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Barkley Heights
Traffic Impact Analysis

Jurisdiction: City of Bellingham
March 2019

GTC #18-271

TABLE OF CONTENTS

1. DEVELOPMENT IDENTIFICATION 3
2. METHODOLOGY 3
2.1 General 3
2.2 Scope of Analysis 3
3. EXISTING CONDITIONS 6
3.1 Collision History 6
3.2 Road Network 7
3.3 2019 Existing Level of Service Analysis 7
4. FUTURE CONDITIONS 10
4.1 Trip Generation 10
4.2 Scenario A – Full Connection to Bristol Way 11
4.2.1. Trip Distribution 11
4.2.2. 2024 Level of Service Analysis 11
4.2.3. Level of Service Analysis Summary 18
4.3 Scenario B – No Connection to Bristol Way 19
4.3.1. Trip Distribution 19
4.3.2. 2024 Future with Development Level of Service Analysis 19
4.3.3. Level of Service Analysis Summary 24
5. ADDITIONAL PUBLIC COMMENTS 25
5.1 Traffic Calming Devices 25
5.2 Sussex Drive at Barkley Boulevard 25
5.3 Squalicum High School Crossings 26
6. TRAFFIC MITIGATION FEES 26
7. CONCLUSIONS 26

LIST OF FIGURES

Figure 1: Site Vicinity Map 4
Figure 2: 2019 Existing Turning Movements – AM Peak-Hour 8
Figure 3: 2019 Existing Turning Movements – PM Peak-Hour 9
Figure 4: Development Trip Distribution – With Bristol AM Peak-Hour 12
Figure 5: Development Trip Distribution – With Bristol PM Peak-Hour 13
Figure 6: 2024 Baseline Turning Movements – AM Peak-Hour 14
Figure 7: 2024 Baseline Turning Movements – PM Peak-Hour 15
Figure 8: 2024 Future with Development Turning Movements – With Bristol AM Peak-Hour . 16
Figure 9: 2024 Future with Development Turning Movements – With Bristol PM Peak-Hour .. 17
Figure 10: Development Trip Distribution – No Bristol AM Peak-Hour 20
Figure 11: Development Trip Distribution – No Bristol PM Peak-Hour 21
Figure 12: 2024 Future with Development Turning Movements – No Bristol AM Peak-Hour... 22
Figure 13: 2024 Future with Development Turning Movements – No Bristol PM Peak-Hour ... 23

LIST OF TABLES

Table 1: Level of Service Criteria for Intersections 5
Table 2: Collision Data Summary (5.75 Years) 6
Table 3: Collision Rate Calculation (5.75 Years) 6
Table 4: 2019 Existing Level of Service Summary – AM Peak-Hour 7
Table 5: Level of Service Summary – PM Peak-Hour 10
Table 6: Trip Generation Summary 10
Table 7: 2024 Future Level of Service Summary – AM Peak-Hour 18
Table 8: 2024 Future Level of Service Summary – PM Peak-Hour 18
Table 9: 2024 Future Level of Service Summary – AM Peak-Hour 24
Table 10: 2024 Future Level of Service Summary – PM Peak-Hour 24

ATTACHMENTS

Trip Generation Calculations ..... A
Collision Data ..... B
Count Data C
Pipeline Information ..... D
Turning Movement Volumes With Bristol ..... E
Turning Movement Volumes No Bristol ..... F
Level of Service Calculations With Bristol – AM Peak-Hour ..... G
Level of Service Calculations With Bristol – PM Peak-Hour ..... H
Level of Service Calculations No Bristol – AM Peak-Hour I
Level of Service Calculations No Bristol – PM Peak-Hour ..... J
Traffic Calming Information ..... K
ITE Crosswalk Warrant L

1. DEVELOPMENT IDENTIFICATION

The Barkley Heights development is located on the north end of Sussex Drive, north of Barkley Boulevard. A site vicinity map is shown in Figure 1. The development is proposed to consist of a maximum of 72 residential units (30 single-family detached units, 1 duplex structure, 2 four-plex structures and 4 eight-plex structures). However, the final number of units is likely to be less. The site is proposed to have access to Barkley Boulevard via Sussex Drive and potentially connect through to Bristol Way. A 5-year horizon period to the year 2024 has been used to analyze the impacts of the development.

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

2. METHODOLOGY

2.1 General

Trip generation calculations for the Barkley Heights development is based on national data contained in *Trip Generation Manual, 10th Edition (2017)* by the Institute of Transportation Engineers (ITE). The average rates for the following Land Use Codes (LUC) have been utilized for the trip generation calculations:

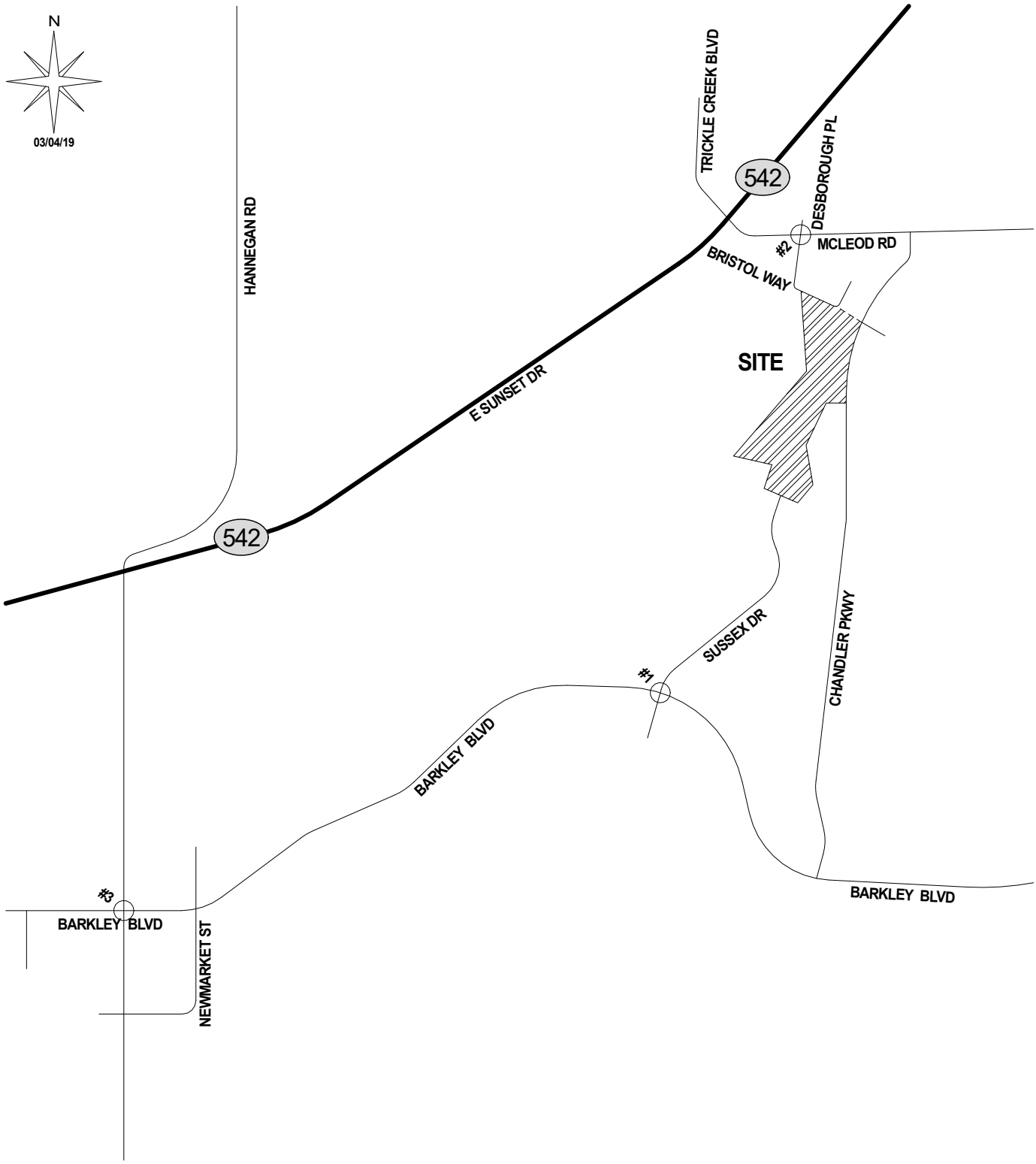
- LUC 210, Single-Family Detached Housing
- LUC 220, Multifamily Housing (Low-Rise)

The distribution of trips generated by the site is based on approved distributions for similar developments in the site vicinity.

2.2 Scope of Analysis

The scope of the intersection analysis is based on scoping conversations with City of Bellingham staff. The intersections that have been required to be analyzed are:

1. Sussex Drive at Barkley Boulevard
2. Desborough Place at McLeod Road
3. Woburn Street at Barkley Boulevard



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DEVELOPMENT SITE

STUDY INTERSECTION

FIGURE 1
SITE VICINITY MAP

Congestion is generally measured in terms of level of service (LOS). The *Highway Capacity Manual: 6th Edition (HCM 2010)* by the Transportation Research Board rates road facilities and intersections between LOS A and LOS F, with LOS A being free flow and LOS F being forced flow or over-capacity conditions. A summary of the level of service criteria is included in Table 1. The level of service at signalized, all-way stop-controlled and roundabout intersections is based on the average delay of all approaches. The level of service for two-way stop-controlled intersections is based on average delays for the critical stopped approach. Geometric characteristics and conflicting traffic movements are taken into consideration when determining level of service values. The acceptable level of service for City of Bellingham intersections is LOS E. The level of service analysis for this report has been performed using the *Synchro 10.2, Build 0* software for signalized and unsignalized intersections.

Table 1: Level of Service Criteria for Intersections

Level of Service [1]	Expected Delay	Intersection Control Delay (Seconds per Vehicle)	
		Unsignalized Intersections	Signalized & Roundabout Intersections
A	Little/No Delay	≤10	≤10
B	Short Delays	>10 and ≤15	>10 and ≤20
C	Average Delays	>15 and ≤25	>20 and ≤35
D	Long Delays	>25 and ≤35	>35 and ≤55
E	Very Long Delays	>35 and ≤50	>55 and ≤80
F	Extreme Delays[2]	>50	>80

The City of Bellingham Comprehensive Plan allows for the use of lower level of service standards where improvements are limited or not feasible.

[1] **Source:** *Highway Capacity Manual, 6th Edition.*

LOS A: Free-flow traffic conditions, with minimal delay to stopped vehicles (no vehicle is delayed longer than one cycle at signalized intersection).
LOS B: Generally stable traffic flow conditions.
LOS C: Occasional back-ups may develop, but delay to vehicles is short term and still tolerable.
LOS D: During short periods of the peak hour, delays to approaching vehicles may be substantial but are tolerable during times of less demand (i.e. vehicles delayed one cycle or less at signal).
LOS E: Intersections operate at or near capacity, with long queues developing on all approaches and long delays.
LOS F: Jammed conditions on all approaches with excessively long delays and vehicles unable to move at times.

[2] When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection.

3. EXISTING CONDITIONS

3.1 Collision History

Collision data at the study intersections was provided by WSDOT from the period beginning January 1, 2013, to December 31, 2017 (five years) and what is available in 2018 (approximately through the end of September). There were no recorded collisions at the intersection of Desborough Place at McLeod Road. The collision data is summarized in Table 2.

Table 2: Collision Data Summary (5.75 Years)

Intersection	Collision Type							Total Collisions	Collisions Per Year
	Rear-End	Entering at Angle	Opp. Dir.	Same Dir.	Sideswipe	Ped. / Cyclist	Fixed/ Other		
Sussex Drive at Barkley Boulevard	0	0	1	0	0	1	0	2	0.34
Woburn Street at Barkley Boulevard	7	10	14	3	1	2	1	38	6.61

Of the 40 total collisions, only one resulted in a fatality, which occurred at the intersection of Sussex Drive and Barkley Boulevard. The collision occurred during the daylight hours with partly cloudy skies and the weather conditions at the time of the collision were icy.

The collision rate has been calculated using PM peak-hour volumes and a K-factor of 10:1 (ADT:PM Peak-Hour Trips) for conversion of the PM peak-hour data to daily volumes. The collision rates over the 5.75-year timeframe are summarized in Table 3.

Table 3: Collision Rate Calculation (5.75 Years)

Intersection	PM Peak-Hour Intersection Vol.	K-Factor	Total Collisions	Collision Rate[3]
Sussex Drive at Barkley Boulevard	946	10	2	0.10
Woburn Street at Barkley Boulevard	2,648	10	38	0.68

WSDOT has published collision data for the Northwest Region in the *2011 Annual Collision Summary* (the latest report that provides data for different road types). The average collision rate for State Routes in an urban area in the Northwest Region is 1.49 collisions per Million Vehicle Miles (considered equivalent to Million Entering Vehicles for comparison to an intersection) for principal arterials and 1.93 for minor arterials. All of the study intersections have collision rates of less than 1.00 and therefore the collision rates should be considered within normal ranges.

[3] The collision rate is based on Million Entering Vehicles.

3.2 Road Network

Sussex Drive is a Residential 2-lane roadway with one lane in each direction. Barkley Boulevard is a Secondary Route 3-lane roadway with one lane in each direction and a center two-way-left-turn-lane. Desborough Place is a Residential 2-lane roadway with one lane in each direction. McLeod Road is a Collector Route 2-lane roadway with an occasional center two-way left-turn lane. Woburn Street is a Principal Route 4-lane roadway with two-lanes in each direction and a two-way center left-turn lane. The control at each of the study intersections is:

1. Sussex Drive at Barkley Boulevard – Two-Way Stop-Controlled
2. Desborough Place at McLeod Road – Two-Way Stop-Controlled
3. Woburn Street at Barkley Boulevard – Signalized

The intersection of Woburn Street at Barkley Boulevard has only been analyzed in the PM peak-hour, based on scoping discussion with the City of Bellingham staff.

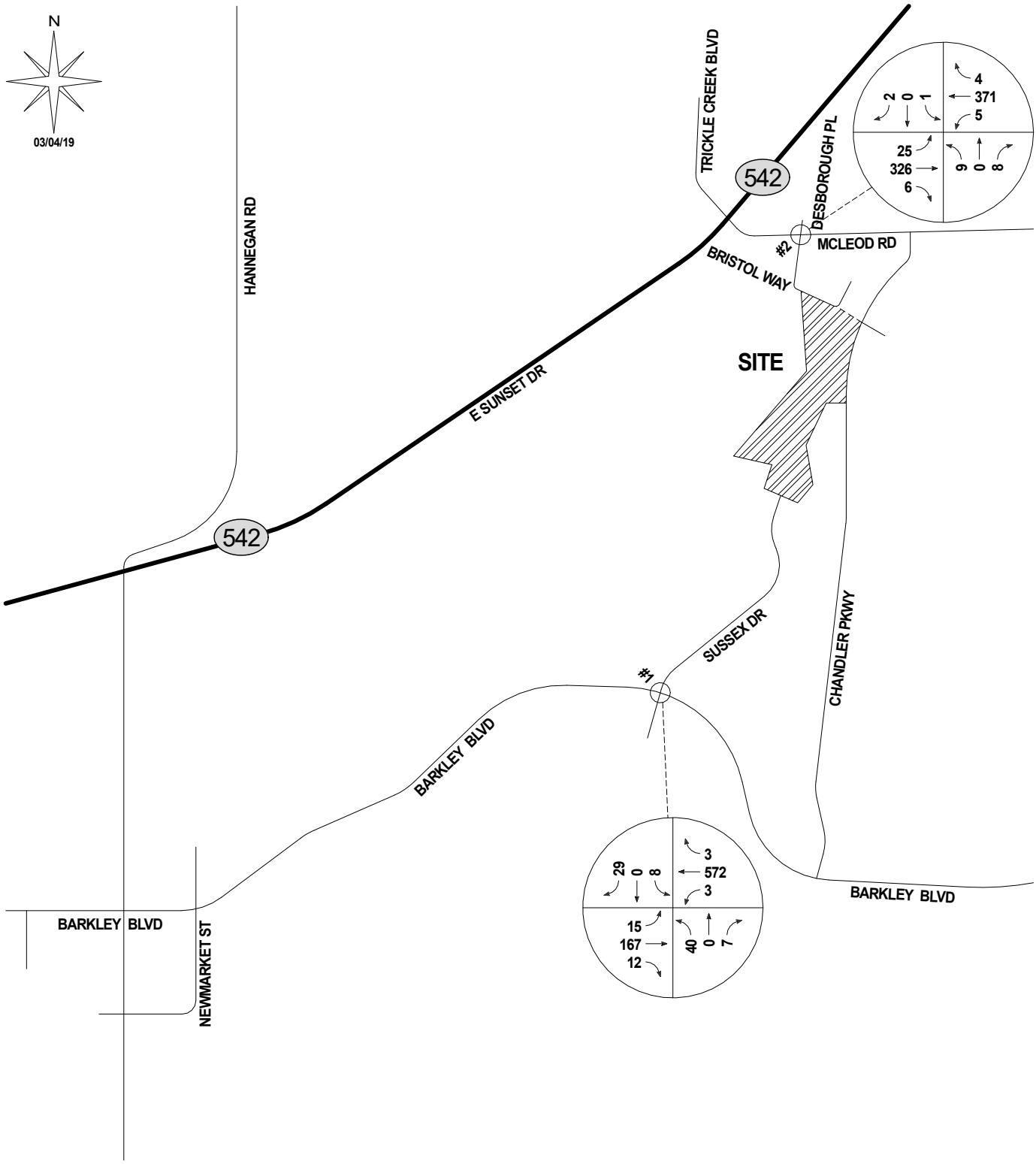
3.3 2019 Existing Level of Service Analysis

Existing turning movement data for the study intersections were collected by the independent count firm of Traffic Data Gathering (TDG) in February 2019. The count data was collected on days when the traffic was not impacted by the weather. The existing turning movements at the study intersections are shown in Figure 2 and Figure 3 for the AM and PM peak-hour, respectively.

The existing level of service analysis has been performed using the existing channelization and traffic control. The level of service for the intersection of Sussex Drive at Barkley Boulevard has been reported for the southbound approach since this is the approach impacted by the development. The level of service results show that the study intersections currently operate at LOS C or better during the AM and PM peak-hours under the 2019 existing conditions. The existing level of service results are summarized in Table 4 and Table 5 for the AM and PM peak-hours, respectively.

Table 4: 2019 Existing Level of Service Summary – AM Peak-Hour

Intersection	2019 Existing Conditions	
	LOS	Delay
1. Sussex Drive at Barkley Boulevard	C (SB)	16.1 sec
2. Desborough Place at McLeod Road	C	16.5 sec



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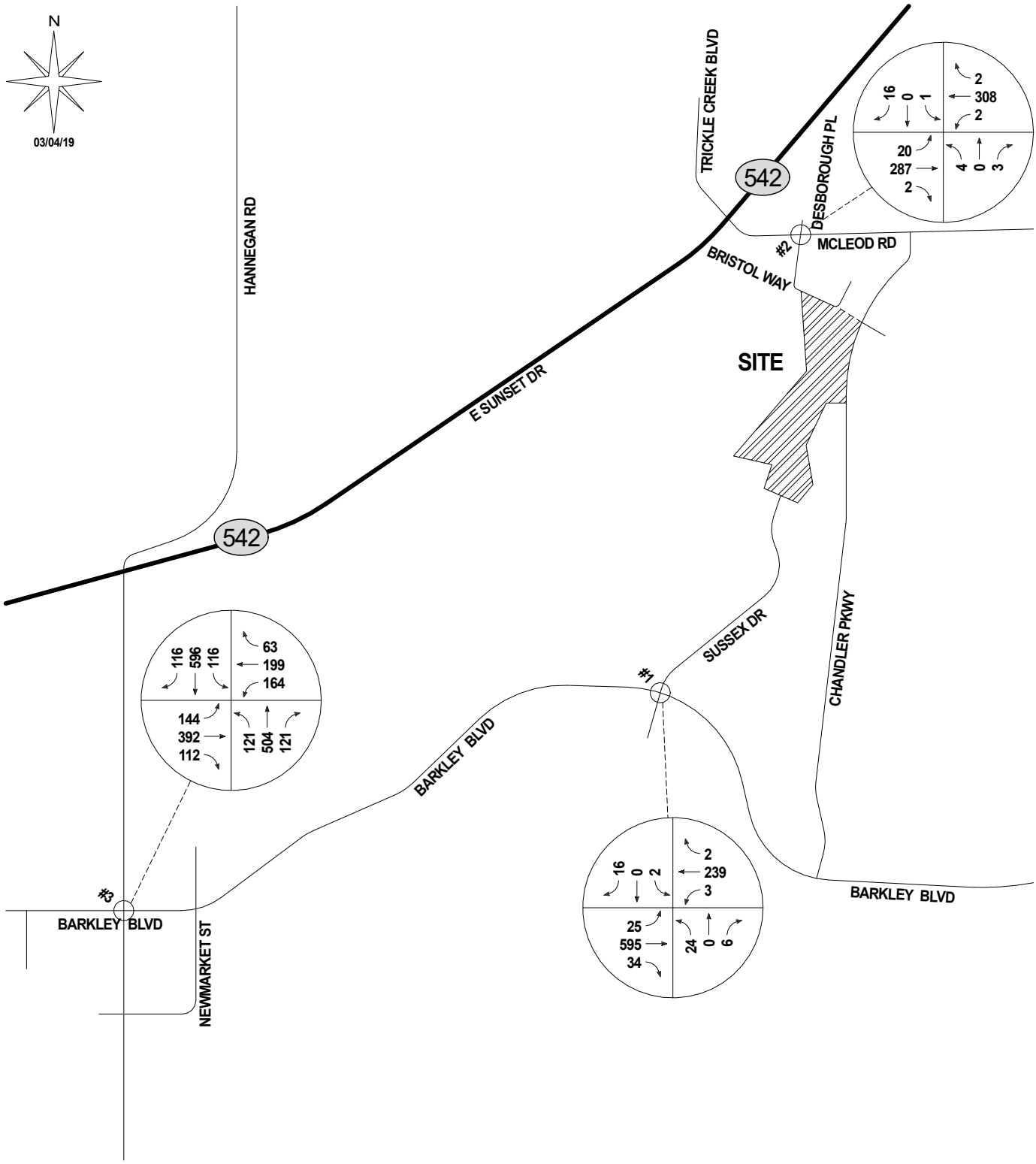
XXX → AM PEAK-HOUR TURNING MOVEMENTS

FIGURE 2
2019 EXISTING AM PEAK-HOUR TURNING MOVEMENTS



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XXX → PM PEAK-HOUR TURNING MOVEMENTS

FIGURE 3
2019 EXISTING PM PEAK-HOUR TURNING MOVEMENTS

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

Intersection	2019 Existing Conditions	
	LOS	Delay
1. Sussex Drive at Barkley Boulevard	C	22.6 sec
2. Desborough Place at McLeod Road	B	14.4 sec
3. Woburn Street at Barkley Boulevard	C	33.4 sec

The level of service results are included in the attachments.

4. FUTURE CONDITIONS

The future conditions have been for two access scenarios to address citizen comments: Full access between Barkley Boulevard and Bristol Way and access restriction between Barkley Boulevard and Bristol Way. The access restriction could be in the form of no connection to Bristol Way or access restricted to emergency vehicles only.

4.1 Trip Generation

The trip generation calculations for the Barkley Heights development are based on average trip generation rates for Land Use Code (LUC) 210, Single-Family Detached Housing, and ITE LUC 220, Multifamily Housing (Low-Rise) contained in the ITE *Trip Generation Manual, 10th Edition (2017)*. The one duplex structure (2 units) was assessed as two single-family detached units. The trip generation is summarized in Table 6.

Table 6: Trip Generation Summary

Land Use	Size	Average Daily Trips	AM Peak-Hour Trips			PM Peak-Hour Trips		
			In	Out	Total	In	Out	Total
Single-Family Detached	32 Units	302	6	18	24	20	12	32
Multi-Family (Low-Rise)	40 Units	293	4	14	18	14	8	22
TOTAL		**595**	**10**	**32**	**42**	**34**	**20**	**54**

The Barkley Heights development is anticipated to generate a maximum of 595 new average daily trips (ADT) with 42 new AM peak-hour trips and 54 new PM peak-hour trips. The trip generation calculations are included in the attachments.

4.2 Scenario A – Full Connection to Bristol Way

4.2.1. Trip Distribution

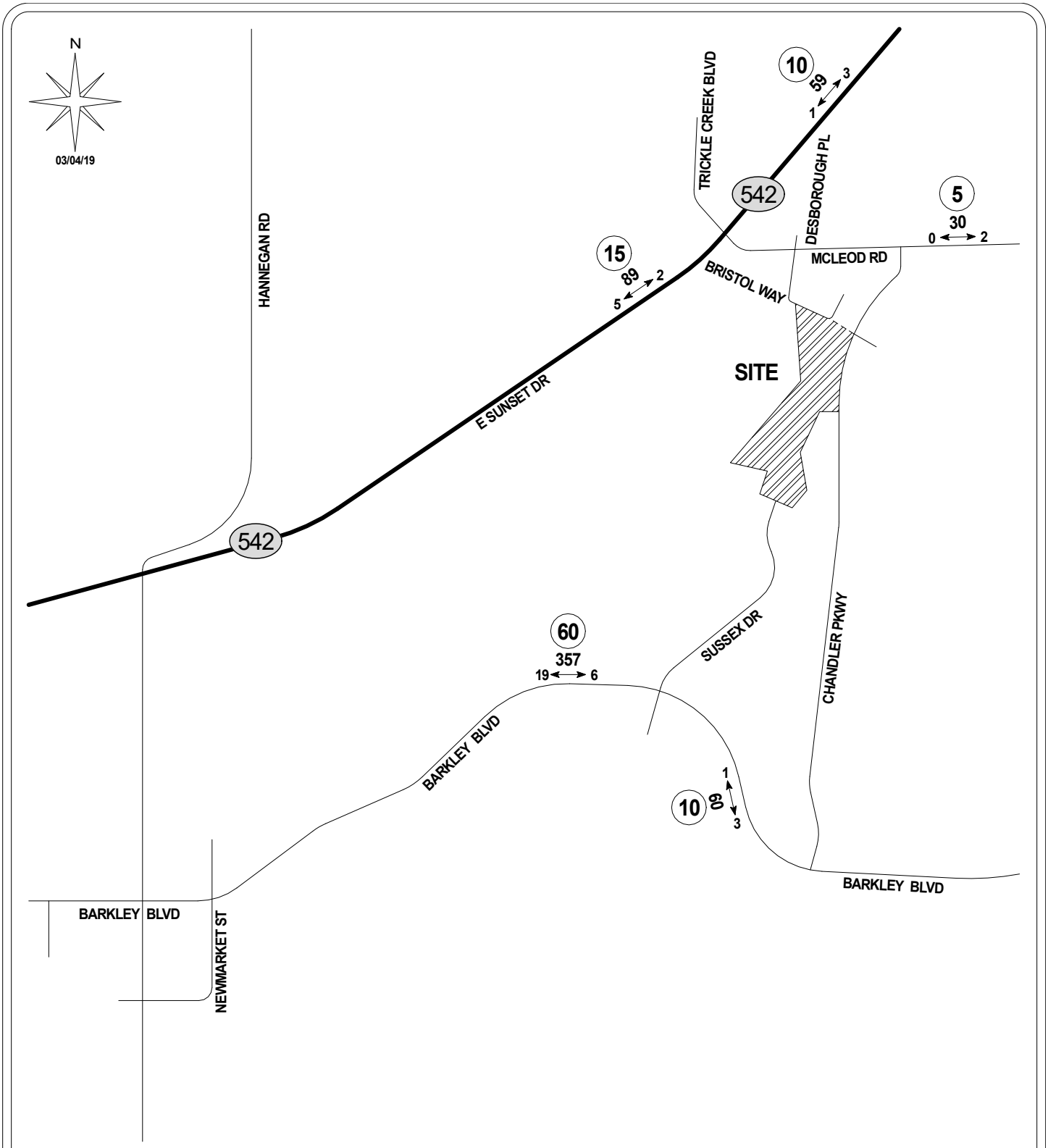
The distribution of trips generated by the Barkley Heights development if there is a full connection to Bristol Way is based on approved distributions for similar developments in the site vicinity.

It is estimated that 75% of the trips generated by the development will travel to and from the west, fifteen percent along SR-542 and sixty percent along Barkley Boulevard. It is anticipated that 10% of the trips generated by the development will travel to and from the north along SR-542. The remaining 15% of the trips generated by the development will travel to and from the east, five percent along McLeod Road and ten percent along Barkley Boulevard. A detailed distribution of the trips generated by the development is shown in Figure 4 and Figure 5 for the AM and PM peak-hours, respectively.

4.2.2. 2024 Level of Service Analysis

The 2024 baseline turning movements were calculated by applying a 2% annually compounding growth rate and trips from the 91-unit apartment pipeline project located at 3202 Newmarket Street. The 3202 Newmarket Street pipeline trips were distributed based on the Barkley Heights trip distribution. This methodology is consistent with the scoping discussions with City of Bellingham staff. The 2024 baseline turning movements are shown in Figure 6 and Figure 7 for the AM and PM Peak-Hours, respectively. The study intersections are anticipated to continue operating at acceptable LOS E or better during the AM and PM peak-hours under the 2024 baseline conditions.

The 2024 future with development turning movements have been calculated by adding the development's trips to the 2024 baseline turning movements and conservatively assigning a total of 50 trips (25 from the northeast traveling southwest and 25 from the southwest traveling northeast) as cut-through trips along Sussex Drive. These trips were added to account for the potential of cut-through street along Sussex Drive with a full connection to Bristol Way. The 2024 future with development turning movements are shown in Figure 8 and Figure 9 for the AM and PM peak-hours, respectively. The 2024 future with development level of service has been performed using the same parameters at the 2024 baseline conditions. The analysis shows that the addition of the Barkley Heights development and a full connection between Barkley Boulevard and Bristol Way will not significantly change the operations of the study intersections. The trips from the Barkley Heights development and cut-through trips are anticipated to increase the delay at the study intersections by approximately 2 seconds or less.



