	10	4.0	11	4.0	0.555	11.4	LOS B	5.2	135.4	0.64	0.54	0.64	35.6
2	T1	1066	4.0	1134	4.0	0.555	5.4	LOS A	5.5	141.1	0.63	0.53	0.63	35.8
12	R2	236	4.0	251	4.0	0.555	5.3	LOS A	5.5	141.1	0.61	0.52	0.61	34.7
Approach		1332	4.0	1417	4.0	0.555	5.5	LOS A	5.5	141.1	0.62	0.53	0.62	35.6
All Vehicles		3154	2.1	3355	2.1	0.662	9.3	LOS A	8.2	207.5	0.79	0.78	0.91	34.4

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: HCM Queue Formula.

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

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

HCM 6th Signalized Intersection Summary  
6: 51st Ave NE & SR 531

Arlington Brown Bear  
Future (2024) With-Project PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	853	210	155	768	45	335	85	140	50	70	57
Future Volume (veh/h)	72	853	210	155	768	45	335	85	140	50	70	57
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		0.98	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	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1453	1453	1453	1575	1575	1575	1647	1647	1647	1673	1673	1673
Adj Flow Rate, veh/h	74	879	216	160	792	46	345	88	144	52	72	59
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
Percent Heavy Veh, %	4	4	4	2	2	2	4	4	4	2	2	2
Cap, veh/h	479	913	224	114	816	47	277	422	357	291	218	178
Arrive On Green	0.30	0.81	0.81	0.02	0.18	0.19	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	1384	1126	277	1500	1472	85	1237	1647	1392	1147	849	696
Grp Volume(v), veh/h	74	0	1095	160	0	838	345	88	144	52	0	131
Grp Sat Flow(s),veh/h/ln	1384	0	1402	1500	0	1557	1237	1647	1392	1147	0	1545
Q Serve(g_s), s	0.0	0.0	107.6	7.4	0.0	85.6	30.0	6.7	13.7	6.0	0.0	11.0
Cycle Q Clear(g_c), s	0.0	0.0	107.6	7.4	0.0	85.6	41.0	6.7	13.7	12.7	0.0	11.0
Prop In Lane	1.00		0.20	1.00		0.05	1.00		1.00	1.00		0.45
Lane Grp Cap(c), veh/h	479	0	1138	114	0	863	277	422	357	291	0	396
V/C Ratio(X)	0.15	0.00	0.96	1.40	0.00	0.97	1.25	0.21	0.40	0.18	0.00	0.33
Avail Cap(c_a), veh/h	479	0	1138	115	0	890	277	422	357	291	0	396
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.72	0.00	0.72	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.4	0.0	13.0	47.1	0.0	64.1	67.4	46.8	49.4	51.7	0.0	48.4
Incr Delay (d2), s/veh	0.1	0.0	19.1	213.6	0.0	19.9	137.6	0.2	0.7	0.3	0.0	0.5
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	2.1	0.0	33.5	11.7	0.0	40.8	21.9	2.8	4.9	1.8	0.0	4.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.5	0.0	32.1	260.6	0.0	84.0	205.0	47.0	50.1	52.0	0.0	48.8
LnGrp LOS	D	A	C	F	A	F	F	D	D	D	A	D
Approach Vol, veh/h		1169			998			577				183
Approach Delay, s/veh		32.5			112.3			142.3				49.7
Approach LOS		C			F			F				D
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.9	140.3		46.9	59.0	97.2		46.9				
Change Period (Y+Rc), s	5.5	* 6.3		* 5.9	6.3	5.5		5.9				
Max Green Setting (Gmax), s	10.5	* 92		* 41	7.7	94.5		40.1				
Max Q Clear Time (g_c+I1), s	10.4	110.6		43.0	3.0	87.6		14.7				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	4.1		0.9				

Intersection Summary

HCM 6th Ctrl Delay	82.4
HCM 6th LOS	F

Notes

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

HCM 6th Signalized Intersection Summary  
7: 59th Ave NE & SR 531/SR 531 (172nd St)

Arlington Brown Bear  
Future (2024) With-Project PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	142	911	10	5	616	20	30	0	10	45	5	347
Future Volume (veh/h)	142	911	10	5	616	20	30	0	10	45	5	347
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		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	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1550	1550	1550	1624	1624	1624	1673	1673	1673	1673	1673	1673
Adj Flow Rate, veh/h	145	930	10	5	629	20	31	0	10	46	5	354
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
Percent Heavy Veh, %	4	4	4	2	2	2	2	2	2	2	2	2
Cap, veh/h	155	906	10	6	768	24	38	0	312	57	5	325
Arrive On Green	0.21	1.00	1.00	0.00	0.49	0.49	0.02	0.00	0.22	0.04	0.23	0.23
Sat Flow, veh/h	1476	1531	16	1547	1566	50	1594	0	1418	1594	20	1401
Grp Volume(v), veh/h	145	0	940	5	0	649	31	0	10	46	0	359
Grp Sat Flow(s),veh/h/ln	1476	0	1547	1547	0	1615	1594	0	1418	1594	0	1421
Q Serve(g_s), s	15.5	0.0	93.7	0.5	0.0	54.7	3.1	0.0	0.9	4.6	0.0	37.1
Cycle Q Clear(g_c), s	15.5	0.0	93.7	0.5	0.0	54.7	3.1	0.0	0.9	4.6	0.0	37.1
Prop In Lane	1.00		0.01	1.00		0.03	1.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	155	0	916	6	0	793	38	0	312	57	0	330
V/C Ratio(X)	0.94	0.00	1.03	0.87	0.00	0.82	0.81	0.00	0.03	0.80	0.00	1.09
Avail Cap(c_a), veh/h	309	0	916	140	0	793	95	0	329	95	0	330
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.09	0.00	0.09	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	62.7	0.0	0.0	79.7	0.0	34.7	77.7	0.0	49.0	76.6	0.0	61.5
Incr Delay (d2), s/veh	3.1	0.0	16.9	134.3	0.0	9.2	32.3	0.0	0.1	22.2	0.0	75.6
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	5.3	0.0	4.3	0.4	0.0	23.2	1.6	0.0	0.3	2.2	0.0	20.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.8	0.0	16.9	214.0	0.0	43.9	110.1	0.0	49.1	98.8	0.0	137.1
LnGrp LOS	E	A	F	F	A	D	F	A	D	F	A	F
Approach Vol, veh/h		1085			654			41			405	
Approach Delay, s/veh		23.4			45.2			95.2			132.7	
Approach LOS		C			D			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.1	101.6	9.3	43.0	23.3	84.4	11.2	41.1				
Change Period (Y+Rc), s	5.5	5.9	5.5	5.9	5.5	5.9	5.5	5.9				
Max Green Setting (Gmax), s	14.5	76.1	9.5	37.1	34.5	56.1	9.5	37.1				
Max Q Clear Time (g_c+I1), s	2.5	95.7	5.1	39.1	17.5	56.7	6.6	2.9				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			51.5									
HCM 6th LOS			D									

HCM 6th Signalized Intersection Summary  
 8: 67th Ave NE & SR 531 (172nd St)

Arlington Brown Bear  
 Future (2024) With-Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	287	579	120	85	334	40	75	200	145	80	215	192
Future Volume (veh/h)	287	579	120	85	334	40	75	200	145	80	215	192
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	1673	1673	1673	1647	1647	1647	1687	1687	1687	1673	1673	1673
Adj Flow Rate, veh/h	302	609	126	89	352	42	79	211	153	84	226	202
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	4	4	4	1	1	1	2	2	2
Cap, veh/h	483	852	722	276	630	75	121	236	171	162	213	191
Arrive On Green	0.12	0.51	0.51	0.04	0.44	0.44	0.05	0.26	0.26	0.05	0.26	0.26
Sat Flow, veh/h	1594	1673	1418	1569	1444	172	1606	906	657	1594	811	725
Grp Volume(v), veh/h	302	609	126	89	0	394	79	0	364	84	0	428
Grp Sat Flow(s),veh/h/ln	1594	1673	1418	1569	0	1616	1606	0	1563	1594	0	1536
Q Serve(g_s), s	16.2	44.9	7.7	5.0	0.0	29.1	5.7	0.0	35.9	6.1	0.0	42.1
Cycle Q Clear(g_c), s	16.2	44.9	7.7	5.0	0.0	29.1	5.7	0.0	35.9	6.1	0.0	42.1
Prop In Lane	1.00		1.00	1.00		0.11	1.00		0.42	1.00		0.47
Lane Grp Cap(c), veh/h	483	852	722	276	0	705	121	0	407	162	0	404
V/C Ratio(X)	0.63	0.71	0.17	0.32	0.00	0.56	0.65	0.00	0.89	0.52	0.00	1.06
Avail Cap(c_a), veh/h	526	852	722	433	0	705	246	0	460	231	0	404
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.0	30.3	21.2	26.9	0.0	33.6	45.7	0.0	57.0	44.5	0.0	59.0
Incr Delay (d2), s/veh	2.0	5.1	0.5	0.7	0.0	3.2	5.8	0.0	19.0	2.6	0.0	61.1
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	6.3	19.1	2.7	1.9	0.0	12.0	2.5	0.0	16.3	2.6	0.0	23.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.0	35.4	21.7	27.5	0.0	36.8	51.5	0.0	76.0	47.1	0.0	120.1
LnGrp LOS	C	D	C	C	A	D	D	A	E	D	A	F
Approach Vol, veh/h		1037			483			443				512
Approach Delay, s/veh		30.7			35.1			71.6				108.1
Approach LOS		C			D			E				F
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.0	87.4	12.6	48.0	23.7	75.7	13.0	47.6				
Change Period (Y+Rc), s	5.0	5.9	5.0	5.9	5.0	5.9	5.0	5.9				
Max Green Setting (Gmax), s	23.0	53.1	20.0	42.1	23.0	53.1	15.0	47.1				
Max Q Clear Time (g_c+I1), s	7.0	46.9	7.7	44.1	18.2	31.1	8.1	37.9				
Green Ext Time (p_c), s	0.2	2.9	0.1	0.0	0.4	3.3	0.1	2.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				54.9								
HCM 6th LOS				D								