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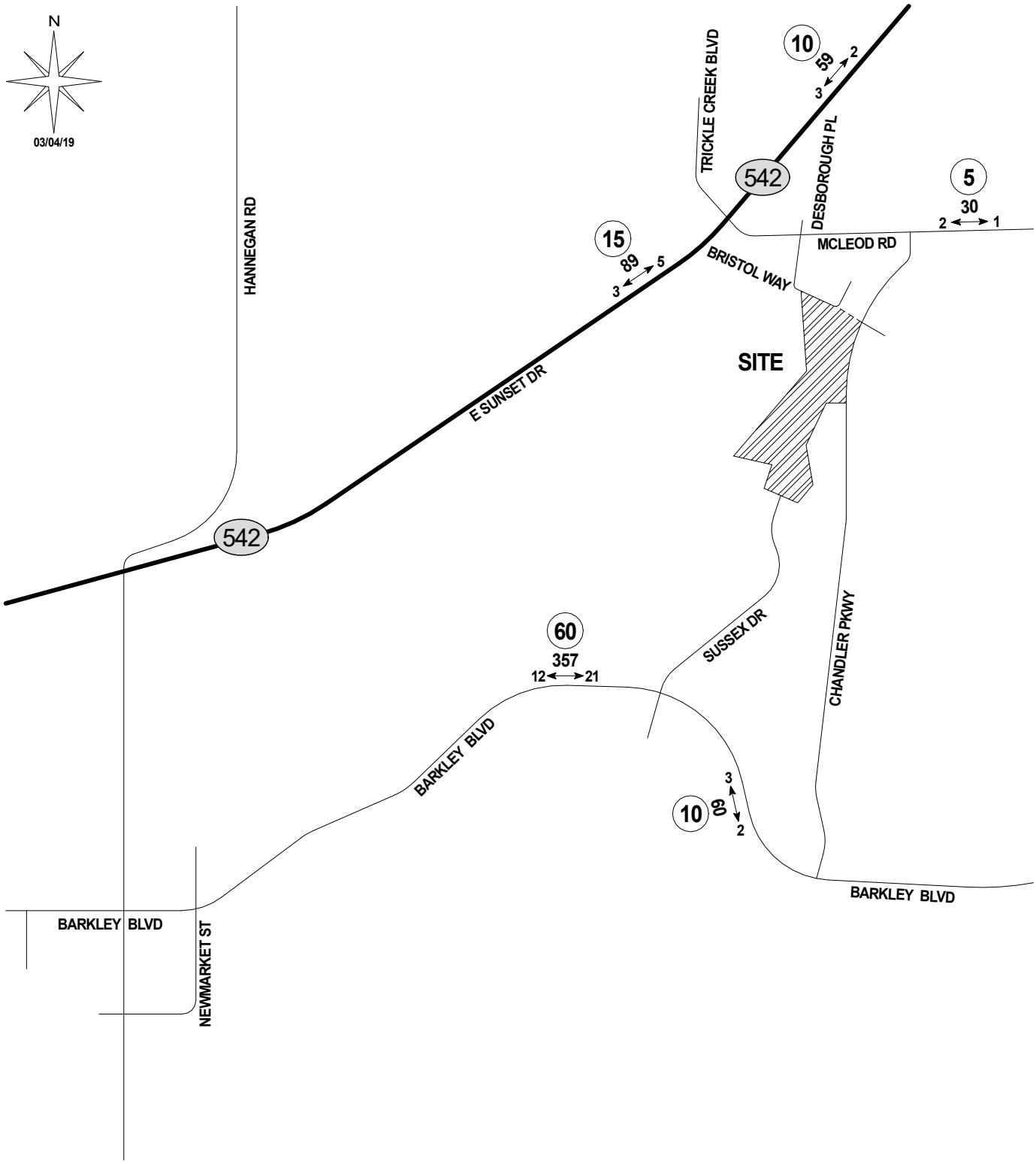
AWDT
AM ← → PEAK — NEW DAILY TRAFFIC / NEW AM PEAK-HOUR TRIPS

(XX) — TRIP DISTRIBUTION %

FIGURE 4
DEVELOPMENT TRIP DISTRIBUTION WITH BRISTOL AM PEAK-HOUR



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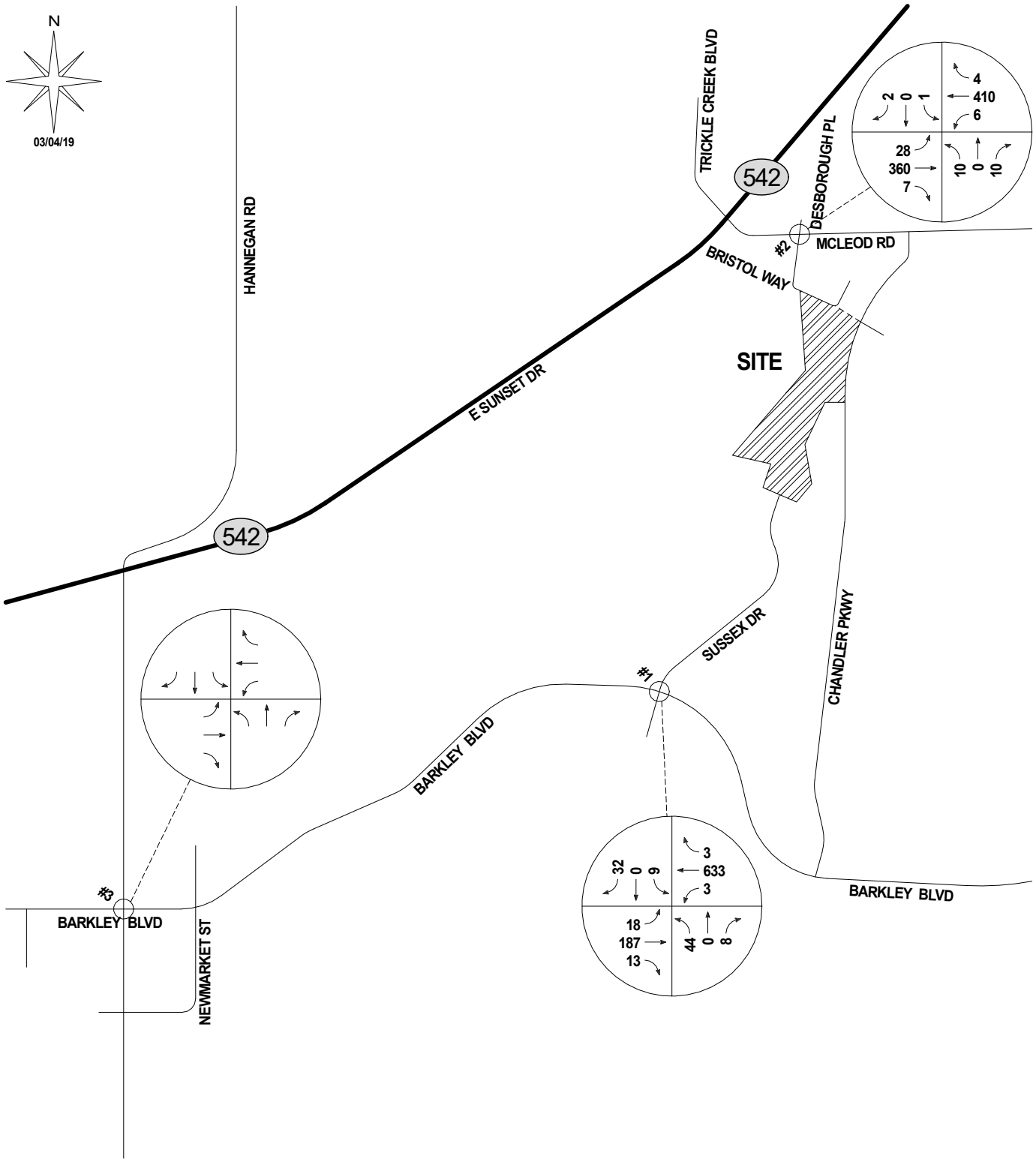
AWDT
PM ← → PEAK — NEW DAILY TRAFFIC / NEW PM PEAK-HOUR TRIPS

(XX) — TRIP DISTRIBUTION %

FIGURE 5
DEVELOPMENT TRIP DISTRIBUTION WITH BRISTOL PM PEAK-HOUR



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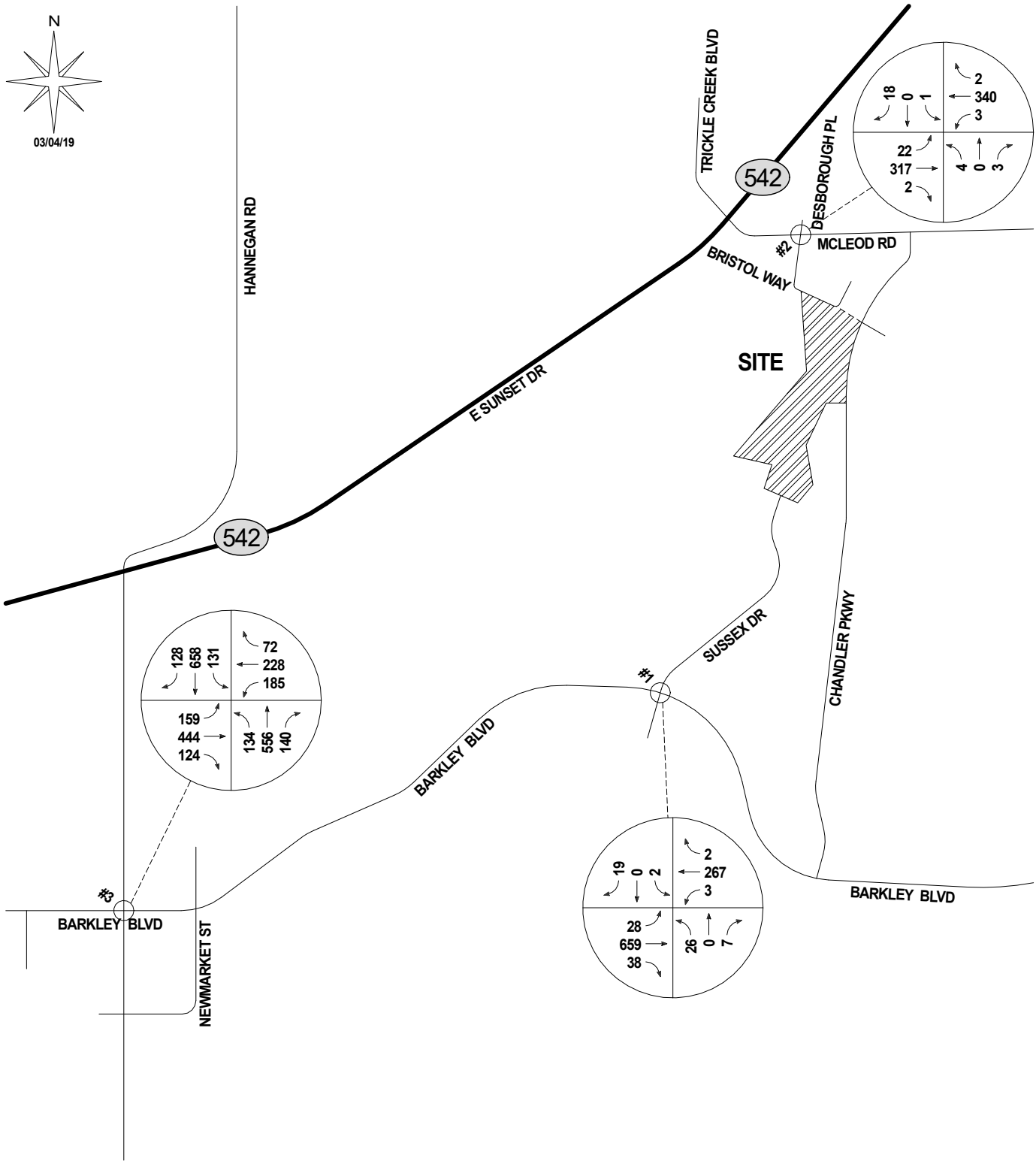
XXX → AM PEAK-HOUR TURNING MOVEMENTS

FIGURE 6
2024 BASELINE TURNING MOVEMENTS AM PEAK-HOUR



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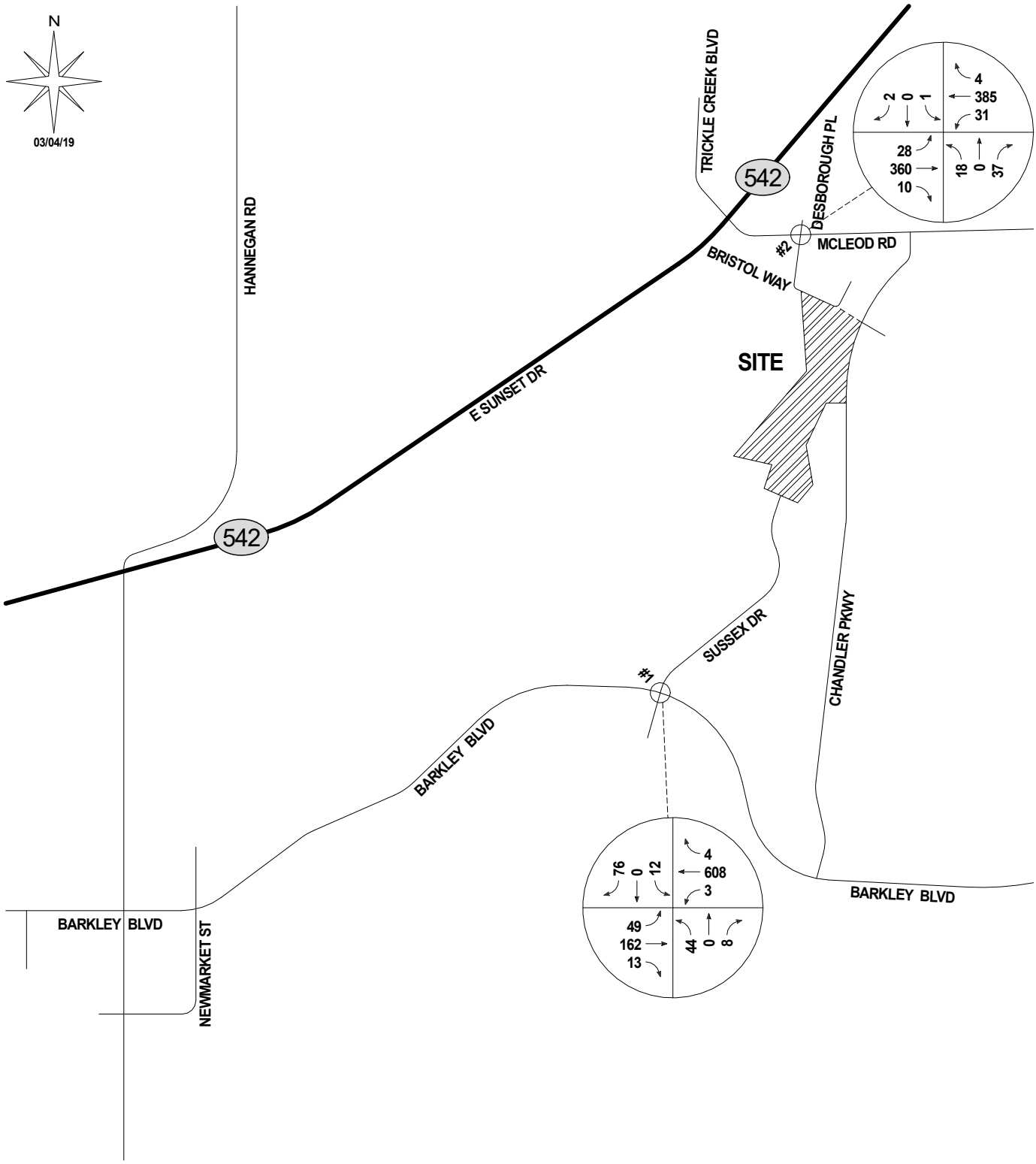
XXX → PM PEAK-HOUR TURNING MOVEMENTS

FIGURE 7
2024 BASELINE TURNING MOVEMENTS PM PEAK-HOUR



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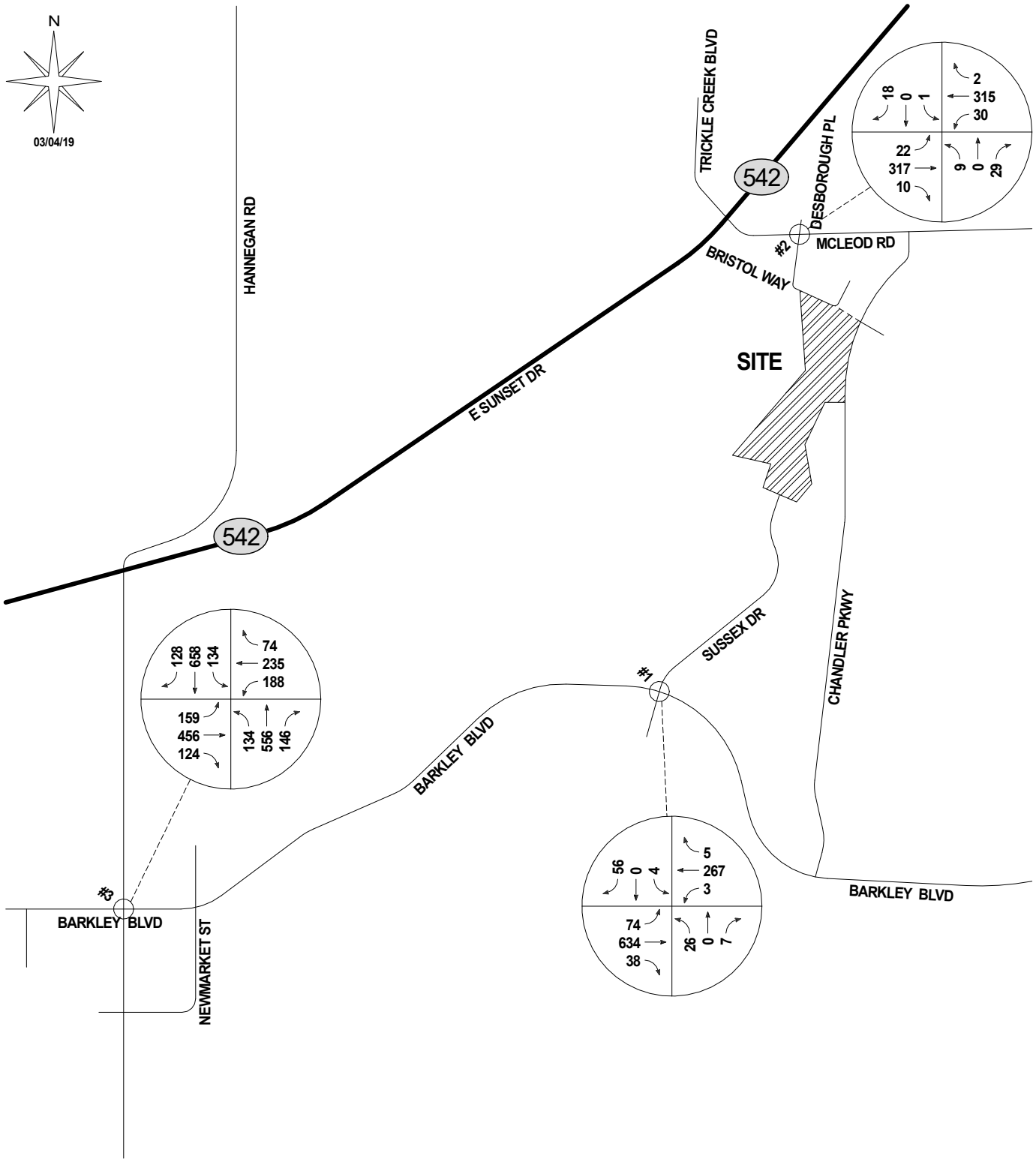
XXX → AM PEAK-HOUR TURNING MOVEMENTS

FIGURE 8

2024 FUTURE W/ DEV. TURNING MOVEMENTS WITH BRISTOL AM PEAK-HOUR



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XXX → PM PEAK-HOUR TURNING MOVEMENTS

FIGURE 9

2024 FUTURE W/ DEV. TURNING MOVEMENTS WITH BRISTOL PM PEAK-HOUR

4.2.3. Level of Service Analysis Summary

The level of service analysis shows that all of the study intersections will operate at acceptable LOS D or better with the Barkley Heights development and a full connection between Barkley Boulevard and Bristol Way. The level of service that has been reported for the intersection of Sussex Drive at Barkley Boulevard is based on the operations of Sussex Drive, which the development uses to access the local street network. However, it is important to note that the Brandywine Way approach on the south side of the intersection will operate at acceptable LOS E or better during the AM and PM peak-hours. It is important to note that the Barkley Heights development does not add trips to Brandywine Way. The intersection level of service results for the AM and PM peak-hours are summarized in Table 7 and Table 8, respectively.

Table 7: 2024 Future Level of Service Summary – AM Peak-Hour

Intersection	2019 Existing Conditions		2024 Baseline Conditions		2024 Future with Development Conditions	
	LOS	Delay	LOS	Delay	LOS	Delay
1. Sussex Drive at Barkley Boulevard	C (SB)	16.1 sec	C (SB)	18.1 sec	C (SB)	19.5 sec
2. Desborough Place at McLeod Road	C	16.5 sec	C	18.4 sec	C	20.4 sec

Table 8: 2024 Future Level of Service Summary – PM Peak-Hour

Intersection	2019 Existing Conditions		2024 Baseline Conditions		2024 Future with Development Conditions	
	LOS	Delay	LOS	Delay	LOS	Delay
1. Sussex Drive at Barkley Boulevard	B (SB)	11.2 sec	B (SB)	11.6 sec	B (SB)	11.9 sec
2. Desborough Place at McLeod Road	B	14.4 sec	C	15.6 sec	B	13.6 sec
3. Woburn Street at Barkley Boulevard	C	33.4 sec	D	37.6 sec	D	38.2 sec

It is important to note that the level of service at the intersection of Desborough Place at McLeod Road improves from the 2024 baseline conditions to the 2024 future with development conditions since the majority of trips being added to the south leg are right-turns, which typically have less delay than left-turns. The level of service calculations are included in the attachments.

4.3 Scenario B – No Connection to Bristol Way

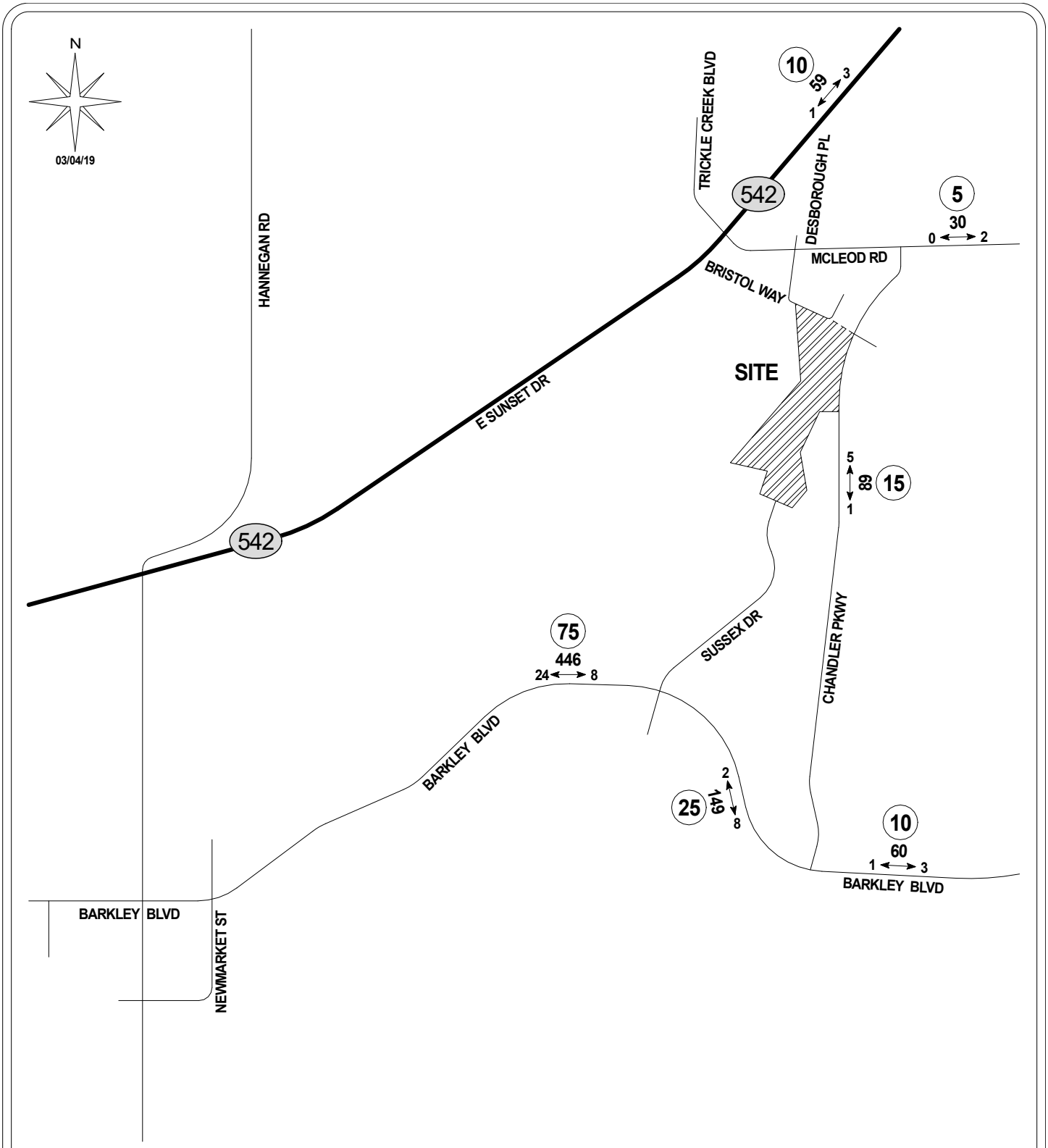
4.3.1. Trip Distribution

The distribution of trips generated by the Barkley Heights without a full connection to Bristol Way is similar to the distribution with a connection to Bristol Way; however, all of the trips generated by the development will utilize the intersection of Sussex Drive at Barkley Boulevard.

It is estimated that 85% of the trips generated by the development will travel along Barkley Boulevard, seventy-five percent to and from the west and ten percent to and from the east. The remaining 15% of the trips generated by the development are expected to travel to and from the north along Chandler Parkway. A detailed distribution of the trips generated by the development without a Bristol Way connection is shown in Figure 10 and Figure 11 for the AM and PM Peak-Hour, respectively.

4.3.2. 2024 Future with Development Level of Service Analysis

The 2024 future with development turning movements have been calculated by adding the development's trips to the 2024 baseline turning movements and are shown in Figure 12 and Figure 13 for the AM and PM peak-hours, respectively. The 2024 future with development level of service has been performed using the same parameters at the 2024 baseline conditions. The analysis shows that the addition of the development will not significantly change the operations of the intersections, even if there is no connection to Bristol Way. The trips from the Barkley Heights development are anticipated to increase the delay at most intersections by approximately 3 second or less. The north leg of Sussex Drive at Barkley Boulevard is anticipated to operate at LOS C or better in both the AM and PM peak-hours with the Barkley Heights development.