# MOVEMENT SUMMARY

**Site: 9 [9. 168th Street NE/51st Avenue NE (Site Folder: With-Project 2024)]**

Future (2024) With-Project PM Peak Hour  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist ] ft				
South: 51st Ave NE														
3	L2	116	2.0	123	2.0	0.372	10.8	LOS B	2.5	62.5	0.48	0.60	0.48	35.2
8	T1	250	2.0	266	2.0	0.372	5.5	LOS A	2.5	62.5	0.48	0.60	0.48	35.2
18	R2	1	2.0	1	2.0	0.372	5.4	LOS A	2.5	62.5	0.48	0.60	0.48	34.3
Approach		367	2.0	390	2.0	0.372	7.2	LOS A	2.5	62.5	0.48	0.60	0.48	35.2
East: 168th St NE														
1	L2	1	0.0	1	0.0	0.010	12.6	LOS B	0.1	1.3	0.61	0.59	0.61	35.2
6	T1	1	0.0	1	0.0	0.010	7.3	LOS A	0.1	1.3	0.61	0.59	0.61	35.3
16	R2	5	0.0	5	0.0	0.010	7.3	LOS A	0.1	1.3	0.61	0.59	0.61	34.3
Approach		7	0.0	7	0.0	0.010	8.0	LOS A	0.1	1.3	0.61	0.59	0.61	34.6
North: 51st Ave NE														
7	L2	5	3.0	5	3.0	0.439	10.5	LOS B	3.2	80.8	0.43	0.51	0.43	36.1
4	T1	275	3.0	293	3.0	0.439	5.2	LOS A	3.2	80.8	0.43	0.51	0.43	36.2
14	R2	175	3.0	186	3.0	0.439	5.1	LOS A	3.2	80.8	0.43	0.51	0.43	35.2
Approach		455	3.0	484	3.0	0.439	5.2	LOS A	3.2	80.8	0.43	0.51	0.43	35.8
West: 168th St NE														
5	L2	170	2.0	181	2.0	0.397	11.6	LOS B	2.6	64.8	0.59	0.71	0.59	34.7
2	T1	1	2.0	1	2.0	0.397	6.3	LOS A	2.6	64.8	0.59	0.71	0.59	34.8
12	R2	186	2.0	198	2.0	0.397	6.3	LOS A	2.6	64.8	0.59	0.71	0.59	33.9
Approach		357	2.0	380	2.0	0.397	8.8	LOS A	2.6	64.8	0.59	0.71	0.59	34.3
All Vehicles		1186	2.4	1262	2.4	0.439	6.9	LOS A	3.2	80.8	0.50	0.60	0.50	35.1

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

Roundabout LOS Method: Same as Signalised Intersections.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: HCM Queue Formula.

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

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

Intersection						
Int Delay, s/veh	2.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	97	25	21	520	310	99
Future Vol, veh/h	97	25	21	520	310	99
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	0	0	0	0
Mvmt Flow	103	27	22	553	330	105

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	980	383	435	0	-	0
Stage 1	383	-	-	-	-	-
Stage 2	597	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.1	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.2	-	-	-
Pot Cap-1 Maneuver	277	664	1135	-	-	-
Stage 1	689	-	-	-	-	-
Stage 2	550	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	272	664	1135	-	-	-
Mov Cap-2 Maneuver	399	-	-	-	-	-
Stage 1	676	-	-	-	-	-
Stage 2	550	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.8	0.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1135	-	435	-	-
HCM Lane V/C Ratio	0.02	-	0.298	-	-
HCM Control Delay (s)	8.2	-	16.8	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.2	-	-

## Appendix D: Trip Generation Observations

Sammamish Brown Bear Car Wash (3050 228th Ave SE)  
Trip Generation Data

**Brown Bear Car Wash<sup>1</sup>**  
**Existing Trip Generation and Maximum Queues Summary - Weekday Daily**  
**Wednesday 10/23/19 and Thursday 10/24/19**

Day	Weekday Daily Trip Generation			Maximum Vehicle Queue Observed	
	In	Out	Total	Time Period	Max Queue (Veh)
Wednesday - October 23, 2019	384	384	768	1:00-2:00 p.m.	4
Thursday - October 24, 2019	295	295	590	4:00-5:00 p.m.	4
<b>2-Day Average</b>			<b>679</b>		

Note:

1. The existing Brown Bear Car Wash is located at 3050 228th Ave SE in the City of Sammamish.

**Brown Bear Car Wash (3050 228th Ave SE, Sammamish, WA)**  
**Existing Trip Generation Summary - Daily**  
**Wednesday - October 23, 2019**