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GTC #18-271

BARKLEY HEIGHTS

CITY OF BELLINGHAM

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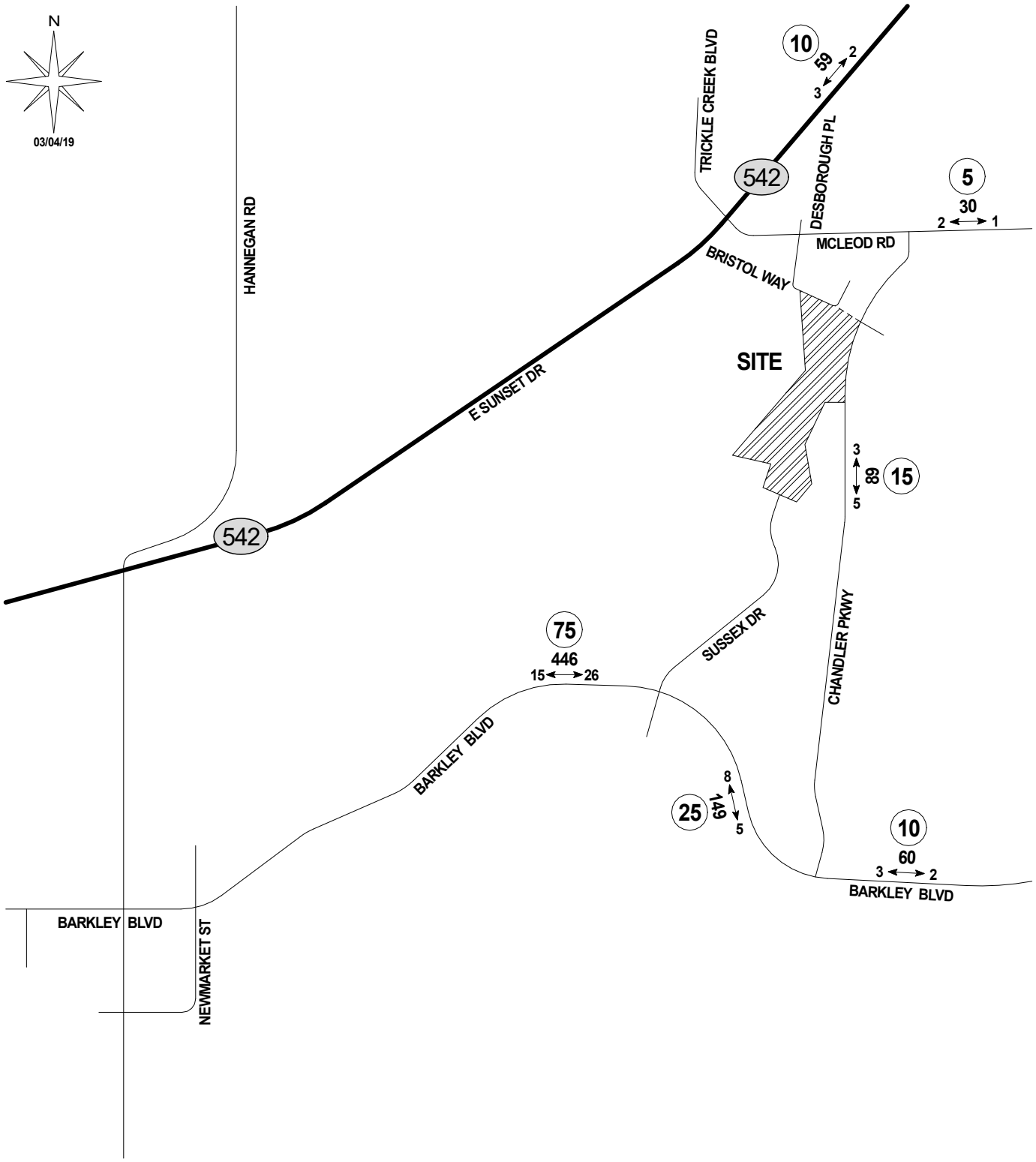
AWDT
AM ← → PEAK — NEW DAILY TRAFFIC / NEW AM PEAK-HOUR TRIPS

XX — TRIP DISTRIBUTION %

FIGURE 10

DEVELOPMENT TRIP DISTRIBUTION NO BRISTOL AM PEAK-HOUR



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TRAFFIC IMPACT STUDY
GTC #18-271

BARKLEY HEIGHTS

CITY OF BELLINGHAM

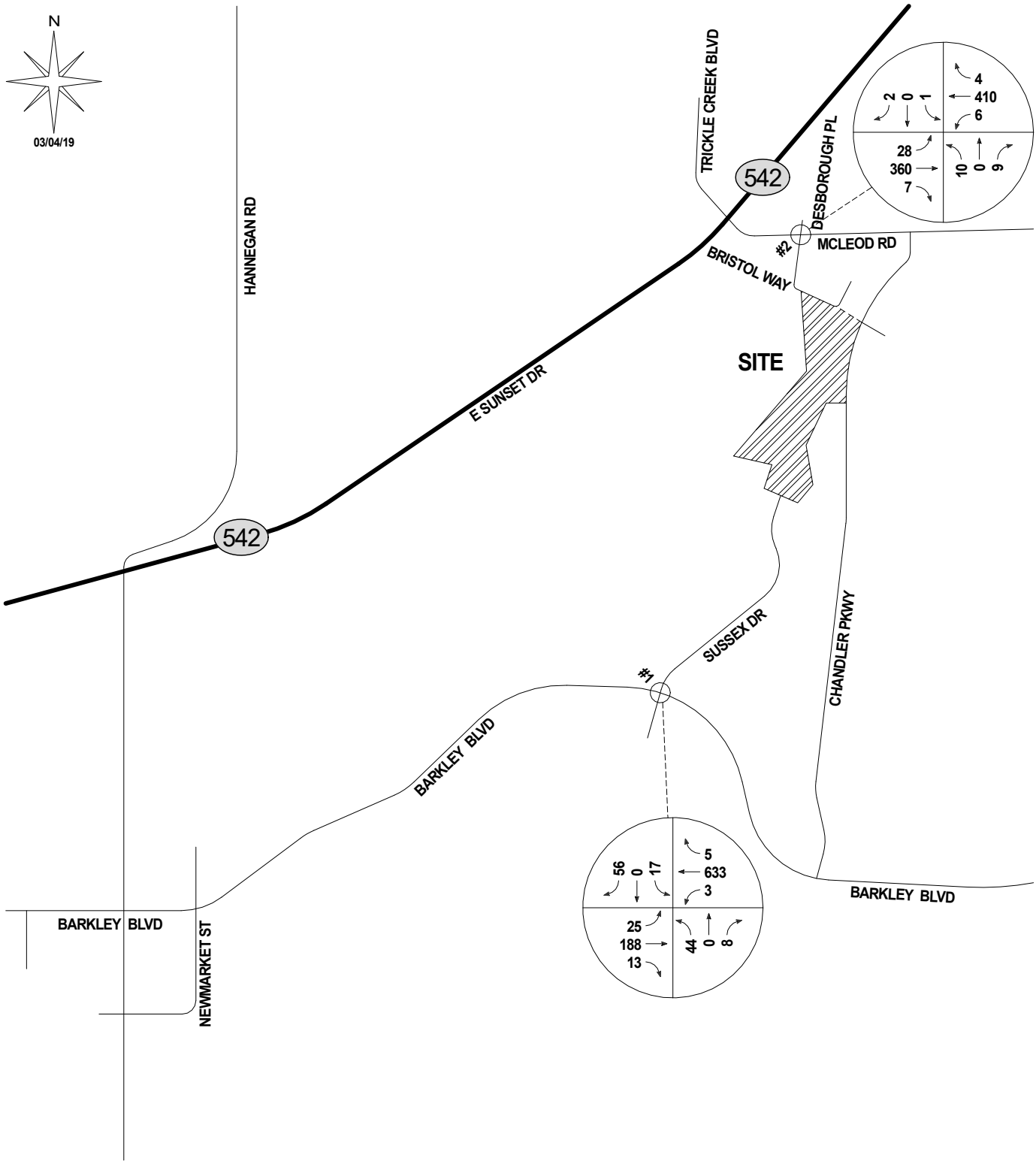
LEGEND

AWDT
PM ← → PEAK — NEW DAILY TRAFFIC / NEW PM PEAK-HOUR TRIPS

(XX) — TRIP DISTRIBUTION %

FIGURE 11

DEVELOPMENT TRIP DISTRIBUTION NO BRISTOL PM PEAK-HOUR



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GTC #18-271

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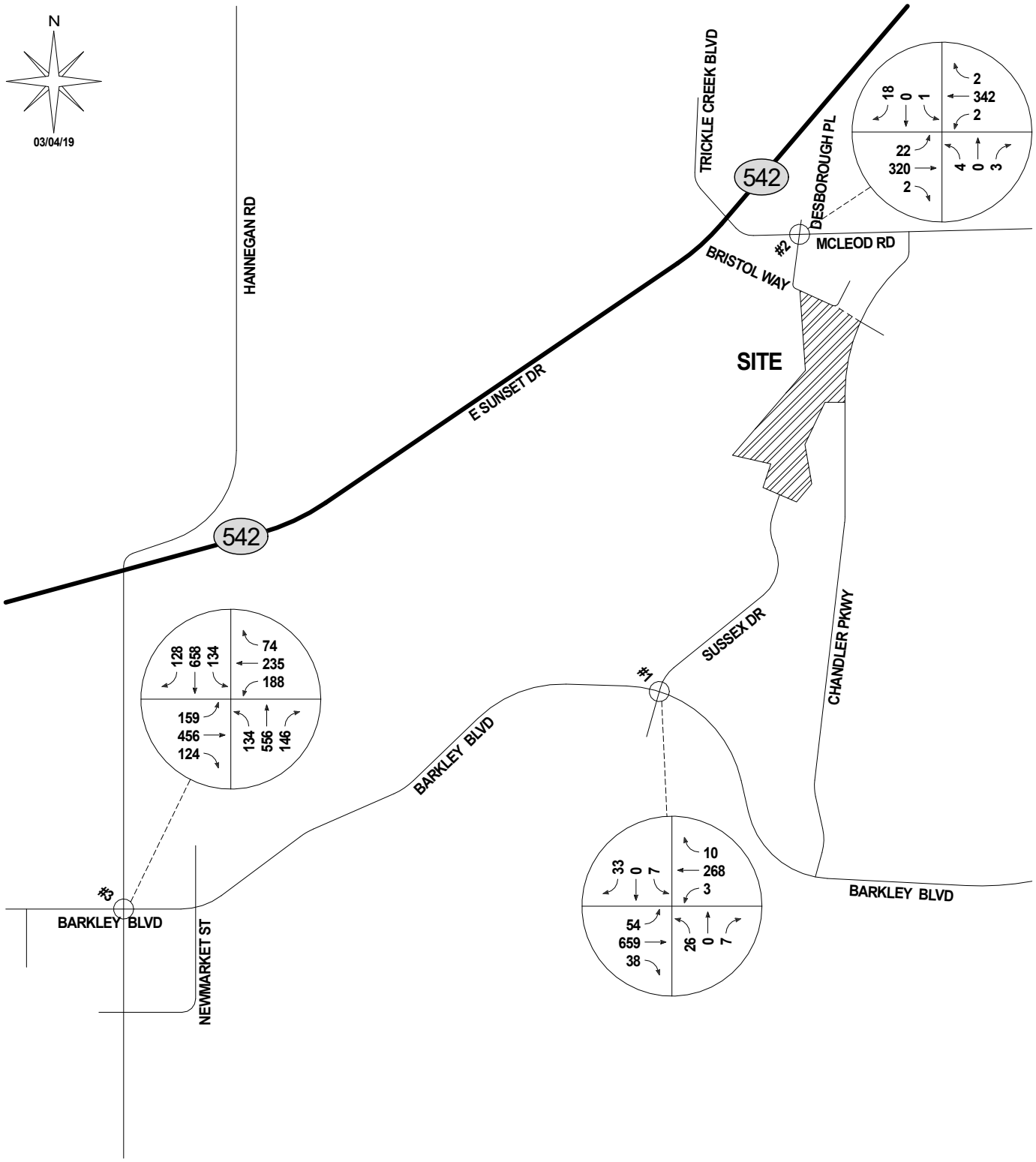
XXX → AM PEAK-HOUR TURNING MOVEMENTS

FIGURE 12
2024 FUTURE W/ DEV. TURNING MOVEMENTS NO BRISTOL AM PEAK-HOUR



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GTC #18-271

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XXX → PM PEAK-HOUR TURNING MOVEMENTS

FIGURE 13
2024 FUTURE W/ DEV. TURNING MOVEMENTS NO BRISTOL PM PEAK-HOUR

4.3.3. Level of Service Analysis Summary

The level of service analysis shows that all of the study intersections will operate at acceptable LOS D or better with the Barkley Heights development. The level of service that has been reported for the intersection of Sussex Drive at Barkley Boulevard is based on the operations of Sussex Drive, due to Barkley Heights not adding any trips to south leg, Brandywine Way. However, the Brandywine Way approach is still expected to operate at an acceptable LOS E or better in both the AM and PM peak-hours. The intersection level of service results for the AM and PM peak-hours are summarized in Table 9 and Table 10, respectively.

Table 9: 2024 Future Level of Service Summary – AM Peak-Hour

Intersection	2019 Existing Conditions		2024 Baseline Conditions		2024 Future with Development Conditions	
	LOS	Delay	LOS	Delay	LOS	Delay
1. Sussex Drive at Barkley Boulevard	C (SB)	16.1 sec	C (SB)	18.1 sec	C (SB)	20.8 sec
2. Desborough Place at McLeod Road	C	16.5 sec	C	18.4 sec	C	18.4 sec

Table 10: 2024 Future Level of Service Summary – PM Peak-Hour

Intersection	2019 Existing Conditions		2024 Baseline Conditions		2024 Future with Development Conditions	
	LOS	Delay	LOS	Delay	LOS	Delay
1. Sussex Drive at Barkley Boulevard	B (SB)	11.2 sec	B (SB)	11.6 sec	B (SB)	13.9 sec
2. Desborough Place at McLeod Road	B	14.4 sec	C	15.6 sec	C	15.6 sec
3. Woburn Street at Barkley Boulevard	C	33.4 sec	D	37.6 sec	D	38.2 sec

The level of service calculations are included in the attachments.

5. ADDITIONAL PUBLIC COMMENTS

5.1 Traffic Calming Devices

Citizen comments identified concerns regarding vehicles speeding through Sussex Drive if a connection to Bristol Way is constructed. If this is the case, several devices could be implemented to reduce the speeds or deter vehicles from cutting through Sussex Drive. Several devices may be used to reduce the speed of vehicles or deter cut-through trips on residential streets, including:

- Speed Humps
- Speed Tables
- Traffic Circles/Islands
- Curb Extensions (Bulb-Outs)

These devices were all identified in the City of Bellingham's Neighborhood Traffic Safety Program.

5.2 Sussex Drive at Barkley Boulevard

Citizen comments included concerns regarding the safety of the intersection of Sussex Drive at Barkley Boulevard for both pedestrians and vehicles. A speed study performed along Barkley Boulevard just east of the intersection found that the 85th percentile speeds along the roadway was 40.9 mph traveling eastbound and 41.7 mph traveling westbound.

Sight distance measurements were assessed based on the speeds found in the speed study. The City of Bellingham assesses sight distance based on AASHTO standards. A stopping sight distance of 325 feet and entering sight distance of 465 feet is required based on the higher speed of 41.7 mph. There is over 600 feet of clear sight distance to the west and at least 465 feet of sight distance to the east.

Per the collision data summarized above in Section 3, there were two collisions at or immediately around the intersection, one involving a bicyclist and one involving a fatality. Neither were due to deficiencies in the design of the intersection.

The need for striped crosswalks was evaluated using Table 13-2 of ITE's *Traffic Control Devices Handbook, 2nd Edition*. A minimum of 15 pedestrians (if special population groups like elderly or children are present) must exist per vehicular peak-hour to be considered for installing a marked crosswalk. There are 5 or fewer pedestrians crossing the roadway during the vehicular peak-hours and therefore a marked crosswalk should not be required.

Signalization of the intersection or not was also mentioned in the citizen comments. A signal for the intersection should not be required since the intersection is anticipated to operate acceptably, there is a lack of correctable collisions at the intersection and there are not enough pedestrians to require a marked crosswalk.

5.3 Squalicum High School Crossings

Another public comment was to evaluate crosswalks at the two access points to Squalicum High School along McLeod Road. Both locations are offsite intersections that are not significantly impacted by the development (less than 10 peak-hour trips), the development should not be held accountable for installing pedestrian improvements at these locations.

6. TRAFFIC MITIGATION FEES

The City of Bellingham has established a traffic mitigation fee system to help fund transportation capacity improvements. The current traffic impact fee is $2,676 per single-family unit and $1,514 per 1-2 story multifamily/townhouse unit. The development is proposing to construct a maximum of 30 single-family units and 42 multifamily units. The development's traffic mitigation fees are therefore $143,868.00. It is important to note that City of Bellingham traffic mitigation fees can be revised annually and may be different from what is shown in this report.

7. CONCLUSIONS

The Barkley Heights development is proposed to construct a maximum of 72 residential units (30 single-family detached units, 1 duplex structure, 2 four-plex structures and 4 eight-plex structures). The development is located on the north end of Sussex Drive, north of Barkley Boulevard. The development is anticipated to generate 595 new daily trips with 42 new AM peak-hour trips and 54 new PM peak-hour trips.

The trips generated by the site are not anticipated to significantly change the operations of the study intersections and the study intersections are anticipated to remain at acceptable LOS D or better with the development. The City of Bellingham traffic mitigation fees for the development will be $143,868.00 based on the 2019 fees and methodology. However, these fees may increase in the future.

Trip Generation Calculations

Barkley Heights
GTC #18-271

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

									NET EXTERNAL TRIPS BY TYPE											
									IN BOTH DIRECTIONS						DIRECTIONAL ASSIGNMENTS					
			Gross Trips				Internal Crossover		TOTAL	PASS-BY		DIVERTED LINK		NEW	PASS-BY		DIVERTED LINK		NEW	
LAND USES	VARIABLE	ITE LU code	Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	Trips In+Out (Total)	In+Out (Total)	% of Ext. Trips	In+Out (Total)	% of Ext. Trips	In+Out (Total)	In+Out (Total)	In	Out	In	Out	In	Out
Single-Family Detached	32 units	210	9.44	50%	50%	302	0%	0	302	0%	0	0%	0	302	0	0	0	0	151	151
Multi-Family (Low-Rise)	40 units	220	7.32	50%	50%	293	0%	0	293	0%	0	0%	0	293	0	0	0	0	147	146
Totals						595		0	595		0		0	595	0	0	0	0	298	297

Barkley Heights
GTC #18-271

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

									NET EXTERNAL TRIPS BY TYPE											
									IN BOTH DIRECTIONS						DIRECTIONAL ASSIGNMENTS					
			Gross Trips				Internal Crossover		TOTAL	PASS-BY		DIVERTED LINK		NEW	PASS-BY		DIVERTED LINK		NEW	
LAND USES	VARIABLE	ITE LU code	Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	Trips In+Out (Total)	In+Out (Total)	% of Ext. Trips	In+Out (Total)	% of Ext. Trips	In+Out (Total)	In+Out (Total)	In	Out	In	Out	In	Out
Single-Family Detached	32 units	210	0.74	25%	75%	24	0%	0	24	0%	0	0%	0	24	0	0	0	0	6	18
Multi-Family (Low-Rise)	40 units	220	0.46	23%	77%	18	0%	0	18	0%	0	0%	0	18	0	0	0	0	4	14
Totals						42		0	42		0		0	42	0	0	0	0	10	32

Barkley Heights
GTC #18-271

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

									NET EXTERNAL TRIPS BY TYPE											
									IN BOTH DIRECTIONS						DIRECTIONAL ASSIGNMENTS					
			Gross Trips				Internal Crossover		TOTAL	PASS-BY		DIVERTED LINK		NEW	PASS-BY		DIVERTED LINK		NEW	
LAND USES	VARIABLE	ITE LU code	Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	Trips In+Out (Total)	In+Out (Total)	% of Ext. Trips	In+Out (Total)	% of Ext. Trips	In+Out (Total)	In+Out (Total)	In	Out	In	Out	In	Out
Single-Family Detached	32 units	210	0.99	63%	37%	32	0%	0	32	0%	0	0%	0	32	0	0	0	0	20	12
Multi-Family (Low-Rise)	40 units	220	0.56	63%	37%	22	0%	0	22	0%	0	0%	0	22	0	0	0	0	14	8
Totals						54		0	54		0		0	54	0	0	0	0	34	20

Collision Data

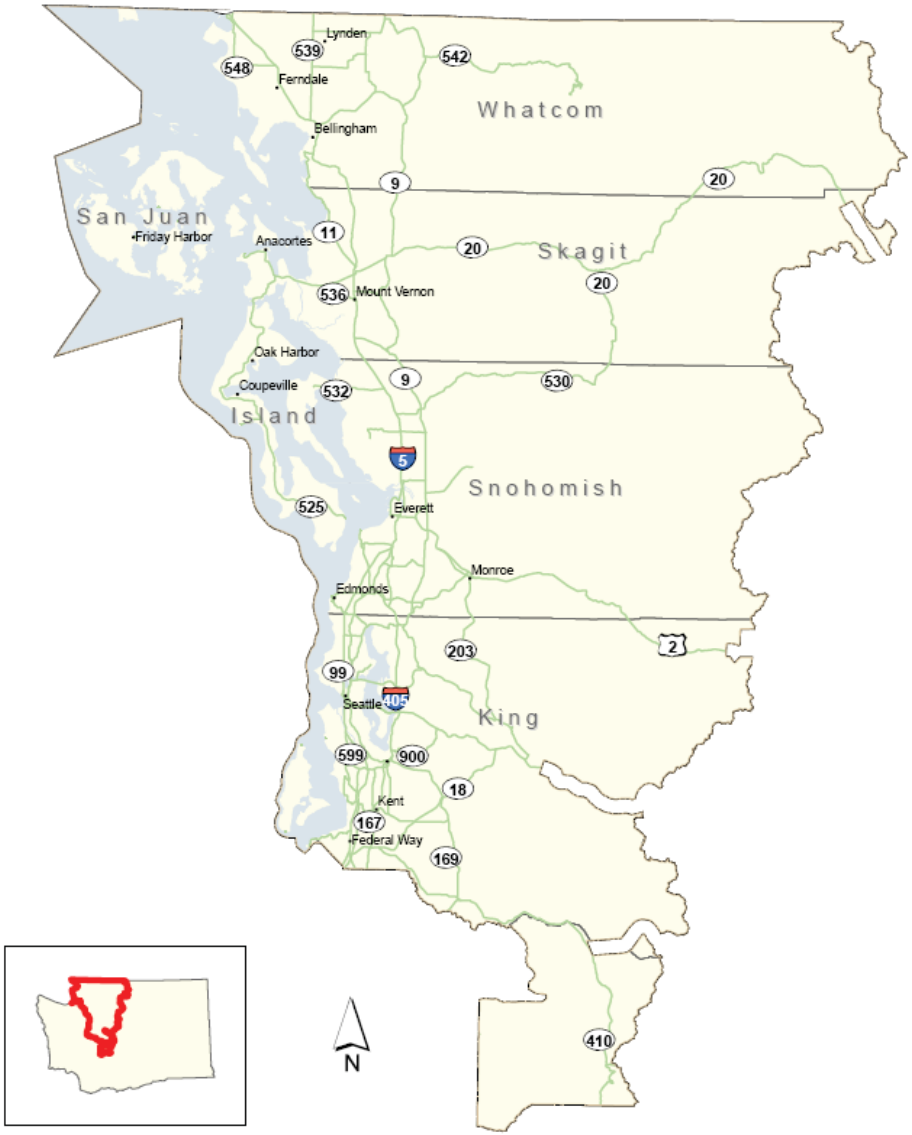
PRIMARY TRAFFICWAY	INTERSECTING TRAFFICWAY/ REFERENCE POINT NAME	DIST FROM REF POINT	MI or FT	COMP DIR FROM REF POINT	REPORT NUMBER	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	# FAT	# VEH	# PEDS	# BIKES	WEATHER	ROADWAY SURFACE CONDITION	LIGHTING CONDITION	FIRST COLLISION TYPE / OBJECT STRUCK
BARKLEY BLVD	SUSSEX DR	0			3654975	2016-02-02	05:06	Suspected Minor Injury	1	0	1	0	1	Clear or Partly Cloudy	Dry	Dark-Street Lights On	Vehicle - Pedalcyclist
BARKLEY BLVD	SUSSEX DR	114	F	SE	E298390	2014-01-05	09:55	Dead at Scene	1	1	2	0	0	Clear or Partly Cloudy	Ice	Daylight	From opposite direction - all others
BARKLEY BLVD	WOBURN ST	0			3654913	2013-12-21	15:20	No Apparent Injury	0	0	2	0	0	Raining	Wet	Daylight	From opposite direction - one left turn - one straight
BARKLEY BLVD	WOBURN ST	0			E275816	2013-10-01	16:35	No Apparent Injury	0	0	2	0	0	Overcast	Dry	Daylight	From same direction - both going straight - one stopped - rear-end
BARKLEY BLVD	WOBURN ST	0			E258120	2013-07-15	17:55	Possible Injury	1	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From opposite direction - one left turn - one right turn
BARKLEY BLVD	WOBURN ST	0			E287660	2013-11-21	12:29	Possible Injury	1	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	Entering at angle
BARKLEY BLVD	WOBURN ST	0			E324047	2014-04-22	17:21	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From opposite direction - one left turn - one straight
BARKLEY BLVD	WOBURN ST	0			3603532	2014-09-20	20:44	Suspected Minor Injury	1	0	1	1	0	Clear or Partly Cloudy	Dry	Dark-Street Lights On	Vehicle turning left hits pedestrian
BARKLEY BLVD	WOBURN ST	0			E348632	2014-08-06	17:36	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From opposite direction - one left turn - one straight
BARKLEY BLVD	WOBURN ST	0			E485732	2015-11-22	19:11	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Dark-Street Lights On	From same direction - both going straight - one stopped - rear-end
BARKLEY BLVD	WOBURN ST	0			3763003	2016-09-10	12:22	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	Entering at angle
BARKLEY BLVD	WOBURN ST	0			E537763	2016-04-22	16:30	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From opposite direction - one left turn - one straight
BARKLEY BLVD	WOBURN ST	0			3603519	2016-01-24	00:08	No Apparent Injury	0	0	2	0	0	Raining	Wet	Dark-Street Lights On	From opposite direction - one left turn - one right turn
BARKLEY BLVD	WOBURN ST	0			E610984	2016-11-18	15:58	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From same direction - one right turn - one straight
BARKLEY BLVD	WOBURN ST	0			3603766	2016-02-05	22:26	Suspected Minor Injury	3	0	2	0	0	Raining	Wet	Dark-Street Lights On	From opposite direction - one left turn - one straight
BARKLEY BLVD	WOBURN ST	0			E753998	2017-12-28	11:48	Possible Injury	1	0	2	0	0	Raining	Wet	Daylight	From opposite direction - one left turn - one straight
BARKLEY BLVD	WOBURN ST	0			3429584	2017-08-03	17:58	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From opposite direction - one left turn - one straight
BARKLEY BLVD	WOBURN ST	0			E690662	2017-07-10	15:01	Possible Injury	1	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From opposite direction - one left turn - one right turn
BARKLEY BLVD	WOBURN ST	0			3529411	2018-02-02	21:52	Suspected Minor Injury	6	0	2	0	0	Raining	Wet	Dark-Street Lights On	From opposite direction - one left turn - one straight
WOBURN ST	BARKLEY BLVD	0			3219409	2013-08-24	15:20	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From same direction - both going straight - both moving - sideswipe
WOBURN ST	BARKLEY BLVD	0			3655027	2013-10-05	13:51	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From same direction - both going straight - one stopped - rear-end
WOBURN ST	BARKLEY BLVD	0			E241129	2013-04-27	18:12	No Apparent Injury	0	0	2	0	0	Raining	Wet	Daylight	Entering at angle
WOBURN ST	BARKLEY BLVD	0			E307984	2014-02-13	07:25	No Apparent Injury	0	0	2	0	0	Overcast	Wet	Daylight	From opposite direction - one left turn - one straight
WOBURN ST	BARKLEY BLVD	0			3603303	2014-06-30	21:54	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Dusk	From same direction - one right turn - one straight
WOBURN ST	BARKLEY BLVD	0			E308795	2014-02-18	16:39	Possible Injury	1	0	2	0	0	Overcast	Dry	Daylight	From opposite direction - one left turn - one straight
WOBURN ST	BARKLEY BLVD	0			E482673	2015-11-13	10:54	No Apparent Injury	0	0	2	0	0	Raining	Wet	Daylight	Entering at angle
WOBURN ST	BARKLEY BLVD	0			3429566	2015-04-12	17:45	Suspected Minor Injury	1	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From same direction - both going straight - one stopped - rear-end
WOBURN ST	BARKLEY BLVD	0			E578964	2016-08-23	19:01	Suspected Minor Injury	1	0	1	0	0	Clear or Partly Cloudy	Dry	Daylight	Linear Curb
WOBURN ST	BARKLEY BLVD	0			2469414	2016-11-03	10:55	Possible Injury	1	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From same direction - both going straight - one stopped - rear-end
WOBURN ST	BARKLEY BLVD	0			3655364	2016-03-04	17:34	No Apparent Injury	0	0	2	0	0	Raining	Wet		Entering at angle
WOBURN ST	BARKLEY BLVD	0			3648811	2016-02-02	18:37	Possible Injury	1	0	1	0	1	Clear or Partly Cloudy	Wet	Dark-Street Lights On	Vehicle - Pedalcyclist
WOBURN ST	BARKLEY BLVD	0			3655525	2016-08-14	10:44	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	Entering at angle
WOBURN ST	BARKLEY BLVD	0			E577312	2016-08-19	14:20	No Apparent Injury	0	0	3	0	0	Clear or Partly Cloudy	Dry	Daylight	Entering at angle
WOBURN ST	BARKLEY BLVD	0			E602425	2016-10-26	15:01	No Apparent Injury	0	0	3	0	0	Raining	Wet	Daylight	From same direction - both going straight - one stopped - rear-end
WOBURN ST	BARKLEY BLVD	0			3655514	2016-02-12	17:50	No Apparent Injury	0	0	2	0	0	Raining	Wet	Dark-Street Lights On	From same direction - one right turn - one straight
WOBURN ST	BARKLEY BLVD	0			3648946	2017-12-29	06:24	Possible Injury	2	0	2	0	0	Raining	Wet	Dark-Street Lights On	Entering at angle
WOBURN ST	BARKLEY BLVD	0			E635073	2017-01-18	14:28	Possible Injury	1	0	2	0	0	Overcast	Wet	Daylight	Entering at angle
WOBURN ST	BARKLEY BLVD	0			E704129	2017-08-22	15:01	Possible Injury	1	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From opposite direction - one left turn - one straight
WOBURN ST	BARKLEY BLVD	0			E833314	2018-08-13	21:16	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Dusk	Entering at angle
WOBURN ST	BARKLEY BLVD	64	F	SE	E455528	2015-08-26	11:25	No Apparent Injury	0	0	2	0	0	Clear or Partly Cloudy	Dry	Daylight	From same direction - both going straight - one stopped - rear-end

Washington State Department of Transportation

2011 Washington State Collision Data Summary

Average Collision Rates by Functional Class by Region

Northwest Region



2011 AVERAGE COLLISION RATES BY FUNCTIONAL CLASS
Northwest Region (State Routes only)

RURAL AREAS	PRINCIPAL ARTERIAL	MINOR ARTERIAL	COLLECTOR	INTERSTATE	ALL HIGHWAYS
Vehicle Miles of Travel (Millions)	554.01	448.32	215.05	970.35	2,187.73
Miles of Highway	133.41	255.91	158.99	57.61	605.92
Total Collisions	564	520	363	510	1,957
Collision Rate (1)	**1.02**	**1.16**	**1.69**	**0.53**	**0.89**
Property Damage Only Collisions	389	305	210	360	1,264
Property Damage Only Collision Rate (1)	**0.70**	**0.68**	**0.98**	**0.37**	**0.58**
Injury Collisions	169	209	152	149	679
Injury Collision Rate (1)	**0.31**	**0.47**	**0.71**	**0.15**	**0.31**
Fatal Collisions	6	6	1	1	14
Fatal Collision Rate (2)	**1.08**	**1.34**	**0.47**	**0.10**	**0.64**