Interval Begin	Drive Thru Tunnel		Detail Express Stall		Total Trips			
	In	Out	In	Out	In	Out	Total	
7:00 AM	0	0	1	1	1	1	2	
7:15 AM	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	<b>2</b> 7:00 - 8:00 a.m.
8:00 AM	2	2	1	0	3	2	5	<b>5</b> 7:15 - 8:15 a.m.
8:15 AM	4	4	1	2	5	6	11	<b>16</b> 7:30 - 8:30 a.m.
8:30 AM	2	2	0	0	2	2	4	<b>20</b> 7:45 - 8:45 a.m.
8:45 AM	2	2	1	0	3	2	5	<b>25</b> 8:00 - 9:00 a.m.
9:00 AM	3	3	0	1	3	4	7	<b>27</b> 8:15 - 9:15 a.m.
9:15 AM	6	6	0	0	6	6	12	<b>28</b> 8:30 - 9:30 a.m.
9:30 AM	3	3	0	0	3	3	6	<b>30</b> 8:45 - 9:45 a.m.
9:45 AM	5	5	0	0	5	5	10	<b>35</b> 9:00 - 10:00 a.m.
10:00 AM	9	9	3	1	12	10	22	<b>50</b> 9:15 - 10:15 a.m.
10:15 AM	10	10	1	2	11	12	23	<b>61</b> 9:30 - 10:30 a.m.
10:30 AM	8	8	0	1	8	9	17	<b>72</b> 9:45 - 10:45 a.m.
10:45 AM	9	9	1	1	10	10	20	<b>82</b> 10:00 - 11:00 a.m.
11:00 AM	6	6	2	2	8	8	16	<b>76</b> 10:15 - 11:15 a.m.
11:15 AM	9	9	3	1	12	10	22	<b>75</b> 10:30 - 11:30 a.m.
11:30 AM	7	7	2	3	9	10	19	<b>77</b> 10:45 - 11:45 a.m.
11:45 AM	5	5	0	1	5	6	11	<b>68</b> 11:00 - 12:00 p.m.
12:00 PM	7	7	1	0	8	7	15	<b>67</b> 11:15 - 12:15 a.m.
12:15 PM	8	8	1	2	9	10	19	<b>64</b> 11:30 - 12:30 a.m.
12:30 PM	8	8	2	1	10	9	19	<b>64</b> 11:45 - 12:45 a.m.
12:45 PM	11	11	1	1	12	12	24	<b>77</b> 12:00 - 1:00 p.m.
1:00 PM	9	9	1	1	10	10	20	<b>82</b> 12:15 - 1:15 p.m.
1:15 PM	8	8	0	1	8	9	17	<b>80</b> 12:30 - 1:30 p.m.
1:30 PM	5	5	0	0	5	5	10	<b>71</b> 12:45 - 1:45 p.m.
1:45 PM	10	10	3	1	13	11	24	<b>71</b> 1:00 - 2:00 p.m.
2:00 PM	9	9	1	2	10	11	21	<b>72</b> 1:15 - 2:15 p.m.
2:15 PM	9	9	1	0	10	9	19	<b>74</b> 1:30 - 2:30 p.m.
2:30 PM	12	12	1	1	13	13	26	<b>90</b> 1:45 - 2:45 p.m.
2:45 PM	7	7	1	3	8	10	18	<b>84</b> 2:00 - 3:00 p.m.
3:00 PM	13	13	2	0	15	13	28	<b>91</b> 2:15 - 3:15 p.m.
3:15 PM	10	10	1	1	11	11	22	<b>94</b> 2:30 - 3:30 p.m.
3:30 PM	9	9	1	3	10	12	22	<b>90</b> 2:45 - 3:45 p.m.
3:45 PM	10	10	0	2	10	12	22	<b>94</b> 3:00 - 4:00 p.m.
4:00 PM	10	10	2	0	12	10	22	<b>88</b> 3:15 - 4:15 p.m.
4:15 PM	11	11	1	1	12	12	24	<b>90</b> 3:30 - 4:30 p.m.
4:30 PM	13	13	2	2	15	15	30	<b>98</b> 3:45 - 4:45 p.m.
4:45 PM	9	9	2	1	11	10	21	<b>97</b> 4:00 - 5:00 p.m.
5:00 PM	16	16	2	2	18	18	36	<b>111</b> 4:15 - 5:15 p.m.
5:15 PM	7	7	3	3	10	10	20	<b>107</b> 4:30 - 5:30 p.m.
5:30 PM	10	10	0	1	10	11	21	<b>98</b> 4:45 - 5:45 p.m.
5:45 PM	2	2	0	0	2	2	4	<b>81</b> 5:00 - 6:00 p.m.
6:00 PM	10	10	2	1	12	11	23	<b>68</b> 5:15 - 6:15 p.m.
6:15 PM	3	3	1	2	4	5	9	<b>57</b> 5:30 - 6:30 p.m.
6:30 PM	2	2	1	1	3	3	6	<b>42</b> 5:45 - 6:45 p.m.
6:45 PM	4	4	1	0	5	4	9	<b>47</b> 6:00 - 7:00 p.m.
7:00 PM	1	1	0	1	1	2	3	<b>27</b> 6:15 - 7:15 p.m.
7:15 PM	0	0	0	0	0	0	0	<b>18</b> 6:30 - 7:30 p.m.
7:30 PM	0	0	1	0	1	0	1	<b>13</b> 6:45 - 7:45 p.m.
7:45 PM	0	0	0	1	0	1	1	<b>5</b> 7:00 - 8:00 p.m.
<b>Total</b>	<b>333</b>	<b>333</b>	<b>51</b>	<b>51</b>	<b>384</b>	<b>384</b>	<b>768</b>	

**Brown Bear Car Wash (3050 228th Ave SE, Sammamish, WA)**  
**Existing Trip Generation Summary - Daily**  
**Thursday - October 24, 2019**

Interval Begin	Drive Thru Tunnel		Detail Express Stall		Total Trips			Hourly Totals	
	In	Out	In	Out	In	Out	Total		
7:00 AM	0	0	0	0	0	0	0		
7:15 AM	0	0	0	0	0	0	0		
7:30 AM	0	0	0	0	0	0	0		
7:45 AM	1	1	0	0	1	1	2	2	7:00 - 8:00 a.m.
8:00 AM	3	3	0	0	3	3	6	8	7:15 - 8:15 a.m.
8:15 AM	2	2	1	0	3	2	5	13	7:30 - 8:30 a.m.
8:30 AM	3	3	0	1	3	4	7	20	7:45 - 8:45 a.m.
8:45 AM	4	4	0	0	4	4	8	26	8:00 - 9:00 a.m.
9:00 AM	3	3	0	0	3	3	6	26	8:15 - 9:15 a.m.
9:15 AM	4	4	2	0	6	4	10	31	8:30 - 9:30 a.m.
9:30 AM	9	9	1	2	10	11	21	45	8:45 - 9:45 a.m.
9:45 AM	8	8	2	1	10	9	19	56	9:00 - 10:00 a.m.
10:00 AM	4	4	1	1	5	5	10	60	9:15 - 10:15 a.m.
10:15 AM	6	6	0	2	6	8	14	64	9:30 - 10:30 a.m.
10:30 AM	6	6	1	0	7	6	13	56	9:45 - 10:45 a.m.
10:45 AM	7	7	3	1	10	8	18	55	10:00 - 11:00 a.m.
11:00 AM	6	6	0	3	6	9	15	60	10:15 - 11:15 a.m.
11:15 AM	8	8	0	0	8	8	16	62	10:30 - 11:30 a.m.
11:30 AM	7	7	0	0	7	7	14	63	10:45 - 11:45 a.m.
11:45 AM	6	6	1	0	7	6	13	58	11:00 - 12:00 p.m.
12:00 PM	9	9	1	1	10	10	20	63	11:15 - 12:15 a.m.
12:15 PM	6	6	1	1	7	7	14	61	11:30 - 12:30 a.m.
12:30 PM	7	7	2	1	9	8	17	64	11:45 - 12:45 a.m.
12:45 PM	7	7	0	1	7	8	15	66	12:00 - 1:00 p.m.
1:00 PM	12	12	3	2	15	14	29	75	12:15 - 1:15 p.m.
1:15 PM	7	7	1	2	8	9	17	78	12:30 - 1:30 p.m.
1:30 PM	9	9	2	2	11	11	22	83	12:45 - 1:45 p.m.
1:45 PM	4	4	1	2	5	6	11	79	1:00 - 2:00 p.m.
2:00 PM	5	5	1	1	6	6	12	62	1:15 - 2:15 p.m.
2:15 PM	9	9	0	0	9	9	18	63	1:30 - 2:30 p.m.
2:30 PM	8	8	2	1	10	9	19	60	1:45 - 2:45 p.m.
2:45 PM	8	8	0	1	8	9	17	66	2:00 - 3:00 p.m.
3:00 PM	7	7	0	0	7	7	14	68	2:15 - 3:15 p.m.
3:15 PM	7	7	2	2	9	9	18	68	2:30 - 3:30 p.m.
3:30 PM	11	11	2	0	13	11	24	73	2:45 - 3:45 p.m.
3:45 PM	5	5	0	2	5	7	12	68	3:00 - 4:00 p.m.
4:00 PM	9	9	2	0	11	9	20	74	3:15 - 4:15 p.m.
4:15 PM	4	4	0	0	4	4	8	64	3:30 - 4:30 p.m.
4:30 PM	5	5	1	2	6	7	13	53	3:45 - 4:45 p.m.
4:45 PM	4	4	0	1	4	5	9	50	4:00 - 5:00 p.m.
5:00 PM	2	2	0	0	2	2	4	34	4:15 - 5:15 p.m.
5:15 PM	6	6	1	1	7	7	14	40	4:30 - 5:30 p.m.
5:30 PM	5	5	0	0	5	5	10	37	4:45 - 5:45 p.m.
5:45 PM	4	4	0	0	4	4	8	36	5:00 - 6:00 p.m.
6:00 PM	6	6	0	0	6	6	12	44	5:15 - 6:15 p.m.
6:15 PM	4	4	1	1	5	5	10	40	5:30 - 6:30 p.m.
6:30 PM	2	2	0	0	2	2	4	34	5:45 - 6:45 p.m.
6:45 PM	0	0	0	0	0	0	0	26	6:00 - 7:00 p.m.
7:00 PM	0	0	0	0	0	0	0	14	6:15 - 7:15 p.m.
7:15 PM	0	0	0	0	0	0	0	4	6:30 - 7:30 p.m.
7:30 PM	0	0	0	0	0	0	0	0	6:45 - 7:45 p.m.
7:45 PM	0	0	1	1	1	1	2	2	7:00 - 8:00 p.m.
<b>Total</b>	<b>259</b>	<b>259</b>	<b>36</b>	<b>36</b>	<b>295</b>	<b>295</b>	<b>590</b>		