URBAN AREAS	PRINCIPAL ARTERIAL	MINOR ARTERIAL	COLLECTOR	INTERSTATE	ALL HIGHWAYS
Vehicle Miles of Travel (Millions)	4,033.90	506.92	0.00	6,899.35	11,440.17
Miles of Highway	326.43	98.04	0.00	141.43	565.90
Total Collisions	9,169	1,483	0	8,881	19,533
Collision Rate (1)	**2.27**	**2.93**	**0.00**	**1.29**	**1.71**
Property Damage Only Collisions	5,992	980	0	6,042	13,014
Property Damage Only Collision Rate (1)	**1.49**	**1.93**	**0.00**	**0.88**	**1.14**
Injury Collisions	3,158	493	0	2,820	6,471
Injury Collision Rate (1)	**0.78**	**0.97**	**0.00**	**0.41**	**0.57**
Fatal Collisions	19	10	0	19	48
Fatal Collision Rate (2)	**0.47**	**1.97**	**0.00**	**0.28**	**0.42**

ALL AREAS	PRINCIPAL ARTERIAL	MINOR ARTERIAL	COLLECTOR	INTERSTATE	ALL HIGHWAYS
Vehicle Miles of Travel (Millions)	4,587.91	955.24	215.05	7,869.70	13,627.90
Miles of Highway	459.84	353.95	158.99	199.04	1,171.82
Total Collisions	9,733	2,003	363	9,391	21,490
Collision Rate (1)	**2.12**	**2.10**	**1.69**	**1.19**	**1.58**
Property Damage Only Collisions	6,381	1,285	210	6,402	14,278
Property Damage Only Collision Rate (1)	**1.39**	**1.35**	**0.98**	**0.81**	**1.05**
Injury Collisions	3,327	702	152	2,969	7,150
Injury Collision Rate (1)	**0.73**	**0.73**	**0.71**	**0.38**	**0.52**
Fatal Collisions	25	16	1	20	62
Fatal Collision Rate (2)	**0.54**	**1.67**	**0.47**	**0.25**	**0.45**

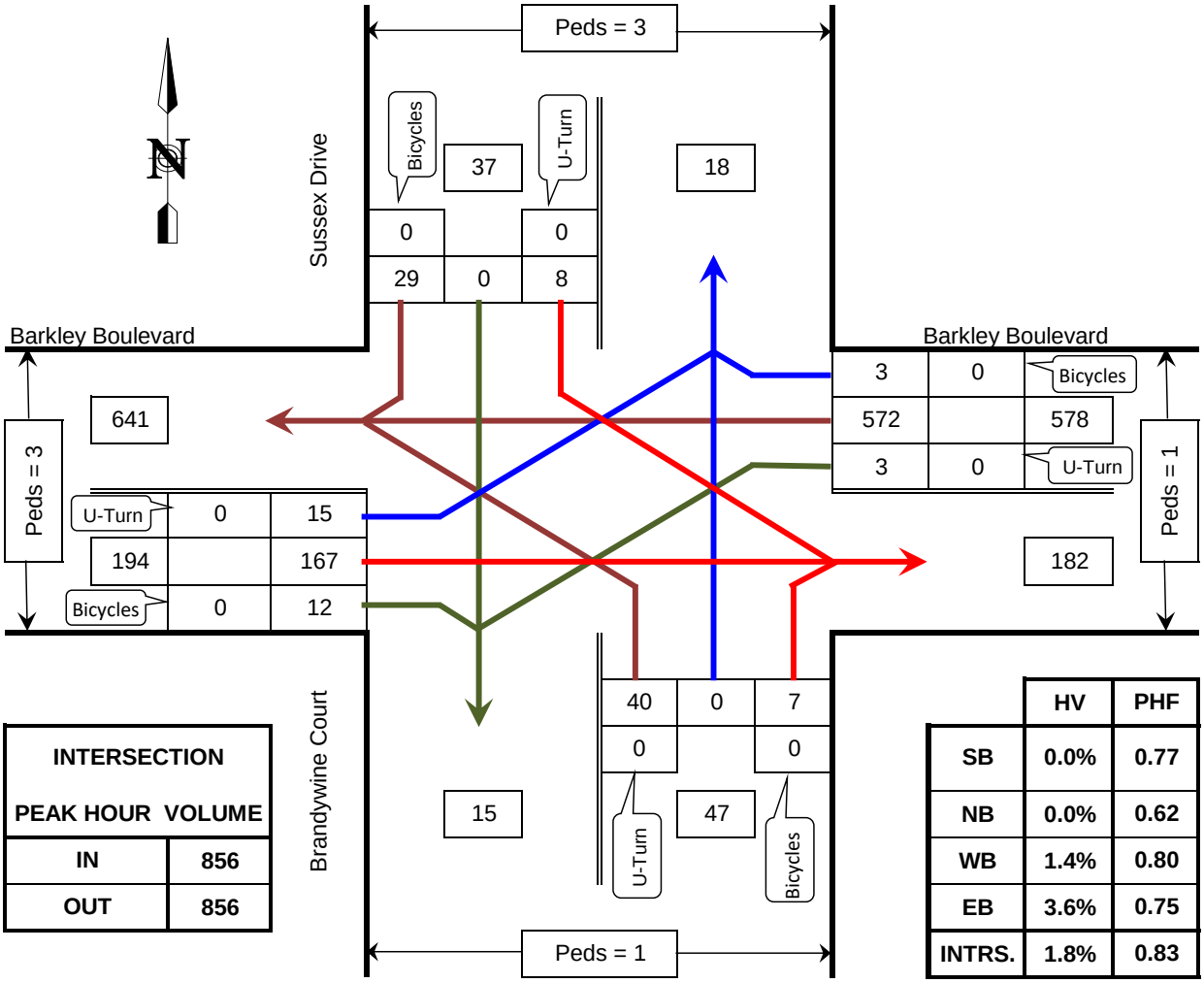
(1) Per Million Vehicle Miles of Travel
(2) Per 100 Million Vehicle Miles of Travel

Count Data

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

7:00 AM - 9:00 AM PEAK HOUR: 7:45 AM TO 8:45 AM



INTERSECTION PEAK HOUR VOLUME	
IN	856
OUT	856

	HV	PHF
SB	0.0%	0.77
NB	0.0%	0.62
WB	1.4%	0.80
EB	3.6%	0.75
INTRS.	1.8%	0.83

PHF = Peak Hour Factor
HV = Heavy Vehicle

Sussex Drive @ Barkley Boulevard

Bellingham, WA

COUNTED BY: TDG

DATE OF COUNT: Thu. 2/21/19

REDUCTION DATE: Sat. 2/23/19

TIME OF COUNT: 7:00 AM - 9:00 AM

TRAFFIC DATA GATHERING

INTERSECTION PEDESTRIANS TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Sussex Drive @ Barkley Boulevard
Bellingham, WA

DATE OF COUNT: Thu. 2/21/19
TIME OF COUNT: 7:00 AM - 9:00 AM

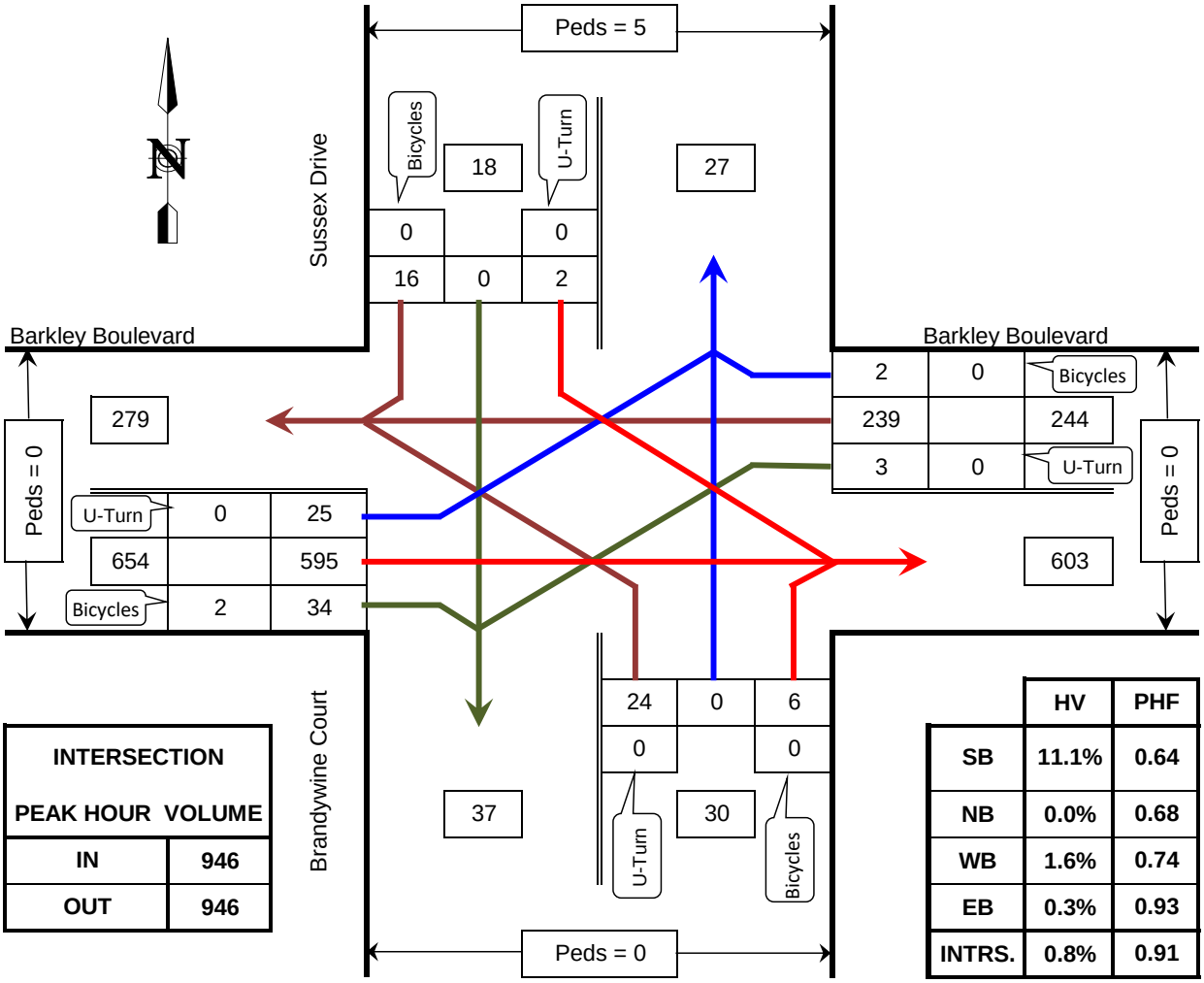
COUNTED BY: TDG
DATE OF REDUCTION: 2/23/2019

TIME INTERVAL ENDING AT	FROM NORTH ON Sussex Drive		FROM SOUTH ON Brandywine Way		FROM EAST ON Barkley Boulevard		FROM WEST ON Barkley Boulevard		INTERVAL TOTALS
	Pedestrians		Pedestrians		Pedestrians		Pedestrians		
	W-->E	E-->W	W-->E	E-->W	N-->S	S-->N	N-->S	S-->N	
07:15 AM	1	1	0	0	0	0	0	0	**2**
07:30 AM	0	0	0	0	0	0	0	0	**0**
07:45 AM	0	1	0	0	0	0	0	0	**1**
08:00 AM	0	0	0	0	0	0	0	3	**3**
08:15 AM	0	0	0	0	0	1	0	0	**1**
08:30 AM	1	1	0	1	0	0	0	0	**3**
08:45 AM	0	1	0	0	0	0	0	0	**1**
09:00 AM	0	2	0	0	0	2	0	0	**4**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

3:00 PM - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM



INTERSECTION PEAK HOUR VOLUME	
IN	946
OUT	946

	HV	PHF
SB	11.1%	0.64
NB	0.0%	0.68
WB	1.6%	0.74
EB	0.3%	0.93
INTRS.	0.8%	0.91

PHF = Peak Hour Factor
HV = Heavy Vehicle

Sussex Drive @ Barkley Boulevard

Bellingham, WA

COUNTED BY: TDG

DATE OF COUNT: Wed. 2/20/19

REDUCTION DATE: Sat. 2/23/19

TIME OF COUNT: 3:00 PM - 6:00 PM

TRAFFIC DATA GATHERING

INTERSECTION PEDESTRIANS TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Sussex Drive @ Barkley Boulevard
Bellingham, WA

DATE OF COUNT: Wed. 2/20/19
TIME OF COUNT: 3:00 PM - 6:00 PM

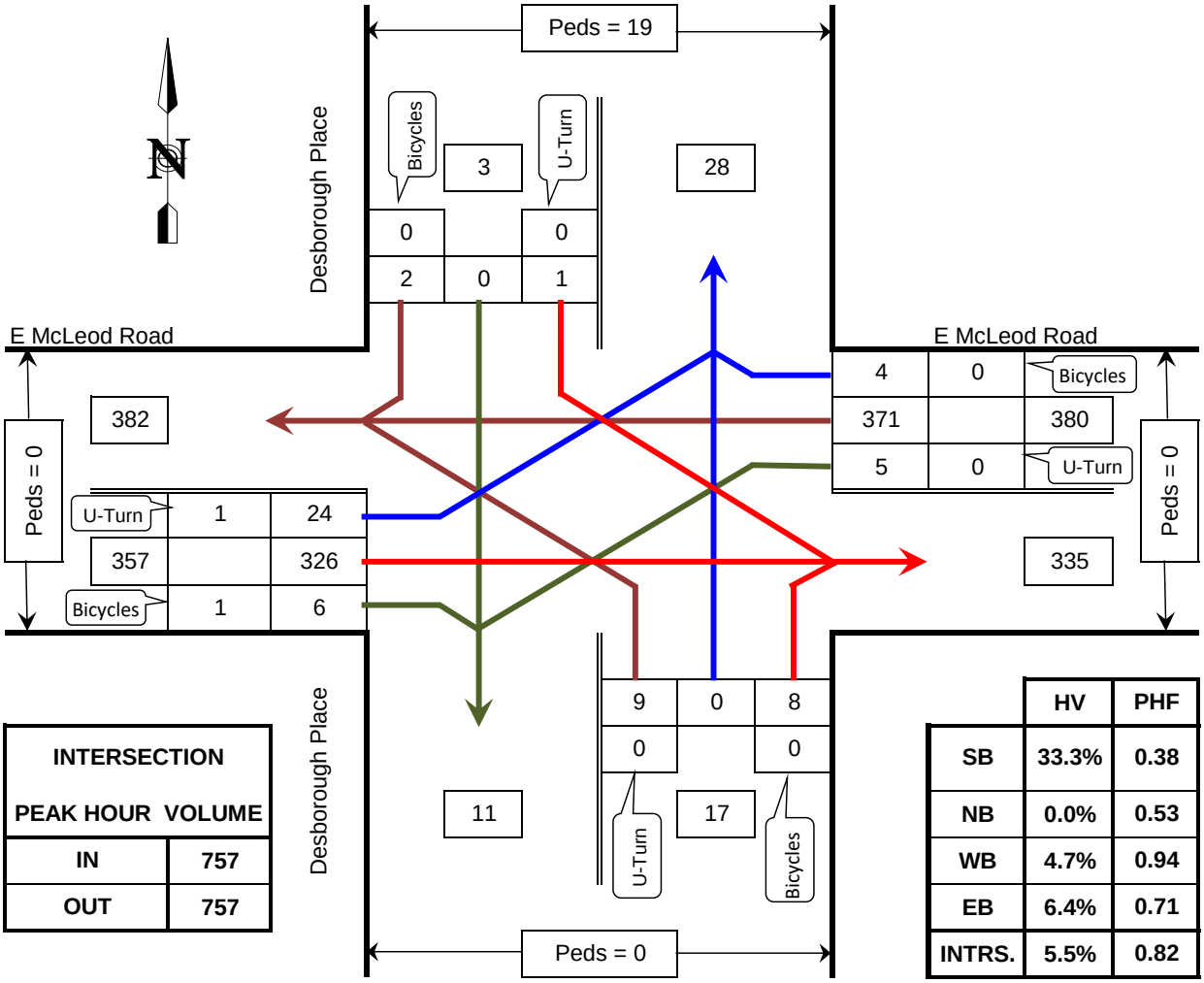
COUNTED BY: TDG
DATE OF REDUCTION: 2/23/2019

TIME INTERVAL ENDING AT	FROM NORTH ON Sussex Drive		FROM SOUTH ON Brandywine Court		FROM EAST ON Barkley Boulevard		FROM WEST ON Barkley Boulevard		INTERVAL TOTALS
	Pedestrians		Pedestrians		Pedestrians		Pedestrians		
	W-->E	E-->W	W-->E	E-->W	N-->S	S-->N	N-->S	S-->N	
03:15 PM	1	2	0	0	0	0	0	0	3
03:30 PM	1	1	0	1	1	0	0	0	4
03:45 PM	1	2	0	0	1	0	2	0	6
04:00 PM	0	0	0	0	0	0	3	0	3
04:15 PM	0	0	0	1	0	0	0	0	1
04:30 PM	0	1	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	1	0	1
05:00 PM	1	0	0	0	0	0	0	1	2
05:15 PM	1	1	0	0	0	0	0	0	2
05:30 PM	0	1	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0
06:00 PM	1	1	0	0	0	0	0	0	2

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

7:00 AM - 9:00 AM PEAK HOUR: 7:30 AM TO 8:30 AM



INTERSECTION PEAK HOUR VOLUME	
IN	757
OUT	757

	HV	PHF
SB	33.3%	0.38
NB	0.0%	0.53
WB	4.7%	0.94
EB	6.4%	0.71
INTRS.	5.5%	0.82

PHF = Peak Hour Factor
HV = Heavy Vehicle

Desborough Place @ E McLeod Road

Bellingham, WA

COUNTED BY: TDG

DATE OF COUNT: Thu. 2/21/19

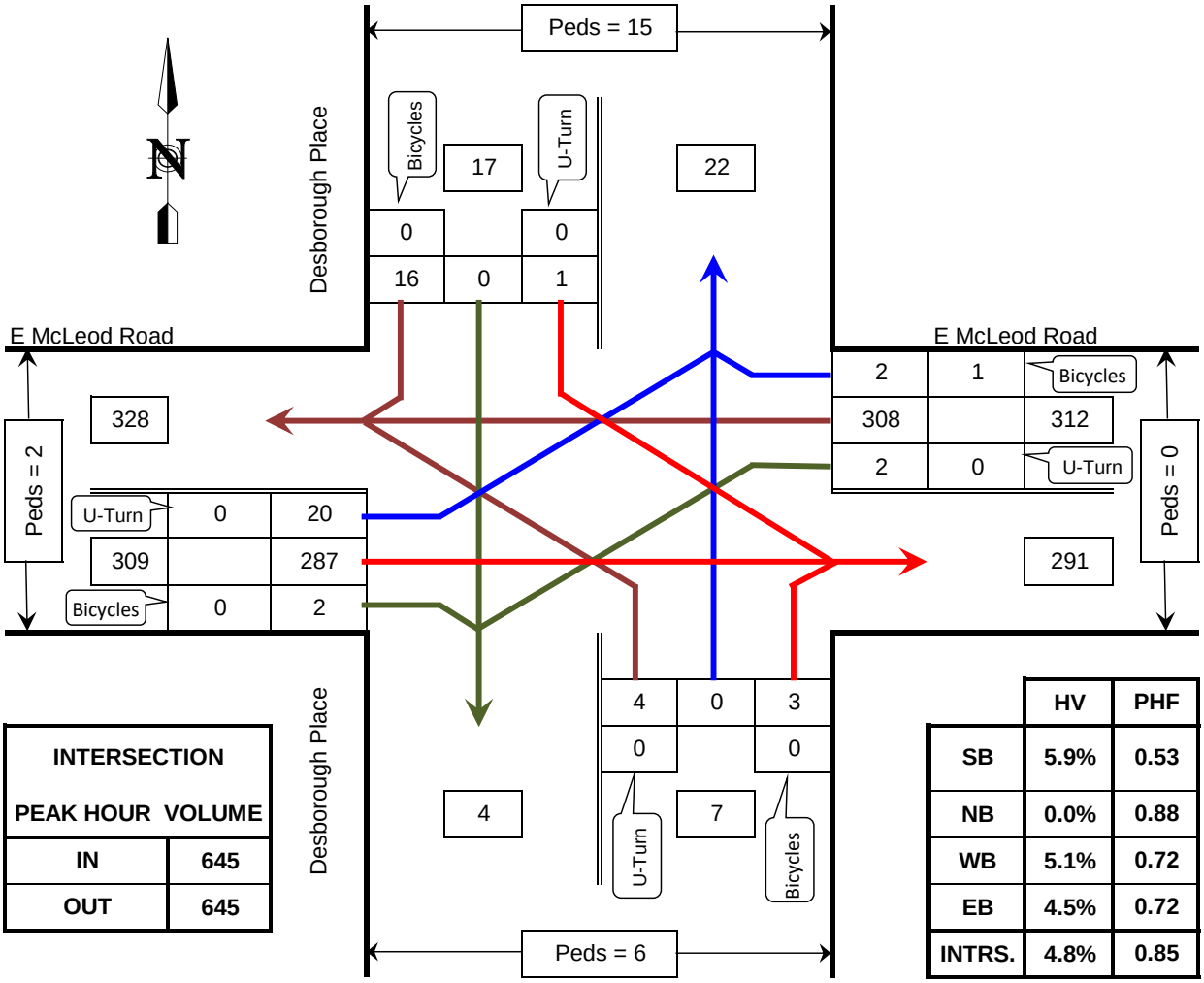
REDUCTION DATE: Sat. 2/23/19

TIME OF COUNT: 7:00 AM - 9:00 AM

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

3:00 PM - 6:00 PM PEAK HOUR: 3:00 PM TO 4:00 PM



INTERSECTION PEAK HOUR VOLUME	
IN	645
OUT	645

	HV	PHF
SB	5.9%	0.53
NB	0.0%	0.88
WB	5.1%	0.72
EB	4.5%	0.72
INTRS.	4.8%	0.85

PHF = Peak Hour Factor
HV = Heavy Vehicle

Desborough Place @ E McLeod Road

Bellingham, WA

COUNTED BY: TDG

DATE OF COUNT: Wed. 2/20/19

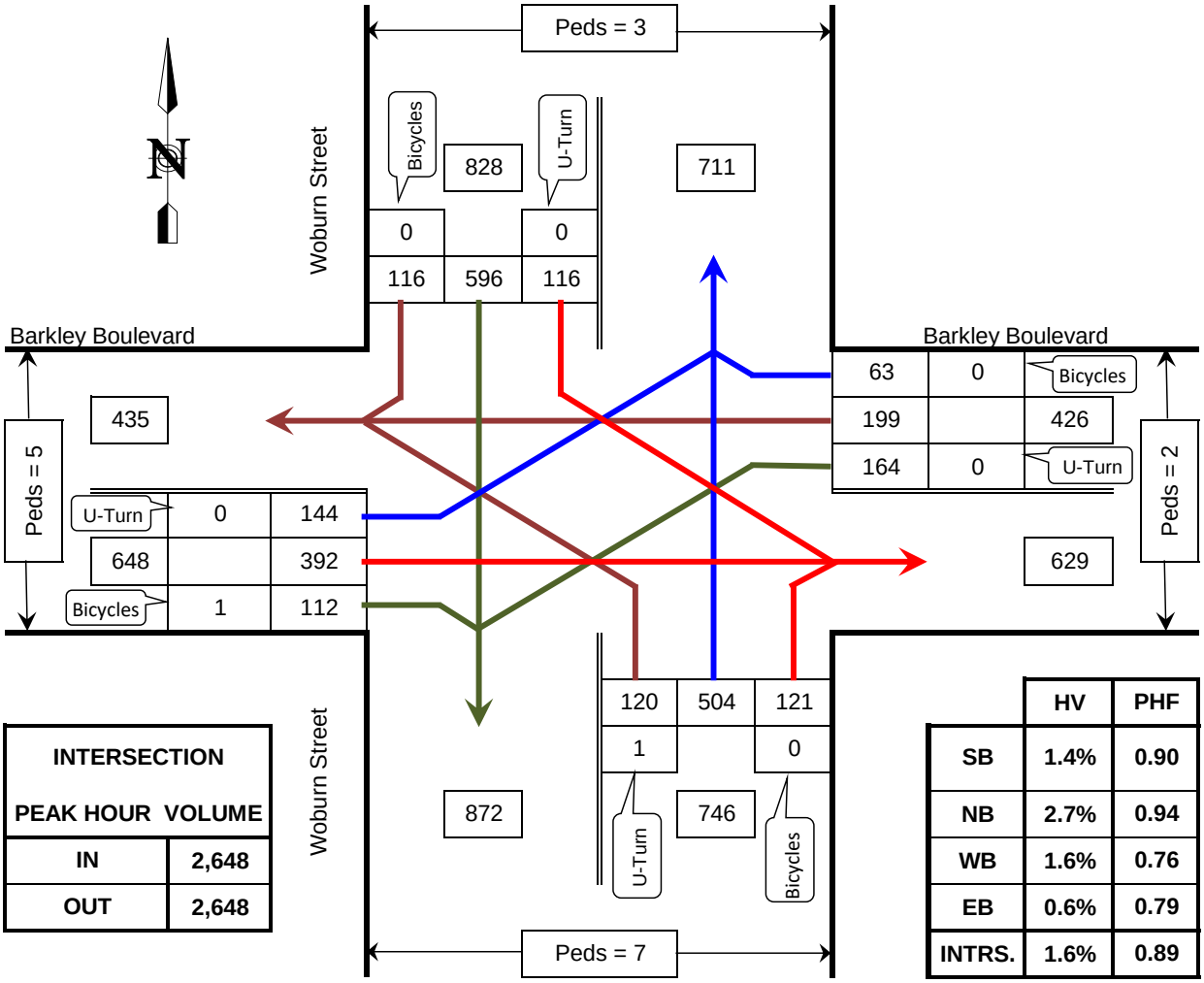
REDUCTION DATE: Mon. 2/25/19

TIME OF COUNT: 3:00 PM - 6:00 PM

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

3:00 PM - 5:00 PM PEAK HOUR: 3:45 PM TO 4:45 PM



INTERSECTION PEAK HOUR VOLUME	
IN	2,648
OUT	2,648

	HV	PHF
SB	1.4%	0.90
NB	2.7%	0.94
WB	1.6%	0.76
EB	0.6%	0.79
INTRS.	1.6%	0.89

PHF = Peak Hour Factor
HV = Heavy Vehicle

Woburn Street @ Barkley Boulevard

Bellingham, WA

COUNTED BY: TDG

DATE OF COUNT: Wed. 2/20/19

REDUCTION DATE: Mon. 2/25/19

TIME OF COUNT: 3:00 PM - 5:00 PM

TRAFFIC DATA GATHERING
LAKE STEVENS, WA (425) 334-3348
EMAIL: CarlaN@trafficdatagathering.com

Location : Barkley Blvd 395ft se/o Sussex Rd
City, State : Bellingham, WA
Counter # : NT-2814

Site: Loc 01
2/20/2019
Wednesday

24 Hour Speed

SEB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200	Avg.
4:00 PM	385	10	12	28	37	104	119	36	6	7	1	6	8	11	35.9
5:00 PM	487	18	13	40	65	139	148	21	8	4	3	9	7	12	34.5
6:00 PM	654	27	3	53	77	192	187	31	8	7	13	21	15	20	36.1
7:00 PM	447	10	6	46	60	142	108	23	4	4	11	15	6	12	35.4
8:00 PM	313	4	3	35	37	101	85	11	1	5	9	6	5	11	36.0
9:00 PM	212	4	0	21	24	60	63	17	3	4	8	3	2	3	35.7
10:00 PM	144	0	2	15	16	54	30	8	3	4	2	6	0	4	36.0
11:00 PM	50	0	0	2	11	18	8	9	0	0	0	0	2	0	35.1
2/21/2019 12:00 AM	37	0	0	3	7	10	6	4	0	2	1	3	0	1	38.0
1:00 AM	21	0	0	0	3	4	10	3	0	0	0	0	0	1	37.6
2:00 AM	8	0	0	2	1	2	2	0	0	0	0	0	1	0	35.4
3:00 AM	10	0	0	0	3	3	1	1	0	0	0	0	0	2	40.7
4:00 AM	4	0	0	0	0	1	3	0	0	0	0	0	0	0	36.4
5:00 AM	2	0	0	0	1	1	0	0	0	0	0	0	0	0	30.3
6:00 AM	14	0	0	1	4	1	3	2	0	0	1	0	0	2	41.9
7:00 AM	35	0	0	2	4	10	12	2	0	0	1	1	1	2	38.8
8:00 AM	112	1	2	15	18	21	29	6	2	3	2	3	6	4	37.2
9:00 AM	186	2	5	13	28	56	54	15	0	2	1	2	2	6	35.3
10:00 AM	164	4	1	11	18	42	56	17	3	2	2	1	2	5	36.0
11:00 AM	207	9	2	18	18	52	79	13	7	3	2	0	2	2	34.4
12:00 PM	264	5	3	12	27	63	97	29	4	3	4	3	6	8	37.0
1:00 PM	334	7	5	26	29	108	102	31	4	3	4	5	3	7	35.4
2:00 PM	293	4	3	22	36	82	85	33	16	3	2	1	1	5	35.4
3:00 PM	299	10	1	14	29	91	102	30	3	4	2	2	2	9	36.0
Total	4682	115	61	379	553	1357	1389	342	72	60	69	87	71	127	35.8
%		2.5	1.3	8.1	11.8	29.0	29.7	7.3	1.5	1.3	1.5	1.9	1.5	2.7	

Average (Mean) 35.8 mph **Minimum** 10.0 mph **Maximum** 89.4 mph **Pace Range** 30.5 - 40.5 mph 2791 vehicles (59.6%)

Percentile Speeds	10%	15%	50%	85%	90%
(mph)	24.5	26.0	34.6	40.9	45.7

Speeds Exceeded	25 mph	35 mph	45 mph	55 mph	65 mph	75 mph
	88.0% (4122)	46.9% (2197)	10.4% (485)	7.6% (354)	4.2% (198)	1.4% (65)

TRAFFIC DATA GATHERING
LAKE STEVENS, WA (425) 334-3348
EMAIL: CarlaN@trafficdatagathering.com

Location : Barkley Blvd 395ft se/o Sussex Rd
City, State : Bellingham, WA
Counter # : NT-2814

Site: Loc 01
2/20/2019
Wednesday

24 Hour Speed

NWB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200	Avg.
4:00 PM	325	2	0	5	10	78	154	59	5	1	0	4	2	5	37.8
5:00 PM	246	1	1	3	7	52	116	48	5	0	2	2	2	7	38.8
6:00 PM	237	3	0	0	5	48	138	27	3	0	0	2	1	10	38.7
7:00 PM	198	0	0	1	9	55	95	25	2	0	1	2	4	4	38.0
8:00 PM	109	0	0	0	2	28	59	14	2	0	1	0	0	3	38.3
9:00 PM	79	0	0	0	3	15	39	16	2	0	1	1	1	1	38.9
10:00 PM	37	0	0	1	1	10	12	10	2	0	0	0	1	0	38.3
11:00 PM	26	0	0	0	3	8	10	4	0	0	0	1	0	0	37.1
2/21/2019 12:00 AM	9	0	0	0	0	4	4	1	0	0	0	0	0	0	35.8
1:00 AM	3	0	0	0	0	0	0	3	0	0	0	0	0	0	42.3
2:00 AM	5	0	0	0	0	2	2	0	1	0	0	0	0	0	37.7
3:00 AM	4	0	0	0	1	1	0	2	0	0	0	0	0	0	35.7
4:00 AM	10	0	0	0	0	1	6	3	0	0	0	0	0	0	38.5
5:00 AM	17	0	0	0	0	4	7	5	1	0	0	0	0	0	38.4
6:00 AM	98	0	0	0	1	18	47	29	2	0	0	0	0	1	38.6
7:00 AM	228	0	0	2	3	36	136	44	5	0	0	0	0	2	38.1
8:00 AM	512	0	1	3	9	64	310	110	2	0	1	3	4	5	38.6
9:00 AM	517	4	0	1	10	96	316	82	1	0	1	1	1	4	37.5
10:00 AM	298	0	0	2	5	30	158	92	5	0	1	0	2	3	39.2
11:00 AM	239	1	0	1	1	23	127	75	0	2	1	0	1	7	40.0
12:00 PM	246	2	0	0	2	19	117	90	12	0	1	0	2	1	39.5
1:00 PM	277	0	0	2	4	31	134	80	13	2	2	2	1	6	39.9
2:00 PM	281	1	1	0	6	47	147	68	5	0	0	2	1	3	38.3
3:00 PM	268	1	0	0	15	58	107	71	6	1	0	3	2	4	38.4
Total	4269	15	3	21	97	728	2241	958	74	6	12	23	25	66	38.6
%		0.4	0.1	0.5	2.3	17.1	52.5	22.4	1.7	0.1	0.3	0.5	0.6	1.5	

Average (Mean) 38.6 mph **Minimum** 10.1 mph **Maximum** 88.2 mph **Pace Range** 32.7 - 42.7 mph 3517 vehicles (82.4%)

Percentile Speeds	10%	15%	50%	85%	90%
(mph)	33.2	34.2	38.0	41.7	42.7

Speeds Exceeded	25 mph	35 mph	45 mph	55 mph	65 mph	75 mph
	99.1% (4230)	79.4% (3389)	4.8% (203)	3.0% (126)	2.1% (91)	1.0% (42)

Pipeline Information

City of Bellingham Public Works Engineering

104 W. Magnolia Street, Bellingham, WA 98225

Pre-Application Transportation Planning Requirements

PRE2019-0010 – 91 apartments at 3202 Newmarket Street

Land Use Description	ITE Land Use Code[1]	Person Trip Generation Rate[1]	Residential Units	Commercial or Industrial Gross Square Feet	Total New Person Trips
Proposed Land Uses	*[1]Note: Table 19.06.040 (A) Bellingham Multimodal TIF Rate Schedule for 2019*				
Mid-Rise Multifamily Apts	221	0.64/unit	91		58.24
Urban Village Trip Reductions (-12.8)			**Subtotal Net New Vehicle Trips =**		**45.44**

Transportation Planning Requirements:

- **BMC 13.70 Transportation Concurrency** application/evaluation
  Pre-Application Requirement *(Partially completed application attached; Submit to Permit Center)*
  Evaluation fee = $10/trip; total for this proposal = **$454.40** *(see application, next 2 pages)*

  - **Transportation Impact Analysis (TIA) NOT REQUIRED** per Public Works Development Guidelines*
    http://www.cob.org/services/department/pw/index.aspx Section 11 Traffic Studies

- **BMC 13.04 & 13.08 Street Standards & Frontage Improvement Requirements**
  - Newmarket Street is a private street
  - Rimland Street abutting property requires ¾ street frontage improvements, including sidewalk.
  - Barkley Boulevard is complete, but Public Works recommends construction of pedestrian-activated Rectangular Rapid Flashing Beacon (RRFB) crosswalk near Weatherby driveway access to Barkley. Work with Parks Department to establish a short connection from this crosswalk to Railroad Trail.

- **BMC 16.20 SEPA - ADA compliance for sidewalk connectivity**
  - Ensure that all abutting sidewalks and/or off-street pedestrian pathways are ADA compliant and connect to other ADA-compliant sidewalks on surrounding properties via marked crosswalks and ADA ramps.

- **BMC 19.06 Transportation Impact Fee (TIF)** estimate (*2019 = $1,864/person trip*) = 45.44 person trips
  X $1,864/person trip
  If building or tenant improvement permit application is submitted by 12/31/2019 = ***$84,700.16****

  **Barkley Company has TIF credit line that can be applied to this project, if requested in writing.*

  For further information on transportation issues, contact the following Public Works staff:
  Chris Comeau, AICP-CTP, Transportation Planner (778-7946) or ccomeau@cob.org

City of Bellingham Public Works Engineering

104 W. Magnolia Street, Bellingham, WA 98225

FOR OFFICE USE ONLY

Date Received: _____

2019 Application for Multimodal Transportation Concurrency*

All Applicants Please Note:

1.) This is a **Pre-Application Requirement** with an evaluation fee of $10/pm peak hour person trip. Complete applications must be submitted to Permit Center with Concurrency Evaluation Fee (page 2)
2.) Projects affecting arterials or intersections with low level of service (LOS) or that produce 50+ peak hour trips will also be required to complete a full traffic study as per BMC 13.70.060 B. 1. a. and Section 11, Public Works Development Guidelines, available on the Public Works web site. Concurrency certificates shall not be issued prior to completion and acceptance of TIA by Public Works.
3.) Projects abutting public right-of-way will be required to construct standard urban street improvements.
4.) Projects will be required to pay 2019 Transportation Impact Fees (TIF) of $1,864/pm peak person trip in full at time of building permit issuance. A TIF estimate is provided at the bottom of page 2.

PROJECT INFORMATION

Project Name: _ Weatherby Apartments _____

Project Address: __ 3202 Newmarket Street, Bellingham, WA 98226_____

Assessor's Parcel Number(s): 380321008480

Concurrency Service Area (CSA) Number: _ 12 – Barkley Urban Village ___

PROPOSED PROJECT DESCRIPTION

Office___ Retail___ Industrial/Manufacturing___ Institutional___ Mixed Use___ Other___

Gross square footage of non-residential building _____

Single family residential _____ Multi-family residential ___91___ **Total number of units**___91___

Expected Date of Project Completion/Occupancy: ____12-31-2020_____

APPLICANT INFORMATION

Name ___ John V. Moullen ___ **Company**____ Barkley Company/Talbot Real Estate _____

Mailing Address_ 2219 Rimland Drive, Suite 115, Bellingham, WA 98226 _____

Phone__ (360) 671-6450, ext. 104 _____ **Email**__ jmoullen@barkleyvillage.com _____

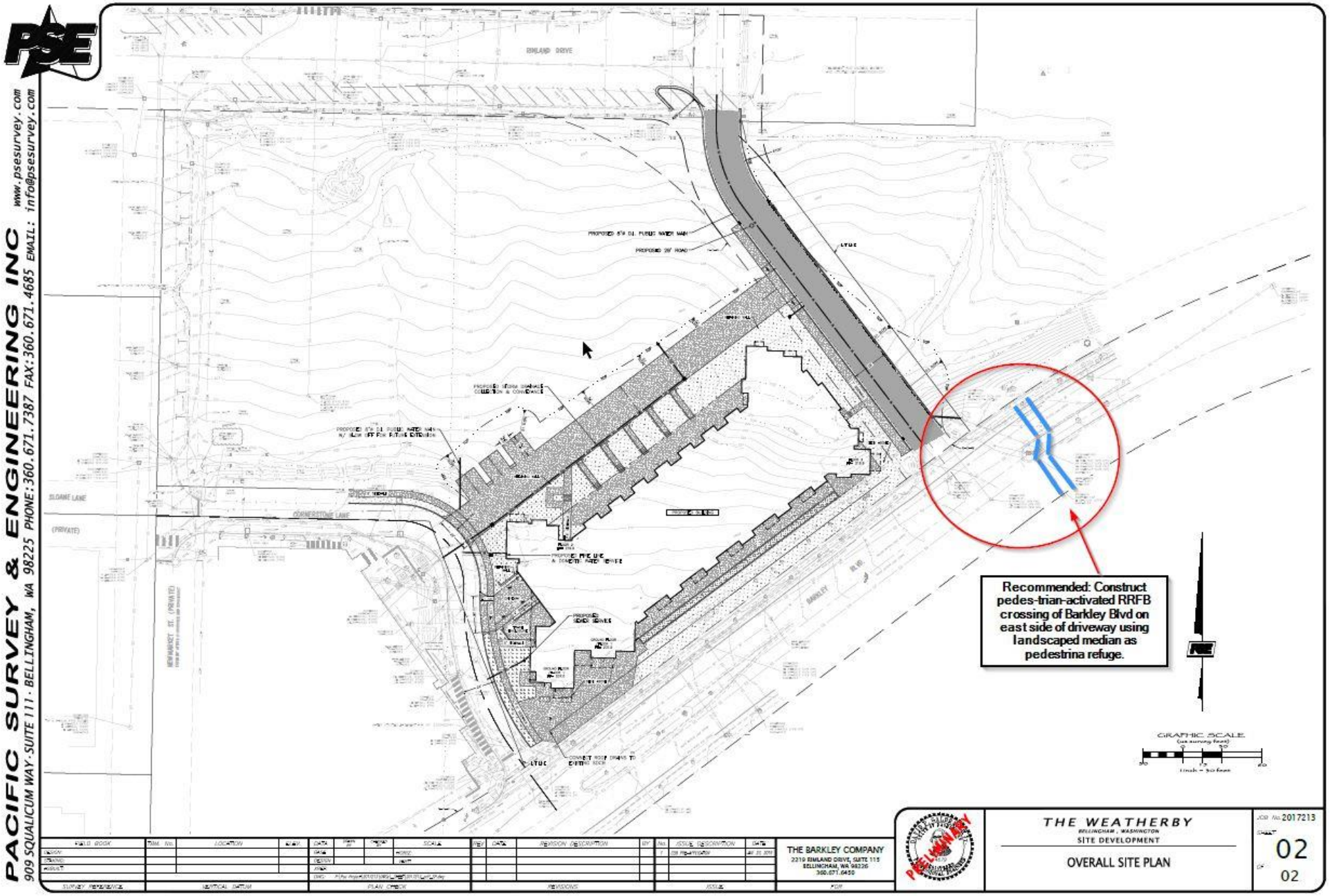
As the project applicant, I hereby acknowledge I have read this permit application and state that the information is correct, and agree to comply with all City ordinances and State laws regulating activities covered by this permit application.

Applicant Name: _____ **Signature:** _____ **Date:** _____

Land Use(s) and Trip Generation

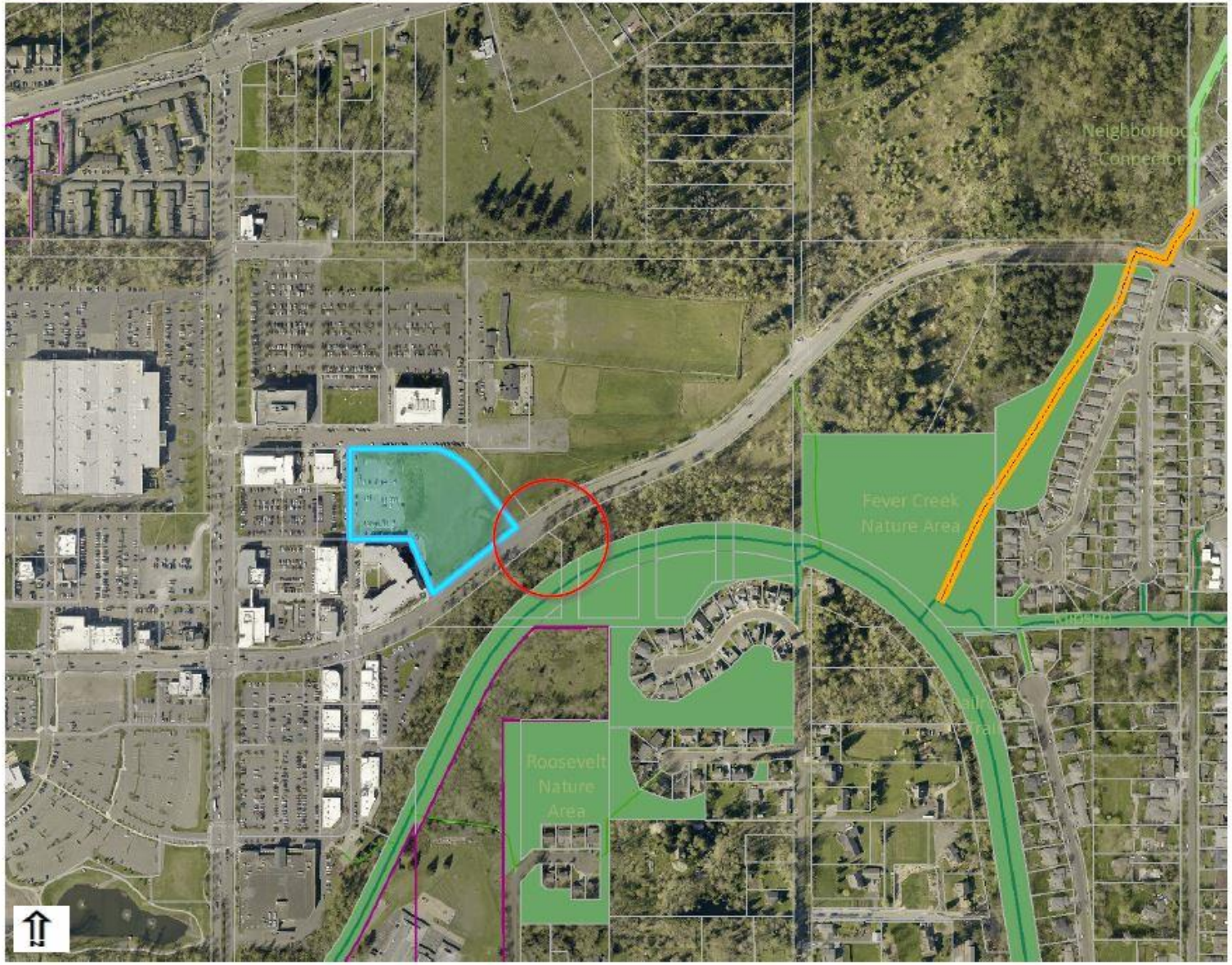
[Call Transportation Planner for assistance (360) 778-7946]

Land Use Description	ITE Land Use Code	Person Trip Generation Rate[1]	Residential Units	Commercial or Industrial Gross Square Feet	Total New Person Trips
Proposed Land Uses	*[1]Note: Table 19.06.040 (A) Bellingham Multimodal TIF Rate Schedule for 2019*				
Mid-Rise Multifamily Apts	221	0.64/unit	91		58.24
Existing Land Uses	*100% Credit for previous land uses*				
Vacant/parking lot					0
				Subtotal Net New Vehicle Trips (Post UV Trip Reductions) =	**58.24**
Urban Village Trip Reduction Credits (BMC 19.06.040 E.)	*In 2019, available only for projects located within the following mixed use Urban Villages: Downtown, Old Town, Samish Way, Fountain District, Fairhaven, Barkley Village, and downtown Waterfront District (see associated Urban Village maps)*				
Urban Village location	*(see associated Urban Village maps)*			15%	(-8.7)
WTA Transit Proximity	**Only One Transit Proximity Reduction Below May Be Used**				
Fronts on a WTA GO line	15-minute frequency at doorstep			10%	n/a
Within ¼-mile of a WTA GO line	5-minute walk of 15-min frequency			7%	(-4.1)
Fronts on a standard WTA line	30- to 60-minute frequency at doorstep			5%	n/a
Within ¼-mile standard WTA line	5-minute walk of 30- to 60-minute frequency			2%	n/a
Commute Trip Reduction Must have 100+ Employees	State law requirement to employ various transportation demand management measures			10%	n/a
Optional/Voluntary Performance Measures to Reduce Vehicle Trips (Requires 2-Year Contractual Agreement)					
WTA bus pass purchase 2 years/$500 each	Only financially feasible for projects with 25+ total trips			1% per WTA bus pass	n/a
Car Share memberships 2 years/$500 each	Only financially feasible for projects with 13+ total trips (If Car Share Company exists)			2% per membership	n/a
Car Share vehicle provided on site	Car Share Company or Property Owner			2% per vehicle	n/a
				Grand Total Net New Vehicle Trips =	**45.44**
2019 Transportation Concurrency Evaluation = $10 / pm peak vehicle trip. Evaluation Fee =					***$454.40***
TIF estimate below is provided out of courtesy and is only informational. TIF is not due until permit issuance.					
2019 Multimodal Transportation Impact Fee (TIF) = $1,864 / pm peak person trip. Project TIF Estimate =					***$84,700.16***


PACIFIC SURVEY & ENGINEERING INC
909 SQUALICUM WAY · SUITE 111 · BELLINGHAM, WA 98225 PHONE: 360.671.7387 FAX: 360.671.4685 EMAIL: info@psesurvey.com
www.psesurvey.com
EIMLAND DRIVE
SLOANE LANE
(PRIVATE)
CORNERSTONE LANE
BARKLEY
Recommended: Construct pedes-trian-activated RRFB crossing of Barkley Blvd on east side of driveway using landscaped median as pedestrina refuge.
GRAPHIC SCALE
THE WEATHERBY
BELLINGHAM, WASHINGTON
SITE DEVELOPMENT
OVERALL SITE PLAN
THE BARKLEY COMPANY
2219 EIMLAND DRIVE, SUITE 115
BELLINGHAM, WA 98226
360.671.6450
JOB No. 2017213
SHEET 02 OF 02

City of Bellingham WASHINGTON

PRE2019-0010



Legend

- Tax Parcels
  - <all other values>
  - Care Facility
  - Hospital
  - Schools
- Proposed Trails
- Trails
  - Primary Trail
  - Secondary Trail
  - Minor Trail
- Parks - Merged
  - Unknown
  - Community park
  - Neighborhood park
  - Open space
  - Parks-maintained educational
  - Parks-maintained institutional
  - ROS
  - Special use
  - Trail/Railroad property
- Schools
  - Colleges/Universities
  - Elementary, Middle, High Schools
  - Private School or Preschool
- Fire Stations
- City Boundary
- Urban Growth Area
- Trails
- Railroads
- Ferries
- Interstate Polygons
  - Street
  - Interstate
- Airport
- Open Channel Streams
- Parks

Notes

Printed: 1/25/2019 8:34:00 AM

993 0 497 993 Feet

THIS MAP IS NOT TO BE USED FOR NAVIGATION

The City of Bellingham has compiled this information for its own use and is not responsible for any use of this information by others. The information found herein is provided simply as a courtesy to the public and is not intended for any third party use in any official, professional or other authoritative capacity. Persons using this information do so at their own risk and by such use agree to defend, indemnify and hold harmless the City of Bellingham as to any claims, damages, liability, losses or suits arising out of such use. Contact the Whatcom County Assessors office (360-778-5050) for the most up to date parcel information.

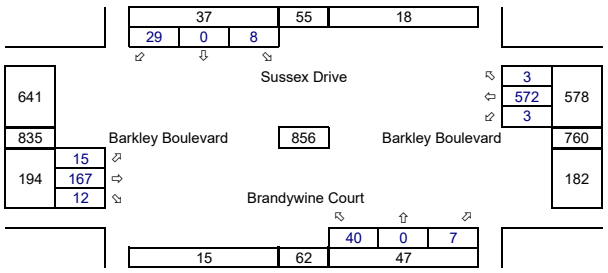
Turning Movement Volumes With Bristol

1 Sussex Dr @ Barkley Blvd

Synchro ID: 1
Existing
Average Weekday
AM Peak Hour

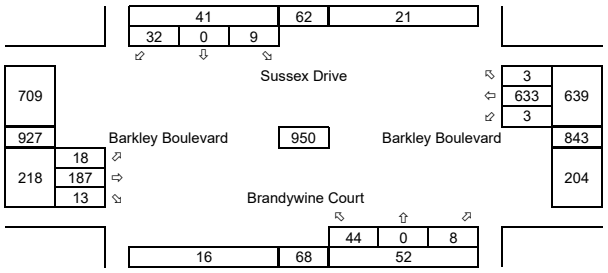
Year: **2/21/19**

Data Source: TDG

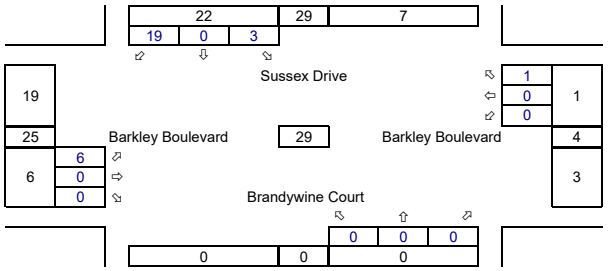


Future without Project
Average Weekday
AM Peak Hour

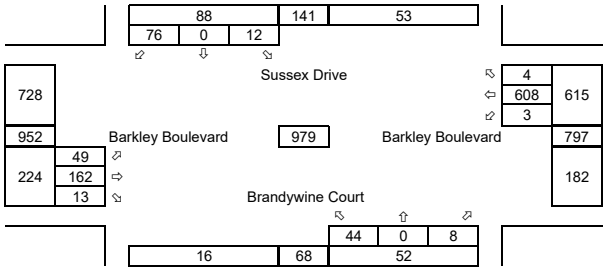
Year: 2024
Growth Rate = 2.0%
Years of Growth = 5
Total Growth = 1.1041



Total Project Trips
Average Weekday
AM Peak Hour

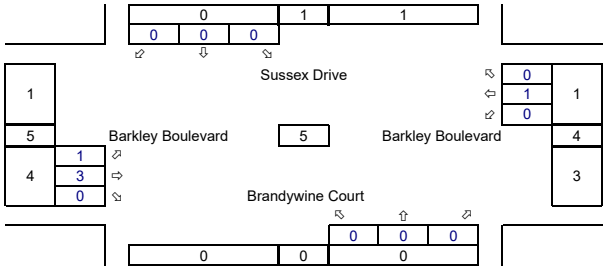


Future with Project
Average Weekday
AM Peak Hour

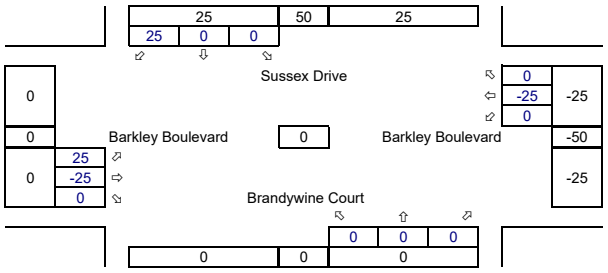


Total Pipeline Project Trips
Average Weekday
AM Peak Hour

3202 Newmarket Street
Apartments
(91 Multi-Family Mid-Rise Units)



Cut-Through Trips
Average Weekday
AM Peak Hour

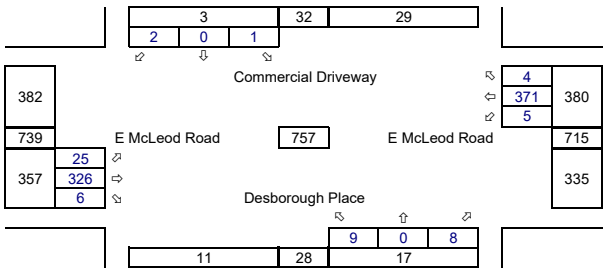


2 Desborough Pl @ McLeod Rd

Synchro ID: 2
Existing
Average Weekday
AM Peak Hour

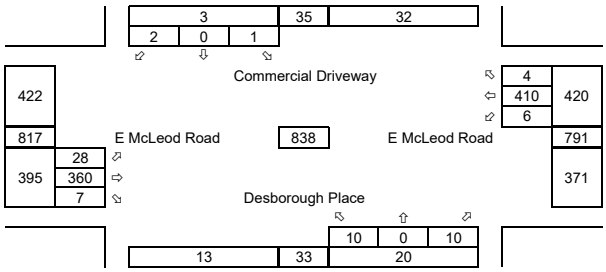
Year: **2/21/19**

Data Source: TDG

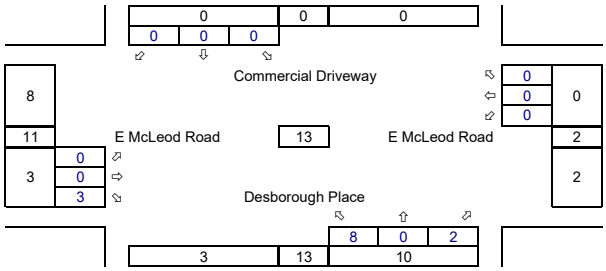


Future without Project
Average Weekday
AM Peak Hour

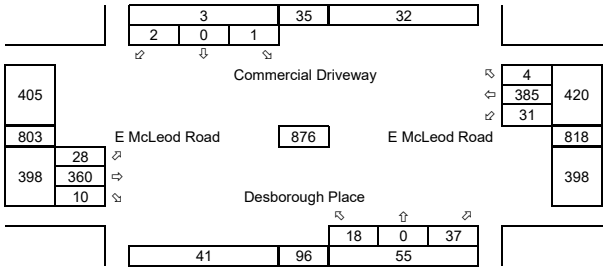
Year: 2024
Growth Rate = 2.0%
Years of Growth = 5
Total Growth = 1.1041



Total Project Trips
Average Weekday
AM Peak Hour

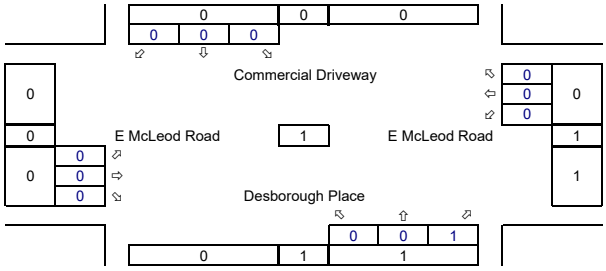


Future with Project
Average Weekday
AM Peak Hour

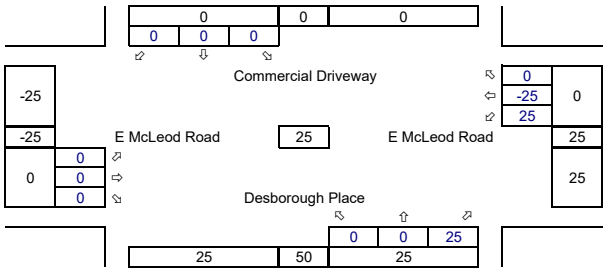


Total Pipeline Project Trips
Average Weekday
AM Peak Hour

3202 Newmarket Street
Apartments
(91 Multi-Family Mid-Rise Units)



Cut-Through Trips
Average Weekday
AM Peak Hour



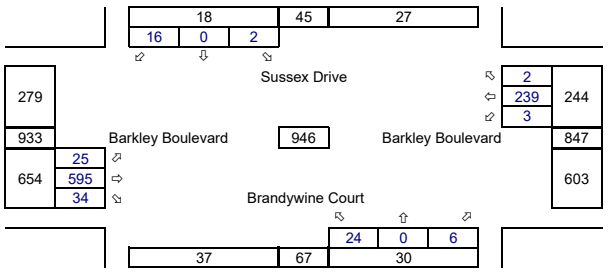
1 Sussex Dr @ Barkley Blvd

Synchro ID: 1

Existing
Average Weekday
PM Peak Hour

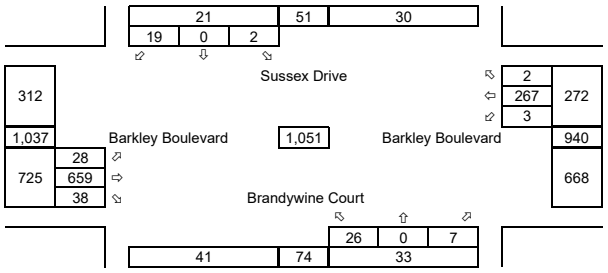
Year: **2/20/19**

Data Source: TDG

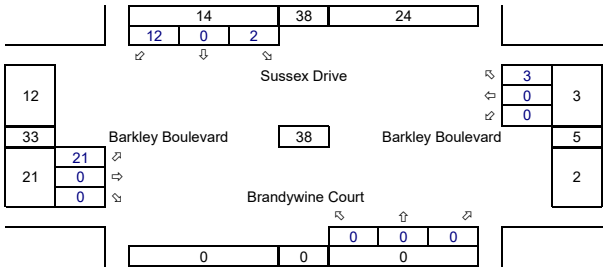


Future without Project
Average Weekday
PM Peak Hour

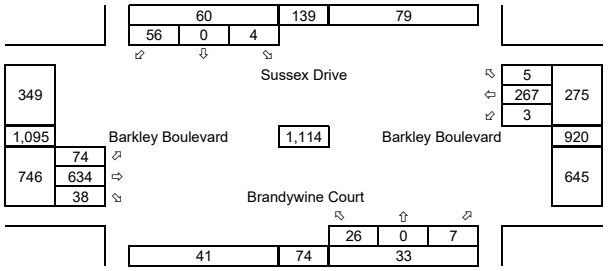
Year: 2024
Growth Rate = 2.0%
Years of Growth = 5
Total Growth = 1.1041