**Brown Bear Car Wash<sup>1</sup>**  
**Existing Trip Generation and Maximum Queues Summary - Saturday Daily**  
**Saturday 10/26/19**

<b>Day</b>	<b>Weekday Daily Trip Generation</b>			<b>Maximum Vehicle Queue Observed</b>	
	<b>In</b>	<b>Out</b>	<b>Total</b>	<b>Time Period</b>	<b>Max Queue (Veh)</b>
Saturday - October 26, 2019	263	263	526	4:15 - 5:15 p.m.	7
<b>Total</b>			<b>526</b>		

Note:

1. The existing Brown Bear Car Wash is located at 3050 228th Ave SE in the City of Sammamish.

**Brown Bear Car Wash  
Existing Trip Generation Summary - Daily  
Saturday - October 26, 2019**

Interval Begin	Drive Thru Tunnel		Detail Express Stall		Total Trips			
	In	Out	In	Out	In	Out	Total	
7:00 AM	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	<b>0</b> 7:00 - 8:00 a.m.
8:00 AM	1	1	0	0	1	1	2	<b>2</b> 7:15 - 8:15 a.m.
8:15 AM	3	3	0	0	3	3	6	<b>8</b> 7:30 - 8:30 a.m.
8:30 AM	5	5	1	0	6	5	11	<b>19</b> 7:45 - 8:45 a.m.
8:45 AM	3	3	0	1	3	4	7	<b>26</b> 8:00 - 9:00 a.m.
9:00 AM	4	4	1	1	5	5	10	<b>34</b> 8:15 - 9:15 a.m.
9:15 AM	1	1	2	2	3	3	6	<b>34</b> 8:30 - 9:30 a.m.
9:30 AM	5	5	2	0	7	5	12	<b>35</b> 8:45 - 9:45 a.m.
9:45 AM	2	2	1	2	3	4	7	<b>35</b> 9:00 - 10:00 a.m.
10:00 AM	3	3	0	1	3	4	7	<b>32</b> 9:15 - 10:15 a.m.
10:15 AM	1	1	0	0	1	1	2	<b>28</b> 9:30 - 10:30 a.m.
10:30 AM	3	3	0	0	3	3	6	<b>22</b> 9:45 - 10:45 a.m.
10:45 AM	5	5	0	0	5	5	10	<b>25</b> 10:00 - 11:00 a.m.
11:00 AM	3	3	2	0	5	3	8	<b>26</b> 10:15 - 11:15 a.m.
11:15 AM	6	6	2	2	8	8	16	<b>40</b> 10:30 - 11:30 a.m.
11:30 AM	8	8	1	2	9	10	19	<b>53</b> 10:45 - 11:45 a.m.
11:45 AM	7	7	3	2	10	9	19	<b>62</b> 11:00 - 12:00 p.m.
12:00 PM	6	6	1	1	7	7	14	<b>68</b> 11:15 - 12:15 a.m.
12:15 PM	7	7	2	2	9	9	18	<b>70</b> 11:30 - 12:30 a.m.
12:30 PM	8	8	0	0	8	8	16	<b>67</b> 11:45 - 12:45 a.m.
12:45 PM	10	10	0	2	10	12	22	<b>70</b> 12:00 - 1:00 p.m.
1:00 PM	2	2	2	0	4	2	6	<b>62</b> 12:15 - 1:15 p.m.
1:15 PM	6	6	2	2	8	8	16	<b>60</b> 12:30 - 1:30 p.m.
1:30 PM	1	1	0	2	1	3	4	<b>48</b> 12:45 - 1:45 p.m.
1:45 PM	2	2	2	0	4	2	6	<b>32</b> 1:00 - 2:00 p.m.
2:00 PM	2	2	0	1	2	3	5	<b>31</b> 1:15 - 2:15 p.m.
2:15 PM	6	6	1	1	7	7	14	<b>29</b> 1:30 - 2:30 p.m.
2:30 PM	1	1	0	1	1	2	3	<b>28</b> 1:45 - 2:45 p.m.
2:45 PM	2	2	0	0	2	2	4	<b>26</b> 2:00 - 3:00 p.m.
3:00 PM	2	2	1	1	3	3	6	<b>27</b> 2:15 - 3:15 p.m.
3:15 PM	8	8	1	1	9	9	18	<b>31</b> 2:30 - 3:30 p.m.
3:30 PM	8	8	2	1	10	9	19	<b>47</b> 2:45 - 3:45 p.m.
3:45 PM	9	9	1	1	10	10	20	<b>63</b> 3:00 - 4:00 p.m.
4:00 PM	7	7	0	1	7	8	15	<b>72</b> 3:15 - 4:15 p.m.
4:15 PM	20	20	2	0	22	20	42	<b>96</b> 3:30 - 4:30 p.m.
4:30 PM	12	12	0	1	12	13	25	<b>102</b> 3:45 - 4:45 p.m.
4:45 PM	11	11	1	1	12	12	24	<b>106</b> 4:00 - 5:00 p.m.
5:00 PM	9	9	2	1	11	10	21	<b>112</b> 4:15 - 5:15 p.m.
5:15 PM	10	10	0	1	10	11	21	<b>91</b> 4:30 - 5:30 p.m.
5:30 PM	7	7	1	2	8	9	17	<b>83</b> 4:45 - 5:45 p.m.
5:45 PM	4	4	0	0	4	4	8	<b>67</b> 5:00 - 6:00 p.m.
6:00 PM	2	2	0	0	2	2	4	<b>50</b> 5:15 - 6:15 p.m.
6:15 PM	1	1	0	0	1	1	2	<b>31</b> 5:30 - 6:30 p.m.
6:30 PM	3	3	0	0	3	3	6	<b>20</b> 5:45 - 6:45 p.m.
6:45 PM	0	0	0	0	0	0	0	<b>12</b> 6:00 - 7:00 p.m.
7:00 PM	1	1	0	0	1	1	2	<b>10</b> 6:15 - 7:15 p.m.
7:15 PM	0	0	0	0	0	0	0	<b>8</b> 6:30 - 7:30 p.m.
7:30 PM	0	0	0	0	0	0	0	<b>2</b> 6:45 - 7:45 p.m.
7:45 PM	0	0	0	0	0	0	0	<b>2</b> 7:00 - 8:00 p.m.
<b>Total</b>	<b>227</b>	<b>227</b>	<b>36</b>	<b>36</b>	<b>263</b>	<b>263</b>	<b>526</b>	