Total Project Trips
Average Weekday
PM Peak Hour

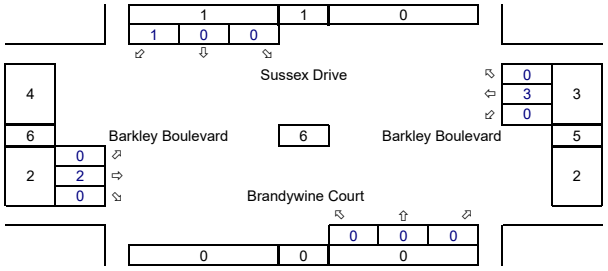


Future with Project
Average Weekday
PM Peak Hour

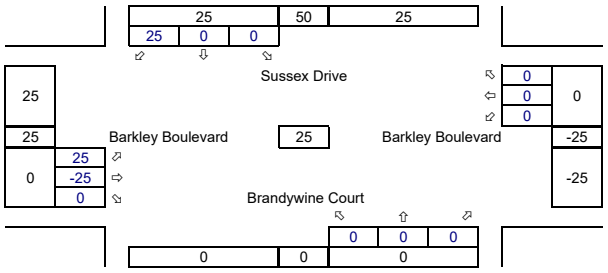


Total Pipeline Project Trips
Average Weekday
PM Peak Hour

3202 Newmarket Street
Apartments
(91 Multi-Family Mid-Rise Units)



Cut-Through Trips
Average Weekday
PM Peak Hour



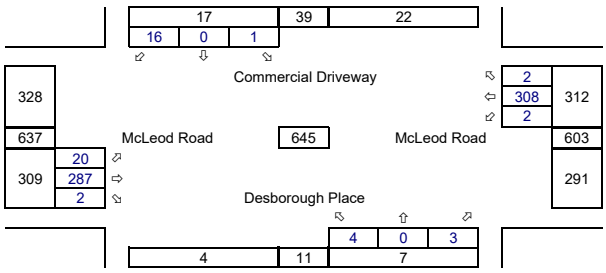
2 Desborough Pl @ McLeod Rd

Synchro ID: 2

Existing
Average Weekday
PM Peak Hour

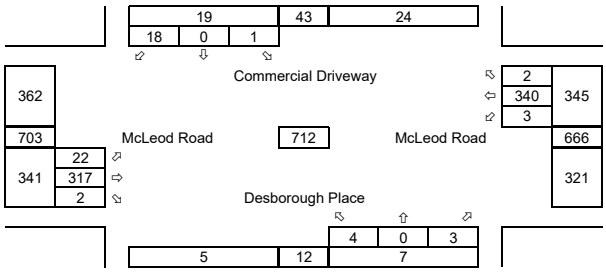
Year: **2/20/19**

Data Source: TDG

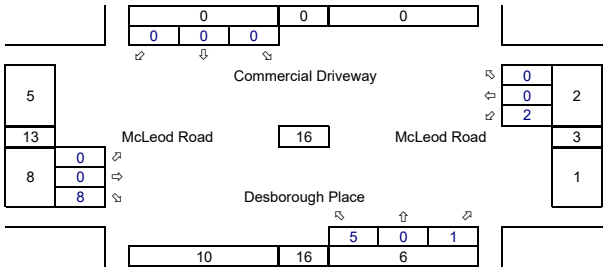


Future without Project
Average Weekday
PM Peak Hour

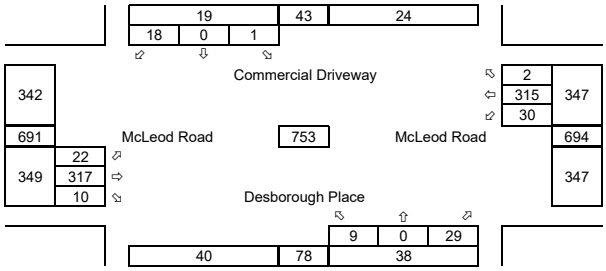
Year: 2024
Growth Rate = 2.0%
Years of Growth = 5
Total Growth = 1.1041



Total Project Trips
Average Weekday
PM Peak Hour

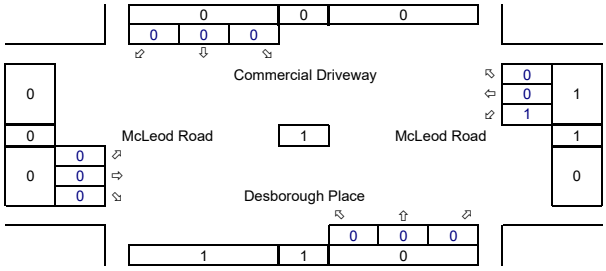


Future with Project
Average Weekday
PM Peak Hour

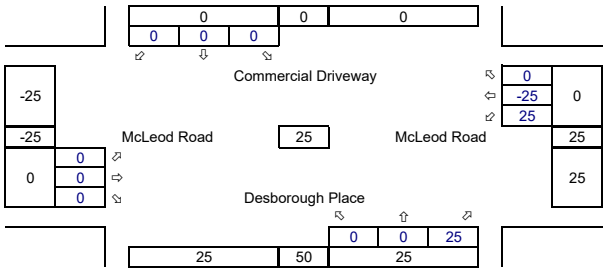


Total Pipeline Project Trips
Average Weekday
PM Peak Hour

3202 Newmarket Street
Apartments
(91 Multi-Family Mid-Rise Units)



Cut-Through Trips
Average Weekday
PM Peak Hour

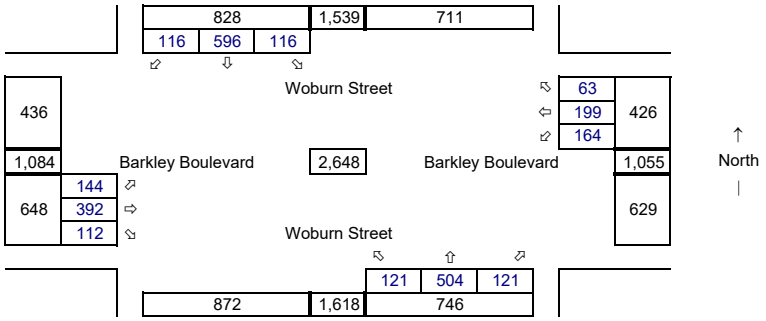


Synchro ID: 3

Existing
Average Weekday
PM Peak Hour

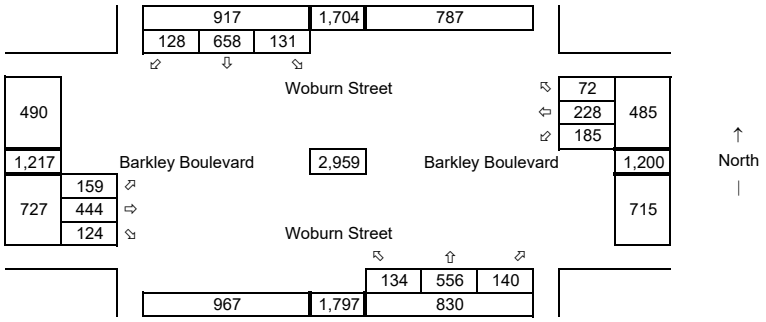
Year: **2/20/19**

Data Source: TDG

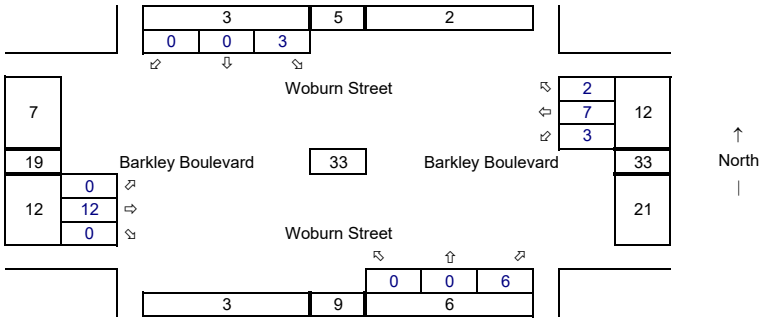


Future without Project
Average Weekday
PM Peak Hour

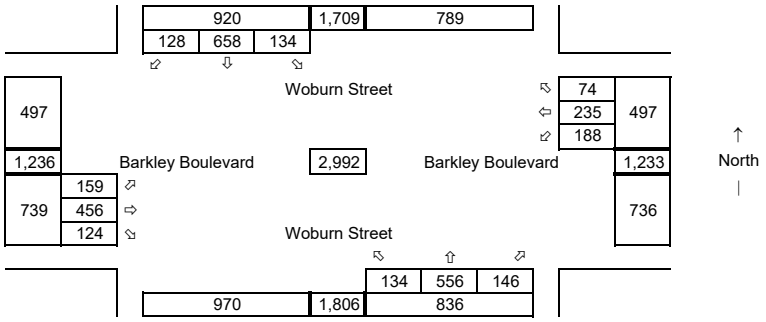
Year: 2024
Growth Rate = 2.0%
Years of Growth = 5
Total Growth = 1.1041



Total Project Trips
Average Weekday
PM Peak Hour

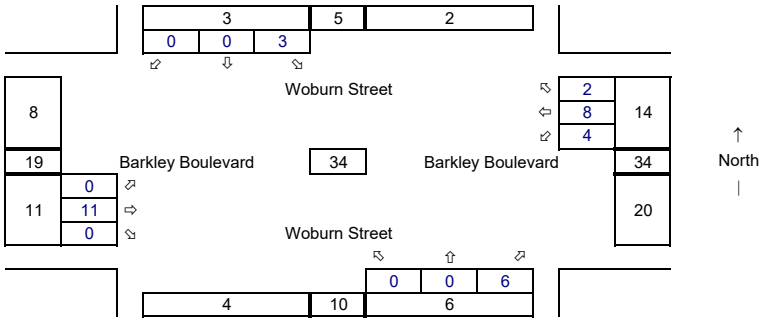


Future with Project
Average Weekday
PM Peak Hour



Total Pipeline Project Trips
Average Weekday
PM Peak Hour

3202 Newmarket Street
Apartments
(91 Multi-Family Mid-Rise Units)



Turning Movement Volumes No Bristol

Synchro ID: 1

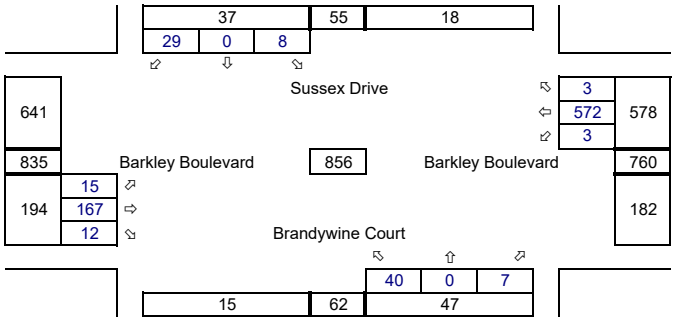
Existing

Average Weekday

AM Peak Hour

Year: **2/21/19**

Data Source: TDG



Future without Project

Average Weekday

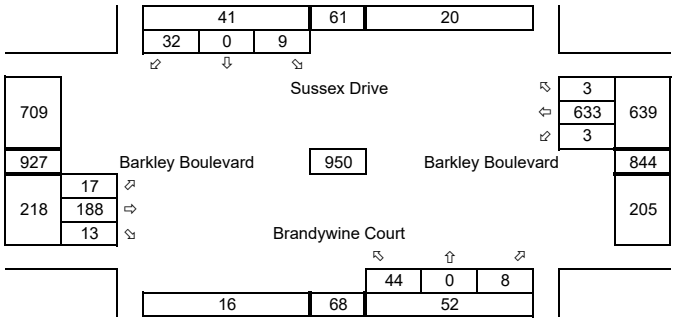
AM Peak Hour

Year: 2024

Growth Rate = 2.0%

Years of Growth = 5

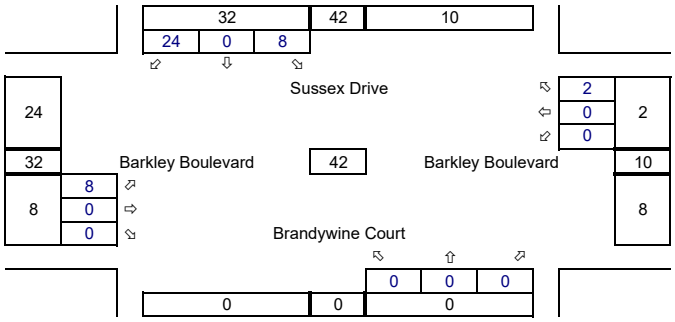
Total Growth = 1.1041



Total Project Trips

Average Weekday

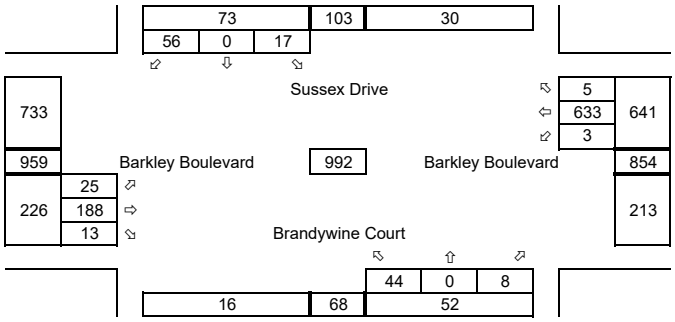
AM Peak Hour



Future with Project

Average Weekday

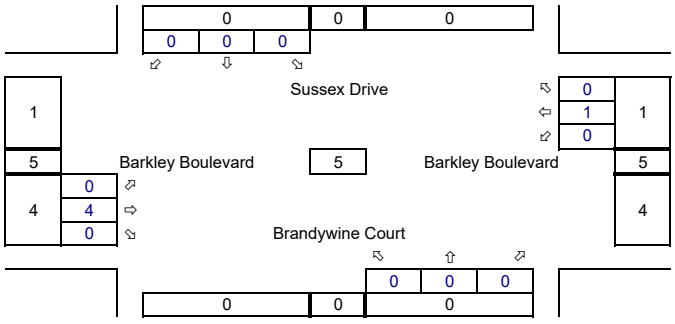
AM Peak Hour



Total Pipeline Project Trips

Average Weekday

AM Peak Hour



No Bristol Connection

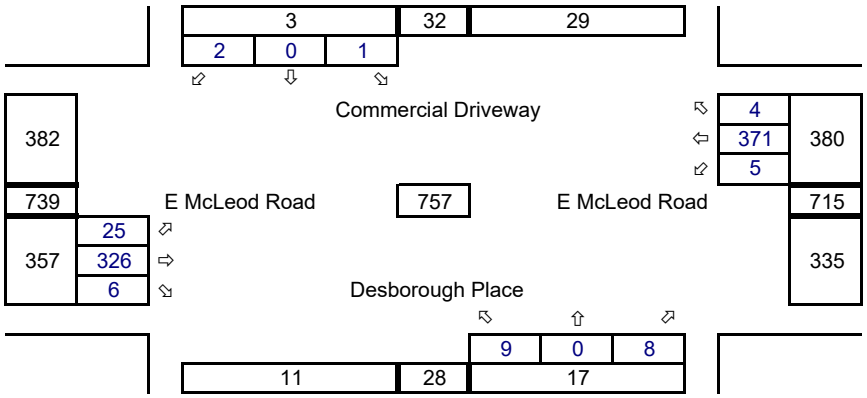
2 Desborough Pl @ McLeod Rd

Synchro ID: 2

Existing
Average Weekday
AM Peak Hour

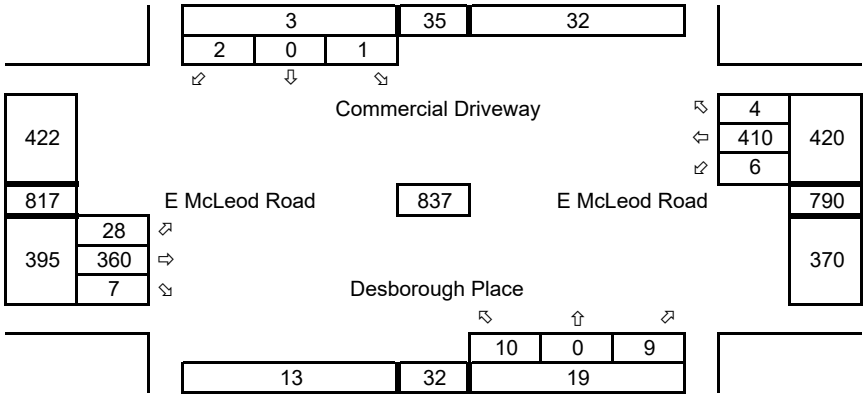
Year: **2/20/19**

Data Source: TDG

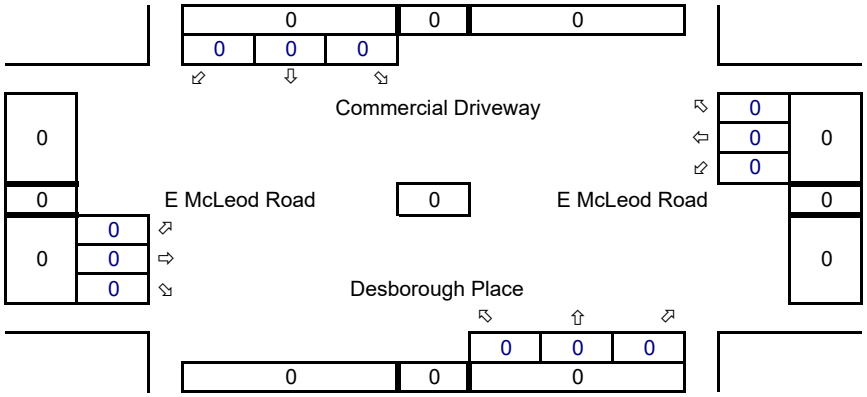


Future without Project
Average Weekday
AM Peak Hour

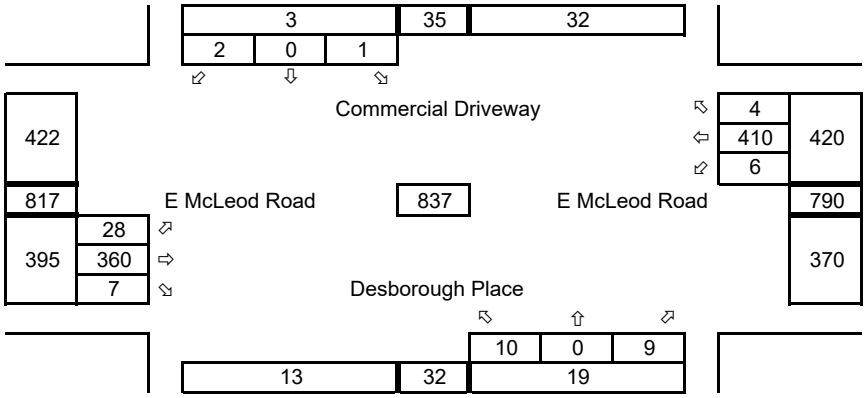
Year: 2024
Growth Rate = 2.0%
Years of Growth = 5
Total Growth = 1.1041



Total Project Trips
Average Weekday
AM Peak Hour



Future with Project
Average Weekday
AM Peak Hour



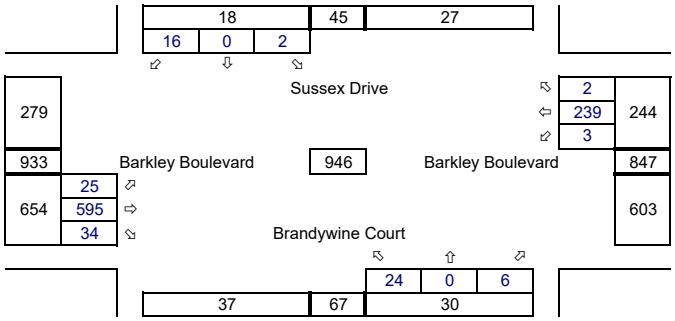
1 Sussex Dr @ Barkley Blvd

Synchro ID: 1

Existing
Average Weekday
PM Peak Hour

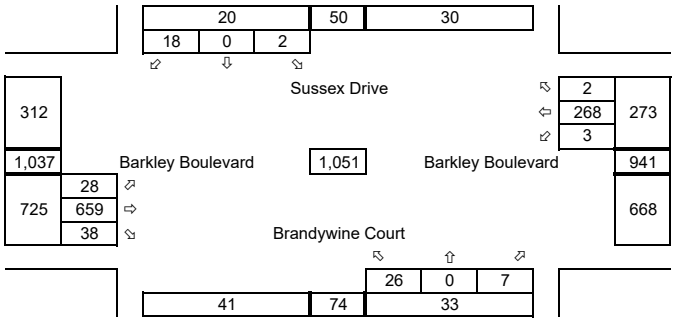
Year: **2/20/19**

Data Source: TDG

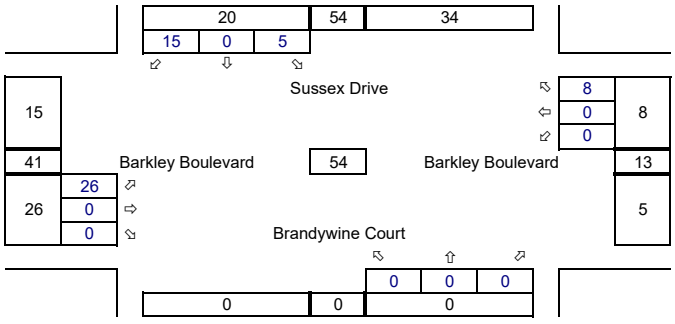


Future without Project
Average Weekday
PM Peak Hour

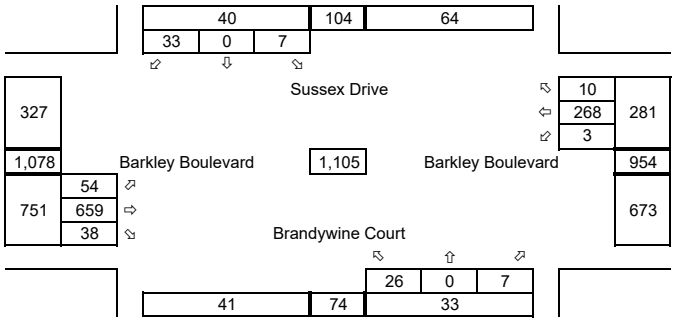
Year: 2024
Growth Rate = 2.0%
Years of Growth = 5
Total Growth = 1.1041



Total Project Trips
Average Weekday
PM Peak Hour

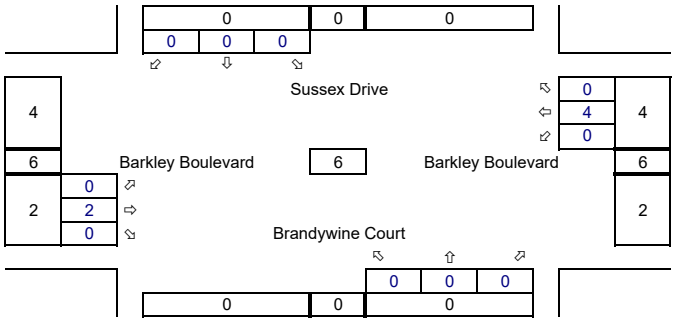


Future with Project
Average Weekday
PM Peak Hour



Total Pipeline Project Trips
Average Weekday
PM Peak Hour

3202 Newmarket Street
Apartments
(91 Multi-Family
Mid-Rise Units)

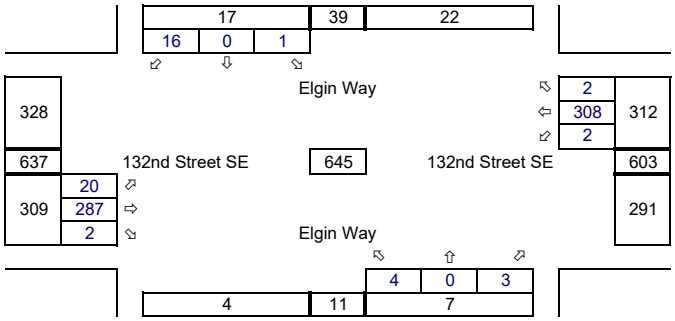


Synchro ID: 2

Existing
Average Weekday
PM Peak Hour

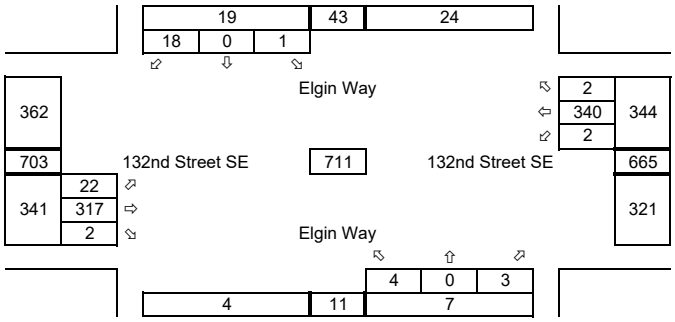
Year: **2/20/19**

Data Source: TDG

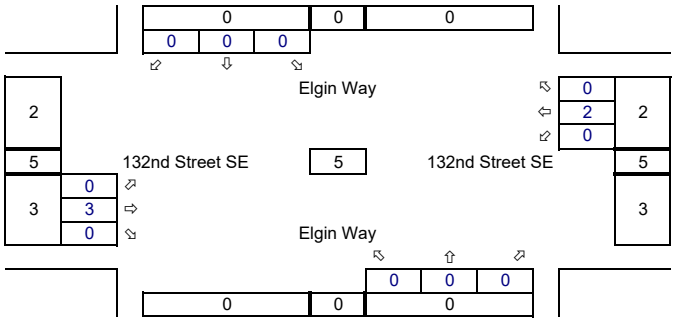


Future without Project
Average Weekday
PM Peak Hour

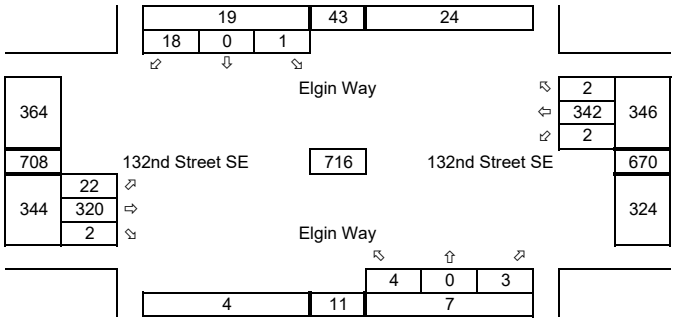
Year: 2024
Growth Rate = 2.0%
Years of Growth = 5
Total Growth = 1.1041



Total Project Trips
Average Weekday
PM Peak Hour

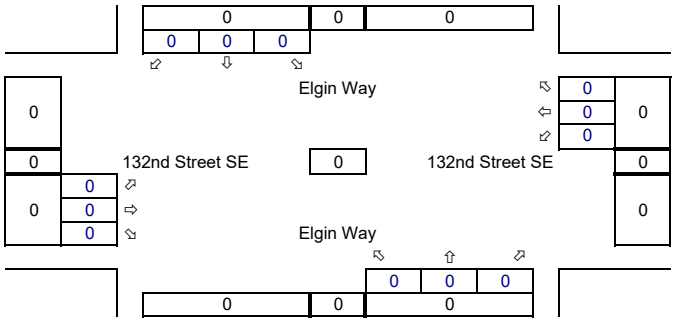


Future with Project
Average Weekday
PM Peak Hour



Total Pipeline Project Trips
Average Weekday
PM Peak Hour

3202 Newmarket Street Apartments
(91 Multi-Family Mid-Rise Units)



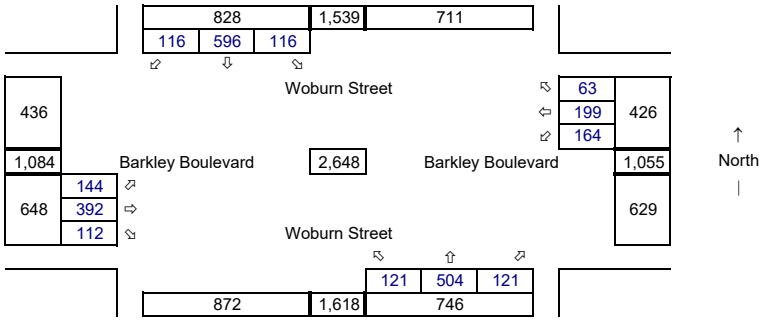
3 Woburn St at Barkley Blvd

Synchro ID: 3

Existing
Average Weekday
PM Peak Hour

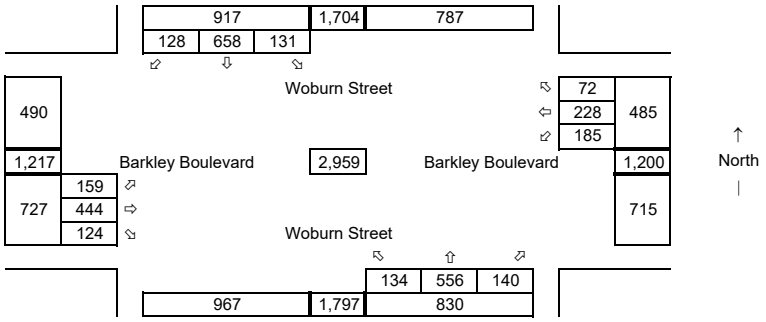
Year: **2/20/19**

Data Source: TDG

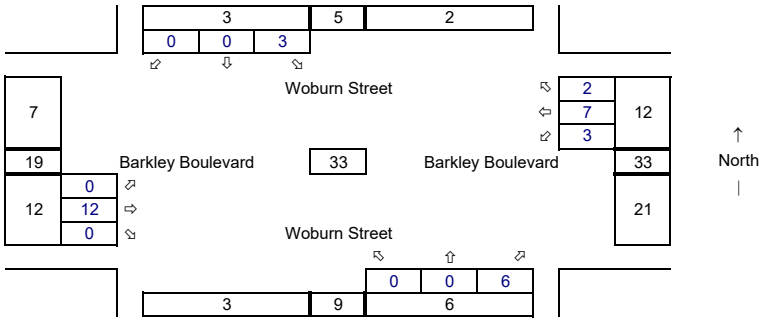


Future without Project
Average Weekday
PM Peak Hour

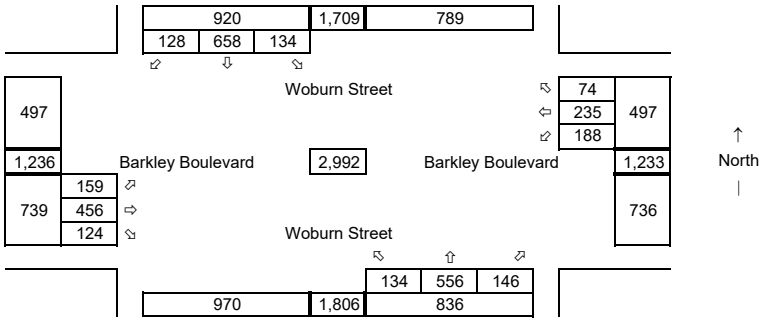
Year: 2024
Growth Rate = 2.0%
Years of Growth = 5
Total Growth = 1.1041



Total Project Trips
Average Weekday
PM Peak Hour

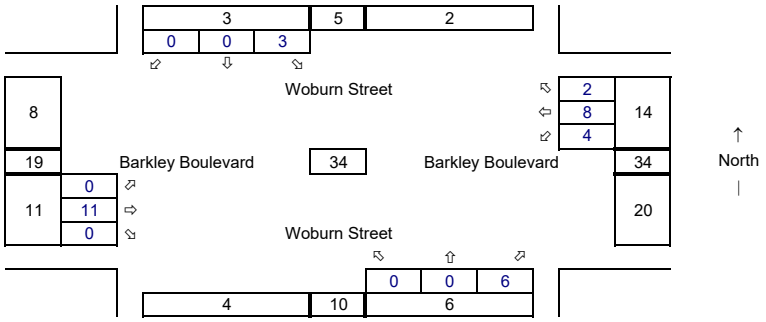


Future with Project
Average Weekday
PM Peak Hour



Total Pipeline Project Trips
Average Weekday
PM Peak Hour

3202 Newmarket Street
Apartments
(91 Multi-Family
Mid-Rise Units)



Level of Service Calculations With Bristol – AM Peak-Hour

Intersection												
Int Delay, s/veh	2.2											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	167	12	3	572	3	40	0	7	8	0	29
Future Vol, veh/h	15	167	12	3	572	3	40	0	7	8	0	29
Conflicting Peds, #/hr	3	0	1	1	0	3	3	0	1	1	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	201	14	4	689	4	48	0	8	10	0	35

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	696	0	0	216	0	0	965	949	210	951	954	697
Stage 1	-	-	-	-	-	-	245	245	-	702	702	-
Stage 2	-	-	-	-	-	-	720	704	-	249	252	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	900	-	-	1354	-	-	234	260	830	240	259	441
Stage 1	-	-	-	-	-	-	759	703	-	429	440	-
Stage 2	-	-	-	-	-	-	419	440	-	755	698	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	897	-	-	1353	-	-	211	253	828	233	252	438
Mov Cap-2 Maneuver	-	-	-	-	-	-	211	253	-	233	252	-
Stage 1	-	-	-	-	-	-	743	688	-	419	437	-
Stage 2	-	-	-	-	-	-	383	437	-	732	683	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0	24.9	16.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	237	897	-	-	1353	-	-	368
HCM Lane V/C Ratio	0.239	0.02	-	-	0.003	-	-	0.121
HCM Control Delay (s)	24.9	9.1	-	-	7.7	-	-	16.1
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0	-	-	0.4

Intersection												
Int Delay, s/veh	0.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	326	6	5	371	4	9	0	8	1	0	2
Future Vol, veh/h	25	326	6	5	371	4	9	0	8	1	0	2
Conflicting Peds, #/hr	19	0	0	0	0	19	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	30	398	7	6	452	5	11	0	10	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	476	0	0	405	0	0	930	950	402	953	951	474
Stage 1	-	-	-	-	-	-	462	462	-	486	486	-
Stage 2	-	-	-	-	-	-	468	488	-	467	465	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.16	6.56	6.26	7.16	6.56	6.26
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Follow-up Hdwy	2.254	-	-	2.254	-	-	3.554	4.054	3.354	3.554	4.054	3.354
Pot Cap-1 Maneuver	1066	-	-	1132	-	-	244	256	640	235	256	582
Stage 1	-	-	-	-	-	-	572	558	-	555	544	-
Stage 2	-	-	-	-	-	-	568	543	-	569	556	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1047	-	-	1132	-	-	235	240	640	220	240	571
Mov Cap-2 Maneuver	-	-	-	-	-	-	235	240	-	220	240	-
Stage 1	-	-	-	-	-	-	551	537	-	525	530	-
Stage 2	-	-	-	-	-	-	562	529	-	540	535	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.1	16.5	14.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	335	1047	-	-	1132	-	-	373
HCM Lane V/C Ratio	0.062	0.029	-	-	0.005	-	-	0.01
HCM Control Delay (s)	16.5	8.5	0	-	8.2	0	-	14.7
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0

Intersection												
Int Delay, s/veh	2.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	188	13	3	633	3	44	0	8	9	0	32
Future Vol, veh/h	17	188	13	3	633	3	44	0	8	9	0	32
Conflicting Peds, #/hr	3	0	1	1	0	3	3	0	1	1	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	20	227	16	4	763	4	53	0	10	11	0	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	770	0	0	244	0	0	1072	1054	237	1057	1060	771
Stage 1	-	-	-	-	-	-	276	276	-	776	776	-
Stage 2	-	-	-	-	-	-	796	778	-	281	284	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	844	-	-	1322	-	-	198	226	802	203	224	400
Stage 1	-	-	-	-	-	-	730	682	-	390	407	-
Stage 2	-	-	-	-	-	-	380	407	-	726	676	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	842	-	-	1321	-	-	174	219	800	196	217	398
Mov Cap-2 Maneuver	-	-	-	-	-	-	174	219	-	196	217	-
Stage 1	-	-	-	-	-	-	712	665	-	379	405	-
Stage 2	-	-	-	-	-	-	341	405	-	700	659	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0	31.4	18.1
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	198	842	-	-	1321	-	-	325
HCM Lane V/C Ratio	0.316	0.024	-	-	0.003	-	-	0.152
HCM Control Delay (s)	31.4	9.4	-	-	7.7	-	-	18.1
HCM Lane LOS	D	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.3	0.1	-	-	0	-	-	0.5

Intersection												
Int Delay, s/veh	0.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	360	7	6	410	4	10	0	9	1	0	2
Future Vol, veh/h	28	360	7	6	410	4	10	0	9	1	0	2
Conflicting Peds, #/hr	19	0	0	0	0	19	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	34	439	9	7	500	5	12	0	11	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	524	0	0	448	0	0	1030	1050	444	1053	1052	522
Stage 1	-	-	-	-	-	-	512	512	-	536	536	-
Stage 2	-	-	-	-	-	-	518	538	-	517	516	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.16	6.56	6.26	7.16	6.56	6.26
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Follow-up Hdwy	2.254	-	-	2.254	-	-	3.554	4.054	3.354	3.554	4.054	3.354
Pot Cap-1 Maneuver	1023	-	-	1091	-	-	208	223	606	201	223	547
Stage 1	-	-	-	-	-	-	537	530	-	521	517	-
Stage 2	-	-	-	-	-	-	533	516	-	534	528	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1004	-	-	1091	-	-	199	207	606	186	207	537
Mov Cap-2 Maneuver	-	-	-	-	-	-	199	207	-	186	207	-
Stage 1	-	-	-	-	-	-	513	506	-	489	503	-
Stage 2	-	-	-	-	-	-	526	502	-	501	504	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.1	18.4	16
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	292	1004	-	-	1091	-	-	330
HCM Lane V/C Ratio	0.079	0.034	-	-	0.007	-	-	0.011
HCM Control Delay (s)	18.4	8.7	0	-	8.3	0	-	16
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	0

Intersection												
Int Delay, s/veh	4.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	49	162	13	3	608	4	44	0	8	12	0	76
Future Vol, veh/h	49	162	13	3	608	4	44	0	8	12	0	76
Conflicting Peds, #/hr	3	0	1	1	0	3	3	0	1	1	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	59	195	16	4	733	5	53	0	10	14	0	92

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	741	0	0	212	0	0	1115	1071	205	1074	1077	742
Stage 1	-	-	-	-	-	-	322	322	-	747	747	-
Stage 2	-	-	-	-	-	-	793	749	-	327	330	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	866	-	-	1358	-	-	185	221	836	198	219	416
Stage 1	-	-	-	-	-	-	690	651	-	405	420	-
Stage 2	-	-	-	-	-	-	382	419	-	686	646	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	864	-	-	1357	-	-	136	204	834	184	203	414
Mov Cap-2 Maneuver	-	-	-	-	-	-	136	204	-	184	203	-
Stage 1	-	-	-	-	-	-	642	606	-	376	417	-
Stage 2	-	-	-	-	-	-	296	416	-	631	601	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0	42.8	19.5
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	156	864	-	-	1357	-	-	354
HCM Lane V/C Ratio	0.402	0.068	-	-	0.003	-	-	0.3
HCM Control Delay (s)	42.8	9.5	-	-	7.7	-	-	19.5
HCM Lane LOS	E	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.8	0.2	-	-	0	-	-	1.2

Intersection												
Int Delay, s/veh	1.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	360	10	31	385	4	18	0	37	1	0	2
Future Vol, veh/h	28	360	10	31	385	4	18	0	37	1	0	2
Conflicting Peds, #/hr	19	0	0	0	0	19	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	34	439	12	38	470	5	22	0	45	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	494	0	0	451	0	0	1063	1083	445	1104	1087	492
Stage 1	-	-	-	-	-	-	513	513	-	568	568	-
Stage 2	-	-	-	-	-	-	550	570	-	536	519	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.16	6.56	6.26	7.16	6.56	6.26
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Follow-up Hdwy	2.254	-	-	2.254	-	-	3.554	4.054	3.354	3.554	4.054	3.354
Pot Cap-1 Maneuver	1049	-	-	1089	-	-	197	214	605	185	212	569
Stage 1	-	-	-	-	-	-	537	529	-	501	500	-
Stage 2	-	-	-	-	-	-	512	499	-	521	526	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1030	-	-	1089	-	-	183	192	605	157	190	559
Mov Cap-2 Maneuver	-	-	-	-	-	-	183	192	-	157	190	-
Stage 1	-	-	-	-	-	-	513	506	-	470	468	-
Stage 2	-	-	-	-	-	-	486	467	-	461	503	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.6	17.9	17.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	345	1030	-	-	1089	-	-	302
HCM Lane V/C Ratio	0.194	0.033	-	-	0.035	-	-	0.012
HCM Control Delay (s)	17.9	8.6	0	-	8.4	0	-	17.1
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-	-	0

Level of Service Calculations With Bristol – PM Peak-Hour

Intersection												
Int Delay, s/veh	1.2											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	595	34	3	239	2	24	0	6	2	0	16
Future Vol, veh/h	25	595	34	3	239	2	24	0	6	2	0	16
Conflicting Peds, #/hr	5	0	0	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	27	654	37	3	263	2	26	0	7	2	0	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	270	0	0	691	0	0	1006	1003	673	1005	1020	269
Stage 1	-	-	-	-	-	-	727	727	-	275	275	-
Stage 2	-	-	-	-	-	-	279	276	-	730	745	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1299	-	-	908	-	-	221	243	457	221	238	772
Stage 1	-	-	-	-	-	-	417	431	-	733	684	-
Stage 2	-	-	-	-	-	-	730	684	-	415	422	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1293	-	-	908	-	-	212	236	457	213	231	768
Mov Cap-2 Maneuver	-	-	-	-	-	-	212	236	-	213	231	-
Stage 1	-	-	-	-	-	-	408	422	-	714	679	-
Stage 2	-	-	-	-	-	-	711	679	-	400	413	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	22.6	11.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	237	1293	-	-	908	-	-	596
HCM Lane V/C Ratio	0.139	0.021	-	-	0.004	-	-	0.033
HCM Control Delay (s)	22.6	7.8	-	-	9	-	-	11.2
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	0.1

Intersection												
Int Delay, s/veh	0.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	287	2	2	308	2	4	0	3	1	0	16
Future Vol, veh/h	20	287	2	2	308	2	4	0	3	1	0	16
Conflicting Peds, #/hr	15	0	6	6	0	15	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	24	338	2	2	362	2	5	0	4	1	0	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	379	0	0	346	0	0	772	776	345	771	776	380
Stage 1	-	-	-	-	-	-	393	393	-	382	382	-
Stage 2	-	-	-	-	-	-	379	383	-	389	394	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1163	-	-	1196	-	-	313	325	691	313	325	660
Stage 1	-	-	-	-	-	-	626	601	-	634	607	-
Stage 2	-	-	-	-	-	-	637	607	-	629	600	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1146	-	-	1189	-	-	295	310	687	300	310	649
Mov Cap-2 Maneuver	-	-	-	-	-	-	295	310	-	300	310	-
Stage 1	-	-	-	-	-	-	606	582	-	609	597	-
Stage 2	-	-	-	-	-	-	616	597	-	609	581	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	14.4	11.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	390	1146	-	-	1189	-	-	607
HCM Lane V/C Ratio	0.021	0.021	-	-	0.002	-	-	0.033
HCM Control Delay (s)	14.4	8.2	0	-	8	0	-	11.1
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	392	112	164	199	63	121	504	121	116	596	116
Future Volume (veh/h)	144	392	112	164	199	63	121	504	121	116	596	116
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.98	1.00		0.99	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	162	440	126	184	224	71	136	566	136	130	670	130
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	334	556	158	277	402	337	353	1257	301	387	1307	253
Arrive On Green	0.09	0.20	0.20	0.10	0.21	0.21	0.06	0.44	0.44	0.06	0.44	0.44
Sat Flow, veh/h	1781	2717	770	1781	1870	1570	1781	2840	680	1781	2966	575
Grp Volume(v), veh/h	162	286	280	184	224	71	136	353	349	130	401	399
Grp Sat Flow(s),veh/h/ln	1781	1777	1710	1781	1870	1570	1781	1777	1743	1781	1777	1765
Q Serve(g_s), s	8.7	18.7	19.1	9.8	13.1	4.6	5.1	17.0	17.1	4.8	20.0	20.0
Cycle Q Clear(g_c), s	8.7	18.7	19.1	9.8	13.1	4.6	5.1	17.0	17.1	4.8	20.0	20.0
Prop In Lane	1.00		0.45	1.00		1.00	1.00		0.39	1.00		0.33
Lane Grp Cap(c), veh/h	334	364	350	277	402	337	353	786	772	387	783	777
V/C Ratio(X)	0.48	0.79	0.80	0.66	0.56	0.21	0.39	0.45	0.45	0.34	0.51	0.51
Avail Cap(c_a), veh/h	524	493	474	449	519	435	596	786	772	633	783	777
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.3	46.2	46.3	35.0	42.9	39.6	18.6	23.8	23.8	18.1	24.8	24.8
Incr Delay (d2), s/veh	1.1	5.1	6.0	2.7	0.9	0.2	0.7	1.9	1.9	0.5	2.4	2.4
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	3.9	8.8	8.7	4.5	6.2	1.8	2.1	7.5	7.4	2.0	8.9	8.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.4	51.3	52.3	37.7	43.8	39.8	19.3	25.6	25.7	18.6	27.2	27.2
LnGrp LOS	D	D	D	D	D	D	B	C	C	B	C	C
Approach Vol, veh/h		728			479			838			930	
Approach Delay, s/veh		48.2			40.9			24.6			26.0	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	60.3	16.9	32.3	13.3	60.0	18.2	31.1
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	24.0	54.0	24.0	34.0	24.0	54.0	24.0	34.0
Max Q Clear Time (g_c+I1), s	6.8	19.1	10.7	15.1	7.1	22.0	11.8	21.1
Green Ext Time (p_c), s	0.3	5.0	0.3	1.1	0.3	5.8	0.4	2.4

Intersection Summary	
HCM 6th Ctrl Delay	33.4
HCM 6th LOS	C

Intersection												
Int Delay, s/veh	1.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	659	38	3	267	2	26	0	7	2	0	19
Future Vol, veh/h	28	659	38	3	267	2	26	0	7	2	0	19
Conflicting Peds, #/hr	5	0	0	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	31	724	42	3	293	2	29	0	8	2	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	300	0	0	766	0	0	1118	1113	745	1116	1133	299
Stage 1	-	-	-	-	-	-	807	807	-	305	305	-
Stage 2	-	-	-	-	-	-	311	306	-	811	828	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1267	-	-	852	-	-	185	209	416	186	204	743
Stage 1	-	-	-	-	-	-	377	396	-	707	664	-
Stage 2	-	-	-	-	-	-	702	663	-	375	387	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1261	-	-	852	-	-	176	202	416	178	197	739
Mov Cap-2 Maneuver	-	-	-	-	-	-	176	202	-	178	197	-
Stage 1	-	-	-	-	-	-	368	386	-	686	658	-
Stage 2	-	-	-	-	-	-	680	657	-	359	377	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	26.8	11.6
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	201	1261	-	-	852	-	-	568
HCM Lane V/C Ratio	0.18	0.024	-	-	0.004	-	-	0.041
HCM Control Delay (s)	26.8	7.9	-	-	9.2	-	-	11.6
HCM Lane LOS	D	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0	-	-	0.1

Intersection												
Int Delay, s/veh	0.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	317	2	3	340	2	4	0	3	1	0	18
Future Vol, veh/h	22	317	2	3	340	2	4	0	3	1	0	18
Conflicting Peds, #/hr	15	0	6	6	0	15	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	26	373	2	4	400	2	5	0	4	1	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	417	0	0	381	0	0	854	857	380	852	857	418
Stage 1	-	-	-	-	-	-	432	432	-	424	424	-
Stage 2	-	-	-	-	-	-	422	425	-	428	433	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1126	-	-	1161	-	-	275	292	660	276	292	629
Stage 1	-	-	-	-	-	-	596	577	-	602	582	-
Stage 2	-	-	-	-	-	-	604	581	-	599	577	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1110	-	-	1154	-	-	257	277	656	264	277	619
Mov Cap-2 Maneuver	-	-	-	-	-	-	257	277	-	264	277	-
Stage 1	-	-	-	-	-	-	575	556	-	576	572	-
Stage 2	-	-	-	-	-	-	580	571	-	578	556	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	15.6	11.5
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	348	1110	-	-	1154	-	-	578
HCM Lane V/C Ratio	0.024	0.023	-	-	0.003	-	-	0.039
HCM Control Delay (s)	15.6	8.3	0	-	8.1	0	-	11.5
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	159	444	124	185	228	72	134	556	140	131	658	128
Future Volume (veh/h)	159	444	124	185	228	72	134	556	140	131	658	128
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	179	499	139	208	256	81	151	625	157	147	739	144
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	338	594	164	281	430	361	317	1189	298	348	1250	244
Arrive On Green	0.10	0.22	0.22	0.11	0.23	0.23	0.07	0.42	0.42	0.06	0.42	0.42
Sat Flow, veh/h	1781	2734	757	1781	1870	1571	1781	2811	705	1781	2964	577
Grp Volume(v), veh/h	179	323	315	208	256	81	151	395	387	147	443	440
Grp Sat Flow(s),veh/h/ln	1781	1777	1714	1781	1870	1571	1781	1777	1739	1781	1777	1764
Q Serve(g_s), s	9.8	22.3	22.6	11.4	15.6	5.4	6.1	21.1	21.2	5.9	24.6	24.6
Cycle Q Clear(g_c), s	9.8	22.3	22.6	11.4	15.6	5.4	6.1	21.1	21.2	5.9	24.6	24.6
Prop In Lane	1.00		0.44	1.00		1.00	1.00		0.41	1.00		0.33
Lane Grp Cap(c), veh/h	338	386	372	281	430	361	317	752	736	348	749	744
V/C Ratio(X)	0.53	0.84	0.85	0.74	0.59	0.22	0.48	0.52	0.53	0.42	0.59	0.59
Avail Cap(c_a), veh/h	502	472	455	423	497	417	535	752	736	568	749	744
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.6	47.9	48.0	35.6	44.0	40.0	21.5	27.4	27.4	20.6	28.5	28.5
Incr Delay (d2), s/veh	1.3	9.9	11.0	3.8	1.1	0.2	1.1	2.6	2.7	0.8	3.4	3.4
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	4.4	10.9	10.8	5.3	7.4	2.1	2.6	9.5	9.3	2.5	11.1	11.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.9	57.9	59.0	39.4	45.1	40.2	22.6	30.0	30.1	21.4	31.9	31.9
LnGrp LOS	D	E	E	D	D	D	C	C	C	C	C	C
Approach Vol, veh/h		817			545			933			1030	
Approach Delay, s/veh		53.5			42.2			28.8			30.4	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.2	60.2	18.2	35.5	14.4	60.0	19.8	33.8
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	24.0	54.0	24.0	34.0	24.0	54.0	24.0	34.0
Max Q Clear Time (g_c+I1), s	7.9	23.2	11.8	17.6	8.1	26.6	13.4	24.6
Green Ext Time (p_c), s	0.3	5.7	0.4	1.3	0.3	6.4	0.4	2.3

Intersection Summary	
HCM 6th Ctrl Delay	37.6
HCM 6th LOS	D

Intersection												
Int Delay, s/veh	2.2											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	74	634	38	3	267	5	26	0	7	4	0	56
Future Vol, veh/h	74	634	38	3	267	5	26	0	7	4	0	56
Conflicting Peds, #/hr	5	0	0	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	81	697	42	3	293	5	29	0	8	4	0	62

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	303	0	0	739	0	0	1213	1189	718	1191	1208	301
Stage 1	-	-	-	-	-	-	880	880	-	307	307	-
Stage 2	-	-	-	-	-	-	333	309	-	884	901	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1264	-	-	872	-	-	159	189	431	165	184	741
Stage 1	-	-	-	-	-	-	343	366	-	705	663	-
Stage 2	-	-	-	-	-	-	683	661	-	341	358	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1258	-	-	872	-	-	138	176	431	153	171	737
Mov Cap-2 Maneuver	-	-	-	-	-	-	138	176	-	153	171	-
Stage 1	-	-	-	-	-	-	321	343	-	656	658	-
Stage 2	-	-	-	-	-	-	624	656	-	313	335	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.1	33.7	11.9
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	161	1258	-	-	872	-	-	588
HCM Lane V/C Ratio	0.225	0.065	-	-	0.004	-	-	0.112
HCM Control Delay (s)	33.7	8.1	-	-	9.1	-	-	11.9
HCM Lane LOS	D	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.8	0.2	-	-	0	-	-	0.4

Intersection												
Int Delay, s/veh	1.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	317	10	30	315	2	9	0	29	1	0	18
Future Vol, veh/h	22	317	10	30	315	2	9	0	29	1	0	18
Conflicting Peds, #/hr	15	0	6	6	0	15	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	26	373	12	35	371	2	11	0	34	1	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	388	0	0	391	0	0	892	895	385	905	900	389
Stage 1	-	-	-	-	-	-	437	437	-	457	457	-
Stage 2	-	-	-	-	-	-	455	458	-	448	443	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1154	-	-	1151	-	-	260	277	656	254	275	653
Stage 1	-	-	-	-	-	-	592	574	-	578	563	-
Stage 2	-	-	-	-	-	-	579	562	-	584	571	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1138	-	-	1144	-	-	237	253	652	225	252	642
Mov Cap-2 Maneuver	-	-	-	-	-	-	237	253	-	225	252	-
Stage 1	-	-	-	-	-	-	571	554	-	553	534	-
Stage 2	-	-	-	-	-	-	537	533	-	537	551	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.7	13.6	11.4
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	461	1138	-	-	1144	-	-	585
HCM Lane V/C Ratio	0.097	0.023	-	-	0.031	-	-	0.038
HCM Control Delay (s)	13.6	8.2	0	-	8.2	0	-	11.4
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.1	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	159	456	124	188	235	74	134	556	146	134	658	128
Future Volume (veh/h)	159	456	124	188	235	74	134	556	146	134	658	128
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	179	512	139	211	264	83	151	625	164	151	739	144
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	336	604	163	281	437	367	315	1167	306	345	1243	242
Arrive On Green	0.09	0.22	0.22	0.11	0.23	0.23	0.07	0.42	0.42	0.07	0.42	0.42
Sat Flow, veh/h	1781	2751	743	1781	1870	1571	1781	2782	729	1781	2964	577
Grp Volume(v), veh/h	179	330	321	211	264	83	151	399	390	151	443	440
Grp Sat Flow(s),veh/h/ln	1781	1777	1717	1781	1870	1571	1781	1777	1734	1781	1777	1764
Q Serve(g_s), s	9.9	22.9	23.1	11.6	16.2	5.5	6.1	21.6	21.7	6.1	24.8	24.8
Cycle Q Clear(g_c), s	9.9	22.9	23.1	11.6	16.2	5.5	6.1	21.6	21.7	6.1	24.8	24.8
Prop In Lane	1.00		0.43	1.00		1.00	1.00		0.42	1.00		0.33
Lane Grp Cap(c), veh/h	336	390	377	281	437	367	315	745	727	345	745	740
V/C Ratio(X)	0.53	0.85	0.85	0.75	0.60	0.23	0.48	0.53	0.54	0.44	0.59	0.59
Avail Cap(c_a), veh/h	499	469	453	419	494	415	531	745	727	560	745	740
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.6	48.1	48.2	35.6	44.0	39.9	21.8	28.0	28.0	21.0	28.9	28.9
Incr Delay (d2), s/veh	1.3	10.9	12.0	4.1	1.4	0.2	1.1	2.7	2.8	0.9	3.5	3.5
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	4.4	11.3	11.1	5.4	7.7	2.2	2.6	9.8	9.6	2.6	11.3	11.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.9	59.0	60.2	39.8	45.4	40.1	22.9	30.7	30.8	21.9	32.4	32.4
LnGrp LOS	D	E	E	D	D	D	C	C	C	C	C	C
Approach Vol, veh/h		830			558			940			1034	
Approach Delay, s/veh		54.5			42.5			29.5			30.8	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.4	60.0	18.2	36.1	14.4	60.0	20.0	34.3
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	24.0	54.0	24.0	34.0	24.0	54.0	24.0	34.0
Max Q Clear Time (g_c+I1), s	8.1	23.7	11.9	18.2	8.1	26.8	13.6	25.1
Green Ext Time (p_c), s	0.3	5.7	0.4	1.3	0.3	6.4	0.4	2.3

Intersection Summary	
HCM 6th Ctrl Delay	38.2
HCM 6th LOS	D

Level of Service Calculations No Bristol – AM Peak-Hour

Intersection												
Int Delay, s/veh	2.2											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	167	12	3	572	3	40	0	7	8	0	29
Future Vol, veh/h	15	167	12	3	572	3	40	0	7	8	0	29
Conflicting Peds, #/hr	3	0	1	1	0	3	3	0	1	1	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	201	14	4	689	4	48	0	8	10	0	35

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	696	0	0	216	0	0	965	949	210	951	954	697
Stage 1	-	-	-	-	-	-	245	245	-	702	702	-
Stage 2	-	-	-	-	-	-	720	704	-	249	252	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	900	-	-	1354	-	-	234	260	830	240	259	441
Stage 1	-	-	-	-	-	-	759	703	-	429	440	-
Stage 2	-	-	-	-	-	-	419	440	-	755	698	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	897	-	-	1353	-	-	211	253	828	233	252	438
Mov Cap-2 Maneuver	-	-	-	-	-	-	211	253	-	233	252	-
Stage 1	-	-	-	-	-	-	743	688	-	419	437	-
Stage 2	-	-	-	-	-	-	383	437	-	732	683	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0	24.9	16.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	237	897	-	-	1353	-	-	368
HCM Lane V/C Ratio	0.239	0.02	-	-	0.003	-	-	0.121
HCM Control Delay (s)	24.9	9.1	-	-	7.7	-	-	16.1
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0	-	-	0.4