Everett - Brown Bear Car Wash  
 07/13/2023 - 7/18/2023  
 8AM-8PM

13-Jul				
TOTAL SITE TRIPS				
TIME	IN	OUT	TOTAL TRIPS	ROLLING 15-MINUTE
8:00 AM	6	7	13	0
8:15 AM	8	9	17	0
8:30 AM	12	12	24	0
8:45 AM	10	8	18	72
9:00 AM	18	18	36	95
9:15 AM	15	14	29	107
9:30 AM	17	17	34	117
9:45 AM	13	13	26	125
10:00 AM	15	16	31	120
10:15 AM	23	22	45	136
10:30 AM	19	18	37	139
10:45 AM	9	7	16	129
11:00 AM	32	14	46	144
11:15 AM	23	23	46	145
11:30 AM	27	27	54	162
11:45 AM	22	24	46	192
12:00 PM	29	26	55	201
12:15 PM	22	26	48	203
12:30 PM	30	28	58	207
12:45 PM	23	29	52	213
1:00 PM	24	21	45	203
1:15 PM	37	26	63	218
1:30 PM	24	29	53	213
1:45 PM	22	25	47	208
2:00 PM	23	22	45	208
2:15 PM	27	18	45	190
2:30 PM	23	32	55	192
2:45 PM	28	29	57	202
3:00 PM	23	25	48	205
3:15 PM	24	26	50	210
3:30 PM	23	22	45	200
3:45 PM	23	23	46	189
4:00 PM	25	23	48	189
4:15 PM	27	17	44	183
4:30 PM	24	28	52	190
4:45 PM	24	23	47	191
5:00 PM	19	19	38	181
5:15 PM	19	24	43	180
5:30 PM	26	15	41	169
5:45 PM	25	29	54	176
6:00 PM	25	24	49	187
6:15 PM	15	21	36	180
6:30 PM	21	17	38	177
6:45 PM	17	18	35	158
7:00 PM	15	14	29	138
7:15 PM	22	19	41	143
7:30 PM	11	14	25	130
7:45 PM	12	16	28	123
<b>TOTAL</b>	<b>1001</b>	<b>977</b>		218

14-Jul				
TOTAL SITE TRIPS				
TIME	IN	OUT	TOTAL TRIPS	ROLLING 15-MINUTE
8:00 AM	19	19	38	0
8:15 AM	23	28	51	0
8:30 AM	31	20	51	0
8:45 AM	25	26	51	191
9:00 AM	23	19	42	195
9:15 AM	21	21	42	186
9:30 AM	28	33	61	196
9:45 AM	21	22	43	188
10:00 AM	32	26	58	204
10:15 AM	28	27	55	217
10:30 AM	22	26	48	204
10:45 AM	33	28	61	222
11:00 AM	34	26	60	224
11:15 AM	30	34	64	233
11:30 AM	24	26	50	235
11:45 AM	35	30	65	239
12:00 PM	28	35	63	242
12:15 PM	31	24	55	233
12:30 PM	20	27	47	230
12:45 PM	30	26	56	221
1:00 PM	32	24	56	214
1:15 PM	35	35	70	229
1:30 PM	26	28	54	236
1:45 PM	29	28	57	237
2:00 PM	33	30	63	244
2:15 PM	29	36	65	239
2:30 PM	32	25	57	242
2:45 PM	24	28	52	237
3:00 PM	25	27	52	226
3:15 PM	24	25	49	210
3:30 PM	27	27	54	207
3:45 PM	24	26	50	205
4:00 PM	20	23	43	196
4:15 PM	12	15	27	174
4:30 PM	32	22	54	174
4:45 PM	19	22	41	165
5:00 PM	28	26	54	176
5:15 PM	26	25	51	200
5:30 PM	16	20	36	182
5:45 PM	22	21	43	184
6:00 PM	22	25	47	177
6:15 PM	19	22	41	167
6:30 PM	16	14	30	161
6:45 PM	22	16	38	156
7:00 PM	19	20	39	148
7:15 PM	8	15	23	130
7:30 PM	20	14	34	134
7:45 PM	12	15	27	123
<b>TOTAL</b>	<b>1191</b>	<b>1177</b>		244