Intersection												
Int Delay, s/veh	0.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	326	6	5	371	4	9	0	8	1	0	2
Future Vol, veh/h	25	326	6	5	371	4	9	0	8	1	0	2
Conflicting Peds, #/hr	19	0	0	0	0	19	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	30	398	7	6	452	5	11	0	10	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	476	0	0	405	0	0	930	950	402	953	951	474
Stage 1	-	-	-	-	-	-	462	462	-	486	486	-
Stage 2	-	-	-	-	-	-	468	488	-	467	465	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.16	6.56	6.26	7.16	6.56	6.26
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Follow-up Hdwy	2.254	-	-	2.254	-	-	3.554	4.054	3.354	3.554	4.054	3.354
Pot Cap-1 Maneuver	1066	-	-	1132	-	-	244	256	640	235	256	582
Stage 1	-	-	-	-	-	-	572	558	-	555	544	-
Stage 2	-	-	-	-	-	-	568	543	-	569	556	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1047	-	-	1132	-	-	235	240	640	220	240	571
Mov Cap-2 Maneuver	-	-	-	-	-	-	235	240	-	220	240	-
Stage 1	-	-	-	-	-	-	551	537	-	525	530	-
Stage 2	-	-	-	-	-	-	562	529	-	540	535	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.1	16.5	14.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	335	1047	-	-	1132	-	-	373
HCM Lane V/C Ratio	0.062	0.029	-	-	0.005	-	-	0.01
HCM Control Delay (s)	16.5	8.5	0	-	8.2	0	-	14.7
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0

Intersection												
Int Delay, s/veh	2.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	188	13	3	633	3	44	0	8	9	0	32
Future Vol, veh/h	17	188	13	3	633	3	44	0	8	9	0	32
Conflicting Peds, #/hr	3	0	1	1	0	3	3	0	1	1	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	20	227	16	4	763	4	53	0	10	11	0	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	770	0	0	244	0	0	1072	1054	237	1057	1060	771
Stage 1	-	-	-	-	-	-	276	276	-	776	776	-
Stage 2	-	-	-	-	-	-	796	778	-	281	284	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	844	-	-	1322	-	-	198	226	802	203	224	400
Stage 1	-	-	-	-	-	-	730	682	-	390	407	-
Stage 2	-	-	-	-	-	-	380	407	-	726	676	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	842	-	-	1321	-	-	174	219	800	196	217	398
Mov Cap-2 Maneuver	-	-	-	-	-	-	174	219	-	196	217	-
Stage 1	-	-	-	-	-	-	712	665	-	379	405	-
Stage 2	-	-	-	-	-	-	341	405	-	700	659	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0	31.4	18.1
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	198	842	-	-	1321	-	-	325
HCM Lane V/C Ratio	0.316	0.024	-	-	0.003	-	-	0.152
HCM Control Delay (s)	31.4	9.4	-	-	7.7	-	-	18.1
HCM Lane LOS	D	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.3	0.1	-	-	0	-	-	0.5

Intersection												
Int Delay, s/veh	0.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	360	7	6	410	4	10	0	9	1	0	2
Future Vol, veh/h	28	360	7	6	410	4	10	0	9	1	0	2
Conflicting Peds, #/hr	19	0	0	0	0	19	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	34	439	9	7	500	5	12	0	11	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	524	0	0	448	0	0	1030	1050	444	1053	1052	522
Stage 1	-	-	-	-	-	-	512	512	-	536	536	-
Stage 2	-	-	-	-	-	-	518	538	-	517	516	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.16	6.56	6.26	7.16	6.56	6.26
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Follow-up Hdwy	2.254	-	-	2.254	-	-	3.554	4.054	3.354	3.554	4.054	3.354
Pot Cap-1 Maneuver	1023	-	-	1091	-	-	208	223	606	201	223	547
Stage 1	-	-	-	-	-	-	537	530	-	521	517	-
Stage 2	-	-	-	-	-	-	533	516	-	534	528	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1004	-	-	1091	-	-	199	207	606	186	207	537
Mov Cap-2 Maneuver	-	-	-	-	-	-	199	207	-	186	207	-
Stage 1	-	-	-	-	-	-	513	506	-	489	503	-
Stage 2	-	-	-	-	-	-	526	502	-	501	504	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.1	18.4	16
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	292	1004	-	-	1091	-	-	330
HCM Lane V/C Ratio	0.079	0.034	-	-	0.007	-	-	0.011
HCM Control Delay (s)	18.4	8.7	0	-	8.3	0	-	16
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	0

Intersection												
Int Delay, s/veh	3.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	188	13	3	633	5	44	0	8	17	0	56
Future Vol, veh/h	25	188	13	3	633	5	44	0	8	17	0	56
Conflicting Peds, #/hr	3	0	1	1	0	3	3	0	1	1	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	30	227	16	4	763	6	53	0	10	20	0	67

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	772	0	0	244	0	0	1107	1076	237	1078	1081	772
Stage 1	-	-	-	-	-	-	296	296	-	777	777	-
Stage 2	-	-	-	-	-	-	811	780	-	301	304	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	843	-	-	1322	-	-	188	219	802	196	218	400
Stage 1	-	-	-	-	-	-	712	668	-	390	407	-
Stage 2	-	-	-	-	-	-	373	406	-	708	663	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	841	-	-	1321	-	-	151	210	800	187	209	398
Mov Cap-2 Maneuver	-	-	-	-	-	-	151	210	-	187	209	-
Stage 1	-	-	-	-	-	-	686	643	-	375	405	-
Stage 2	-	-	-	-	-	-	308	404	-	674	638	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0	37.2	20.8
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	173	841	-	-	1321	-	-	315
HCM Lane V/C Ratio	0.362	0.036	-	-	0.003	-	-	0.279
HCM Control Delay (s)	37.2	9.4	-	-	7.7	-	-	20.8
HCM Lane LOS	E	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.5	0.1	-	-	0	-	-	1.1

Intersection												
Int Delay, s/veh	0.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	360	7	6	410	4	10	0	9	1	0	2
Future Vol, veh/h	28	360	7	6	410	4	10	0	9	1	0	2
Conflicting Peds, #/hr	19	0	0	0	0	19	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	34	439	9	7	500	5	12	0	11	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	524	0	0	448	0	0	1030	1050	444	1053	1052	522
Stage 1	-	-	-	-	-	-	512	512	-	536	536	-
Stage 2	-	-	-	-	-	-	518	538	-	517	516	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.16	6.56	6.26	7.16	6.56	6.26
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Follow-up Hdwy	2.254	-	-	2.254	-	-	3.554	4.054	3.354	3.554	4.054	3.354
Pot Cap-1 Maneuver	1023	-	-	1091	-	-	208	223	606	201	223	547
Stage 1	-	-	-	-	-	-	537	530	-	521	517	-
Stage 2	-	-	-	-	-	-	533	516	-	534	528	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1004	-	-	1091	-	-	199	207	606	186	207	537
Mov Cap-2 Maneuver	-	-	-	-	-	-	199	207	-	186	207	-
Stage 1	-	-	-	-	-	-	513	506	-	489	503	-
Stage 2	-	-	-	-	-	-	526	502	-	501	504	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.1	18.4	16
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	292	1004	-	-	1091	-	-	330
HCM Lane V/C Ratio	0.079	0.034	-	-	0.007	-	-	0.011
HCM Control Delay (s)	18.4	8.7	0	-	8.3	0	-	16
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	0

Level of Service Calculations No Bristol – PM Peak-Hour

Intersection												
Int Delay, s/veh	1.2											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	595	34	3	239	2	24	0	6	2	0	16
Future Vol, veh/h	25	595	34	3	239	2	24	0	6	2	0	16
Conflicting Peds, #/hr	5	0	0	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	27	654	37	3	263	2	26	0	7	2	0	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	270	0	0	691	0	0	1006	1003	673	1005	1020	269
Stage 1	-	-	-	-	-	-	727	727	-	275	275	-
Stage 2	-	-	-	-	-	-	279	276	-	730	745	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1299	-	-	908	-	-	221	243	457	221	238	772
Stage 1	-	-	-	-	-	-	417	431	-	733	684	-
Stage 2	-	-	-	-	-	-	730	684	-	415	422	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1293	-	-	908	-	-	212	236	457	213	231	768
Mov Cap-2 Maneuver	-	-	-	-	-	-	212	236	-	213	231	-
Stage 1	-	-	-	-	-	-	408	422	-	714	679	-
Stage 2	-	-	-	-	-	-	711	679	-	400	413	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	22.6	11.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	237	1293	-	-	908	-	-	596
HCM Lane V/C Ratio	0.139	0.021	-	-	0.004	-	-	0.033
HCM Control Delay (s)	22.6	7.8	-	-	9	-	-	11.2
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	0.1

Intersection												
Int Delay, s/veh	0.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	287	2	2	308	2	4	0	3	1	0	16
Future Vol, veh/h	20	287	2	2	308	2	4	0	3	1	0	16
Conflicting Peds, #/hr	15	0	6	6	0	15	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	24	338	2	2	362	2	5	0	4	1	0	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	379	0	0	346	0	0	772	776	345	771	776	380
Stage 1	-	-	-	-	-	-	393	393	-	382	382	-
Stage 2	-	-	-	-	-	-	379	383	-	389	394	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1163	-	-	1196	-	-	313	325	691	313	325	660
Stage 1	-	-	-	-	-	-	626	601	-	634	607	-
Stage 2	-	-	-	-	-	-	637	607	-	629	600	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1146	-	-	1189	-	-	295	310	687	300	310	649
Mov Cap-2 Maneuver	-	-	-	-	-	-	295	310	-	300	310	-
Stage 1	-	-	-	-	-	-	606	582	-	609	597	-
Stage 2	-	-	-	-	-	-	616	597	-	609	581	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	14.4	11.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	390	1146	-	-	1189	-	-	607
HCM Lane V/C Ratio	0.021	0.021	-	-	0.002	-	-	0.033
HCM Control Delay (s)	14.4	8.2	0	-	8	0	-	11.1
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	392	112	164	199	63	121	504	121	116	596	116
Future Volume (veh/h)	144	392	112	164	199	63	121	504	121	116	596	116
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.98	1.00		0.99	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	162	440	126	184	224	71	136	566	136	130	670	130
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	334	556	158	277	402	337	353	1257	301	387	1307	253
Arrive On Green	0.09	0.20	0.20	0.10	0.21	0.21	0.06	0.44	0.44	0.06	0.44	0.44
Sat Flow, veh/h	1781	2717	770	1781	1870	1570	1781	2840	680	1781	2966	575
Grp Volume(v), veh/h	162	286	280	184	224	71	136	353	349	130	401	399
Grp Sat Flow(s),veh/h/ln	1781	1777	1710	1781	1870	1570	1781	1777	1743	1781	1777	1765
Q Serve(g_s), s	8.7	18.7	19.1	9.8	13.1	4.6	5.1	17.0	17.1	4.8	20.0	20.0
Cycle Q Clear(g_c), s	8.7	18.7	19.1	9.8	13.1	4.6	5.1	17.0	17.1	4.8	20.0	20.0
Prop In Lane	1.00		0.45	1.00		1.00	1.00		0.39	1.00		0.33
Lane Grp Cap(c), veh/h	334	364	350	277	402	337	353	786	772	387	783	777
V/C Ratio(X)	0.48	0.79	0.80	0.66	0.56	0.21	0.39	0.45	0.45	0.34	0.51	0.51
Avail Cap(c_a), veh/h	524	493	474	449	519	435	596	786	772	633	783	777
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.3	46.2	46.3	35.0	42.9	39.6	18.6	23.8	23.8	18.1	24.8	24.8
Incr Delay (d2), s/veh	1.1	5.1	6.0	2.7	0.9	0.2	0.7	1.9	1.9	0.5	2.4	2.4
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	3.9	8.8	8.7	4.5	6.2	1.8	2.1	7.5	7.4	2.0	8.9	8.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.4	51.3	52.3	37.7	43.8	39.8	19.3	25.6	25.7	18.6	27.2	27.2
LnGrp LOS	D	D	D	D	D	D	B	C	C	B	C	C
Approach Vol, veh/h		728			479			838			930	
Approach Delay, s/veh		48.2			40.9			24.6			26.0	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	60.3	16.9	32.3	13.3	60.0	18.2	31.1
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	24.0	54.0	24.0	34.0	24.0	54.0	24.0	34.0
Max Q Clear Time (g_c+I1), s	6.8	19.1	10.7	15.1	7.1	22.0	11.8	21.1
Green Ext Time (p_c), s	0.3	5.0	0.3	1.1	0.3	5.8	0.4	2.4

Intersection Summary	
HCM 6th Ctrl Delay	33.4
HCM 6th LOS	C

Intersection												
Int Delay, s/veh	1.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	659	38	3	267	2	26	0	7	2	0	19
Future Vol, veh/h	28	659	38	3	267	2	26	0	7	2	0	19
Conflicting Peds, #/hr	5	0	0	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	31	724	42	3	293	2	29	0	8	2	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	300	0	0	766	0	0	1118	1113	745	1116	1133	299
Stage 1	-	-	-	-	-	-	807	807	-	305	305	-
Stage 2	-	-	-	-	-	-	311	306	-	811	828	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1267	-	-	852	-	-	185	209	416	186	204	743
Stage 1	-	-	-	-	-	-	377	396	-	707	664	-
Stage 2	-	-	-	-	-	-	702	663	-	375	387	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1261	-	-	852	-	-	176	202	416	178	197	739
Mov Cap-2 Maneuver	-	-	-	-	-	-	176	202	-	178	197	-
Stage 1	-	-	-	-	-	-	368	386	-	686	658	-
Stage 2	-	-	-	-	-	-	680	657	-	359	377	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	26.8	11.6
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	201	1261	-	-	852	-	-	568
HCM Lane V/C Ratio	0.18	0.024	-	-	0.004	-	-	0.041
HCM Control Delay (s)	26.8	7.9	-	-	9.2	-	-	11.6
HCM Lane LOS	D	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0	-	-	0.1

Intersection												
Int Delay, s/veh	0.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	317	2	3	340	2	4	0	3	1	0	18
Future Vol, veh/h	22	317	2	3	340	2	4	0	3	1	0	18
Conflicting Peds, #/hr	15	0	6	6	0	15	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	26	373	2	4	400	2	5	0	4	1	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	417	0	0	381	0	0	854	857	380	852	857	418
Stage 1	-	-	-	-	-	-	432	432	-	424	424	-
Stage 2	-	-	-	-	-	-	422	425	-	428	433	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1126	-	-	1161	-	-	275	292	660	276	292	629
Stage 1	-	-	-	-	-	-	596	577	-	602	582	-
Stage 2	-	-	-	-	-	-	604	581	-	599	577	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1110	-	-	1154	-	-	257	277	656	264	277	619
Mov Cap-2 Maneuver	-	-	-	-	-	-	257	277	-	264	277	-
Stage 1	-	-	-	-	-	-	575	556	-	576	572	-
Stage 2	-	-	-	-	-	-	580	571	-	578	556	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	15.6	11.5
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	348	1110	-	-	1154	-	-	578
HCM Lane V/C Ratio	0.024	0.023	-	-	0.003	-	-	0.039
HCM Control Delay (s)	15.6	8.3	0	-	8.1	0	-	11.5
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	159	444	124	185	228	72	134	556	140	131	658	128
Future Volume (veh/h)	159	444	124	185	228	72	134	556	140	131	658	128
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	179	499	139	208	256	81	151	625	157	147	739	144
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	338	594	164	281	430	361	317	1189	298	348	1250	244
Arrive On Green	0.10	0.22	0.22	0.11	0.23	0.23	0.07	0.42	0.42	0.06	0.42	0.42
Sat Flow, veh/h	1781	2734	757	1781	1870	1571	1781	2811	705	1781	2964	577
Grp Volume(v), veh/h	179	323	315	208	256	81	151	395	387	147	443	440
Grp Sat Flow(s),veh/h/ln	1781	1777	1714	1781	1870	1571	1781	1777	1739	1781	1777	1764
Q Serve(g_s), s	9.8	22.3	22.6	11.4	15.6	5.4	6.1	21.1	21.2	5.9	24.6	24.6
Cycle Q Clear(g_c), s	9.8	22.3	22.6	11.4	15.6	5.4	6.1	21.1	21.2	5.9	24.6	24.6
Prop In Lane	1.00		0.44	1.00		1.00	1.00		0.41	1.00		0.33
Lane Grp Cap(c), veh/h	338	386	372	281	430	361	317	752	736	348	749	744
V/C Ratio(X)	0.53	0.84	0.85	0.74	0.59	0.22	0.48	0.52	0.53	0.42	0.59	0.59
Avail Cap(c_a), veh/h	502	472	455	423	497	417	535	752	736	568	749	744
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.6	47.9	48.0	35.6	44.0	40.0	21.5	27.4	27.4	20.6	28.5	28.5
Incr Delay (d2), s/veh	1.3	9.9	11.0	3.8	1.1	0.2	1.1	2.6	2.7	0.8	3.4	3.4
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	4.4	10.9	10.8	5.3	7.4	2.1	2.6	9.5	9.3	2.5	11.1	11.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.9	57.9	59.0	39.4	45.1	40.2	22.6	30.0	30.1	21.4	31.9	31.9
LnGrp LOS	D	E	E	D	D	D	C	C	C	C	C	C
Approach Vol, veh/h		817			545			933			1030	
Approach Delay, s/veh		53.5			42.2			28.8			30.4	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.2	60.2	18.2	35.5	14.4	60.0	19.8	33.8
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	24.0	54.0	24.0	34.0	24.0	54.0	24.0	34.0
Max Q Clear Time (g_c+I1), s	7.9	23.2	11.8	17.6	8.1	26.6	13.4	24.6
Green Ext Time (p_c), s	0.3	5.7	0.4	1.3	0.3	6.4	0.4	2.3

Intersection Summary	
HCM 6th Ctrl Delay	37.6
HCM 6th LOS	D

Intersection												
Int Delay, s/veh	1.9											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	54	659	38	3	268	10	26	0	7	7	0	33
Future Vol, veh/h	54	659	38	3	268	10	26	0	7	7	0	33
Conflicting Peds, #/hr	5	0	0	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	59	724	42	3	295	11	29	0	8	8	0	36

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	311	0	0	766	0	0	1188	1180	745	1179	1196	306
Stage 1	-	-	-	-	-	-	863	863	-	312	312	-
Stage 2	-	-	-	-	-	-	325	317	-	867	884	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1255	-	-	852	-	-	166	191	416	168	187	736
Stage 1	-	-	-	-	-	-	351	373	-	701	659	-
Stage 2	-	-	-	-	-	-	690	656	-	349	365	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1249	-	-	852	-	-	152	180	416	158	177	732
Mov Cap-2 Maneuver	-	-	-	-	-	-	152	180	-	158	177	-
Stage 1	-	-	-	-	-	-	335	355	-	665	653	-
Stage 2	-	-	-	-	-	-	654	650	-	326	348	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.1	30.7	13.9
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	176	1249	-	-	852	-	-	447
HCM Lane V/C Ratio	0.206	0.048	-	-	0.004	-	-	0.098
HCM Control Delay (s)	30.7	8	-	-	9.2	-	-	13.9
HCM Lane LOS	D	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0	-	-	0.3

Intersection												
Int Delay, s/veh	0.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	320	2	2	342	2	4	0	3	1	0	18
Future Vol, veh/h	22	320	2	2	342	2	4	0	3	1	0	18
Conflicting Peds, #/hr	15	0	6	6	0	15	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	26	376	2	2	402	2	5	0	4	1	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	419	0	0	384	0	0	855	858	383	853	858	420
Stage 1	-	-	-	-	-	-	435	435	-	422	422	-
Stage 2	-	-	-	-	-	-	420	423	-	431	436	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1124	-	-	1158	-	-	275	291	658	276	291	627
Stage 1	-	-	-	-	-	-	594	575	-	604	583	-
Stage 2	-	-	-	-	-	-	605	583	-	597	575	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1108	-	-	1151	-	-	257	276	654	264	276	617
Mov Cap-2 Maneuver	-	-	-	-	-	-	257	276	-	264	276	-
Stage 1	-	-	-	-	-	-	573	554	-	577	574	-
Stage 2	-	-	-	-	-	-	582	574	-	576	554	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0	15.6	11.5
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	347	1108	-	-	1151	-	-	576
HCM Lane V/C Ratio	0.024	0.023	-	-	0.002	-	-	0.039
HCM Control Delay (s)	15.6	8.3	0	-	8.1	0	-	11.5
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	159	456	124	188	235	74	134	556	146	134	658	128
Future Volume (veh/h)	159	456	124	188	235	74	134	556	146	134	658	128
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	179	512	139	211	264	83	151	625	164	151	739	144
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	336	604	163	281	437	367	315	1167	306	345	1243	242
Arrive On Green	0.09	0.22	0.22	0.11	0.23	0.23	0.07	0.42	0.42	0.07	0.42	0.42
Sat Flow, veh/h	1781	2751	743	1781	1870	1571	1781	2782	729	1781	2964	577
Grp Volume(v), veh/h	179	330	321	211	264	83	151	399	390	151	443	440
Grp Sat Flow(s),veh/h/ln	1781	1777	1717	1781	1870	1571	1781	1777	1734	1781	1777	1764
Q Serve(g_s), s	9.9	22.9	23.1	11.6	16.2	5.5	6.1	21.6	21.7	6.1	24.8	24.8
Cycle Q Clear(g_c), s	9.9	22.9	23.1	11.6	16.2	5.5	6.1	21.6	21.7	6.1	24.8	24.8
Prop In Lane	1.00		0.43	1.00		1.00	1.00		0.42	1.00		0.33
Lane Grp Cap(c), veh/h	336	390	377	281	437	367	315	745	727	345	745	740
V/C Ratio(X)	0.53	0.85	0.85	0.75	0.60	0.23	0.48	0.53	0.54	0.44	0.59	0.59
Avail Cap(c_a), veh/h	499	469	453	419	494	415	531	745	727	560	745	740
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.6	48.1	48.2	35.6	44.0	39.9	21.8	28.0	28.0	21.0	28.9	28.9
Incr Delay (d2), s/veh	1.3	10.9	12.0	4.1	1.4	0.2	1.1	2.7	2.8	0.9	3.5	3.5
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	4.4	11.3	11.1	5.4	7.7	2.2	2.6	9.8	9.6	2.6	11.3	11.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.9	59.0	60.2	39.8	45.4	40.1	22.9	30.7	30.8	21.9	32.4	32.4
LnGrp LOS	D	E	E	D	D	D	C	C	C	C	C	C
Approach Vol, veh/h		830			558			940			1034	
Approach Delay, s/veh		54.5			42.5			29.5			30.8	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.4	60.0	18.2	36.1	14.4	60.0	20.0	34.3
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	24.0	54.0	24.0	34.0	24.0	54.0	24.0	34.0
Max Q Clear Time (g_c+I1), s	8.1	23.7	11.9	18.2	8.1	26.8	13.6	25.1
Green Ext Time (p_c), s	0.3	5.7	0.4	1.3	0.3	6.4	0.4	2.3

Intersection Summary	
HCM 6th Ctrl Delay	38.2
HCM 6th LOS	D

Traffic Calming Information

The City of Bellingham

Neighborhood Traffic Safety Program

(N T S P)

NOTE: Due to City budget cuts, this program is not funded for 2010 and 2011 and is suspended. Public Works is not currently accepting requests for Neighborhood traffic calming evaluation.

DEVICE SUMMARIES (pg 1 of 9)

SPEED HUMPS

DESCRIPTION
Speed Humps are twelve foot long by four inch high asphalt mounds constructed on residential streets and spaced 200-750 feet apart.

PURPOSE
Speed Humps are intended to reduce vehicle speeds on residential streets to about 15 mph to create a disincentive to speeding and/or cut-through traffic.

ADVANTAGES
Effectively reduce vehicle speeds
Volumes typically decrease where cut-through traffic is a problem
Do not require parking removal
Do not affect intersection operations
Relatively inexpensive

DISADVANTAGES
Increased traffic noise from braking and accelerating vehicles driving over hump
Slightly inhibited emergency vehicle response

INSTALLATION COST
Approximately $5,000-10,000 each

Vallette Street
Bellingham, WA

Note: Speed Humps are not constructed on grades greater than 8%.

DEVICE SUMMARIES (pg 2 of 9)

SPEED TABLES

DESCRIPTION
Speed Tables are twelve foot long by four inch high asphalt platforms constructed on residential streets at intersections with trail crossings for pedestrians and bicycles.

PURPOSE
Speed Tables are intended to reduce vehicle speeds on residential streets to about 15 mph to slow vehicles and improve the safety of trail crossings.

ADVANTAGES
Effectively reduces vehicle speeds and increases trail crossing visibility and safety
Volumes typically decrease where cut-through traffic is a problem
Do not usually require parking removal
Do not affect intersection operations
Relatively inexpensive

DISADVANTAGES
Increased traffic noise from braking and accelerating vehicles driving over hump
Slightly inhibited emergency vehicle response

INSTALLATION COST
Approximately $10,000 each

St. Paul Street, Bellingham, WA

Note: Speed Tables are not constructed on grades greater than 8%.

DEVICE SUMMARIES (pg 3 of 9)

TRAFFIC CIRCLES & ISLANDS

DESCRIPTION
Traffic Circles are raised islands placed at residential street intersections. They are usually landscaped with ground cover and street trees. Traffic Circles require drivers to slow to a speed that allows them to comfortably maneuver around them.

PURPOSE
To slow high-speed traffic to about 15 mph on residential streets.

ADVANTAGES
Effectively reduce vehicle speeds
Reduce the number of approach-turn and right angle accidents
Visually attractive
Discourages cut-through traffic

DISADVANTAGES
Can require addition of curb, gutter, sidewalk and sometimes parking removal
Can slightly inhibit emergency vehicle response
Can cause bicycle/auto conflicts at intersections due to restricted travel lanes

INSTALLATION COST (Neighborhoods maintain any landscaping)
Approximately $20,000-25,000 each

Illinois/Racine
Bellingham,WA

DEVICE SUMMARIES (pg 4 of 9)

CURB EXTENSIONS (BULB-OUTS)

DESCRIPTION
Curb Extensions narrow the street by widening the sidewalk and/or the landscaped planting strip. They are used to make pedestrian crossing distances shorter and to provide a visual narrowing effect along the roadway which can reduce vehicle speeds.

PURPOSE
Curb Extensions are installed to enhance pedestrian circulation and physically narrow a section of the residential street.

ADVANTAGES
Reduce pedestrian crossing distance and time
Make pedestrians more visible to drivers
Can reduce vehicle speeds
Can visually enhance the street through landscaping

DISADVANTAGES
Usually requires on-street parking removal
Only possible on residential streets that already have curbs
May impede bicycle traffic by restricting travel lanes

INSTALLATION COST (Neighborhoods maintain landscaped areas)
Approximately $10,000-12,000 each

ITE Crosswalk Warrant

TABLE 13-2. Recommendations for Considering Marked Crosswalks*

	≤9,000 ADT			>9,000 to ≤12,000 ADT			>12,000 to ≤15,000 ADT			> 15,000 ADT		
	≤30 mph (≤48 km/h)	35 mph (56 km/h)	≥40 mph ** (≥64 km/h)	≤30 mph (≤48 km/h)	35 mph (56 km/h)	≥40 mph ** (≥64 km/h)	≤30 mph (≤48 km/h)	35 mph (56 km/h)	≥40 mph ** (≥64 km/h)	≤30 mph (≤48 km/h)	35 mph (56 km/h)	≥40 mph ** (≥64 km/h)
2 LANES												
3 LANES												
≥4 LANES RAISED MEDIAN ***												
≥4 LANES NO MEDIAN												

	Candidate Sites for Marked Crosswalks Alone.
	Probable Candidate Site for a Marked Crosswalk. Potential Increase in Pedestrian Crash Risk May Occur if Marked Crosswalks are Added without other Pedestrian Facility Enhancements. These locations should be closely monitored and may be considered for enhancements, as feasible.
	Marked Crosswalks Alone are Insufficient. Potential Increase in Pedestrian Crash Risk Will Most Likely Occur if Marked Crosswalks are Added without other Pedestrian Facility Enhancements. These locations should be considered for marking only after the application of one or more appropriate enhancements to reduce traffic speeds, shorten crossing distances, enhance driver awareness of the crossing, and/or provide active warning of pedestrian presence are determined.

* These guidelines include intersection and mid-block locations without traffic signals/beacons or STOP or YIELD signs on the approach to the crossing. They do not apply to school crossings. These are general recommendations; engineering judgment should be used in individual cases for deciding when to install a marked crosswalk. It is recommended a minimum of 20 pedestrian crossings per vehicular peak hour (or 15 or more pedestrians in special population groups, i.e., elderly and/or child pedestrians) exist at a location before considering the installation of a marked crosswalk.

** Where the posted speed limit exceeds 40 mi/h (64 km/h) marked crosswalks should not be used at locations not controlled by a signal, beacon, STOP or YIELD Pedestrian Regulatory/Warning sign(s) and/or other enhancements.

*** The raised median or refuge island should be approximately 5 ft. (1.5 m) wide and 6 ft. (1.8 m) long to adequately serve as a refuge area for pedestrians. The raised median, if feasible, generally provides a greater pedestrian-vehicle crash reduction benefit; however, the presence of a Two-Way Left-Turn Lane or painted median can also provide significant advantages to the crossing pedestrian over an undivided arterial.

SOURCE: Adapted from *Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Crossing Locations.* University of North Carolina Highway Research Center, May 2001.

considered carefully. They usually only have a low to moderate impact on changing approaching drivers' behavior, and pedestrians may frequently not use adequate caution while crossing, expecting the driver to obey the law and stop. Pedestrian-actuated flashing beacons are somewhat more effective than constantly flashing pedestrian beacons.

4. Reduction of the effective street crossing distance for pedestrians by providing pedestrian refuge islands, bulb-outs, or curb extensions, where on-street parking exists. Road diets (e.g., reducing four-lane undivided road sections to two through lanes with two-way left turn lanes or left turn pockets) can also be very effective when ADTs are generally no more than 20,000.