15-Jul				
TOTAL SITE TRIPS				
TIME	IN	OUT	TOTAL TRIPS	ROLLING 15-MINUTE
8:00 AM	14	10	24	0
8:15 AM	26	25	51	0
8:30 AM	21	27	48	0
8:45 AM	27	23	50	173
9:00 AM	16	19	35	184
9:15 AM	15	16	31	164
9:30 AM	25	24	49	165
9:45 AM	30	18	48	163
10:00 AM	35	31	66	194
10:15 AM	24	30	54	217
10:30 AM	33	27	60	228
10:45 AM	34	32	66	246
11:00 AM	32	28	60	240
11:15 AM	22	29	51	237
11:30 AM	22	22	44	221
11:45 AM	26	29	55	210
12:00 PM	21	24	45	195
12:15 PM	28	27	55	199
12:30 PM	26	28	54	209
12:45 PM	30	24	54	208
1:00 PM	31	28	59	222
1:15 PM	24	32	56	223
1:30 PM	25	20	45	214
1:45 PM	24	26	50	210
2:00 PM	21	20	41	192
2:15 PM	24	23	47	183
2:30 PM	26	29	55	193
2:45 PM	20	21	41	184
3:00 PM	24	23	47	190
3:15 PM	26	20	46	189
3:30 PM	17	20	37	171
3:45 PM	16	15	31	161
4:00 PM	15	17	32	146
4:15 PM	13	15	28	128
4:30 PM	23	17	40	131
4:45 PM	14	19	33	133
5:00 PM	15	18	33	134
5:15 PM	25	22	47	153
5:30 PM	24	24	48	161
5:45 PM	19	19	38	166
6:00 PM	18	19	37	170
6:15 PM	12	18	30	153
6:30 PM	8	8	16	121
6:45 PM	7	8	15	98
7:00 PM	8	10	18	79
7:15 PM	6	6	12	61
7:30 PM	9	8	17	62
7:45 PM	9	9	18	65
<b>TOTAL</b>	<b>1010</b>	<b>1007</b>		246

18-Jul				
TOTAL SITE TRIPS				
TIME	IN	OUT	TOTAL TRIPS	ROLLING 15-MINUTE
8:00 AM	20	15	35	0
8:15 AM	19	21	40	0
8:30 AM	22	19	41	0
8:45 AM	16	13	29	145
9:00 AM	29	22	51	161
9:15 AM	22	25	47	168
9:30 AM	24	22	46	173
9:45 AM	21	19	40	184
10:00 AM	22	18	40	173
10:15 AM	17	16	33	159
10:30 AM	30	22	52	165
10:45 AM	23	19	42	167
11:00 AM	23	22	45	172
11:15 AM	36	26	62	201
11:30 AM	22	24	46	195
11:45 AM	24	21	45	198
12:00 PM	25	27	52	205
12:15 PM	20	29	49	192
12:30 PM	24	27	51	197
12:45 PM	26	20	46	198
1:00 PM	28	22	50	196
1:15 PM	23	23	46	193
1:30 PM	29	35	64	206
1:45 PM	30	25	55	215
2:00 PM	31	30	61	226
2:15 PM	27	26	53	233
2:30 PM	21	28	49	218
2:45 PM	14	25	39	202
3:00 PM	28	16	44	185
3:15 PM	18	23	41	173
3:30 PM	28	27	55	179
3:45 PM	21	24	45	185
4:00 PM	27	25	52	193
4:15 PM	27	14	41	193
4:30 PM	18	34	52	190
4:45 PM	26	24	50	195
5:00 PM	18	20	38	181
5:15 PM	22	15	37	177
5:30 PM	23	26	49	174
5:45 PM	28	19	47	171
6:00 PM	14	19	33	166
6:15 PM	17	20	37	166
6:30 PM	12	12	24	141
6:45 PM	19	11	30	124
7:00 PM	8	12	20	111
7:15 PM	6	9	15	89
7:30 PM	18	9	27	92
7:45 PM	8	15	23	85
<b>TOTAL</b>	<b>1054</b>	<b>1015</b>		233

# Queueing Observations - Everett Brown Bear (July 2023)

## Peak Queue Observed

Date	Time Interval	Longest Queue (# of Cars)
13-Jul	11:15 AM	12
14-Jul	1:30 PM	11
15-Jul	11:00 AM	13
18-Jul	11:45 AM	10

## PM Peak Hour (queue)

<u>13-Jul</u>		<u>14-Jul</u>		<u>15-Jul</u>		<u>18-Jul</u>	
Time	Longest Queue (# of Cars)						
16:00	5	16:00	5	16:00	6	16:00	3
16:15	7	16:15	3	16:15	4	16:15	7
16:30	7	16:30	6	16:30	3	16:30	7
16:45	7	16:45	7	16:45	5	16:45	4
17:00	3	17:00	5	17:00	3	17:00	1
17:15	5	17:15	7	17:15	6	17:15	1
17:30	5	17:30	5	17:30	5	17:30	4
17:45	5	17:45	3	17:45	5	17:45	5